

THE ULTIMATE GUIDE TO

DIGITAL PHOTOGRAPHY

FULLY UPDATED 4TH EDITION

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WITH EXPERT
TIPS AND
TECHNIQUES**

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Easy tips for great photos

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Using software to make shots shine



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Welcome

There have been few creative revolutions as massive as the advent of digital photography. Remember when most people used to wield a camera only to take annual holiday snaps? Those who keep track of such things say that in 2009, around 55 billion digital photos were taken worldwide. And that number is increasing by a few billion a year. Thanks to digital, anyone can now take photos, anytime.

This guide is for everyone – no matter what their level of experience – who wants inside information and ideas on how to enhance and retouch photos on a PC, plus advice on techniques beyond simply pointing the camera and pressing the shutter button. We'll show you the differences between the various types of digital camera; take you on a crash course in photographic theory and how to compose your shots; guide you through PC setup on Windows 7, Vista and XP; and give you techniques on using photo-editing software to improve your shots. There's no point in taking photos if you don't show them, so you'll also find advice on how to print and share them online.

Whatever type of camera you use, it's easy to improve your photography through being aware of some simple principles that you'll find within these pages and – far more important – getting out there and practising them. Having good basic kit is incredibly helpful, but with the right knowledge even the most basic digital camera can capture great shots.

In short, this is the only digital camera guide you'll ever need to buy. But remember, there's no substitute for getting out there and taking photos of absolutely everything. Ignore the odd looks as you grab that shot of the inside of a dustbin, and have fun with your photography.



A stylized, handwritten signature in blue ink that reads "David".

David Fearon, Editor
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CONTENTS

CHAPTERS
1-5

08 CHAPTER 1 WHERE DO I START?

The digital camera market can seem like a minefield. Get your bearings by reading our introduction to the main types of camera and their differences.

20 CHAPTER 2 PHOTOGRAPHIC THEORY

A crash course in the absolute essentials you need to know. Start getting the most out of your camera and producing creative shots.

28 CHAPTER 3 DIGITAL SLRs AND LENSES

There are many types of digital SLR on the market. This chapter takes you through the best-known manufacturers and what features they have to offer.

42 CHAPTER 4 TAKING BETTER PICTURES

You can improve your photos no end by learning the basics of composition. A few simple principles will let you see and grab shots you'd never have noticed.

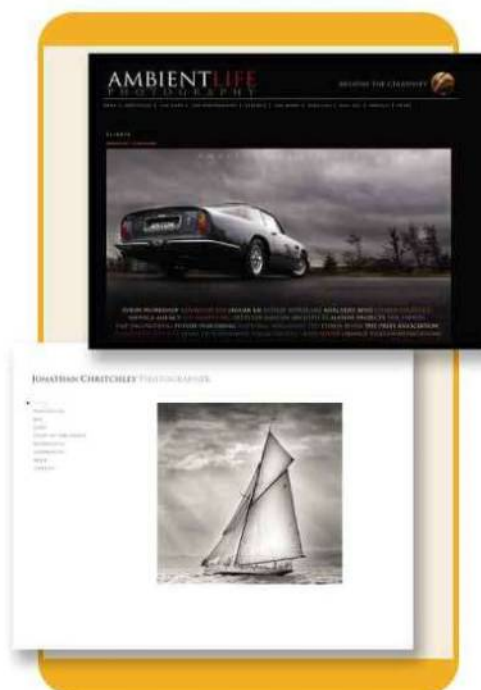
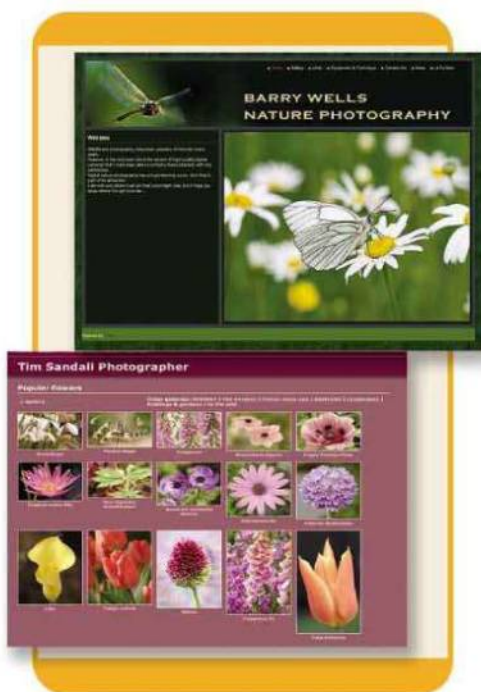
60 CHAPTER 5 MASTERING CAMERA SETTINGS

The modern camera is stuffed with features and settings, some of which are more useful than others. In this chapter, we'll focus on the ones that matter.

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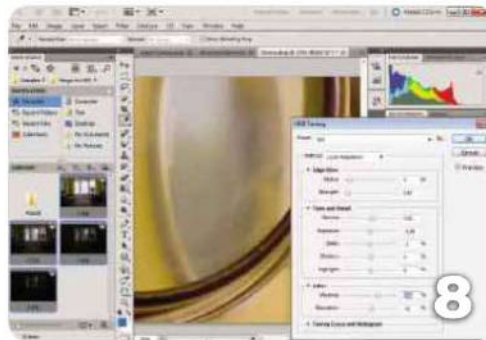
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6



7



8



9



10



11

CONTENTS

CHAPTERS
6-11

72 CHAPTER 6 ADVANCED SETTINGS

More advanced models, particularly digital SLRs, mean more advanced options and custom modes. We take a look at the ones photographers consider useful.

84 CHAPTER 7 SETTING UP YOUR PC

With digital photography, you're in charge of the processing of your pictures and your PC is the development lab. It's vital to set it up correctly.

96 CHAPTER 8 DIGITAL PHOTO SOFTWARE

The ability to process, retouch and enhance your photos using your PC is a fantastic benefit of going digital. Here's an overview of the software available.

112 CHAPTER 9 EDITING AND RETOUCHING

Once you've sorted your PC hardware and software, dig into our comprehensive selection of techniques, hints and tips on enhancing and retouching your shots.

158 CHAPTER 10 ORGANISATION AND BACKUP

There's only one problem with digital photography: you'll soon accumulate hundreds or even thousands of photos on your computer. Don't lose track of them!

172 CHAPTER 11 SHOWING OFF YOUR PHOTOS

There's no point in spending hours and days taking pictures if they just sit on your hard disk. Learn how to create perfect prints and share images online.

IN THIS CHAPTER

10 What sort of camera do I need?

Start here for help on unravelling the differences between the array of cameras in the shops.

12 Anatomy of a digital compact camera

It's the world's most popular type of camera, but what can a digital compact offer?

14 Anatomy of a digital SLR camera

The choice of the majority of amateur photography enthusiasts and many professionals.

16 Superzooms and advanced compacts

A halfway house between the convenience of a compact and the power of an SLR.

18 About memory cards

Choosing the right type of memory card can be a minefield – we navigate it for you.

CHAPTER 1

WHERE DO I START?

With confusing jargon and exaggerated marketing claims, the huge range of cameras on the market can seem intimidating. In this chapter, we'll introduce you to the main types, what their benefits and disadvantages are, and thoroughly dissect each offering to see what features they can offer the budding digital photography enthusiast. Don't dismiss any of the options out of hand: each category of camera has something to offer a photographer.



BEFORE PLUMPING FOR A SPECIFIC MODEL, YOU NEED TO GET A HANDLE ON THE THREE MAIN TYPES OF DIGITAL CAMERA AND DECIDE WHICH IS FOR YOU.

What sort of camera do I need?

There's a bewildering range of cameras on the market, but if you follow some simple guidelines you can narrow down the choice. The first thing is that if you're considering spending a couple of hundred pounds or more on a camera, we'd always recommend buying from a physical shop rather than the internet. Many shops can come within a few pounds of the online price, and it's well worth it to be able to handle the camera before you buy. Image quality is more difficult to scrutinise, but there are plenty of ways to find out whether a particular camera takes great pictures or not. Magazine and internet reviews, forums and photo-sharing websites such as Flickr (see p174) can offer both advice and proof of a camera's quality. Some manufacturers also have sample photos on their websites.

However, before thinking about specific models, you need to decide what type of camera is going to suit you best. The choice can be broken down into three main groups: compacts, superzooms and DSLRs.

COMPACTS Compacts are exactly what they sound like – small, light and easily portable. There's a wider choice of compact digital cameras than any other type, and prices vary from £50 to around £250. The more expensive models are smaller, with longer-lasting batteries and higher megapixel ratings. There's also a fairly distinct class of high-end digital compact, which is more expensive still and offers more manual control for the serious photographer (see p16).

A mid-range compact such as the Canon Digital Ixus below is a good choice if you want to shoot a variety of subjects: people, landscapes and macro (extreme close-up

shots). Most offer a modest 3x zoom lens. A huge benefit compacts enjoy is doubling up as a video camera, letting you shoot near-TV-quality clips with sound. In the world of digital SLRs, video recording is a feature currently restricted to a handful of models.

And while DSLRs need a special lens to shoot in macro, most compacts simply take it in their stride. Whether you want photos of flowers or more abstract shots, simply switch to macro mode and press the shutter; most compacts will focus down to just a few centimetres from your subject.

Compacts have their limitations, though. Many don't offer full control over settings such as aperture (see p22) or shutter speed (see p24), and the actual range of each setting is limited compared to DSLRs, particularly when it comes to aperture. This means that certain types of shots are very difficult to take with a compact.

Take waterfalls (see p51), for example. With a DSLR, you can choose to freeze the water or turn it into a soft blur, but with a compact in bright conditions you'll only be able to achieve the first effect because of the limited aperture range. Similarly, if you want to take long-exposure shots (see p44), you might be frustrated by the shutter speed range.

Of course, if you're not fussed about being able to take these kinds of creative photos and prefer a pocketable camera that you can carry around with you everywhere, a compact is ideal.

SUPERZOOMS Superzooms, not surprisingly, have much longer zoom lenses. Although they often look similar to DSLRs, their internal design is more akin to a digital compact. Superzoom lenses vary in magnification from

TIP

▶ Although prices are usually lower in online stores, the difference is often only a matter of a few pounds. It's worthwhile paying a little more in return for being able to hold the camera before you buy.



Compacts such as this Canon Digital Ixus take good pictures and slip into a pocket.



This Nikon superzoom has a 26x zoom and a well-built body.



The interchangeable lens of a DSLR such as this Nikon D90 is a huge benefit.

around 7x to 18x, but while these let you take shots that are impossible to achieve with a compact camera, they can often leave shots blurred due to camera shake (see p25) when using maximum zoom, especially in poor light. Some have image-stabilisation systems to try to eliminate camera shake, but a tripod is the only guaranteed path to sharp photos in low light.

Superzooms also share the very small image sensor designs of compact models, which means the absolute quality sometimes isn't as high as it could be, particularly at high ISO levels (see p64 for an explanation of ISO).

Most superzooms offer more control than compacts, though, allowing you full manual control over shutter and aperture settings. The majority also have more advanced features including manual white balance (see p66) and histograms (see p70), all of which help you to take better photos. For more on superzooms, see p16.

DIGITAL SLRs If you don't mind carrying a larger, heavier camera around with you, a digital SLR (digital single-lens reflex – also known simply as a DSLR) is the best tool for taking great pictures. Stunning sunsets, lightning or fireworks can all be captured easily with a DSLR.

A major difference of DSLRs is that they have interchangeable lenses. Usually, the lens bundled with an entry-level model such as the Nikon D90 shown above (referred to as the kit lens) is good quality but not brilliant, and is limited in its zoom range. For each manufacturer's lens-fitting standard (they vary according to brand), there are dozens of third-party lenses offering higher image quality, better build, different focal lengths (see p26) or a combination of all three, compared to the kit lens. That

means a DSLR is hugely upgradeable. The starkest example of this is the enormous telephoto lenses you see attached to sports photographers' cameras. Specialist lenses such as these cost several thousand pounds, but upgrading to a better-than-kit lens can easily be achieved for less than £200.

There are more advantages to DSLRs. They turn on in a fraction of a second and can immediately start shooting several frames per second. Their superior autofocus systems can also keep a moving subject in sharp focus where a compact would struggle. Large batteries allow them to take hundreds of shots before needing a recharge, and most allow you to attach extra battery packs for extended shooting. All DSLRs have a hot-shoe for attaching a better flash – see p25 for an explanation of why this can be a good idea.

Last, but by no means least, DSLRs have larger, higher-quality digital image sensors than either compacts or superzooms. They produce more detailed pictures, with fewer digital artefacts such as noise or chromatic aberrations (see p122). They also have a higher dynamic range, meaning they can capture more subtle tonal variation in the light – this can have a huge impact on the resulting photo. If you're frustrated by the quality of your pictures, a DSLR is for you.

WHAT ABOUT MEGAPIXELS? You'll notice that we haven't made a big deal of the megapixel rating in your choice of camera. That's because these days it's basically irrelevant. There are very few cameras on the market with a rating of below 6 megapixels – that is, 6 million individual dots making up each picture. Most cameras are now 8 megapixels or higher. Salesmen and adverts may try to convince you otherwise, but unless you're planning on printing your pictures at poster size, anything over 6 megapixels is fine.

TIP

▶ The rule of thumb is simple: if you just want to take snaps, go for a digital compact. For more serious holiday shots, a superzoom is fine. Budding professionals and serious amateurs, as well as those who simply want the most flexible option, should always go for a DSLR.

THE HUMBLE COMPACT CAMERA IS BELOVED BY HOLIDAY SNAPPERS EVERYWHERE. HERE WE EXPLAIN THE FEATURES ON A TYPICAL MODEL.

Anatomy of a digital compact

No prizes for guessing how digital compact cameras got their name: they're generally small enough to slip into a pocket and can travel with you anywhere. After a shaky

start a few years back, their quality is now as good as film compacts of the past. Don't worry about megapixel ratings: look for other features such as a good zoom range.

The integrated flash unit gives a burst of enough light for indoor shots at night, or indoors in low light.

This is an AF (autofocus) assist lamp – it lights up to help the camera to focus in low-light conditions. Because digital compacts' autofocus works by detecting the contrast of edges, without the AF lamp the focus will tend to 'hunt' and not be able to lock on.



This camera has a 5x zoom lens, allowing for tight framing of distant subjects. For a greater range, think about a superzoom – see p16.

These numbers relate to the maximum aperture of the lens and its focal-length range – see Chapter 2.

Mid-range models and above have lots of different in-camera features, including slideshows and red-eye correction. You can even change the type of fade effect for slideshows.

The mode dial allows you to switch between picture playback, fully auto and manual modes, as well as special scene modes such as snow and sports.

The movie mode of many compacts is now far better than camcorders of a few years ago.

Most compacts have a thumbpad such as this that lets you set macro mode, force the flash on or off, and set the camera on self-timer.

All cameras have a standard thread on the bottom for attaching the camera to a tripod to steady your shots.

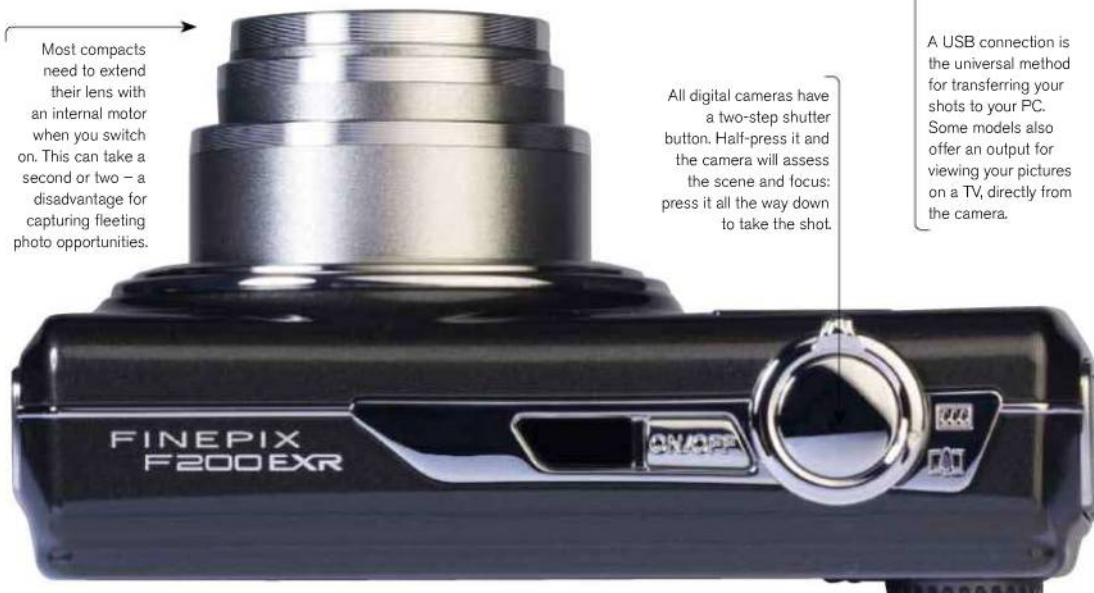
Although some models have a certain amount of internal memory, you'll need a separate memory card to be able to take a sensible number of shots – see p18.



A USB connection is the universal method for transferring your shots to your PC. Some models also offer an output for viewing your pictures on a TV, directly from the camera.

Most compacts need to extend their lens with an internal motor when you switch on. This can take a second or two – a disadvantage for capturing fleeting photo opportunities.

All digital cameras have a two-step shutter button. Half-press it and the camera will assess the scene and focus: press it all the way down to take the shot.



DIGITAL SLRs CAN BE COMPLEX BEASTS, DRIPPING WITH BUTTONS AND CONTROLS TO BE AS FLEXIBLE AS POSSIBLE. HERE WE REVEAL HOW THEY WORK.

Anatomy of a DSLR

Once the preserve of semi-professionals because of their outrageously high price, in the past year or two the cost of digital SLRs has plummeted to affordable levels. A rash of entry-level models designed to entice users away from high-end compacts and superzooms has appeared. And there's absolutely nothing wrong with the entry-level offerings: they're good value as they come with their stock

kit lenses. Partner one with a better-quality lens, however, and you can take shots that come within a hair's breadth of the quality of a shot from a model costing ten times as much. More expensive models will give even more control with a bigger choice of metering modes, for example (see p68). As well as that you'll get more megapixels and faster burst modes for capturing action.

Inside the central bulge of the viewfinder housing is a prism that acts like a periscope to direct the view from the lens to the photographer's eye.

The mirror reflects the image from the lens up into the viewfinder prism. When the shutter is pressed to take a shot, the mirror flips up and the light falls directly on to the electronic image sensor to capture the shot.

This model has a dedicated LED focus-assist lamp for low-light focusing; some other DSLRs use the flash instead.

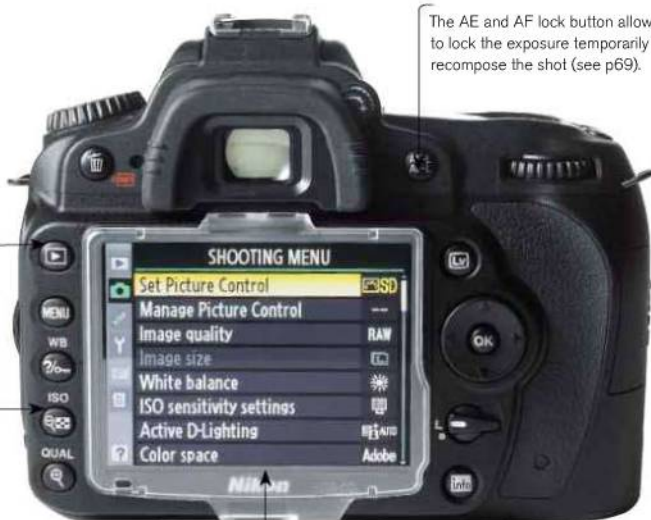
DSLRs will always have at least one rotary control that falls under the thumb or index finger for altering settings without taking your eye from the viewfinder.



This layout of buttons to the left of the screen is fairly standard, with shot preview, erase and menu buttons.

The function of these three buttons changes according to whether you're in playback or shooting mode. In shooting, they allow the user to directly set white balance (p66), ISO sensitivity (p64) and quality and file format of captured shots (p74).

The AE and AF lock button allows you to lock the exposure temporarily and recompose the shot (see p69).



This model has dedicated buttons to force the flash and enable exposure-bracketing mode (see p78).

Entry-level to mid-range models have a built-in pop-up flash normally hidden in the viewfinder housing (turn to p128 to see one popped up). High-end models designed for professionals only have a hot-shoe.

All DSLR zoom lenses have both a manual focusing ring and manual zoom control.

With their larger bodies, DSLRs can offer big screens that don't completely dominate the back of the camera in the way they do with compact models. 3in screens are now standard on new models.



For maximum control, you can flip to manual focusing and use the mechanical lens focusing ring. It's far easier than the menu-based electronic manual-focus modes of digital compacts and superzooms.

A socket for an external shutter release allows the user to take a shot without touching – and potentially joggling – the camera.

As well as USB and TV outputs, this model has a DC power input for both tethered shooting in a studio and quick downloading of shots even if the battery's nearly flat.



The all-important mode dial allows the user to flip between major modes in seconds. See p62 for more.

This is the hot-shoe for mounting an external flash gun. The fitting is completely standard and will accommodate any flash.

This mid-range model sports a top-mounted LCD to show all shooting settings at a glance. Entry-level DSLRs tend to have only rear screens.

IF A STANDARD DIGITAL COMPACT WON'T DO, THERE ARE ALTERNATIVES WITHOUT STEPPING INTO DSLR TERRITORY AND THE PRICE HIKE THAT BRINGS.

Superzooms and high-end digital compacts

Compact digital cameras are great when you want to point and shoot, but there are occasions when you'll want extra control, and most compacts won't be able to deliver.

HIGH-END DIGITAL COMPACTS If you crave control over shutter speed, aperture and other exposure controls, yet still want a small camera, there is an answer. Look further up manufacturers' ranges and you'll find high-end digital compacts that usually have such controls. The Nikon Coolpix P6000 (shown here) and Canon PowerShot G series (currently up to the G11) are such examples, and cost roughly £320 and £400 respectively.

Both offer aperture- and shutter-priority modes (see p62), so whichever you choose to set the camera will automatically choose the most appropriate setting to ensure a correct exposure. It means you can force the camera to use a fast shutter speed to freeze motion, or a slow speed to induce artistic blur. They also give you full manual control over both settings, although you need to know what you're doing before you can extract perfect exposures.

Most high-end compacts give you control over other settings, too. Manual white balance is useful. Auto white balance mechanisms can be fooled in extreme conditions (particularly when there are various types of light source on a subject), but a manual control lets you overcome this, allowing you to achieve a perfect white balance in any scene (see p66). Expect to see manual focus control, too. Usually, this is cumbersome, because you have to use an onscreen slider or menu to set the focus distance. Due to the relatively low resolution of most LCD screens, it's then difficult to tell whether your subject is in sharp focus. However, as with the auto white balance, autofocus can be fooled and a manual control can let you take a great shot.

Onscreen histograms can be a useful guide, too (see p70), and a live, constantly updating histogram can help you know whether a shot will be good or not, even before you've pressed the shutter.

High-end compacts sometimes offer higher-resolution sensors than those available lower down in the range. You tend to find better-quality lenses on more expensive

A high-end model will usually be larger than most other compacts, but still far smaller and more discreet than a bulky SLR.

The traditional rotary mode dial that many serious amateurs expect will always be found on a high-end compact.

An optical viewfinder is also something that's always present to cater for traditionalists who refuse to use a colour screen.

As well as integrated flash, high-end compacts always feature a hot-shoe to attach an external flashgun.



TIP

▶ If you know you'll want to use a superzoom in a similar way to a DSLR – using the viewfinder to take pictures rather than the main LCD – look carefully at the resolution of the Electronic ViewFinder (EVF). Some are higher than others, and you should try to go for the highest resolution you can find, so that you can see more detail and whether or not your subject is in focus.



The body styling of a superzoom will often ape DSLR designs, with a chunky handgrip for steadying your shots.

Like a high-end compact, superzooms always have a top-mounted mode dial. This model also has a pop-up flash.

A superzoom's primary advantage: the lens. It will offer a very wide zoom range from wide angle to extreme telephoto.

compacts as well, which means sharper photos with less distortion. Cheaper lenses can introduce what's called barrel distortion when the zoom is at its widest-angle position. This makes the edges of the image look curved instead of straight. Likewise, you're less likely to see purple fringing on a higher-quality lens (see p122). Often, when there are high-contrast edges in a scene – such as the sun shining through the branches of a tree – the resulting photo will have thin purple lines between the branches and the sky.

Usability is another factor that's often overlooked. It's all very well having all these advanced controls on tap, but if you have to click through pages of menu options before you get to them, you're unlikely to bother using them. But cameras that have dedicated buttons for them mean you can quickly change the ISO setting, for example, or flick between aperture- and shutter-priority modes.

SUPERZOOMS High-end compacts and superzooms can occasionally fit into the same category, but if you want a 10x or greater optical zoom you'll have to settle for a bigger camera. It's also worth noting that not all superzooms have high-end features. Olympus, for example, always has an affordable superzoom in its range; the sensor may not be the highest resolution around, but you'll get a big zoom lens for getting really close to the action.

OPTICAL ZOOM When looking at the specifications of a zoom lens, make sure it's the optical zoom and not the digital zoom. For the best quality, you should disable a

digital zoom, since it works by enlarging the centre portion of the image. Adding pixels in this way makes everything look bigger, but it doesn't add detail, so digitally zoomed images are easy to spot since they're blocky or blurry close up. This is the last thing you want for a high-quality photo.

Most superzooms share the advanced controls of the high-end compacts. They usually have a command dial that has aperture-priority, shutter-priority, full manual and programme auto modes to choose from (see p62). Some have a manual focus ring on the lens barrel, which is quicker to use than a gauge on the rear screen. But these are usually electronic, so you may find they're not as responsive as a real manual focus ring on a DSLR lens. You'll also still have the problem of checking precise focus on the LCD, although some cameras do enlarge the centre section of the preview to aid in this.

If you know you'll be taking lots of photos at full zoom where light is limited, use a tripod or look for a camera with image stabilisation. There are various types, including optical systems that compensate for camera shake, sensor-shift systems that move the sensor to eliminate blur, and electronic systems that increase the sensitivity of the sensor so it works with faster shutter speeds. Some high-end digital compacts also have optical or electronic stabilisation.

The different systems aren't all as effective as each other (higher sensitivities lead to grainier photos) and none will compensate for serious movement. Trying to hold a camera still when the zoom is set to 12x or 18x is difficult, so it's best to use a tripod as well as a stabilisation system.

ALTHOUGH THE BASIC TECHNOLOGY BEHIND ALL MEMORY CARDS IS THE SAME, THEY AREN'T PHYSICALLY COMPATIBLE. HERE'S THE LOW-DOWN.

About memory cards

There are four major types of memory card used by digital cameras: CompactFlash, Secure Digital, xD-Picture card and Memory Stick. The first two are by far the most common, and because of this are cheaper to buy.

COMPACTFLASH The first CompactFlash cards were made by SanDisk in 1994, and because of the format's large size (43 x 36mm) it's quickly becoming unfashionable with camera manufacturers. Few compact digital cameras use it any more, leaving only high-end DSLRs to persevere with the format.

There are two types, Type I being 3.3mm thick and Type II being 5mm thick. Type II cards aren't generally used for memory, although IBM's Microdrive used this format to house a tiny 1in hard disk to boost capacities up to 8GB. However, solid-state memory technology has overtaken mechanical disks at this size, and you can now buy CompactFlash cards in capacities up to 48GB.

SECURE DIGITAL SD is the most popular format for digital cameras, and was born from the collaboration of Panasonic, SanDisk and Toshiba back in 1999. The cards measure 24 x 32 x 2.1mm, making them considerably smaller than CompactFlash.

MMC (multi-media card) already existed using the same physical format, but it didn't have the hardware encryption of SD, a feature that was needed to try to prevent music piracy. But, although that's the

reason behind the Secure in the title, SD cards were never really used for storing music; instead, digital camera manufacturers realised their advantages over CompactFlash cards: they were smaller and had the potential for greater capacities.

However, the original SD 1.0 specification reached only 2GB before a new type of card was introduced: SDHC, the HC standing for high capacity. SDHC cards aren't supported by all cameras with SD slots, so look for the SDHC logo if you want to use cards with capacities larger than 2GB. Currently the maximum capacity of the SDHC format is 32GB.

Also watch out for camera and media card reader compatibility with large non-SDHC cards. Older models are especially unlikely to support 2GB or 4GB cards, regardless of whether they're SD or SDHC.

The SD format has spawned other formats, too. MiniSD cards are almost the same width, but only 21.5mm tall. Few digital cameras use this format, but a miniSD card can be plugged into an SD adapter to be used in any SD slot. A much more popular format is microSD, which measures only 11 x 15mm. This size makes them ideal for mobile phones and MP3 players, but no digital cameras can accept this format without an adapter.

MEMORY STICK This was launched by Sony in 1998, and only Sony digital cameras have taken advantage of the format. The original size was 50 x 21.5 x 2.8mm, and

CompactFlash is the oldest and largest format, now found only in digital SLRs.

The xD-Picture card format is used only in Olympus and Fujifilm cameras.

Memory Stick is a proprietary Sony format not used in other models.



SD cards are by far the most popular type for digital compacts.

TIP

Remember that the very highest capacity cards available always sell for a premium. You can usually get much better value by going for a slightly lower capacity.

The unfeasibly tiny microSD and miniSD formats can be used with a standard SD adapter.

allowed capacities only up to 128MB. Naturally, this had to be fixed in order to compete with other formats, and current Memory Sticks have capacities up to 8GB.

The latest Sony digital cameras use Memory Stick Pro Duo cards, which measure 31 x 20mm, similar to an SD card. The largest Duo currently available is 16GB. Like microSD, there's also a Memory Stick M2, which measures 15 x 12.5mm. Again, no digital cameras use this format, possibly because of the tiny physical size.

Memory Sticks cost more than the equivalent SD or CompactFlash card, sometimes up to twice as much, which is worth bearing in mind if you're considering buying a Sony compact digital camera.

XD-PICTURE CARD This is the latest format to be used by digital cameras, although it's only been used by its two collaborators: Olympus and Fujifilm. Original cards, which were launched in 2002, varied in capacity from 16MB to 512MB. Newer Type M cards allow for capacities up to 8GB, but the largest capacity to date is 2GB.

The other problem that's faced the 20 x 25mm cards is slow transfer speeds. This has limited the number of images that can be taken in a camera's continuous shooting mode, as well as making it slower to transfer images to a PC. A Type H card was released to counter this, in theory offering up to three times the performance, but in practice this speed has never materialised.

As with SD cards over 2GB, there may be compatibility issues between some cameras and the newer Type M and H cards. Some card readers may also be incompatible with them.

NEED FOR SPEED It isn't only xD-Picture cards that are available with different speed grades. Often, you'll see packaging marked with 80x or 133x, referring to multiples of 150KB/sec – a throwback to the CD, where a 1x CD drive was capable of transferring 150KB of data per second. Sadly, these figures are usually an unreliable guide, as



the actual speed can be limited by the electronics in your media card reader or camera. In extensive testing of 2GB cards, we've found that the xD-Picture format is by far the slowest at both reading and writing. On average, cards were able to read at around 4.5MB/sec and write at 1.5-2MB/sec.

Memory Stick Duos were much better at reading (over 8MB/sec) but poor at writing (3MB/sec). By contrast, almost all standard SD cards can write at 4MB/sec, reading at well over 8MB/sec. If you're prepared to spend extra on a fast SD card, expect write speeds to increase to between 6MB/sec and 8MB/sec; read speeds will remain similar at around 8-9MB/sec.

Depending on what you prefer, you could either buy several small-capacity cards or fewer high-capacity cards. It's sensible to have at least two with you in case one should fail, so you can carry on shooting. The table below shows approximately how many JPEG photos you can expect to fit on memory cards of different capacities depending on the sensor resolution.

A multi-format memory card reader such as this connects to your PC via USB and lets you directly transfer pictures from almost any type of card by simply dragging and dropping to a folder in Windows.

MEMORY CARD PHOTO CAPACITIES

This is a rough guide to the number of JPEG photos you'll be able to store on different capacities of memory card with various camera megapixel ratings.

Camera sensor	1GB card	2GB card	4GB card	8GB card
5 megapixels	400	800	1,600	3,200
6 megapixels	340	680	1,360	2,720
8 megapixels	280	560	1,120	2,240
12 megapixels	200	400	800	1,600
14 megapixels	170	340	680	1,360

TIP

Don't buy memory cards in the stores – they sell at a massively inflated price. Always shop online for your storage cards.

IN THIS CHAPTER

22 Mastering aperture

Probably the most important setting for any photo is the aperture you use. Learn how it can affect your shots.

24 Mastering shutter speed

For those looking to capture action or produce outlandish creative effects, shutter speed is key.

27 Mastering focal length

A quick look at what those numbers that all lenses seem to be festooned with actually mean in practice.

CHAPTER 2

PHOTOGRAPHIC THEORY

Technology may change, but the basics of taking a photo are the same as they were 100 years ago. There are plenty of textbooks crammed with equations on photographic and lens theory, but the good news is that you only need to get to grips with a few basic concepts; over the next few pages, we'll give you a crash course in what you should know about aperture and shutter speed, and the effect they'll have on your photos. Knowing a little can go a very long way.



APERTURE IS ONE OF TWO FUNDAMENTAL CONCEPTS IN PHOTOGRAPHY.
IT CAN GET A LITTLE COMPLEX, BUT THE BASICS ARE EASY TO UNDERSTAND.

Mastering aperture

Only two camera settings are key to taking a photograph. Despite modern technology giving cameras dozens of modes, settings and add-on features, a camera is at heart a box that contains a light-sensitive element (film in the case of traditional photography; a sensor in a digital camera). The lens directs light on to that element and captures an image. The only complication is that you need to control how much light reaches the sensor. This is determined via the aperture setting and shutter speed (explained overleaf).

The aperture – formed by a set of variable interlocking blades in the lens assembly – sets the amount of light that reaches the sensor when it's exposed; the shutter controls how long it's exposed for. With these settings, you can control the exposure – the lightness or darkness of the final picture. A correct exposure faithfully recreates what a human would have perceived the light levels to be. An underexposed shot is too dark; an overexposed shot is too bright.

In fact, it's possible to make a camera that has fewer controls than that – a pinhole camera, for instance, has no shutter and a very small fixed aperture. You get a correct exposure simply by taking the cover off the hole in the front of the camera and timing how long the film is exposed using a wristwatch. It works, but it's very limiting. Because of the need to time the exposure manually, the

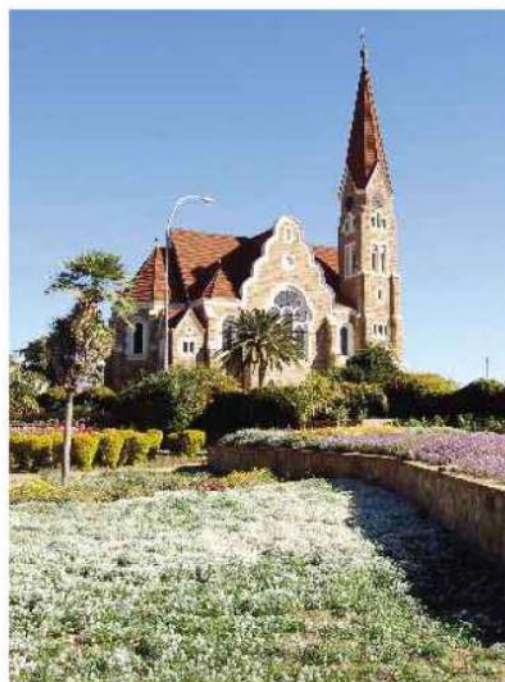
aperture has to be tiny and isn't practical. Adding a shutter and an aperture control makes things more controllable.

WHY USE TWO SETTINGS? Using both shutter speed and a variable aperture setting gives you all sorts of advantages. For a start, it increases the total range of lighting conditions under which you can take a picture. A fast shutter speed – in other words, a short interval where the shutter is open – combined with a small aperture allows shots to be taken in extremely bright light, whereas going the other way and using the widest aperture and a slower speed allows shots in poor light and even in almost total darkness (see p54).

DEPTH OF FIELD But that's not the only reason there are independent shutter and aperture controls on a camera. Altering the two settings has different effects aside from the basic one of controlling the amount of light hitting the sensor. In the case of aperture, that mainly comes down to what's known as depth of field. The causes of depth of field are complex, but the results and the rule of thumb aren't. Depth of field is also called depth of focus, which is a more intuitive way of expressing it. The practical effect is that with a small aperture, more of the objects in a scene will appear to be in focus than with a large aperture. This is a huge bonus when it comes to being creative with your

Right: This shot was taken with a wide aperture, throwing the background out of focus.

Far right: This shot, on the other hand, was taken with a small aperture to get both foreground and background in focus.



shots – use a wide aperture to focus on a particular subject and throw the background out of focus; this works well for portrait photography. For a landscape shot, where you want everything in focus, use a small aperture – say $f/16$ – and your whole scene will likely be pin-sharp.

IMAGE SHARPNESS Aperture can subtly affect other aspects of your image, too, particularly if you're using a DSLR. For instance, the apparent sharpness of a shot can be affected, even if technically speaking it's perfectly focused. In general, stopping down a shot (not using the widest aperture) will improve sharpness. This is because if the shot is taken wide open (at maximum aperture), the full surface area of the lens is used. The glass of most lenses is uniform and free of optical imperfections towards the centre. Decreasing the aperture means light from the less-than-perfect edges of the lens aren't contributing to the final image, reducing distortions and giving a sharper final picture. Stopping down can also sometimes reduce the unpleasant effects of colour fringing (see p122) and can reduce flare – that star-like effect that sometimes shoots across images.

F NUMBERS The actual size of the aperture is expressed in terms of an f-number, often referred to as f-stops. For advanced photography, they're an important concept, but you don't need to know what they mean. Just remember that the lower the number, the larger the lens aperture. So a small number means a wide aperture, which means as much light as possible is entering the lens. This is good for low-light situations or where you want a fast shutter speed to capture sports action (see p55). Conversely, a large number means a small aperture. This is good for a large depth of field and a sharp image; landscape photography, for instance.

APERTURE AND DIGITAL COMPACTS If you own a digital compact camera, the chances are you'll be limited in the aperture settings you can choose. Even if you have a high-end model with manual modes (see p16), many digital compacts give a choice of only two f-stop settings and rely on altering shutter speed to fine-tune exposure. Also, the actual focal length of a digital compact tends to be short, typically 8mm as opposed to the 35mm or so of a DSLR at the same zoom setting. The actual numbers aren't important, but the upshot is that a digital compact naturally has a large depth of field regardless of aperture setting – almost everything is in focus. That's a good thing for casual snaps, but it does mean deliberate depth-of-field effects are harder to achieve with a digital compact.

APERTURE AND DSLRS With a digital SLR, you'll get a much wider range of aperture settings. The exact range depends on the lens you're using, but it's typically between $f/4$ and $f/22$. A particular lens is often identified in terms of its focal length (see p27) and its maximum aperture. This is because the maximum aperture is a key aspect that identifies the quality of the lens. For zoom lenses, a range of maximum apertures is often specified; this is because it varies according to whether the lens is zoomed in or out.

In general, the kit lens that comes with a standard SLR kit (for instance, the Canon EOS 400D) will offer a maximum aperture of $f/3.6$ to $f/5.6$ – the smaller aperture is at the maximum zoom range. A higher-quality and more expensive third-party zoom lens may offer a wide aperture of $f/2.8$ across the entire zoom range. Lenses with wide maximum apertures are often known as fast lenses. Fast lenses are expensive, but much sought after by sports and street photographers eager to catch the action in varying light.

The aperture of a lens is formed by a series of blades that can increase or decrease the size of the hole that light passes through.

This third-party lens is a "fast" lens offering a maximum aperture of $f/2.8$ across the entire zoom range.



SHUTTER SPEED IS AN IMPORTANT CONCEPT TO GET TO GRIPS WITH IN PHOTOGRAPHY, AND NOT AT ALL DIFFICULT TO MASTER.

Mastering shutter speed

Along with aperture, the shutter speed is the second setting that needs to be correct for an accurate exposure. It's actually slightly misnamed – the point isn't the actual speed that the shutter opens or closes, but the length of time it stays open for. The shutter itself is simply a mechanism that prevents light reaching the camera's sensor, opening for a predetermined time when you take a shot. Unlike the tricky concept of f-numbers with exposure settings (see previous page), shutter speed is simply expressed in seconds or, more often, in fractions of a second. Most shots are taken with a shutter speed of somewhere between 1/60th (one-sixtieth) and 1/250th (one two-hundred-and-fiftieth) of a second.

Like the aperture setting, the shutter speed has secondary effects on the picture besides simply determining that the correct amount of light reaches the sensor. A photo is a captured moment in time, but of course varying the shutter speed varies the length of the moment. You can use that fact to great creative effect, but you also need to be aware of it to avoid problems.

CREATIVE USES OF SHUTTER SPEED Varying the shutter allows you three distinct creative effects: freezing a

moment in time with a very fast speed; creating dream-like effects with a long exposure of several seconds or more; and giving an impression of dynamism and movement with a medium setting. Making sure you have a fast enough speed to freeze the action depends on the speed of the subject, but in general you can be pretty sure that a speed of 1/250th or faster will ensure you capture the action in sharp relief with no blurring. For a long exposure of several seconds or more, trial and error is usually the best way – p50/51/54 give some examples of creative use of long exposures.

GIVING A SENSE OF MOVEMENT The trickiest shutter setting is one that gives a little bit of blur to fast-moving objects in the scene, to convey an impression of movement, but without being so long that it blurs into an indistinct mess or problems such as camera shake spoil the shot. Try a setting of between 1/10th and 1/30th. Remember that to specifically set the shutter speed you want and still get a correct exposure, the aperture setting has to be adjusted to follow. By using the shutter-priority mode in a good digital compact or DSLR, you can set the shutter speed you want, and the camera will set the aperture for you (see p62).



A very fast shutter speed will freeze movement – it's particularly effective with water, but you need bright conditions.

SHUTTER SPEED AND DIGITAL COMPACTS Unlike aperture, most digital compacts have almost the same amount of control over shutter speed as a digital SLR does. If your digital compact has a shutter priority or fully manual mode, you'll generally be able to set the shutter in very small increments from an extremely fast $1/2,000$ th of a second up to around 30 seconds. That range is plenty for the majority of shots you'll ever take. Digital SLRs do have a small advantage – more expensive models will have an even faster maximum speed of anything up to $1/8,000$ th of a second. That can be useful for shooting in very bright conditions with a wide aperture for minimum depth of field (see p22). More of an advantage for creative effects is a DSLR's bulb mode, which allows you to keep the shutter open for as long as you want (see p54 for an example of where this is useful). But for many long-exposure shots, the 30 seconds that a good digital compact will offer gives plenty of scope.

SHUTTER SPEED AND CAMERA SHAKE If you're taking handheld shots – in other words, not using a tripod or other means of steadying the camera – you need to be aware of the concept of camera shake. It's simple enough: it's down to the fact that it's impossible to hold the camera completely still. Your hands will sway slightly no matter how hard you try to keep it steady. With a typical shutter speed in bright conditions of $1/125$ th second, that doesn't matter since your hands don't have time to move far enough to affect the shot in such a short space of time. But in lower light or with a small aperture, the shutter speed needs to be slower. Once it starts getting below $1/60$ th second or so, blurring of the picture due to the movement of your hands starts to become a danger.

ISN'T THIS WHAT THE FLASH IS FOR? You may be puzzled at this point about why we don't just tell you to make sure the flash is switched on in low-light shots (as it will be automatically if the camera is in fully auto mode). The simple reason is that when you use the integrated flash in your camera, you completely obliterate all the subtleties of natural lighting. Try taking a shot with the flash switched on and the same shot with it switched off. The flash shot will be harsh, with hard shadows and very little sense of depth. The flash lets you see what's there in sharp relief and with no camera shake, but it won't make a very good ►



By setting a shutter speed of around $1/15$ th of a second, the movement of the flywheel of this steam engine is made more obvious.



Using a medium-long shutter speed of $1/10$ th second has given this shot of a seagull a nice abstract quality, but there's just enough detail left to see at a glance that it's a seagull.

CHAPTER 2

PHOTOGRAPHIC THEORY

It's a nice memory, but using the flash gives a flat, bunny-in-the-headlights look to indoor shots. There's evidence of red-eye, too (see p128 for how to deal with this).

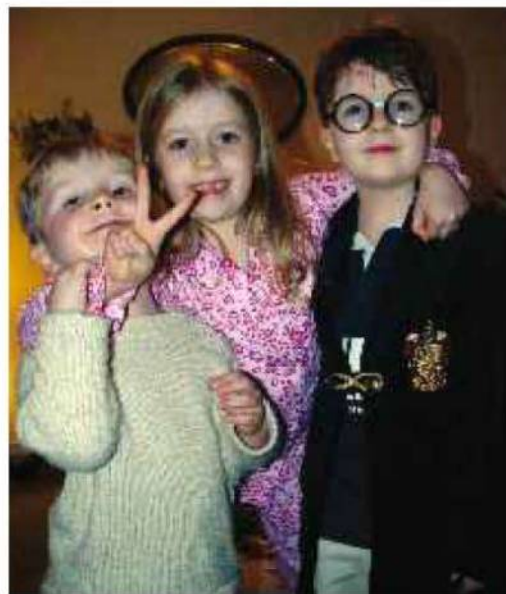
Trying to zoom in on this squirrel and catch a quick shot without a fast enough shutter speed has led to camera shake and a spoiled shot. The hurried hand-held nature of the shot contributed to the effect – with a little more foresight the photographer could have got into a more stable position.

photograph. You can get round the problem to some extent by using a dedicated flash gun with a swivelling head, to bounce light off the ceiling. But these are expensive and hard to master, as well as being unwieldy. It's much better to shoot with natural light if you can.

AVOIDING CAMERA SHAKE There are several strategies you can use to mitigate the possibility of your shots being ruined because of camera shake. The first is pretty obvious: hold the camera steady. The three main ways you do that are first, to tuck your arms into your sides when you take a shot so they naturally act as a prop against your chest. Then, before you take the shot, breathe out. Finally, don't ever stab at the shutter release button. You should squeeze it gently, then follow through by keeping it pressed for half a second or so after the shot's been taken. Do that and you'll be able to handhold the camera for much slower shots.

Aside from that, you can let the camera do some of the work for you. If you're in low light and you know that the shutter speed is likely to be slow, pop the camera into burst mode. When you take the shot, keep the camera as steady as you can using the advice above, but when you squeeze the shutter, keep it pressed and let the camera reel off three or four shots. You'll probably find that one or two of them will be sharper than the rest since the shutter release will have fallen between two heart beats – believe it or not, your pulse can have a significant effect on camera shake.

The final piece of advice is simple: zoom out. The further you're zoomed in, the more pronounced the effects of camera shake become. This is a last resort, though: you should compose your shots with the zoom set to the right level for the composition rather than using it as a tool to avoid camera shake if you can (see p44).



THE JOY OF ISO One of the things a digital camera can do that a film camera can't is change its ISO setting – its sensitivity to light. You can read more about ISO on p64. The relevant point here is that by increasing the ISO setting, you can get a correct exposure with a faster shutter speed. And, of course, a faster shutter speed means less chance of camera shake.

BRACE YOURSELF Having said all that, one of the simplest ways of avoiding shake is to find something to brace yourself against. Lean up against a doorway; rest your elbow on the back of a chair; crouch down and use your own knee as a support. If you're propped up against something you'll find you can hold the camera much steadier. Obviously, the ideal solution is to use a tripod, but they're big and unwieldy things to carry around with you all the time. There are plenty of options in camera shops that are easier to cope with, though, from tiny tabletop tripods – which you can place on a convenient wall or ledge – to beanbag supports. These let you rest the camera on uneven surfaces but get the shot level with a bit of rearrangement. You don't need to stick to specific camera accessories, of course; anything that will let you place the camera on it but re-orientate to frame the shot will do.

THE RULE OF THUMB One of the problems with camera shake is that it's very difficult to detect. Your shots may look fine when you look at them on the camera's built-in monitor. Even if you zoom in to the picture it might look okay on the tiny screen on the back of the camera. But then when you get back home and download the pictures to your PC, the blurring is painfully obvious.

What you can do here is learn the basic rule of thumb to avoid camera shake. The rule is that you should never shoot at less than "one over the equivalent focal length". Which isn't a terribly intuitive thing to say, but bear with us, it's actually pretty simple. Say you have a camera or DSLR lens with a focal length (zoom) range of 30-100mm equivalent – see the panel to the right for what this means. The one-over-focal-length rule means that when you're fully zoomed out you can get away with a handheld shot down to around 1/30th of a second. But when fully zoomed in (at 100mm), you should only try handholding at a maximum of around 1/100th of a second, because of the exacerbating effect of zooming in. Similarly, for a lens with an equivalent range of, say, 70-300mm, when at the widest 70mm setting you can handhold for a minimum of 1/70th of second and at full zoom you shouldn't attempt a handheld shot at anything less than a fast 1/300th of a second.

Obviously, because shutter speed goes in standard increments, you have to adapt this slightly – there's no 1/70th of a second shutter setting on most cameras, so you'd set your minimum to the nearest speed you can select (probably 1/80th of a second in this case).



A shot at 320mm equivalent.



The same scene at 28mm equivalent.

FOCAL LENGTH

Like aperture, the focal length of a lens is a technical aspect of camera design that you don't have to worry about: you just have to know the effect it has. Simply put, the higher the focal length number, the more magnification a lens has. Zoom lenses, of course, are specified in terms of their maximum and minimum focal length (as well as a simple multiplier rating such as 4x for digital compacts – see p12). The smaller the focal length, the more wide angle the lens, and the more will fit in the frame.

But it isn't quite as simple as that, since physical sizes of camera have different focal lengths for the same magnification factor. For that reason, to let you compare the actual magnifying power of a lens, they're often specified in terms of a common baseline called the 35mm equivalent focal length or, more commonly, just the equivalent focal length. Using this baseline, the actual real-world results from a lens can be expressed. For instance, a common equivalent length for a wide-angle lens is 28mm. This gives a nice broad field of view without introducing too many distortions. Any lens with an equivalent length of 28mm will give the same field of view. An equivalent length of 50mm gives roughly the same magnification as the human eye. When you get up to 100mm or so you're starting to get into the high-magnification telephoto range, useful for sports and wildlife photography. A popular class of add-on lenses for digital SLRs is the superzoom 18-200mm. The equivalent length of these is around 28-320mm, giving a full range from wide angle to very high magnification telephoto.

IN THIS CHAPTER

30 **The Canon EOS series**

Canon is a fixture on the DSLR market. Find out what its products can offer photographers looking for a digital camera.

32 **The Nikon D series**

With plenty of attractive features to get to grips with, discover what the Nikon D Series has got that other DSLRs haven't.

34 **The Sony Alpha range**

Sony may be a relatively new name on the DSLR scene, but its cameras have made a huge splash.

35 **Olympus and Pentax**

They may not grab all the headlines, but these stalwarts of the photography industry are still going strong and are worth considering.

36 **Other DSLR systems**

A new class of DSLR-like camera is becoming increasingly popular. We look at what the new standard offers photographers.

38 **Introducing DSLR lenses**

There are a number of lenses you can use to enhance your DSLR further. Learn how.

CHAPTER 3

DIGITAL SLRs AND LENSES

If you're looking for the best way into taking high-quality pictures with the maximum flexibility and creative potential, a DSLR is the only real choice. Modern entry-level models are compact and well-priced, yet still able to offer stacks of features. This chapter guides you through the ranges available from the big makers. One of the major benefits of a DSLR is interchangeable lenses – we'll look at those too.



IF YOU'RE AFTER THE MOST POPULAR BRAND OF DSLR, LOOK NO FURTHER THAN CANON'S LEGENDARY RANGE.

The Canon EOS series

Sales of Canon's digital SLRs outstrip all other brands, so if you're in the market for a camera it's the natural first port of call. The EOS range itself has been around since 1987 – way before digital SLRs came on to the market. In those days, EOS cameras were film cameras, some of which, such as the EOS 1V, are still being sold.

The EOS range has one incredibly attractive feature: the lens mount. Known as the EF mount, it's remained unchanged since the inception of the EOS range. The advantage? Any EF lens will fit any Canon EOS camera. Obviously you don't magically get benefits that aren't in the lens. If the lens isn't autofocus you'll have to focus manually, even on the most up-to-date EOS DSLR. But it does mean that you can pick up old lenses for bargain prices on sites such as eBay and experiment with them without having to shell out hundreds of pounds for modern optics. In particular you can pick up old prime lenses, which have a fixed focal length. These are not only cheaper than zoom lenses, they often offer better quality, too.

It's not just the price of lenses that might prod you in the direction of Canon. Because the EF mount has been

around so long and because Canon is such a popular brand, there's a huge selection of new optics on the market as well as used ones. These come not only from Canon but also third-party manufacturers including Sigma and Tamron. They also tend to be slightly less expensive than equivalent-quality lenses for other camera systems.

THE EOS DIGITAL RANGE Canon can lay claim to being the first manufacturer to bring an affordable DSLR to the masses, back in 2003. The EOS 300D (branded the Digital Rebel in the US) was the first model to be sold at under £1,000 in a kit including a stock lens. That's pretty expensive by today's standards, but at the time it was about three times cheaper than the nearest competitor. It sported a mere 6 megapixels and a 1.8in screen. But its heritage lives on: after the 300D came a succession of evolved models, in the shape of the 350D, 400D, 450D (see below), 500D and 550D. These increased pixel counts to 8, 10 and 12 megapixels and beyond, and added automatic sensor cleaning (for more about sensor-cleaning and dust problems see p82). The newer models also have larger screens.

The predecessors of this camera, the EOS 450D, ushered in the era of affordable SLRs. The 450D itself makes a fine choice as a first DSLR.



TIP

Don't forget that you can often pick up the previous model in a camera range for quite some time after a new one is released. The EOS 350D remained available after the 400D and even 450D were introduced, and the price dropped to less than £300. Remember the main factor that makes a decent photo is the photographer: the latest and greatest camera body makes relatively little difference.



To compete with lower-cost models from its competitors, Canon has introduced the EOS 1000D series. Its specifications are a little lower than the 450D but, as with all EOS models, the lens mount is the same so you can trade up later.

If you're after a camera with a bit more of a professional air about it, the 'xxD' series might appeal more. Starting with the EOS 10D and now up to the EOS 50D, the series isn't quite professional level, but does have larger, more robust bodies. The 50D actually has slightly fewer megapixels than the cheaper 550D – proof that megapixels aren't everything – but its build is much sturdier. It also has a much faster burst frame rate at 6.5 frames per second, which is almost twice that of the 550D.

THE PROFESSIONAL EOS RANGE Canon cameras are used by a huge proportion of professional photographers, and very nearly every sports photographer (take a look at the row of lenses on the sidelines next time you watch a football match – they're all likely to have the tell-tale white or light-grey finish of Canon's professional 'L' series). Professionals are catered for by the 'xD' series: sports photographers by the EOS 1D and fashion, landscape and wildlife photographers by the 1Ds. Currently both are up to Mk III. The EOS 1D Mk III maximises the chances of catching the moment with a spectacular maximum burst rate of 10 frames per second for up to 110 frames. The EOS 1Ds Mk III works similar miracles on the detail front, offering an amazing 21 megapixels. Its image sensor is also a "full-frame" model, meaning it's the same size as a frame of traditional 35mm film. That's in comparison to the much smaller size of usual DSLR sensors, which are known as APS-C size since they're the size of the now-defunct APS film format. APS-C sensors are themselves much larger than digital compact sensors, giving them better quality, and the quality of full-

frame sensors is better still, with a greater ability to capture the nuance of light. Full-frame sensors also allow a larger, clearer view through the viewfinder, making it considerably easier to frame shots and get an idea of how they're likely to turn out once they've been printed.

Both of the 1D models have truly professional build quality, with large, bulky bodies. They're made to do the job rather than looking discreet. The serious downside is the price. For just the body, without a lens, you can expect to pay more than £2,500 for a 1D Mk III and an eye-watering £5,000+ for a 1Ds Mk III.

ODD ONE OUT A strange little member of the family is the EOS 5D Mk II. It's a 21-megapixel, full-frame DSLR with all the benefits that confers, including great image quality and a big viewfinder. In some ways it is to the EOS 50D what the 1Ds is to the 1D – a camera for the serious amateur (you can expect to pay around £2,000 including a good-quality lens for a 5D and its successors) who wants to shoot landscapes and still life-type shots rather than sports.

THE NEWEST MEMBER OF THE FAMILY Canon has recently started what looks to be a new model line in the shape of the EOS 1000D (see above). Aimed at beating the creeping price inflation of recent models, the 1000D comes in below the 550D range, with slightly lower specifications including a 10-megapixel sensor, fewer autofocus points (seven to the pricier model's nine) and a smaller 2.5in screen. It's also smaller and lighter, resembling the older 350D model of a few years back.

WITH A PRESTIGE REPUTATION AND GREAT-HANDLING CAMERAS, NIKON IS FAR FROM PLAYING SECOND FIDDLE TO CANON.

The Nikon D series

Nikon is possibly the best-known camera manufacturer in the world, with an enviable reputation. The company has been making cameras since just after the Second World War, and produced its first SLR camera in 1959. For several decades Nikon was essentially the only SLR choice for professional photographers and photo-journalists.

Nikon suffered a little during the 1990s, when Canon developed the EOS SLR range and EF-series autofocus lenses (see p30). The fast autofocus performance from EF-based Canon SLRs meant that Nikon lost ground to Canon, which emerged as the most popular brand. Nikon is still very popular, though, and the second largest-selling DSLR brand after Canon. It's also been making up ground recently with its high-end DSLRs (see below).

Like Canon, Nikon SLRs have a consistent lens mount. The F-mount has been around for decades, so there's no shortage of both Nikon lenses (usually branded Nikkor) and third-party models. The situation with compatibility of modern Nikon lenses is more complicated than with

Canon-mount optics, however. The problem stems from the fact that not all Nikon autofocus lenses have the focus motors built in – they rely on a mechanical focus link to the camera body, which drives the focusing mechanism.

Lenses for EOS cameras, by contrast, always have separate focusing motors built into the lens itself. Part of the philosophy of EOS (which stands for Electro-Optical System) was that there would be only electronic contact between lens and body. The upshot is that some of the lower-end Nikon D-series bodies don't work with some Nikkor autofocus lenses, because they're not fitted with autofocus motors, primarily in order to keep the body as compact as possible.

So, lenses designated AF rather than AF-S will be manual-focus only. If you're considering a Nikon D3000, D5000 or D60, it's something to bear in mind, although all new lenses have been AF-S (indicating that they incorporate "silent wave" autofocus motors) for some time, so it's not a huge issue.

The Nikon D60 is perhaps the best choice as a first DSLR. It has Nikon quality and it's as cheap as chips. You can pick one up for less than £350 with a good-quality 18-55mm kit lens.

TIP

▶ With Nikon DSLRs, the general rule of thumb is the higher the model number, the better the camera. But be careful applying the same rule to the top end of the spectrum. From the D3 upwards, superior quality does not correspond with numerical value.





The D90 is a step up from the D60 and offers a more up-to-date 12.3 megapixels, sensor-dust removal and a faster burst rate.

THE D SERIES RANGE Nikon's naming convention for most of its D-series SLRs is nicely straightforward: the higher the number, the better the camera. At the consumer level, the Dxx series consists of the D60 up to the D90 (see p14). The bottom-end D60 has a basic specification, with a 10-megapixel sensor, but is a perfectly capable camera and can be picked up for very reasonable prices – less than £300 including VAT. The D3000 has better headline specifications, such as a 12-megapixel sensor, and the D90 is an enthusiast-level camera with chunky build quality and touches including a dedicated exposure-bracketing button (see p78 for more on bracketing).

Going up to the serious amateur and semi-professional level, the D300 and D300s compete with the likes of Canon's EOS 50D, offering more solid build. The newer D700 goes a step further, combining a full-frame sensor and fast 5 frames per second burst rate. The price is high, though, at around £2,000 for the body with a kit lens.

At the top end of the scale the higher-numbers-are-better rule falters. Rivalling Canon's EOS 1Ds is the D3. Like the Canon model, this features a full-frame sensor, dubbed the FX format by Nikon, as opposed to its DX format, which is Nikon's name for the APS-C-sized sensor used in most DSLRs.

The more consumer-oriented Nikon DSLRs such as the D60 and D3000 are characterised by a chunky feel: many people find them easier to hold and generally "friendlier"

feeling than the consumer-level Canon bodies. They also have some distinctive features.

UNIQUE FEATURES Nikon has pioneered an in-camera feature known as Active D-Lighting. Unlike most in-camera editing and retouching features, Active D-Lighting can be very effective. It amounts to a method of increasing the dynamic range of a shot by boosting shadow exposure and decreasing exposure in highlights. That means you can get a similar effect to an HDR image (see p146) without needing multiple exposures. You can't expose for such an extreme dynamic range as with HDR, but it certainly helps in lifting shadow detail when it's needed.

Many of the D-series cameras also have a feature unique to current DSLRs: the ISO Auto mode. This is more than just an automatic ISO setting (see p64 for more on ISO). You can explicitly programme the maximum ISO sensitivity you deem to be acceptable – say, ISO 400 – and then also set the minimum shutter-speed threshold at which the camera will start to increase the sensitivity to keep the shutter speed high enough to avoid camera shake. If you've got a good steady hand and decent grip technique, you can set the camera not to start increasing the ISO setting until the shutter speed is down to, say, 1/15th of second as opposed to the 1/60th or so that a completely automatic auto ISO setting will use. It's like traditional aperture priority and shutter priority modes (see p62), but for ISO.

A NEWCOMER TO THE DSLR FRAY, BUT SONY IS MAKING HEADWAY FAST WITH ATTRACTIVE EXTRA FEATURES AT COMPETITIVE PRICES.

The Sony Alpha range

Digital SLRs are easily the fastest-growing camera market. That's led Sony – which until recently had no DSLRs in its range – to jump on the bandwagon. The company has lots of experience with digital compacts, in the form of its Cyber-shot range, but had never produced a digital SLR camera until 2006.

To combat the established players, Sony acquired technology developed by Konica Minolta and based its first camera heavily on the Konica's existing Maxxum design.

Sony came in with artillery blazing, and in a bid to outgun the established players it offered a feature introduced by Konica but much-improved by Sony's engineers: integrated image stabilisation. Dubbed SteadyShot, it performs the same function as image-stabilised lenses, but by being integrated into the body it effectively makes every lens image-stabilised without the extra expense. It works by physically moving the camera's sensor to accommodate for the less-than-perfectly steady human hand, effectively allowing you to take handheld shots around two to three stops slower than would otherwise be possible without introducing visible camera shake (see p26 for more).

The A100 also brought image sensor-cleaning to the fray, which vibrates the sensor to shake off dust particles. At the time, the competition from Canon and Nikon didn't offer this at an equivalent price point. It's now standard in stock kit lenses of both makers, but neither yet offers the in-camera image stabilisation of Sony. Pentax and Olympus do have models with in-body stabilisation, though.

The lens mount of the Alpha range was also brought over from Konica, giving Alpha users access to the range of pre-existing lenses, and Sony also introduced its own range. However, the availability of third-party lenses using the Alpha mount is still relatively limited, and own-brand Sony lenses tend to be expensive.

Later Alpha models such as the A330 (below) have addressed the clunky, utilitarian looks of the earlier Konica bodies. There's also an extension into the higher-end market (although it's still a very long way from Canon or Nikon's professional cameras), with the A850 offering an advanced 24-megapixel full-frame CMOS sensor, 9-point autofocus and sensitivity up to ISO 6400. Its price – about £1,700 – puts it in competition with the likes of Nikon's D700 and Canon's EOS 5D Mk II.

The Sony Alpha series is based on Konica's technology. The first models kept the agricultural looks of the old Konica cameras, but new bodies such as this A330 have a sharper, contemporary look.

FAQ

Q What's this Live View I keep hearing about?

A A new feature on DSLRs, sported by Sony models as well as Olympus, Nikon and Canon, Live View lets you take shots using the camera's screen rather than the viewfinder. It works by flipping up the mirror, which lets the sensor display what the lens can see in real-time. It can be useful for framing awkward over-the-head shots.



TWO OF THE TRADITIONAL BIG PLAYERS STILL HAVE PLENTY TO OFFER
IN THE DIGITAL AGE.

Olympus and Pentax

Although they're a bit less visible in the DSLR market than in the days of film SLRs, two of the grand old marques of SLR photography – Olympus and Pentax – are still very much alive and kicking. With loyal users and some interesting models, they're worth considering.

Olympus has carved a niche for itself by offering exceptionally compact DSLRs. The E-400 range, which started with the E-410 and progressed to the E-420 and E-450, are the lightest and most compact DSLRs on the market. Their sensor format – known as the Four Thirds system – helps this. Four Thirds cameras have a smaller sensor than the APS-C of the majority of DSLRs (or the full-frame sensors of the likes of Canon's 1Ds Mk III and Nikon's D700). Since the sensor is that much smaller, the entire physical design of the lens mount and the optics that go with it can be more compact, too. To partner its E-400 range, as well as a standard 14-42mm kit lens there's also a compact fixed-focal-length 25mm "pancake" lens that's only 24mm deep, making for a super-compact travel setup.

The smaller sensor of Four Thirds cameras means that the absolute image quality of the results theoretically isn't as high as DSLRs with APS or full-frame sensors. However, a

Four Thirds sensor still has a surface area almost ten times larger than that of a standard digital compact. A Four Thirds sensor measures around 17 x 13mm, compared to the 6 x 4mm or so of a typical compact-camera sensor.

Very small DSLRs aren't Olympus's only range. The higher-end E-600 series caters for more traditional amateur photographers, while the double-digit E series caters for the mid-range. The E-30, for instance, is a capable mid-range model that trumps some of its competitors with features such as a 4fps burst mode. Up at the high end, there's less activity in Olympus's range, but check over the page for an interesting new direction in its models.

The name Pentax will be familiar to many, and the company is still producing good DSLR cameras with an individual twist. The K200D, for instance, takes AA batteries, which appeals to travellers in remote regions.

Pentax is also still active at the low to mid-range end of the market, recently releasing its cute consumer-focused K-x model, which comes in a choice of colours and boasts HD video recording as well as stills capability. Elsewhere, its K-m is a low-cost rival to the likes of the Nikon D3000, with a price of well under £400.

Traditional marques such as Olympus have a loyal following and produce some great cameras. The Olympus E-420 and E-450 can lay claim to being the lightest, most compact DSLRs around: perfect if you want a camera to keep with you at all times.



A NEW CLASS OF CAMERA IS BEGINNING TO MAKE INROADS INTO THE HEARTS OF SERIOUS PHOTOGRAPHERS.

Other DSLR-like systems

In 2009 a new class of camera began to appear, and it's gaining ground in 2010. It's an extension of the Four Thirds system, pioneered by Olympus and Panasonic.

This new standard, called Micro Four Thirds, is getting a good deal of attention, with several models now released by both companies. The defining characteristic of all of them is that they're very compact, aiming to be as small, light and portable as possible but retaining SLR quality.

Initially very expensive, prices are starting to become more realistic, with models such as the Olympus E-P1 PEN system (inspired by the original Olympus Pen model hailing from the late 1950s) now available for around £500. Some models based on the system, such as Panasonic's Lumix GH1 (pictured opposite), remain an expensive option since they're designed as a replacement for both a stills camera and an HD professional-level camcorder. The GH1 comes with a 14-140mm zoom lens that's far superior to most kit lenses, and hence it's far more expensive.

THE NEW SYSTEM Micro Four Thirds cameras have a sensor the same size as that of Four Thirds cameras such as the Olympus E-450 on the previous page. That means the

basic level of quality is closer to a DSLR than a compact camera, with lower noise levels at high ISO (see p64 for more on ISO), and much better dynamic range, which avoids the clipped highlights of compacts and gives shots a more natural look. You also get greater potential for the photographic creativity that SLR-style interchangeable lenses brings. In fact, you can fit Four Thirds-standard lenses to the new system with an adapter, although some of the lens functions may not work – it's better to use a dedicated Micro Four Thirds lens. Lens choice is far more limited than for established standards such as Canon's EF lenses or Nikon's F-mount, but there is the option of a few fixed-focal-length models, as well as zooms.

The difference between standard and Micro Four Thirds lies in the mechanical specifications relating to the lens mount and dimensions, rather than the sensor. Micro Four Thirds' dimensions are deliberately very compact – so compact that there's no room for the traditional reflex mirror that defines a true DSLR. The compact specs mean it's possible to produce cameras that, in theory, give the best of both worlds: DSLR quality with compact-camera weight and dimensions.

This Olympus E-PL1 is one of the latest Micro Four Thirds cameras. Its 350g weight and compact dimensions are far less than a standard DSLR, but image quality is very much in the DSLR class.

TIP

▶ If you're considering one of these new models, remember that the range of accessories such as lenses and filters is more limited than more established camera formats.



And to some extent it succeeds. The quality from the new models easily outstrips any compact camera, giving the expected DSLR-level images, albeit not quite at the pinnacle of digital quality since Micro Four Thirds (and standard Four Thirds) cameras use slightly smaller sensors than the majority of DSLRs. But for many shots you'd be hard-pushed to tell the difference, particular at low ISO settings below ISO 400.

DRAWBACKS One thing you don't get with a Micro Four Thirds camera is the super-fast response and lack of shutter lag – the delay between pressing the shutter and the camera actually taking the shot. That's because true DSLRs use a focusing system called phase-detection. This is very fast – fractions of a second for a good DSLR – but it needs a mirror, to divert some of the light entering the lens on to a dedicated autofocus sensor. Instead, Micro Four Thirds cameras use the main image sensor itself, and focus using a method called contrast detection. This is the same as digital compact cameras, and it's much slower – well over a second in most cases, which is more than enough to miss a shot. To get anything like DSLR performance, you have to resort to manually pre-focusing so the autofocus step is eliminated. It's an interesting discipline, but far from ideal in most cases.

A second drawback relates to lens changes. Because there's no mirror in these cameras, when you come to take one lens off and fit another one, you must be extremely

careful: the sensor assembly is completely exposed and lies only around 1.5cm away from your ruinously oily fingers. If you do touch the sensor (or, more accurately, the low-pass filter directly in front of it) a trip to the repair shop may well be in order. Thus you should try to limit the number of lens changes, and be very wary when you change them.

NEW TERMINOLOGY Because the new models can't be called DSLRs but have more in common with DSLRs than standard compacts, many in the industry are now referring to "interchangeable-lens" cameras as an umbrella term for DSLRs and Micro Four Thirds DSLR-alikes.

Despite the slight drawbacks, the new format has found a lot of favour with amateurs who want a flexible, high-quality digital camera that's not as bulky as traditional systems. In late 2009 Micro Four Thirds accounted for 10% of all interchangeable-lens systems sold in the UK, which is impressive for such a young system.

ALTERNATIVES Ricoh has recently come from left-field with its own, completely original interchangeable-lens format. Its GXR system not only has interchangeable lenses but complete interchangeable modules containing both lens and sensor. It's an interesting approach but not one we'd recommend a beginner – or indeed anyone – to consider until this new, very expensive system has been shown to stand the test of time.

The Micro Four Thirds system allows incredibly compact DSLR-style cameras that can also record HD video. The Panasonic Lumix GH1 here is one of the first, with other manufacturers such as Olympus expected to produce their own versions.



BUYING A DSLR GIVES YOU ACCESS TO AN ENORMOUS ARRAY OF LENSES.
HERE'S A BRIEF GUIDE.

Introducing DSLR lenses

Probably the greatest advantage of an SLR camera is the enormous range of different lenses you can use. At the basic level it simply allows different focal lengths, ranging from super-wide-angle to extreme telephoto (see p27 for more on focal length). But there's more to consider than just the length of the camera focus. Maximum aperture is a very important part of a lens's specification, and the wider the maximum the more expensive – and heavier – the lens will be (see p22 for more on the effects of aperture).

Swapping a DSLR lens in a compatible camera is the work of a couple of seconds – just depress the release button on the camera body, twist to free the old lens and slot the new one back in its place.

DIGITAL SPECIFIC LENSES Many new lenses for SLRs now being released are described as being digital-specific. There are two aspects to this. Many are designed specifically for cameras with APS-C sized sensors, rather than full-frame 35mm. This is an important limitation since they're designed to project an image circle that covers only the smaller size of an APS sensor. If you attach a designed-for-digital APS-C lens to a 35mm film camera, or a full-frame professional-level camera such as the Nikon D700, the result will be severe 'vignetting', with darkened corners to all your images. There's a benefit to lenses designed for these sensors, though – they can be more compact and produced more cheaply than full-frame versions. But you need to bear in mind your lens choice if you're planning

ever to upgrade to a full-frame digital camera, which may become more prevalent in the future.

FLARE AND GHOSTING The second reason a lens might be classed as being designed for digital use is down to the coatings used on the glass. This isn't merely a marketing ploy to get you to buy more expensive lenses, even though your old film-camera lenses might fit perfectly well on your new digital body. If you do use your old film-specific lenses you may well find that in some lighting conditions your pictures turn out almost unusable, with very low contrast, plus blooming and halo effects around bright parts of the image. Digital cameras are far more prone to the bad effects of light bouncing around inside the lens and the camera body. This is because of the construction of digital sensors. To maximise the use of all available light, every pixel element of a sensor is covered by a tiny microlens. These tend to pick up indirect, stray light very readily, leading to light contamination and unwanted effects on your images. Digital-specific coatings are designed to absorb that stray light, massively reducing its effect.

If you do use your old, non-digital-specific lenses with your DSLR, you can reduce these side-effects by paying careful attention to the position of light sources in your



This is the relatively cheap, stock 18-55mm lens supplied with Canon's newer DSLRs, featuring optical image stabilisation.



The after-market EF-S range is a step up in quality. This is the 10-22mm EF-S model for wide-angle photography.

shots. If the sun or bright lights are anywhere in front of the lens, try to shield it, either by simply holding an outstretched hand or by using a lens hood.

LENS TYPES Lenses for DSLRs can be split into two basic categories: primes lenses and zooms. The difference is simple: prime lenses have a fixed focal length; zooms can vary their magnification.

WHY PRIME? The immediate reaction of most novices to the idea of a lens that doesn't have a zoom is simply to ask, "Why?" A zoom is more versatile, why would you want an inflexible fixed lens? The answer comes down to quality and cost. It's extremely difficult to design a zoom lens with low distortion and pin-sharpness throughout its zoom range. And the wider the zoom range, the more difficult the problem becomes (see superzooms below). With a prime lens, however, the designer has only one focal length to worry about. That means prime lenses are often very sharp indeed. What's more, with fewer glass elements in a prime lens, there's less chance of internal reflections with the elements, which reduces flare and improves contrast. Finally, for a given level of quality, the simpler design and construction of a prime lens means they're usually cheaper and lighter as an added bonus.

ZOOM LENSES It has to be said, however, that very few professional photographers now use prime lenses except in studio conditions. In recent years the technology behind zooms has meant that the best are extremely close in terms of quality to prime lenses, and the convenience factor means new prime lenses are produced only very rarely. That said, most serious amateurs and professionals still have three or four lenses in their kit bag. You'll usually find a zoom covering the wide-angle end of the spectrum, perhaps around 10-22mm; a 'middling' zoom that will cover most everyday situations, typically around 18-70mm; and a ►



The top of Canon's range is the 'L' series, denoted by the red stripe around the barrel. L lenses are the choice of many professionals.



A common sight at sports events is a sea of the distinctive white L-series telephoto glass.

TIP

► Although a lens with zoom ability should theoretically give you more choice in how you shoot your subject, it's extremely difficult to get low distortion and pin-sharpness throughout the zoom range. Consider instead a prime lens, which will give you only one length to worry about.

CHAPTER 3

DIGITAL SLRs AND LENSES

telephoto for things such as wildlife photography, the most common range for these being 70–200mm or 70–300mm.

SUPERZOOMS A relatively new class of lens is known as the superzoom. The aim of these is to replace a bag full of lenses with one that covers the whole range of focal lengths from true wide-angle to telephoto. The first generation of superzooms had a range of 18–200mm (28mm–320mm equivalent). Models with this range are available from Canon, Nikon, Sigma, Tamron and several other manufacturers. As the technology has progressed even further, the range has become even more extreme – for example, Tamron now has an 18–270mm model, which is equivalent to a 15x zoom range.

Superzooms are made possible for a couple of reasons. The first is continuing advances in optics and lens construction technology. The second is that the majority of them are designed for APS-C sensors only, which helps to keep their bulk and weight down.

While a superzoom can make a great ‘carry-around’ lens that’s ready for any everyday situation (they’re particularly good for holidays where you’re not able to take your whole kit bag), they have their drawbacks. First, they’re not usually especially fast, averaging f/3.5 at wide-angle to around f/5.6 at maximum telephoto. That means depth-of-field effects can be that much more difficult to achieve, and low-light photography without camera shake can be difficult too, especially at maximum zoom where the aperture is at its minimum and camera-shake is exacerbated by the magnification factor. To mitigate the second of those effects, superzooms are now appearing that feature image stabilisation, as with the Nikon 18–200mm model in the picture opposite. Because of the large number of glass elements in a superzoom, there’s more chance of unwanted effects such as flare and ghosting.

IDENTIFYING LENSES Unlike most other types of product, lenses aren’t identified by model names or numbers. The primary way of distinguishing them is by focal length and maximum aperture. Beyond that they often have various prefixes and suffixes indicating their relative quality and features you’ll learn as you go along.

You should bear in mind that lens names are very precise, and some are so similar it’s easy to get confused. For example, Canon until recently had two different 70–300mm zoom lenses. One was called the 70–300mm f/4.5–5.6 IS USM; the other the 70–300mm f/4.5–5.6 DO IS USM. The DO version was roughly twice the size and twice the price. Canon also has four different 70–200mm professional ‘L’ series lenses, with and without image stabilisation and with either f/4 or f/2.8 maximum aperture.

MANUFACTURER vs THIRD-PARTY The major camera manufacturers all have a wide range of their own lenses to fit their cameras. Nikon and Canon in particular have a very large range of their own optics. Believe it or not, Canon has over 70 different models in its current EF lens

range. Despite this, there’s still a healthy market from third-party lens manufacturers, with the two biggest being Tamron and Sigma. The latter manufacturer does in fact make its own cameras but its lens division is a much bigger part of its business. The main thing that the third-party manufacturers offer is value: having a manufacturer-branded lens commands a price premium.

While most professionals primarily tend to choose lenses made by their camera manufacturer, Sigma and Tamron both make some excellent models. To take one example, Tamron’s 28–75mm f/2.8 XR Di lens (see the right-hand image on p23) has users who swear it’s as sharp as any professional-level lens, for a fraction of the price. The third-party manufacturers also tend to be more adventurous with bringing out new classes of lens – they spearheaded the superzoom revolution, for instance.

A final point to remember is that when buying a third-party lens, it’s important to specify the correct mount. Each lens is usually produced in several different versions to accommodate different makes, and a Canon-mount lens isn’t much use on an Olympus camera.

SPECIALIST LENSES For specialist photography, there are various niche categories of lens. The most popular of these are macro lenses. While the term ‘macro’ tends to be applied to any lens with the ability to focus at a short distance from the subject, true macro lenses are different. A genuine macro lens is able to reproduce the object in front of it at equal to or greater than lifesize on the image sensor. This allows for true close-up work. Genuine macro



Nikon's stock 18–55mm lens, with VR optical image stabilisation. Quality of Nikon's stock lenses is above average.

TIP

For highly detailed close-up work, a specialist “macro” lens will actually reproduce your subject at the same size or larger than life on the image sensor. Researching a wide range of lenses can allow you to become very specific in how you choose to represent your subject.

lenses tend to be primes, and the most popular focal length is 90-100mm. They're not cheap, though: expect to pay around £300 for a true macro prime lens.

More esoteric – and more expensive – are tilt-and-shift lenses. These have elements that can be skewed, to distort the perspective of an image. They're primarily used in architectural photography to "straighten" the sides of buildings in shots taken from street level.

HIGH-END LENSES There's more to a lens than just zoom range. Sharpness, contrast and colour reproduction are all important qualities. Some lenses have gained almost legendary status and become highly sought-after and expensive classics when production stops. Manufacturers tend to have high-end ranges for the professional, with image quality matched by hefty construction designed to take the rough and tumble of heavy use, marked out by gold flashes and so on. Internet forums are a great way of getting to grips with the many foibles and characteristics of various high-end lens ranges and types.

BOKEH You may see this rather strange word used in relation to a particular lens. Internet chat forums about lenses in particular sometimes seem to be slightly obsessed with the subject. When shooting with a narrow depth of field, bokeh is the quality of the out-of-focus area of the image. This varies a surprising amount. A lens that's considered to have

good bokeh will show soft blurring, whereas one that's not so good may show obviously hexagonal or hard-edged blurs, caused by the shape of the aperture blades.

IMAGE STABILISATION A feature that's quickly gaining ground is image stabilisation. Once the preserve of extremely expensive lenses, it's recently found its way into even the cheapest stock lenses sold with DSLR kits. Image stabilisation works by sensing camera shake using gyroscopes, and tilting an element in the lens very quickly to compensate. Most of these lenses give between two and three stops of leeway. In other words, if you can normally hand-hold a lens down to 1/125th second before camera shake, a stabilised lens will let you get away with an exposure as slow as 1/30th or even 1/15th of a second.



This is an example of a superzoom, with a focal-length range spanning from wide-angle 18mm to telephoto 200mm.



For wildlife shots on a budget, you can pick up the likes of this Nikon 70-300mm image-stabilised lens for a few hundred pounds.

IN THIS CHAPTER

44 **Composing your shots**

Snapping blindly won't usually get you very far. Pick up some pointers here.

48 **Shooting landscapes**

There's more to landscapes than just finding an idyllic spot and pointing the camera at it. Timing is crucial.

49 **Shooting in macro**

Close-up photography can take you to a previously unseen world. Perfect for flower and insect pictures.

50 **Shooting lightning**

This is where having the patience of a saint can pay off. Check the weather forecast, and good luck.

51 **Getting the dream-like look**

Shooting water can produce some of the most beautiful photos you can imagine, and it's dead easy.

52 **Shooting in snow**

Ever come back from a winter paradise to find you were apparently holidaying in sludge? Here's why.

53 **Shooting sunsets**

One of the easiest ways to get a nice-but-boring shot is snapping a sunset. But you can make it better!

54 **Shooting at night**

The joy of long-exposure photography is an addictive one. Get your first hit by following our advice.

55 **Shooting sports and action**

Eliminate those shots of someone's receding left foot by following our advice on action photos.

CHAPTER 4

TAKING BETTER PICTURES

Obviously, if there were three simple steps to becoming a master photographer, everyone who wanted to could become a professional. It isn't quite that easy, but what is easy is learning some well-established principles of technique and composition. As well as doing that, in the following pages we'll give you pointers on how to take specific types of shots. Once you're armed with some basic knowledge, you'll be amazed at how simple it is to improve your photography.



IT DOESN'T MATTER HOW EXPENSIVE OR CHEAP YOUR CAMERA EQUIPMENT IS,
A GOOD PHOTO DEPENDS FAR MORE ON YOU THAN ON EXPENSIVE KIT.

Composing your shots

The French street and documentary photographer Henri Cartier-Bresson is often hailed as the greatest photographer who ever lived. But the bulk of his most famous work was taken on the streets of Paris with a simple black-and-white rangefinder camera (a rangefinder has a separate viewfinder, like the optical viewfinder on a digital compact, as opposed to the through-the-lens view of an SLR). Cartier-Bresson used no tripod, no flash and had no extra equipment. What he did have was an unearthly knack of seeing a shot before it happened and snapping the shutter at what he called the decisive moment. This is the moment when pressing the shutter button captures a shot that embodies the scene around you, even though the photo itself is a static picture devoid of the sounds, smells and motion that colour a lot of our everyday experience.

We can't all be Cartier-Bressons, unfortunately, but we can learn a lot from his approach. Decent photography – particularly candid people photography – is all about timing and composition. The cheapest camera in the world will still give you a great shot if you pick your moment and think about how you've framed the picture.

That said, for some types of photo – landscape photography is an obvious one – a sharp, high-quality lens and a good camera are pretty much essential.

Decent kit never hurts, but don't get obsessed with the latest and greatest. With the cost of high-end digital compacts and digital SLRs getting lower almost by the day, you don't need to spend more than a few hundred pounds to get yourself equipment as good as a professional would have used – and paid a few thousand for – three or four years ago.

TAKE LOTS OF SHOTS You'll see this simple advice in other chapters, too, and we make no apologies for repeating it. Remember that it costs you nothing to take a digital photo. So take lots! For every shot that a professional photographer releases to the world at large, they will have taken dozens that didn't make the grade. And if the pros don't feel bad about taking lots of pictures and picking the best, neither should you. Reading about photography is a good start, but the best thing to do is simply get out there and start shooting.

We don't mean you should just keep snapping the shutter indiscriminately, though – try to keep thinking about how your shots will turn out. You can easily fill a whole book on techniques in photographic composition, but read on for some concise pointers on ways you can think about improving your photographic efforts.



This picture works insofar as the runner is positioned so as to be moving into the frame...

...but the background arguably spoils the shot, particularly the people standing on the pavement drawing the eye away from the runner.

The distracting colour of the traffic cone is also a problem.



Changing angles can give a shot more interest. The object in the foreground is a metal bench.



Putting the camera on the floor has given this shot more of a sense of geometry and perspective.



DON'T TELL PEOPLE TO SAY CHEESE There aren't many ways of ensuring you get a dull picture that are quite as certain as drawing attention to the fact that you're taking one. As soon as you tell people to "smile!" they'll turn to face the camera directly, tense up and look as awkward as they're ever going to. Added to that, of course, is the fact that many people will recoil in horror and you'll get the classic hand-in-front-of-the-face shot.

A candid picture is almost always better than a posed shot, so try practising your stealth techniques (Cartier-Bresson is said to have wrapped his camera in black tape to make it less conspicuous). A common technique for street photographers is to come across a situation where they can "see" a potentially interesting shot in their head. They then pre-focus and preset the exposure settings, and wait for people to enter the frame or naturally move into the right position. Then they'll quickly raise the camera and fire off the shot. Remember that once you've taken a couple of pictures, most people will know you're there. At that point, if you really must, you can do the artificial group shot for the family album.

It goes without saying, of course, that people's privacy should be respected. Although there's no law in the UK against taking people's photos in a public place, take it

from us that people you don't know will sometimes react badly when they realise you're taking their picture.

PAY ATTENTION TO YOUR BACKGROUND Probably the single most common mistake that photographic novices make is only to look at their subject when taking a photo. But when people – including you – come to look at the results afterwards it's not just the main subject they'll focus on, it's the whole picture, and unwanted background clutter can distract from the subject enough to spoil the shot completely. If you've tried to take a nice subtle picture of a robin on a fence post, for instance, a bright yellow JCB digger in the background isn't going to help with the mood. And if you've just captured a poignant shot of your child coming out of his or her first day at school, you don't want to get it up on your PC's screen afterwards only to see another small child in the background with his finger up his nose!

Take a look at any professional shot and you'll see that the photographer has arranged themselves so that the background is either empty, in keeping with the tone of the main subject or, if that wasn't possible, thrown out of focus by using as wide an aperture as possible (see p22). When you're composing your shots you should try to alter the

A classic use of the rule of thirds: a single tree in a field. More overleaf.

CHAPTER 4

TAKING BETTER PICTURES

camera angle and framing to keep unwanted objects out of the frame. Brightly coloured objects – particularly red – tend to have a seriously detrimental effect.

RULE OF THIRDS Most people have heard of the rule of thirds, and it isn't a bad guideline. It simply says that when you're composing a picture, the most conventionally attractive and pleasing composition is often when you have the main subject placed at one-third or two-thirds of the way along the frame, ideally at the intersection of a horizontal and vertical line of thirds. This is as opposed to plonking the main subject slap-bang in the centre of the frame, which is the most tempting thing to do but often makes for a dull shot.

The drawback is that slavishly following the rule of thirds will lead to all your pictures being good but not great. They'll all follow the same safe method and won't tend to be very inspiring. That's why the rule of thirds is the first rule you should break once you have some confidence in your composition abilities. And, again, it's an area where the fact that taking a digital photo costs nothing is a boon. Take a nice, safe rule-of-thirds picture, then do something unconventional with the same subject. It's free!

COMPOSE FOR YOUR SUBJECT It's an obvious thing to say, but not all ways of composing a picture work for all situations. A good shot will often be composed in sympathy with the subject. Perhaps the most obvious example of that is when you're taking a picture of a moving subject – say,

a runner. You can use the rule of thirds here, but which third? Clearly, if the runner is moving from left to right across the shot, it's best to frame the picture so that they're at the left-hand third. That way, they'll seem to be running into the clear space in the centre of the shot (see p44). If you position them on the right it will look as if they're about to run into the brick wall of the edge of the frame.

DON'T BE AFRAID TO CROP This is a hot topic. Some photographers think that cropping your picture after you've taken it is a failure and you should have composed it correctly beforehand. But so what? A picture is a picture. It can be fun to discipline yourself never to crop your shots and always to try to get the composition right before you shoot, but cropping can often make the difference between a ruined shot with someone's finger in the frame and a great memory. Get in there with your photo software's cropping tool and be done with it. The thing to bear in mind is that if you go in for very extreme cropping and keep only a small section of the original frame, your newly cropped picture will have a much lower resolution. In other words, you may have chopped an 8-megapixel picture down to, say, 4 megapixels. This will limit the size at which you can print the resulting picture without it getting blocky and pixellated (see p184 for more on calculating how large you can print an image).

THINK ABOUT FOCAL LENGTH The majority of people use the zoom lens of their camera simply to adjust the



This simple shot works mainly because the rule of thirds is applied. If the knot were in the centre of the frame it would be a lot less interesting.



Far left: zooming out and getting close gives large buildings a far better sense of imposing scale.

Left: using a wide-angle focal length for close-up portraits isn't very flattering.

number of things that are visible in the shot. This is the wrong way to use zoom! The focal length of the camera has a huge impact on the way a shot will turn out besides just determining how much you can see of what's there. Remember that at a very wide-angle setting, the perspective of a shot will seem to be exaggerated and distorted. Objects close to the camera will seem to be curved, which can give a slightly nightmarish, hall-of-mirrors look to people. This might be what you want for the shot you have in mind, but it certainly isn't flattering. For the best portraits, the most popular focal length is a medium-telephoto setting of around 100mm equivalent (see p27 for more on equivalent focal lengths), and to frame the subject's face for that you'll need to move back several feet.

Conversely, there are times when you don't want to be zoomed in. Setting the camera to its maximum zoom will flatten perspective, so that even objects separated by quite some distance will seem close together. This is the last thing you want if you're trying to get a sense of the scale of a large subject such as a cathedral. Rather than shooting the outside from half a mile away as soon as you see it, try walking right up to it, setting the widest zoom and then taking the shot. It will seem to loom much more effectively that way.

So, the right way to use zoom is to work out the focal length that will be best for the picture you're trying to

get and then move yourself – not the zoom – to compose the picture in terms of what is and what isn't captured in the frame. Your body should do the zooming, not the lens. Occasionally, of course, you'll be restricted in how close or how far away you can physically move yourself in relation to the subject. In that case, you may have to resort to zooming in or out to frame the picture correctly, but it should be the last resort.

GO WILD, YOU ANIMAL, YOU Put the camera on the ground for a worm's perspective on the world. Press it against a low ceiling and hit the shutter button for a light-fitting's eye view. Take a longish exposure and zoom in while the shutter's open for a whacky psychedelic effect. Put your friend's pink sunglasses over the lens, just to see what the shot will look like. Put the camera on self-timer, put it in the fridge and close the door. Remember to take it out again afterwards. Deliberately overexpose. Deliberately underexpose. Do whatever the hell you feel like. It's all photography. It's all good. Most of the whacky shots you take will be absolute disasters, but it won't have cost you anything. You can also have fun with these shots by doing extreme amounts of retouching in software to see if you can make them more interesting (see Chapter 9). On top of that, every now and then one of the off-the-wall shots might work. You'll never know if you don't take it.

TIP

▶ Because of the lack of white objects in many landscape scenes, leaving the white balance on auto can often result in a nasty unnatural colour cast. It's well worth setting the white balance manually before you shoot (see p66).

TIP

▶ Landscapes are an ideal subject for trying HDR (high dynamic range) images, to get both a detailed sky and foreground. See p146 for more.

THE MOST COMMON TYPE OF PHOTO IS ALSO THE TYPE THAT OFTEN NEEDS THE MOST WORK TO MAKE IT STAND OUT FROM THE CROWD.

Shooting landscapes

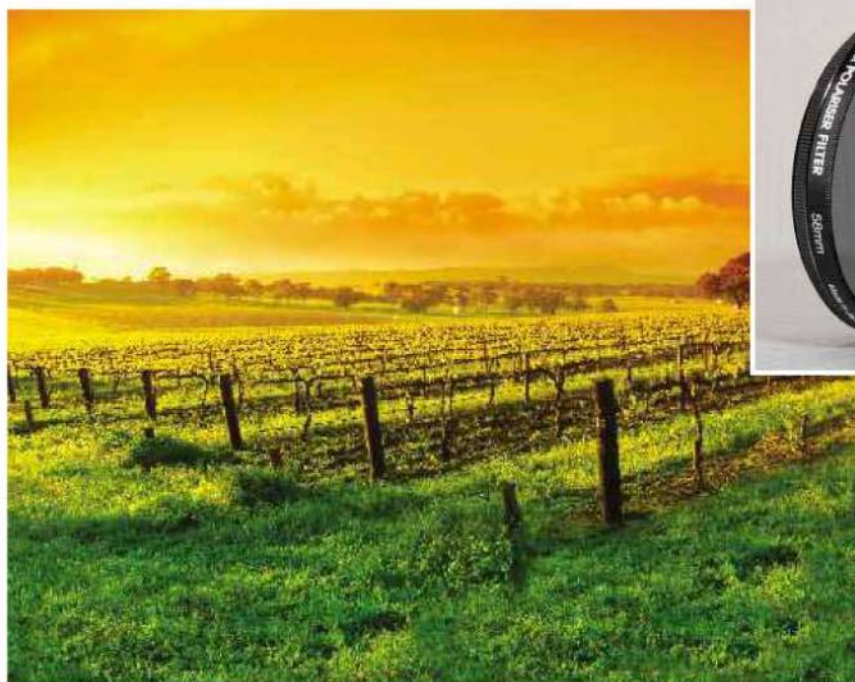
Landscape photography is one of the hardest photographic disciplines to get right. As far as the technicalities of camera settings are concerned, though, there isn't too much to the basic technique. To be sure of getting a sharp shot with the whole scene in focus – as with the shot below – you can drop the camera into aperture priority mode and select a small aperture. Remember that a small aperture means a large f-number. In a digital compact, the maximum available will be something around f/5.6; in a digital SLR, f/11 or f/16 are good bets. The added benefit of a small aperture is that most lenses will produce sharper results with less distortion at smaller apertures. Remember that small apertures often mean a slow shutter speed, so the primary weapon in most landscape photographers' armoury is a tripod.

The second aspect to remember is that you want to get as much crisp detail as possible, so make sure your camera is set to its lowest ISO setting (see p64). Again, this will tend to mean slow shutter speeds, but low ISO will produce less noise in your picture and maximum detail. In fact, landscape shots are one of the areas where it's a real help to have a DSLR and a decent lens, since DSLRs capture detail better.

NO HURRY One of the luxuries of photographing a landscape is that it isn't going anywhere in a hurry; you should have plenty of time to think about how you want

to frame the shot. If you want to get it right and you're not happy with the result when you've got the picture on your PC, you can potentially revisit the spot and take the picture again. That said, plenty of professional landscape photographers maintain that precise timing is just as crucial for them as it is for the street photographer trying to catch fleeting shots that are there one second and gone the next. The time-sensitive aspect of landscape shots is the light.

GET THE TIME OF DAY RIGHT The conventional wisdom in landscape photography is that you should suffer for your art: the few minutes before, during and after dawn are often hailed as the times of day when the light is at its softest and most flattering. If the sky is brilliantly sunny and clear you can get that particular style of super-vibrant shot in the middle of the afternoon, but generally the light is harsh. If you're forced to shoot in the middle of the day, you can enhance the vibrancy of a clear, sunny sky by using a polarising filter (see below). Polarisers have the effect of deepening the colour of a clear sky and increasing contrast, for a more vibrant picture. Near the end of the day, the light softens again as the sun gets lower, giving better conditions again and the likelihood of dramatic skies, and if you get some mist into the equation as the evening cools that's all the better for adding some atmosphere.



If you're forced to shoot in the afternoon, try using a polarising filter on your DSLR to deepen the colour of the sky.

If you can manage to get up early enough, you could be rewarded with a sky such as this.

CLOSE-UP PHOTOGRAPHY CAN REVEAL A WORLD THAT ISN'T NORMALLY SEEN.
JUST SWITCH INTO MACRO MODE AND GET SHOOTING.



Shooting in macro

Although the true definition of macro is to take life-size or greater than life-size photos, most camera manufacturers use the term fairly loosely, and it usually simply means close-up photography. However, almost every compact and superzoom has a macro mode that lets it focus very close to objects, letting you bring out detail that most people will never otherwise see. Some cameras have two or more macro modes, so make sure you try both to find out how close each will let you shoot.

THE KIT DSLRs usually need a special macro lens for true 1:1 (life-size) photography, but many standard lenses can still focus very close to subjects. These days, even the kit lens that comes with a digital SLR will usually let you focus down as close as 15cm. For specialist macro work, there are a variety of specialist lenses on the market, but a true 1:1 lens will usually cost upwards of £350, and you shouldn't splash out on something like that until you've experimented with what your camera's capable of out of the box.

You can take macro photos of just about anything, but flowers and insects can produce some of the most interesting shots. Possibly the most crucial aspect of macro photography is keeping the camera – and subject – still. Even the slightest movement will be magnified, so a tripod is the best way to avoid camera shake. Also, use the

self-timer so that your hand doesn't move the camera when the shutter fires. If your camera has a shutter priority mode, use it and select the fastest shutter speed you can (see p62).

Take some practice shots to get to know where your camera's limits are. Some autofocus systems will tell you the picture is in focus, but when you magnify it on your PC screen it's blurred. Simply looking at the scene on the camera's low-resolution screen can often hide blurring. Also, be aware that the depth of field in macro mode is extremely narrow, so ensure you know which point the camera is focusing on – otherwise, parts of your shot could be blurred when you intended them to be sharp.

KEEP IT STEADY Make sure your subject is still. If you're shooting flowers, wait until there's no breeze or pick one and take it indoors. With insects, watch where they tend to land before setting up your tripod – you may have to wait a while before something enters the frame.

Don't be afraid to use the flash, either. When you're up close to an object, there's often a lack of light, but a flash can fix this problem. If the flash is too powerful, place some opaque plastic over it to diffuse the light. You can also experiment with different angles and heights. For example, place the camera on the ground, looking upwards, to get an insect's perspective on the world.



HOW HARD?

Advanced amateur.

ESSENTIAL

Camera with macro mode or macro lens.

DESIRABLE

Tripod.



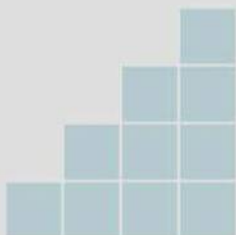
Macro photography is available to almost everyone with a modern digital compact or digital SLR. For medium-close shots like this you won't need any special equipment.

TIP

▶ To get as close as possible to your subject, try focusing in reverse. Set the focus to its minimum distance setting and then physically move the camera towards the subject until it's in focus.

CHAPTER 4

TAKING BETTER PICTURES



HOW HARD?

Advanced amateur to expert.

ESSENTIAL

Camera with a bulb mode; tripod; cable or remote release.

TIP

▶ Rather than pointing your camera directly at the sky, include some of the surrounding buildings or countryside in the shot to give lightning photos more interest. You'll need to make sure you keep the shutter open long enough for them to be suitably well exposed.



IT'S A HIT-AND-MISS PROCESS BUT WELL WORTH A TRY NEXT TIME
THERE'S A STORM BREWING.

Shooting lightning

Ever wondered how people capture those amazing shots of bolts of blinding white light streaking across the sky? Well, it isn't easy: decent shots of lightning are one of the trickiest special effects to achieve in photography. That said, it doesn't take much in the way of preparation and, if you know how to do it beforehand, the next time a storm comes your way you'll be able to give it a whirl.

The main problem, of course, is that you never know exactly where lightning is going to strike. Besides luck and patience, you'll need to know the technique, too. It's amazing how many people think that to photograph lightning you should stand with camera in hand and quickly press the shutter when you see a bolt. This might work with fireworks, but it's hopeless with lightning – your reactions will never be quick enough.

HOW TO DO IT The key to shooting lightning is your camera's bulb setting. This is almost exclusively the preserve of more advanced cameras, mainly DSLRs, but some more advanced digital compacts have it, too. With your camera set to bulb mode (marked with a B on the top-mounted rotary dial), the shutter stays open for as long as you keep the shutter-release pressed down. You should hopefully be realising what the secret is: you open the shutter before the lightning strikes.

Set up the camera on a tripod. You'll also need a shutter release: preferably a wired cable release, or an infrared remote that allows push-open, push-to-release when in bulb mode to prevent the battery running down by keeping the

button pressed. Now you need to use your judgement: look at where the storm is coming from and the approximate delay between bolts of lightning. Set the aperture setting to a small value – $f/16$ or $f/22$. Wait until you think a lightning bolt is about due, then open the shutter. Now simply wait! And when a bolt of lightning hits, release the shutter button to finish the shot. The trick is to get the exposure right – if the shutter is open too long, the ambient light in the sky from streetlights and so on will mean the background becomes too light and you'll lose the drama, but conversely it's good for the exposure to be long enough to get at least some detail of the clouds in the background if you can.

KEEP TRYING Shooting lightning is one of those situations in which a digital camera is a huge advantage over traditional film photography. By reviewing each shot as you take it you can see if you're getting overexposed blown-out skies, in which case you should try to decrease the time the shutter is open. And, of course, if you have a decent-sized memory card you can do what the pros do: take loads and loads of shots.

TRY IT WITH FIREWORKS, TOO Although you can use a more basic technique for fireworks – simply point and shoot with your camera in its fireworks scene mode if it has one – you can get better results with this technique. If the background sky isn't polluted by too many spurious light sources such as streetlights, you can keep the shutter open for the duration of several bangs and get a superb pyrotechnic montage.



Taking a lightning shot as good as this is tricky. But who knows, you may get lucky.



Getting the dream-like look

One of the most fascinating effects you can achieve is a shot of a waterfall or stream, where the water looks like it's melted into one smooth cotton-like mass, while the rocks and scenery around the water look perfectly normal. The way this effect is achieved is simple: it's a long exposure.

HOW TO DO IT The basic technique is simple, but, ideally, you need a DSLR and a tripod, unless by some miracle there's a rock you can put the camera down on and still get the angle you want. Set the ISO sensitivity to its minimum (usually ISO 100 or 50 – see p64), and set the shooting mode to shutter-priority mode (marked S or Tv on the mode dial – see p62). Now set the shutter speed to around five seconds and place the camera in self-timer mode. Compose the shot the way you want it, then press the shutter. Having the camera in self-timer mode ensures that once the shutter release has been pressed, the camera has time to settle from being jogged by your hand. Alternatively, you can use a cable release or infrared remote.

PITFALLS There's a difficulty that doesn't come with shooting long-exposure night-time scenes (see opposite). The problem is too much light. To get a perfectly smooth dream-like effect, the shutter needs to stay open for long enough that the water is completely blurred; that usually means 5-10 seconds or even longer. The trouble is, even with the aperture of your camera set to minimum, you can end up with an overexposed image – too much light

will enter the camera over the required ten seconds or so, and you'll either end up with a completely blank, white image, or the camera will refuse to take the shot since it knows the image will be overexposed. This is primarily why a DSLR is essential for reliable waterfall shots: the aperture of a DSLR can go down as small as f/22 or even f/32, allowing an absolute minimum amount of light to enter the camera. This is as opposed to the minimum aperture of f/8 or f/11 for most digital compacts and superzooms.

However, it's still possible that in normal daylight you simply won't be able to achieve a small enough aperture to allow for a long enough exposure. In this case, you can either compromise and go for the longest exposure you can achieve – a few seconds will still give pleasant blurring – or you can use filters, another advantage of a digital SLR. In this case, you need what's called a neutral density, or ND, filter. This is simply a high-quality piece of glass that's slightly tinted, reducing the amount of light going into the lens and thus allowing for a longer exposure.

ND filters are specified in terms of stops. A 1-stop ND filter means one stop of light reduction. In other words, it will halve the amount of light going into the lens, so if you could achieve only a ten-second exposure without one, you can achieve 20 seconds with one. Likewise, a 2-stop ND filter will slow the camera by two stops, meaning your ten seconds can now be 40 seconds (the speed is halved twice). They're not cheap, but a two- or three-stop ND filter in your kit bag can be invaluable.



Use long exposures to get the characteristic dream-like effect of fast-flowing waterfalls.



ESSENTIAL

Tripod.

DESIRABLE

Digital SLR;
ND filter.

TIP

▶ As well as the longest possible exposure time, try an exposure of just half a second to a second. You'll still get blur, but the result will be more dynamic than dream-like.

CHAPTER 4

TAKING BETTER PICTURES



ESSENTIAL

Camera with exposure compensation control – almost every model has one.

TIP

► The same principle applies in reverse if you're shooting a predominantly dark scene, or a small object against a mostly dark or black background. To stop the image or subject being overexposed, try applying negative exposure compensation of about one stop (-1EV).

IT SEEMS SIMPLE ENOUGH, BUT THERE'S A TRICK TO GETTING THE SPARKLING LOOK YOU EXPECT FROM SHOTS TAKEN IN WINTER SUNSHINE.

Shooting in snow

Almost all compacts have different scene modes, often selected via the top-mounted rotary control. These can be useful, but you can often get the same effect manually if you know what you're doing. The snow scene mode is one of these. If you've ever taken photos on a skiing holiday, you'll probably know why it's there. In standard Auto scene mode, shots come out with the white snow looking grey.

Why does this happen? It's because the camera has no way of telling that it's in the unusual lighting conditions that snow and sunshine produce. The reason that cameras get it wrong is the same reason people get snow-blindness: the brightness of winter sunshine reflecting off snow leads to lots of light bouncing around.

EXPOSURES A standard auto-exposure mode means that the camera expects an average level of light reflectivity from objects in a scene. In normal conditions, this is around 13%, but in snow it can be much, much higher. The very high level of reflected light from snow means the camera gets confused. It tries to compensate for what it thinks is extreme brightness by automatically underexposing (decreasing shutter speed). And when bright white snow is underexposed, it ends up looking like grey slush. When it underexposes the snow, it underexposes everything else; people's faces look too dark. If you've already got a shot like

this, you can compensate by using the levels control in your photo-editing software (see p115). But it's far better to avoid the situation in the first place.

BRIGHT SHOTS There are essentially two ways to avoid getting dull snow shots. One option, if your camera has it, is simply to pop it into its snow scene mode. Here it will know to expect a much higher light level than normal.

So what the snow scene mode does is up the exposure compensation: you can achieve exactly the same effect by using manual exposure compensation and dialling in +1EV of overexposure. The way to do this varies by camera, but all digital cameras will give you the option if you're in any mode other than fully automatic.

A little exposure compensation will usually do the trick. If you want to ensure this isn't too much, check the histogram display (see p70), but briefly all you have to do is make sure your image histogram doesn't abruptly cut off at the right-hand side of the graph; if it does, you're overexposing and you need to reduce the exposure compensation – try a half-stop instead. Bear in mind, though, that if the snow is very bright, to expose for the other objects in the scene correctly will mean that the snow may necessarily have to be overexposed and blown out to white.



If you know how, it's easy to cure the dreaded grey-slush syndrome.



Shooting sunsets

A sunset is such a great sight that it's tempting just to wait until passers-by are out of the frame, plonk the sun in the centre of the shot and hit the shutter. If you do that you'll end up with a shot everyone's seen a million times – pretty but dull, and when you come to look at it a year later you'll struggle to remember where it was taken. To capture the atmosphere of a great holiday, you need to include some clues to the scene. Photos can't capture the warm sand between your toes or the feeling that the office is 2,000 miles away. Like the picture below, think about what makes the evening interesting, and try to frame the scene so it captures some of that.

THE TECHNICAL SIDE The main characteristic that gives sunset shots their look is the foreground is usually in silhouette. This is because the sun is such a dominant light source, and if your camera is set to fully automatic it will dial the exposure right down to compensate, resulting in the dark moody foreground. This can be very effective, but you can potentially achieve a less clichéd and more interesting picture by applying some exposure compensation; this will lift figures in the foreground from pure shadow. Try dialling in +1EV – almost every camera can do this, including digital compacts. If you're using a digital SLR, you can try bracketing the exposure, too

(see p78 for more on bracketing). Going a step further into more advanced territory to get more detail in the foreground while keeping the full richness of a blood-red sky, you could try to take an HDR sequence (see p146), but bear in mind that it will complicate matters if there are people in the shot moving as you shoot the sequence.

What you can do instead, of course, is avoid shooting the sun altogether – make sure it's out of the frame or obscured by an object or person. That will give your shot less extreme lighting for the camera to cope with and you should end up with a more even transition between foreground and background.

If you're taking portrait shots of friends and family with the sunset as a backdrop, remember that they'll tend to come out either in pure silhouette or with very dark faces. In this case, you can try switching the flash on to lift the foreground – this is known as fill-in flash.

You should also think about the white-balance setting. If you manually set the white balance to daylight, you can make sure you'll get the warm tones of the sun (see p66 for more on white balance). If you rely on the automatic setting, note that many cameras tend to set the balance a little on the cool side to compensate for what seems to be too much red and yellow in the image, but, of course, the reds and yellows are exactly what you want.



ESSENTIAL

A camera!

DESIRABLE

Manual white balance control; an idyllic location.



A little tweak can turn a good sunset into a great photo.

TIP

Remember that sand and cameras don't mix. Make sure you keep them apart, and if you're using a digital SLR never change lenses on the beach: one gust of wind can render the camera useless.

CHAPTER 4

TAKING BETTER PICTURES



ESSENTIAL

Camera with bulb and manual focus modes; tripod.

DESIRABLE

Cable release or infrared remote; wristwatch or stopwatch.

TIP

▶ Trying to set up a shot in the dark can be a pain. Bring a torch and organise yourself so you don't end up leaving things behind by mistake after you've finished.

DON'T CONFINE YOURSELF TO DAYLIGHT – GET OUT WITH YOUR CAMERA AT NIGHT AND YOU CAN PRODUCE SOME GREAT IMAGES.

Shooting at night

There's one sure-fire way to get really interesting pictures without having to go much further than the nearest road: night-time photography. We're not talking about using the flash here, we're talking about long exposures, compensating for the lack of light by leaving the shutter open for far longer than usual – sometimes as long as four or five minutes.

HOW TO DO IT A tripod is your friend when it comes to night shots. You'll also need a cable-release or remote control, as well as a wristwatch. Some digital compacts have long-exposure modes of up to 30 seconds, which is enough for some night-time shots, but what you really need is a DSLR with a bulb mode. Manual control is the best way to do night-time photography, since the automatic exposure controls of most cameras get confused when confronted with a night scene.

Part of the fun of night shots is the experimenting. Get out with your tripod, set up the camera and choose the bulb mode (see p50 for more). Set a medium aperture of about f/8 to give a reasonable depth of field. Focusing at night isn't easy, and most cameras' autofocus system won't work in the dark so you'll have to focus manually. With an aperture of f/8 the depth of field means focus shouldn't be too critical, but it won't be so small that you'll need to leave the shutter open for ages to get decent results. Now

simply have a go at taking a shot: press the shutter and use your watch to keep it open for 30 seconds. Now have a look at the result on the camera's monitor. Anything? If not, try doubling the exposure time to a minute, and so on.

That's all there is to it – because the camera's electronics can't reliably meter a night-time scene, long-exposure photography is a fascinating process of trial and error, even for professional photographers. The fun part is seeing how familiar night scenes are rendered into unfamiliar dream-like landscapes.

POTENTIAL PROBLEMS Digital cameras can be prone to image noise, which normally manifests itself as a consistent speckling or mottling effect on the image (see p65 for more). With exposures of more than a few seconds, however, another type of noise comes into play. You may find you get "hotspots" – random bright single-pixel splodges of red, green or blue. Some cameras are more prone to it than others, but if you do find excessive hotspot noise, check to see your camera's long-exposure noise reduction is switched on (see Specialist SLR settings on p81).

You can also deal with hotspots in your photo-editing software, in the same way you deal with dust and other specks in your images – turn to p140 to see how.



Long-exposure shots of traffic are easy to do and the results can look great.



Shooting sports and action

The key to capturing sports shots and fast-moving subjects is, like the chief attributes of the subjects themselves, speed. To freeze a moment in time without blurring you need to have a shutter speed of at least 1/125th of a second. That means the key to good sports photography is good, bright light.

If conditions aren't ideal, all is not lost, but you or your camera have to make some compromises. You'll need a wide aperture to get enough light to the camera's sensor. You'll also need to increase the camera's sensitivity to light by upping the ISO setting. The drawback is, as you'll see on p64, higher ISO sensitivity brings with it noisier images.

A wide aperture by itself isn't necessarily a bad thing: if you're capturing a sporting moment, the narrow depth of field a wide aperture gives will throw the background out of focus, letting the subject stand out. The drawback is that with a fast-moving subject and a narrow depth of field you have no leeway – if the focus is less than perfect your subject will be frustratingly blurred.

Fortunately, this is often an area where you don't have to worry too much about manual control; dropping your camera into its sports mode puts it into the equivalent of shutter priority (see p62), and will enable its burst-shooting mode. Burst modes are becoming very good, and many can keep taking a few shots a second for as long as you hold the shutter down, until the memory card fills up.

TIPS AND TRICKS If you find your camera isn't focusing quickly enough when you take action shots, there's a simple way to solve the problem. It works on digital compacts just as well as DSLRs, as long as they have a manual focus mode. What you need to do is pre-focus on a particular point you judge will give a good composition, and then wait for the subject to reach that point. You can do it by focusing on the ground at the point you want to capture the action. It's a technique that works particularly well when you know your subject is going to be at a particular place: motor races, athletics events and so on. It's more difficult with more open events such as football matches, but if you make sure the camera is in burst mode, you can get a decent shot by a process of attrition: just take lots and lots of pictures and chances are you'll get a decent one among the failures. This is exactly what professional sports photographers do.

The second main trick is learning the art of panning the camera: if you keep it still and stab at the shutter when the subject is in the frame, you're more likely to get a blurred shot. By keeping a fast-moving subject in view and smoothly panning the camera, squeezing the shutter as the subject hits the correct point, you'll get a sharp subject and the background will be blurred, giving the shot an impression of dynamism and movement.



By panning the camera with the subject you can create a great impression of speed.



ESSENTIAL

A camera!

DESIRABLE

Manual focus mode;
a fast burst mode;
bright conditions.

TIP

▶ Don't position yourself so your subject is moving directly towards or away from you – it makes it hard for you or the camera to focus. Try to arrange yourself so the subject is moving past you to keep their distance as constant as possible. This also makes panning more effective.

CHAPTER 4

TAKING BETTER PICTURES

This shot has been taken with skilful use of flash. It looks natural but flash has been used to lift the model and the horse out from the background and soften harsh shadows from the bright sunlight.

STRANGE AS IT MAY SEEM, THE IDEAL TIME TO USE A FLASH ISN'T IN LOW LIGHT, OR INDOORS. IT CAN BE BEST WHEN YOU'RE IN PLENTY OF SUNLIGHT.

Flash photography

Every consumer-level camera, from compact digitals to DSLRs, has an integrated flash. In fully automatic mode, the flash doesn't need a second thought – if the shutter speed will be too slow to get a steady, well-exposed picture, the flash fires, adding light to the scene. Some cameras, such as Canon's EOS range, have flashes that pop up when needed, while others are manually sprung, but the effect is the same.

The first thing to appreciate is that using an automatic pop-up flash will have a detrimental effect on your images more often than not. In a dark room, firing a flash directly into someone's face will result in a ghostly appearance, complete with shadows and red eyes. It all leads to a distinctly unflattering photo, and while the flash will have allowed you to capture vital extra information that wouldn't

otherwise be visible, your subject probably won't thank you for the harsh depiction.

Instead of simply using a flash in all low-light situations, try getting to grips with your camera's high-ISO abilities (see p64). Many DSLRs produce good results right up to ISO 1600, which is enough for a reasonable shutter speed in most indoor conditions.

USING THE BUILT-IN FLASH OUTDOORS Now that you've stopped using your flash indoors, it's time to start using it outside. Again, this is rather counter-intuitive: the outside world is brilliantly lit, so why would you need a flash? The key is control: the sun can cast all kinds of distracting shadows over someone's face. Using your flash to fill in those shadows can actually make your shots look more





This high-end flash from Nikon allows you to angle the head to bounce light off walls or other objects. The large infrared panel on the front is for accurate focusing, as well as for integrating the flash into a complex multi-flash system.

something that soon becomes addictive, and we'd suggest buying as flexible a flash unit as you can afford. If you own an entry-level DSLR you'll probably find your flashgun outlives your camera body.

You don't just get more power from an external flash. The majority of flashguns have adjustable heads, which can be pivoted away from your subject. This solves the biggest problem of integrated flash units – that they shine a harsh, bright light right at your subject, leading to sharp shadows, an unflattering image and complaints of temporary blindness from your model. If you can point a flash gun at a wall, the light from your flash will bounce off it. The reflected light from the flash is then softened and more widely spread.

Almost all standalone flash guns also have a zoomable head – the bulb sits on a motorised platform inside the flash, and your camera relays information about your lens setting to the flash. If your lens is set at 24mm, for instance, you get a wide spread of light. If your lens is at 105mm, the flash head zooms in and produces a sharper, narrower beam, in order that the

natural, in contrast to the general perception that flash is best used for adding an artificial light to indoor conditions and darkened surroundings.

EXTERNAL FLASH The flash built into your camera will only get you so far, and before long you'll want more control, which is where a standalone flashgun comes in. A hotshoe-mounted flash sits on top of a DSLR, and the camera relays metering and lens information to the flash. Not only does this make them easy to use, it also allows plenty of room for you to grow as a photographer and get more out of the equipment as you become increasingly experienced.

Flashguns are far more powerful than integrated flash units. A flash's power is expressed as its Guide Number, which is a measure of the furthest distance its burst of light will reach, multiplied by the aperture setting at ISO 100. You can work out a flash's maximum range by dividing its guide number by your intended aperture setting. A camera such as the Nikon D40 has a flash with a range of up to 11 feet at ISO 200, while Nikon's top-end SB 900 flash has a guide number of 157.5 at the same ISO. This represents a maximum range, at f/3.5, of 45ft – more than four times that of the D40's integrated flash. All external flash units offer adjustable power output – in automatic mode the power of the flash is set by the information it receives from your camera's light meter. Some newer entry-level flashes, and all high-end units, offer a manual mode in which you can set the flash power yourself. Flash photography is



This is a mid-range flash from Canon's Speedlite range. It has a manual mode: enter the distance from your subject, your ISO, your camera's aperture or the power your flash should use and the LCD fills in the rest of the data.

TIP

Some flashes can be set to trigger by others firing. Combining this feature with additional flashes triggered remotely on slave mode can be the first step in creating a professional multi-flash studio.

CHAPTER 4

TAKING BETTER PICTURES

Another good use of fill-in flash to reduce harsh light. If it hadn't been used, the sun shining from the left-hand side of the frame would have meant most of the right side of the little boy's face would be in shadow.

flash isn't wasting its energy illuminating parts of a room that aren't in the frame.

A final reason to buy a flash is that it's the first step on the road to building a photographic studio, and producing pictures with professional-looking lighting. Most flashes have a slave mode, which means they can be triggered remotely. Some flashes, when they detect another flash firing, can fire themselves. Having this available means it is no great step to turn a dimly lit space into a photo studio that's flooded with light, with all angles of your subject well lit. If you're interested in finding out the kind of effect this technology can have on your pictures, there are some spectacular uses of multiple-flash online – a good place to start is www.strobist.com.

HOW MUCH TO SPEND? Entry-level flashguns start at around £150. This will buy you an adjustable-head, adjustable-power flash with an infrared receiver for use in remote slave mode. Most flashes at this price will offer a manual mode in which you can set the flash's power yourself –

many cheaper ones offer automatic-only modes, which can cause problems in complicated multi-flash studio setups. Cheaper flashes are also incapable of working as master flashes, so you can't build a studio from cut-price flashguns alone.

High-end flashes, such as Nikon's SB-900, cost around £300, but you get a much longer feature list. Flashguns chew through AA batteries at an astonishing rate, and cheap batteries can cause a flash to take a long time to recycle – that is, charge itself enough to provide another flash. High-end flashes have power ports that allow you to connect high-voltage power packs which, while expensive and heavy, are rechargeable, provide far shorter recycle times and, most importantly, provide more shots on a single charge. In terms of simple economics, if you're planning on using a flashgun extensively, you'll have to weigh the cost of replacing all those batteries with the extra money needed to buy a higher-quality unit that recharges. Typically, a more expensive flash is also more powerful than cheaper versions.



Expensive flash units can also be used as master flashguns, transmitting metering information to slave units. In addition, they tend to support lenses with longer focal length. So where Canon's cheap 420EX Speedlite supports lenses up to 105mm, for example, the top-end Nikon SB 900 supports lenses up to 200mm.

HOW TO USE A STANDALONE FLASH Using a standalone camera flash is one of photography's more technical aspects. To get it right you need to be mindful of a number of factors, including your flash's power, your camera settings, the distance from your camera to your subject and how your flash's light will behave once it's fired.

INDOORS The rules about using a built-in flash apply to a certain extent: most professional photographers would rather die than use an on-camera flashgun to fire into someone's face, so look for more creative ways to get light from your flash on to your subject.

Bouncing your flash's light is the way to go, and in recognition, almost all standalone flashes allow you to do this. To get it right, position your subject relatively close to a wall (within five feet should be an adequate distance), and point your flash's head at the wall. When it fires, the light will bounce off the wall and disperse.

OUTDOORS Outside, you can forget about bouncing your flash off nearby objects, but then you also don't need to worry about red-eye or about the flash providing the only illumination in your shot: the sun does the hard work (during the day, at least), and your flash is simply filling in the shadows that the sun casts.

METERING WITH A STANDALONE FLASH This is where things get tricky, or at least a little mathematical. When you're starting out with an external flash, the best thing to do is to set your camera to automatic and allow it to set its own shutter and aperture speeds. This way you can focus on the technical side of getting the direction of your flash right. When you're ready to move on to manual exposures, you can use some fairly standard formulas – and an exposure meter (see p69) isn't a bad idea either.

First, forget about shutter speed. A flash emits light for an incredibly short period of time – at minimum power expect a duration of 1/28,000th, and at best 1/840th of a second – so you'll almost always be using a longer shutter speed (your camera's aperture controls exposure instead). After that, it's a simple – or complex – matter of maths to know your flash's effective range.

If you already know your camera's aperture, you can work out your flash's effective range by dividing the guide number by your camera's aperture. If your flash has a guide number of 150 (in feet), and you're using an aperture of f/8, your flash has a maximum range of just under 19ft. Alternatively, to calculate the aperture needed, divide your flash's guide number by the distance to your subject. So, if your flash has a guide number of 150 in feet and your



Against the bright sky, the boy on the skateboard would have been virtually in silhouette without the use of flash.

subject is 10ft away, you should set your aperture to f/15. This assumes you're shooting at ISO 100 with your flash either at full power or set to automatic.

More expensive flashes have a full manual mode. Using this is a matter of patience, perseverance and practice, but as you become more experienced it will become second nature. High-end flash units have a power calculator on the back, in which you set a variable – either distance, flash power, aperture or ISO – and the flash displays the other three. All bets are off if you're using the flash to bounce light off a wall or ceiling, though: a flash has no hope of successfully metering its power, so you're best off practising.

IN THIS CHAPTER

62 Mastering camera modes

Your digital camera may have a couple of dozen different picture-taking modes: three or four are key.

64 Mastering ISO sensitivity

Being able to adjust how sensitive the camera is to light is a huge benefit of digital. Here's why.

66 Mastering white balance

Another fundamental advantage of digital cameras – adjust their colour response whenever you like!

68 Mastering metering modes

You can't take a picture unless you can measure how much light there is. Cameras have several methods.

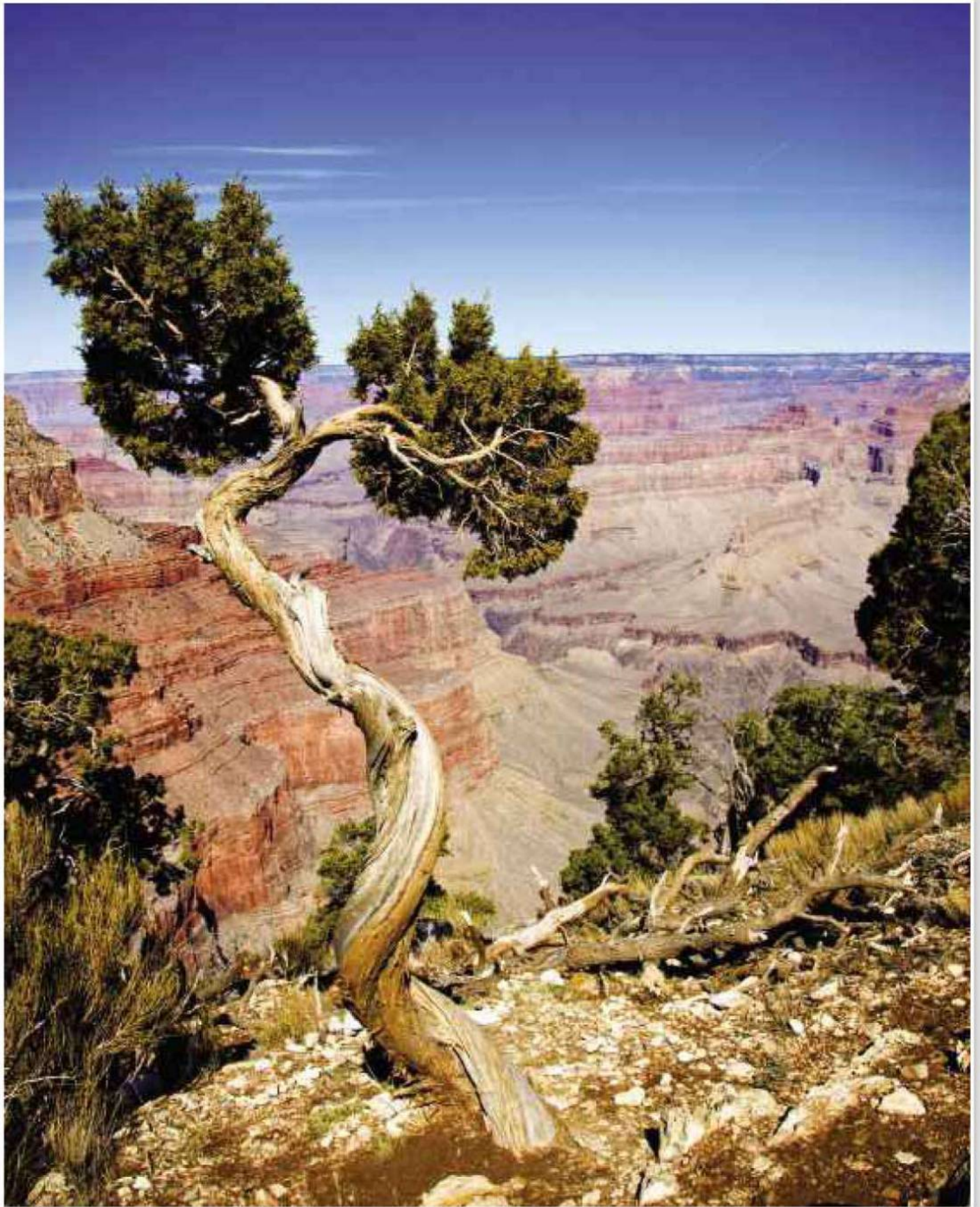
70 Mastering histograms

The digital photographer's secret weapon. Use these right and you'll never take a bad exposure again.

CHAPTER 5

CAMERA SETTINGS

Modern digital cameras tend to have stacks of different modes, controls, menus and settings. You shouldn't see this as a drawback – it's a boon that stems from the flexibility of digital photography. Some settings are far more useful than others, though, and in this chapter we'll go through the picture-taking settings that you absolutely have to know about, and the effect they'll have on your shots. Learn the concepts here and you'll be well armed for your next photo foray.



GOING BEYOND FULLY AUTOMATIC MODE CAN BE CONFUSING,
BUT THE DIFFERENT MODES ARE THERE FOR A GOOD REASON.

Mastering camera modes

If you're only using your camera on fully automatic mode, you're missing out. All digital SLR cameras and many of the better-quality compact models have a variety of semi-manual and manual modes to allow you to be more creative and direct shots yourself, rather than letting the camera decide what it thinks is best. Here, we'll go through the major modes that most cameras have.

In the image below, you'll see a top view of a typical digital camera's mode dial. The fundamental modes available to you, aside from fully auto (usually indicated by a green camera symbol), are P, A, S and M.

P stands for program mode, A for aperture priority, S (sometimes labelled Tv) for shutter priority, and M for fully manual mode. For someone not used to all these modes it can be hard to see the point of having so many, but there's a reason for all of them.

PROGRAM MODE Once you've reached the limitations of your camera's fully automatic mode, program mode is the first place to visit. Program doesn't give you the full-on responsibilities of setting both aperture and shutter speed,

but it opens all the menu options that are closed to you in fully automatic mode. In DSLRs, this means you can shoot in RAW mode (see p74) and select your own ISO setting (see p64). If you make changes that will affect your exposure, such as raising your ISO to make your camera more sensitive to light, the shutter speed will be decreased so you get shorter exposures. You also get more control over focus modes. You can make limited changes to exposure, and the camera will simultaneously adjust other settings to try to keep your shots usable.

SHUTTER PRIORITY This mode is favoured by sports photographers and anyone who wants to catch movement or action (see p55). Shutter priority is actually very simple: all you have to set is the shutter speed you want – in other words, the length of time you want the shutter to be open for (see p24 for an in-depth explanation of shutter speed). Once you've set the appropriate speed, the camera decides on the other key factor: the correct aperture to get a good exposure. Why is this useful? Because if you're trying to capture fast action then it's crucial that the shutter speed

Your camera is likely to have a dial that looks like this. Here's what the four major selections mean.

M: manual mode. You're in complete control of both shutter and aperture.

A: aperture priority. Also known as Av. This allows you to set the size of the aperture, subject to the capabilities of your lens. The camera sets the shutter speed depending on the aperture size you select.

S: shutter priority. Also known as Tv. You select how long the shutter remains open. The camera adjusts aperture size to capture a correctly exposed image.



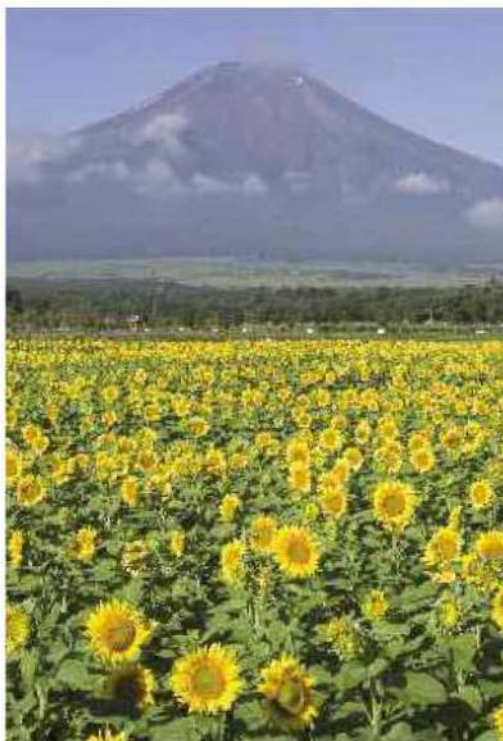
P: program mode. A large degree of control over camera settings, but the camera will automatically prevent you from using settings that result in over- or underexposure.

TIP

Even if your camera doesn't have a top-mounted mode dial like the one shown here, you may be able to set modes such as aperture priority by digging into the onscreen menu system.



With aperture priority, you can set a large aperture to blur the background for a more striking shot.



Set to automatic, most cameras will try to get everything in focus. That works for landscapes like this, but isn't so great for close-ups.

is as fast as possible – other considerations such as depth of field (see p22) or a low ISO setting (see p64) aren't as important. By explicitly setting the shutter speed, the camera can worry about getting the other settings right and you can concentrate on shooting the action.

APERTURE PRIORITY Aperture priority is the opposite of shutter priority, and a favourite mode of a great many portrait, candid and landscape photographers. As the name suggests, you set the aperture you need, and the camera's electronics work out the correct shutter speed to get a good exposure. Remember that aperture doesn't only control the amount of light falling on the camera's sensor; it also controls depth of field (see p22 for more). When shooting portrait shots, it's often desirable to set as large an aperture as possible, giving a short depth of field and throwing the background out of focus. This makes your subject stand out. Conversely, for landscape photography, you often want as much of the scene as possible in focus. What you'd do then is set a small aperture, giving a large depth of field, and the camera will sort out the shutter speed appropriately.

MANUAL MODE Not for the fainthearted, manual mode gives you full control. You set all of the camera's menu functions, and your aperture and shutter speed are set independently of one another. This means that unless you know what you're doing it's entirely possible to get your exposure completely wrong, and the camera won't make any adjustments for your mistakes. Manual control is tricky to use, and you need to have put in plenty of practice before taking your camera out to photograph sporting

events or wildlife in manual mode. But once you get the hang of it, it's the most rewarding way of using your camera, besides being one of the best reasons to buy a digital SLR.

OTHER MODES Many modern digital cameras are festooned with a glut of modes beyond the basic PASM choice. Many of these are for very specific situations, such as photographing in snow. A sports mode is common, which will give shutter-speed priority over other settings but won't allow you to set the shutter explicitly. This can be a good thing if you're inexperienced, since if you set the shutter too fast the camera won't be able to increase its aperture enough to compensate, and you'll end up with underexposed pictures. Other modes include fireworks and landscape modes. While these can be useful, by using one of the standard manual modes you'll obtain more control over the results, and learn more in the process, as demonstrated in Chapter 3.

PITFALLS If you're using a digital compact camera, you should bear in mind that many compacts give you a choice of only two aperture settings (typically something like f/2.8 and f/5.6). This is in contrast to a digital SLR, which will offer aperture from f/2.8 all the way to f/22, with everything in between. Also, because they have a very short focal length, it can be hard to get depth-of-field effects using a digital compact – almost everything will tend to be in focus. For that reason, your first forays into aperture priority and depth of field are likely to be more successful if you have a digital SLR. With shutter priority, however, you can achieve some great results with either a compact or a digital SLR, since both offer the same level of control.

IT MAY SOUND TERRIFYINGLY OBSCURE, BUT FEAR NOT, AS
THE CONCEPT OF ISO SENSITIVITY IS PRETTY STRAIGHTFORWARD.

Mastering ISO sensitivity

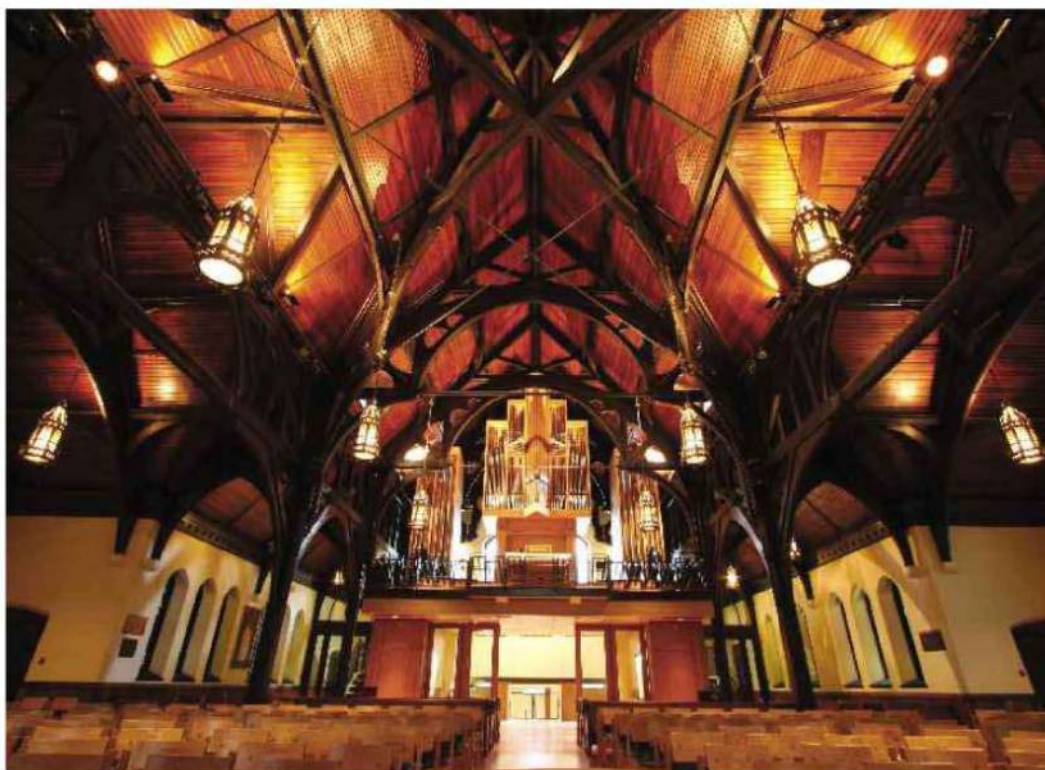
The number of megapixels a camera can produce was once the only tool of digital camera marketing, but these days you're likely to see mention of ISO, followed by a number like 1600, 3200 or even 6400. Simply put, the higher the maximum ISO number of a camera, the less light it needs to take pictures before having to resort to the flash. Why does that matter? Well, flash often isn't the ideal solution to throwing more light on to a scene. Where natural light tends to be soft and flattering, a flash will produce harsh shadows in all the wrong places. For a portrait picture, it can leave even the most attractive subject looking as if they've been out on the tiles every day for a month.

Why is the flash ever needed? It's because to get a correct exposure in low light conditions needs a longer shutter speed than the same shot in bright light. As the light level drops and the shutter has to stay open for longer, there's less chance you'll be able to hold the camera steady enough to avoid camera shake and a ruined, blurry shot. At very low light levels, a camera set to conventional ISO levels of between 100 and 400 might need the shutter to stay

open for a few seconds. That's completely useless for a candid, spontaneous shot of your friends – all you'll end up with is an incomprehensible blurry mess. That's when high ISO can come into its own. Double the ISO sensitivity and you'll halve the shutter speed you'll need for a shot. It's easy for a digital camera to increase its sensitivity – it simply electronically turns up the volume on the digital signals coming from its image sensor.

Here's an example: if you're indoors at a party with a camera set to ISO 100, you might well need a shutter speed of a blur-inducing half a second. Increase the sensitivity to 400 (which most compacts will do automatically in low light) and that reduces to 1/8th of a second. You might now just get away with a usable shot if you're very lucky (see p26 for more advice on keeping your camera steady to improve your chances).

But if your camera has an ISO 3200 setting, under the same conditions the shutter speed can be a moderately fast 1/60th of a second, and you're pretty likely to get a sharp image, especially if you put the camera into burst mode and take several shots (see p26).



A high ISO setting means you can capture low-light shots such as this without a tripod.



For low-light indoor shots, increase the ISO rating to get subtle pictures without harsh and distracting flash. The image noise can sometimes even add to the atmosphere of the shot.



In bright conditions where there's plenty of light, make sure you set your ISO level as low as possible for clean, noise-free images. With lots of light you don't have to worry about camera shake.

THE DOWNSIDE So why do digital cameras even bother with low ISO settings such as ISO 100? It's because the downside of setting a camera to a high ISO is image noise. It manifests itself in your pictures as coloured speckles and graininess. This is because when the camera electronically amplifies the digital signal from its sensor, it amplifies the noise inherent in all electronics – the effect is exactly the same as the increased hiss you hear when you turn a television or hi-fi up loud. The higher the ISO rating, the higher the volume and the worse the noise gets. It gets so bad, in fact, that until recently, most digital compact cameras couldn't be set above ISO 400 because the resulting pictures were absolutely terrible.

Fortunately, the situation is improving, which is why digital compacts now have settings up to ISO 6400. But don't be fooled into thinking that just because your camera has a setting of ISO 1600, 3200 or 6400 the shots will be usable at that level. You need to experiment to find the acceptable level. Remember, also, that what's acceptable will vary according to the subject.

TAKING CONTROL OF YOUR CAMERA'S ISO SETTING In fully automatic mode, a digital compact camera will usually try to keep the ISO setting as low as possible to ensure the pictures look clean and detailed. Rather than upping its ISO setting it will resort to using the flash, which isn't necessarily what you want. So pop the camera into one of its more advanced modes, such as aperture priority or program. Then dive into the menu system and look for the

ISO settings menu. In most cases, this will let you manually configure the ISO setting to suit what you're doing. Remember that this can work both ways: if you're outdoors taking a picture of a beautiful landscape in low light and the camera's held very steady or you're using a tripod, you can make sure the camera captures maximum detail by forcing it to use its lowest ISO setting (usually ISO 50 or 100). In lower light, where you don't want the harshness and distraction of flash but you're taking quick snapshots of your friends, set the ISO up high to capture candid moments. If your snaps are mainly going to be uploaded to websites such as Facebook, you can get away with a high ISO setting, since the effects of noise aren't nearly as obvious when pictures are scaled down for web use.



The downside of high ISO sensitivity is image noise, as you can see here.

HAVE YOU TAKEN A DIGITAL PHOTO TO FIND THE COLOURS LOOK WRONG?
CHANCES ARE YOU HAD PROBLEMS WITH WHITE BALANCE. HERE'S HOW TO FIX IT.

Mastering white balance

Like ISO sensitivity (see p64), the white balance setting on your camera is something that automatic cameras shield you from by setting it for you. They usually get it more or less correct, but they rarely get it spot on, and sometimes they get it spectacularly wrong. For general snapshots, it's safe to leave it set to automatic, but for a shot you really want to get right it takes only a few seconds to set the white balance manually to make sure your final pictures have great colour.

WHAT IS WHITE BALANCE? The only reason you can see objects is because they reflect light. Objects appear to be different colours because they absorb and reflect different light wavelengths. A white object – say, a piece of paper – looks white because it reflects most of the spectrum equally. But if the light falling on a scene isn't white itself, then, of course, a “white” object in fact isn't white. Since human perception is very clever, your brain normally compensates for this fact, and objects that you know to be white appear to be so. A camera isn't that clever, so in order to make white

things look white – and get the colour balance for the rest of a scene correct – it applies compensation by guessing the type of light falling on the scene and adjusting the image appropriately.

Sunlight has a stronger blue tint than the light from a tungsten bulb (the filament in a standard light bulb is made of tungsten). If you're outdoors and the camera correctly guesses you're in sunlight, it will reduce the blue in the scene and the colours will look neutral. If it gets it wrong and thinks you're inside under artificial light, it will boost blues, giving your outdoor shot a blue cast.

MAKING SURE YOU GET IT RIGHT To avoid the camera having to guess, you can explicitly tell it what sort of lighting conditions you're in by setting its white balance (often referred to simply as WB in camera menus). There are two ways to do this – one is quick and usually quite accurate. The second is only slightly less quick and will always give you spot-on accuracy if you do it right. See opposite for the low-down.

The left half of this photo shows incorrect white balance caused by the fluorescent lighting; the right half is corrected.



TIP

▶ Shots with the wrong white balance aren't lost. Although it's always better to get it right in the first place, you can fix incorrect white balance in software – turn to p120 to see how to do it.

HOW TO...

GET SPOT-ON WHITE BALANCE

It's strange to think that there are different definitions of "white", since your brain normally compensates for the difference in colour balance of things around you caused by differing conditions. Your camera needs help in deciding – here's how.

1 THE REALLY EASY WAY The quick method is very quick: just manually select one of the camera's pre-existing settings to tell it what sort of light you're shooting in. There's usually a choice of at least five. For indoor shots, there's tungsten (in other words, standard incandescent room lighting), fluorescent lighting or flash. If you're outdoors, there'll be two or three choices – often sunny, cloudy or overcast. Some digital cameras will allow you to set the white balance even in fully automatic mode; others need you to be in a semi-manual or manual mode such as aperture priority. Once you're in the right mode, just select the appropriate one and that's it. The only thing to remember is to reset it (or set it back to automatic) if the conditions change.

2 THE FAIRLY EASY WAY The not-quite-as-quick method is usually in the WB menus as either manual or preset. In this mode, you can inform the camera exactly what the conditions are by allowing it to see a white surface under the current lighting conditions.

3 FIND SOME PAPER To set the white balance manually, simply hold a piece of white paper or card – or any other neutral, flat object – in front

of the camera, so it fills the field of view. By neutral we mean pure white or grey, with no hint of any other colour. It can be quite tricky working out if a colour is neutral when you're not used to it, but if it looks warm or cool it isn't neutral. Make sure you arrange things so that the object is directly lit and there are no shadows across it.

4 HIT THE BUTTON Now go into the camera's menu and select the manual or preset option. You'll get a display similar to the one here, telling you to arrange your white object in the field of view. Press the shutter or hit the OK button (depending on your model) and the camera will record the scene. From analysing the colour of this neutral view, it can work out what the colour balance should be and record the scene faithfully. Your shots should turn out neutral with no false warmth or, more annoyingly, no shot-ruining colour casts.

Of course, there are times when you might want colours that are different to the real ones – you might want more warmth. Don't worry: the joy of digital photography is that all those things can be achieved later on when you transfer the pictures to your PC. It's almost always best to start with a faithful reproduction and use that as a basis for enhancement in software.



HOW HARD?

Simple, once you know how.

ESSENTIAL

A piece of white paper or neutral grey card or other object.



TIP

Bear in mind that metering modes are considered by camera manufacturers to be an advanced feature, and consequently you'll only tend to find a full range on more expensive camera models, although some wildcard lower-end cameras (even compacts) sport the full range.

CAMERAS HAVE SEVERAL WAYS OF ASSESSING THE LIGHTING IN A SCENE. IT'S WELL WORTH LEARNING WHAT THE DIFFERENCES ARE BETWEEN THEM.

Mastering metering modes

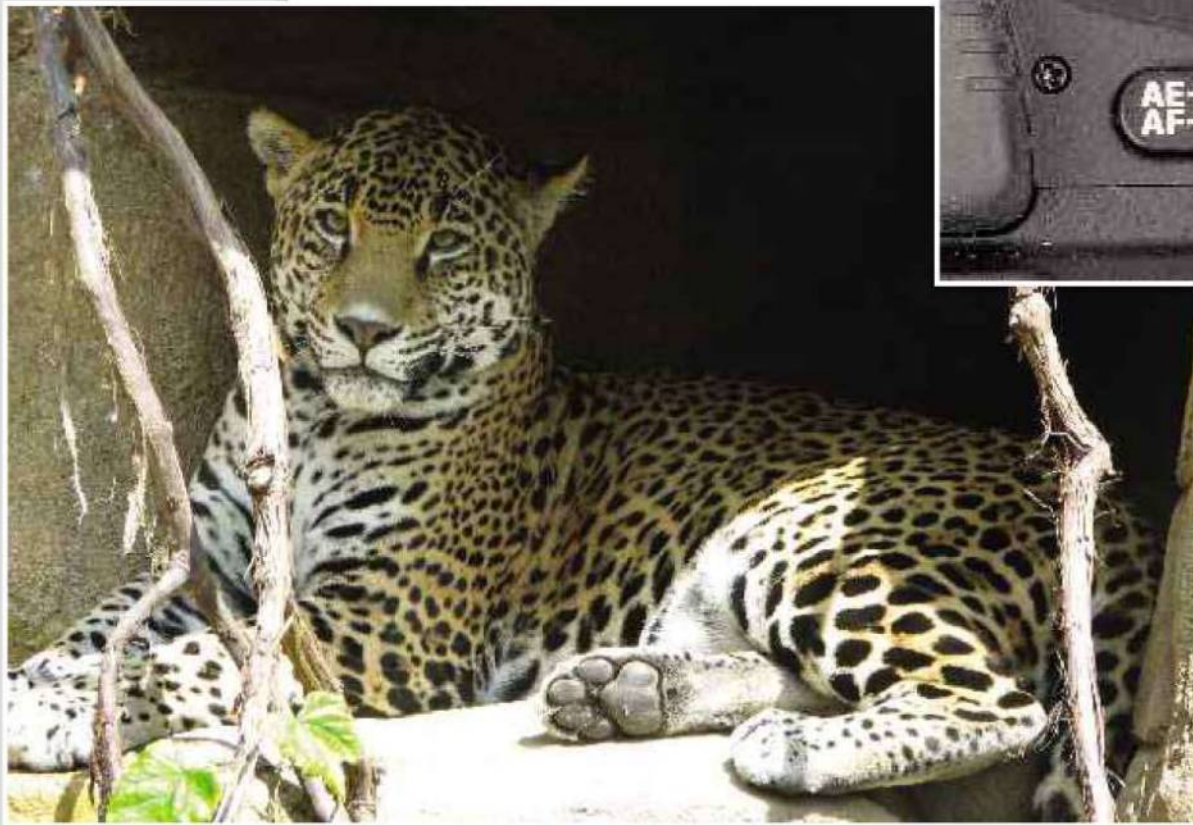
Photography is all about light, and you can't take a decent photograph without working out how much of it there is falling on the scene you're trying to photograph. It's almost impossible to guess correctly at the level of light in the scene, since your vision system is constantly altering its own exposure settings to compensate for ambient light. You'll need to rely on the camera's built-in metering system to get the correct exposure settings. But there are several ways for your camera to assess the light.

Remember that setting exposure – the right combination of shutter speed and aperture to capture a scene correctly – is often a compromise, since a camera can't fully record the whole range of light intensity in a scene (see p146 for more on this). So it comes down to a compromise: whether you want to expose correctly for a certain part of the scene and accept that other parts will be either in shadow (see below) or conversely blown out to white; whether simply to go for an average level that will get most of the scene

mostly correct; or whether to go for a mix between those two, with a bias toward the part of the frame you're more interested in. These three choices are essentially what different metering modes allow you to select.

MATRIX METERING Matrix metering, also known as evaluative and given all sorts of other posh names for marketing purposes, is the default metering mode for any camera when it's set to automatic. This is where the camera takes advantage of the power of sophisticated modern microprocessors and intelligently assesses the whole frame. It then tries to guess what sort of scene you're looking at, setting the exposure appropriately.

The method of deciding varies – some have built-in statistical models or databases to help them decide – but modern cameras now have very sophisticated computer algorithms for setting exposure using this method. They rarely get it very wrong, and you'll usually find you only need to override matrix metering when you want to achieve a specific effect.



DSLRs usually have an AE lock button to allow you to take control of spot metering.

The bright light in the foreground is just the kind of condition that can fool traditional metering, but modern matrix metering systems usually cope with it very well.

SPOT METERING The drawback of matrix metering is that, while it's effective, the camera doesn't know what your intentions are. If you're taking a shot of someone's face illuminated in a shaft of light, for instance, the camera is likely to set a middling exposure to try to get both the area illuminated by the strong light and the rest of the scene exposed correctly. This completely loses the drama of the shot – you wanted only to expose for the area of the face in the bright light, leaving the rest of the shot in shadow, as in the shot on the right.

This is where spot metering comes in. It meters the light from a very small point in the centre of the frame, allowing you to home in and expose for exactly the part of the frame you want. Of course, unless the subject you want to expose for really is in the centre of the frame, you'll need to use this in conjunction with the AE lock (auto-exposure lock) feature that all cameras have. In a DSLR, it's usually a dedicated button marked AE-L (see opposite). Pressing that will lock the exposure for that frame (or fix it for a few seconds), so you can aim the centre of the frame at the part of the subject you want to expose for, hit the AE lock button and then recompose the shot.

PARTIAL METERING This is a safer version of spot metering, used by Canon in some of its models. It's like spot metering in that it takes the light reading from a small portion of the centre of the frame, but it's a slightly larger area than usual – around 9%. This mitigates one of the dangers of spot metering, which is if you meter from slightly the wrong part of the frame – by happening to have the spot centred, for instance, on a reflection highlight – the exposure can be wildly wrong. Partial metering means you get most of the benefit of a spot-metering scheme but without the danger.

CENTRE-WEIGHTED AVERAGE This is the type of metering that was used by SLR cameras before microprocessor-based metering was possible. As the name suggests, it simply means that the camera measures the light from the whole scene and sets the exposure based on that average, but will give a little more priority to the centre portion of the frame.

Centre-weighted averaging is still included on many digital SLRs, but is mostly there to keep traditional film photographers who've grown accustomed to it happy. There's little reason to use it when matrix-metering is available. A few digital cameras also have a straight, non-centre-weighted averaging mode. Again, it's pretty much obsolete.



This is the type of shot where spot metering is an absolute must to get the dramatic contrast.

A digital exposure meter such as this will cost around £100.



SPECIALIST METERING TOOLS

Remember that the type of metering the camera does isn't always accurate. This is because a camera's meter has to be a reflective light meter. That means it looks at the scene and tries to guess the light falling on the objects by the light being reflected off them. The reason for unreliability is simple: different objects reflect different amounts of light. Say you're trying to photograph two cats: a black one and a white one. If you place them both in the same location one after the other, under the same lighting and then take shots of them with the camera's metering set to auto, the camera will almost certainly set a longer shutter speed for the black cat. Clearly, that's nonsense – the black cat isn't any less visible to the human eye than the white one and doesn't need different exposure settings. But the dumb camera sees less light being reflected from the black cat, so assumes it needs to set a longer shutter time, a wider aperture or a combination of both. The only way to eliminate such a metering error is to use a handheld exposure meter. This lets you measure the light falling on the object you're trying to shoot, and it will give you a readout of the right shutter speed and aperture for a correct exposure. You then need to drop the camera into manual mode and dial in the settings yourself. The drawbacks are that they're useless for quick action shots; they're one more piece of kit to lug around; and they're expensive – about £100 for an easy-to-read digital one. But you can easily get away without one and still achieve great exposures by paying attention to the histogram (see p70).

DIGITAL CAMERAS HAVE A SECRET WEAPON THAT TRADITIONAL FILM CAMERAS NEVER HAD – BUT ONLY IF YOU KNOW HOW TO USE IT.

Mastering the histogram

You might have encountered histograms in maths lessons at school, where they seemed to serve no useful purpose. The opposite is true in cameras. That's because they can show you exactly how well your image is exposed.

WHAT IS THE HISTOGRAM AND WHERE DO I FIND IT?

It's a simple bar graph (albeit one with a lot of bars), showing the distribution of light across a shot, and a typical one looks like some sort of cross-section of a hill or mountain. Almost all digital compacts have the facility to show it, and every digital SLR without exception will have it in its menu system somewhere. Look it up in the index of the camera's manual if you can't find it.

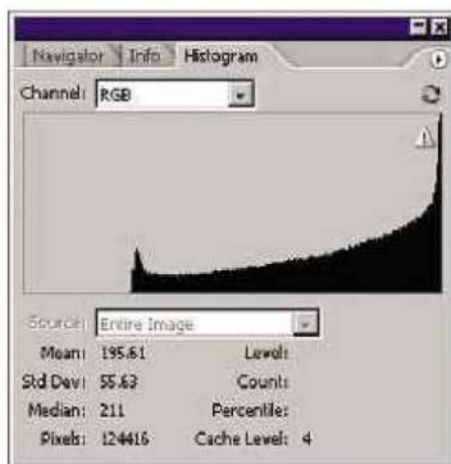
In a digital compact, you'll often find a real-time histogram preview mode. With a digital SLR this isn't possible, since the sensor is obscured until the mirror flips up when you take the shot; it will generate the histogram for the shot afterwards.

WHY DO I NEED CORRECT EXPOSURE? A correctly exposed image is absolutely key to getting a decent picture, especially in the world of digital. At the basic level, if your picture is underexposed, light areas will be dull and dark areas will simply be black. An overexposed image can be even worse: because of the way digital image sensors work, they have more of a tendency to blow out light areas of images than traditional film cameras do. Blown-out areas appear as solid white and look terrible – what's more, no amount of digital jiggery-pokery in software once the shots are downloaded to your PC will help. There's no detail in blown-out areas, and you can't enhance or get back detail that simply isn't there.

HOW THE HISTOGRAM WORKS The histogram display represents the distribution of light and dark pixels across the tonal range of your image. The extreme left-hand edge of the histogram represents completely black pixels, while the extreme right-hand edge represents completely white, and the rest represents all the intensity levels in between. The higher the line at a given point across the bottom of the graph, the more pixels there are of that intensity in your photo. So, an image that's predominantly dark in nature will show a hill that rises from nothing to a big peak on the left of the histogram, trailing off towards the middle and with little or nothing on the right. Conversely, a bright image will show the opposite, with the majority of pixels being light and thus the main hump of the histogram will be on the right.

DETECTING POORLY EXPOSED IMAGES The power of the histogram is that it's easy to detect when your exposure settings aren't optimal, leading to under- or overexposed photos. Since an overexposed image has a large proportion of blown-out pixels, which are solid white, the histogram display will look very distinctive. It will start with nothing on the left, rise sharply once it gets past the mid-point, and the very peak of your histogram mountain will be at the extreme right of the display. The main tell-tale is that there's no gentle roll-off: the graph will be abruptly cut off with a cliff on the right-hand side. If you get an image such as this you're almost certainly overexposing: simply dial in some manual negative exposure compensation to reduce the exposure level. Start with -0.3EV and take the shot again. If you still have cut-off on the right, reduce the exposure again until you have all your pixels nicely contained within the histogram range.

The histograms corresponding to the three images opposite. Note that the histogram for the correctly exposed left-most shot isn't clumped to one side or the other, whereas the incorrectly exposed shots are abruptly cut off to one side.





Conversely, if you're seriously underexposing, the histogram will be the mirror image, with a cliff on the left-hand side indicating a large number of black or nearly black pixels that contain almost no information and hence no detail. In that situation, you need to add positive exposure compensation until the pixels are all shifted to the right and there's no left-hand cut-off.

INTERPRETING MORE COMPLEX SITUATIONS With most photographic subjects, you'll be aiming for a histogram that resembles a symmetrical hill, rising gently from the left to peak roughly in the middle and tailing off gently to the right. That's because most scenes consist primarily of a range of mid-level tones and are neither very bright nor very dark. Indeed, in many correctly exposed shots, there'll be no pixels at all on the extreme left or extreme right – just a hump in the middle.

There are exceptions to this, though, which you need to be aware of. For instance, if you're taking a shot of someone with their back to the sun, a correct exposure will probably have a hill in the middle, but with a second big spike on the right. The reason for this is simple – you (or the camera's auto-exposure) have exposed for their relatively dark face, represented by the central histogram hump. That means the bright sky in the background is likely to be overexposed and

blown out to white, hence the spike. When you're assessing your histogram, keep in mind that if you're in a situation such as this you may have to assess the curve differently.

IN PRACTICE In practical terms, you don't need to check the histogram after every shot. What you should do is check it every so often and try to learn if there are situations when your camera's auto-exposure gets it wrong. And, of course, if you're taking a shot you really think is going to turn out great, give the histogram a quick once-over to make sure all is well. It will tell you a lot more than simply looking at the shot itself on your camera's screen, since it's very hard to determine correct from incorrect exposure on a tiny 2in monitor, particularly if you're in bright sunlight.



The left-hand image is correctly exposed, the middle overexposed and right-hand underexposed.

Checking the histogram of your shot will instantly show if it's correctly exposed.

IN THIS CHAPTER

74 Mastering file formats

Fine? Superfine? RAW mode? What are these things of which you speak? It pays to find out, so read on.

78 Mastering exposure bracketing

If you're worried about your best-ever photo opportunity being ruined by bad exposure, fret not.

80 Advanced DSLR settings

There are lots of settings in most DSLRs that can help your shots. We explain some of them here.

82 Dust and how to deal with it

The bane of many a digital SLR user, fortunately the problem of internal dust is easily dealt with.

CHAPTER 6

ADVANCED SETTINGS

Many photographers go through their whole lives without knowing very much about the specialised settings of their camera, and they still manage to take superb pictures. But that doesn't mean it won't pay to learn about and understand some of the more advanced features in your digital camera, particularly when it comes to the format you save your shots in. And if you have strange specks of something appearing in your photos, read on to see how to eliminate them.



DIGITAL FILE FORMATS ARE HARDLY THE WORLD'S MOST INTERESTING SUBJECT, BUT UNDERSTANDING THEM IS KEY TO GETTING THE BEST-QUALITY PHOTOS.

Mastering file formats

If you want to be an accomplished digital photographer, you need to know something about how your photos are stored when you take a shot and the camera transfers it to the memory card. That's because the way your shots are processed and stored on the card affect the quality of the final picture to a much greater extent than you might imagine.

JPEG AND HOW IT WORKS For all but a tiny proportion of high-end models, every digital camera uses JPEG (which stands for Joint Photographic Expert Group, the consortium that developed it) as its default file format for storing pictures. It wasn't specifically developed for camera use – the JPEG format was originally confined to storing and reproducing pictures and scans on computers. But it's specifically designed for storing photographic images, and it excels at what it does.

The primary function of a JPEG file is what's known as compression: taking the digital information that makes up an image and manipulating it so it takes up as little space on your memory card as possible. This compression means you can fit far more images on to a card than if it were stored completely uncompressed. To get the maximum amount of compression, JPEG is what's known as a lossy compression format, which means that in the process of compressing the file it throws away some of the image

data. It does this without apparently affecting the quality of an image by taking advantage of human perception. For instance, human vision is much less sensitive to colour than it is to brightness, so some of the colour data can be discarded without affecting the appearance.

COMPRESSION LEVELS You'll notice that your camera has several quality settings, usually called Standard, Fine and Superfine, or Low, Medium and Best. This affects the compression level of the resulting image – in other words, how much data is thrown away to reduce the file size: the higher the compression level, the more data is thrown away, and the smaller the file. The downside is that at high levels of compression, the quality starts to degrade. Characteristic artefacts of an overly compressed JPEG are noticeable blocks and fuzziness at the edges of objects. Photo-editing software almost invariably gives 11 levels of compression; one is the lowest quality but smallest, while 11 has compression that's almost impossible to detect but will give a file size of 3 or 4MB for a typical 8-megapixel image.

IN-CAMERA SETTINGS If you think about it for a moment, it should be obvious that if a camera has to convert raw image data into a JPEG image it needs to apply some processing. It's a side effect of the way digital sensors work that the results from a digital camera image, once it's

A photo converted from RAW and saved as lossless **TIFF**.



The same shot saved at **medium JPEG** quality. The difference in apparent sharpness is marginal.

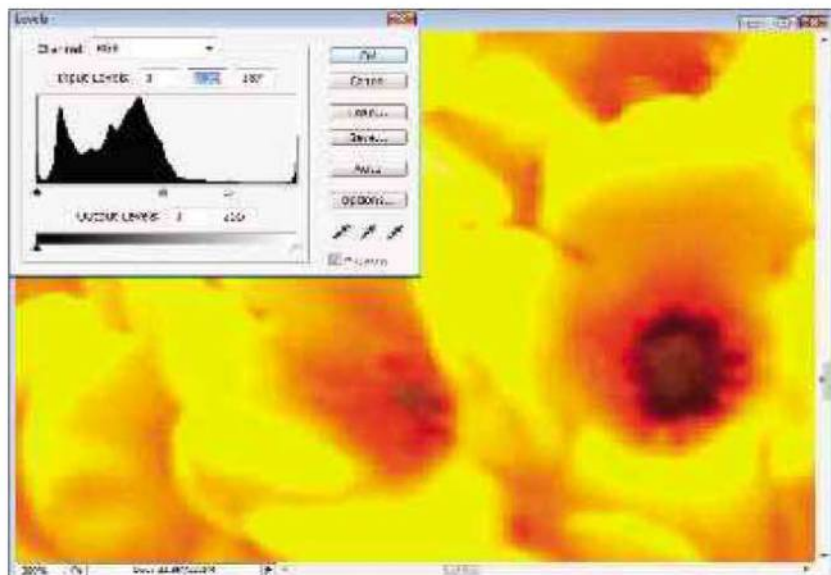


Now at **low JPEG** setting for a tiny file size. Note the obvious block artefacts.



TIP

The quality of the RAW file conversion software that manufacturers provide with their cameras varies wildly. If yours is below par, there's plenty of third-party software that will do the job.



Overdo your processing and nasty posterisation will set in.

been processed out of the raw domain and turned into a recognisable photo, are usually quite “soft”, and look like the image isn’t perfectly in focus. To compensate, a process known as sharpening needs to be applied (see p114). Also, to give images a little more punch, the camera will tend to increase the contrast and boost the colour saturation so that images look more vivid.

This is all very well and makes for JPEGs that most people will like. The trouble is you have no control over it, and if you’re serious about getting the best from your images it’s better to start with an image that’s as unprocessed as possible. For that reason, if you decide to shoot in JPEG (or your camera doesn’t offer a RAW mode), you should go into the menu settings and reduce the level of processing. This does vary between cameras, but almost all decent digital compacts will give you the option to alter the sharpness, saturation and contrast. Often there’s a three-level choice of -1, 0 or +1, with +1 being the default. The only difficulty may be working out whether the “real” neutral setting is -1 or 0 – sometimes, the -1 setting is artificially low. The best bet here is to consult the camera’s manual; they’re often surprisingly comprehensive on subtle technical points.

RAW FILES RAW files are also compressed in a way, since they’re not a complete image – they need to be processed in software (see below) and the colour information for each pixel reconstructed. For that reason, although a RAW file is larger than a JPEG file of the same photo, the difference isn’t huge. For a typical 8-megapixel camera, the standard best-quality JPEG size will be around 3MB, while a RAW file will be about 7MB. If you’re trying to squeeze as many shots as possible on to a card it will have an impact, but with storage so cheap these days (see p18), there’s little reason to avoid RAW shooting on grounds of their size.

REASONS TO SHOOT IN RAW MODE There are several very good reasons for shooting in RAW. A RAW file is the unadulterated data that comes straight from the camera’s sensor – it means very little until some extremely

sophisticated maths has been applied to the data to produce a final image. And since it’s the data before processing, the white-balance correction hasn’t been applied (see p66). That means if the camera’s automatic settings were wrong – or you’d accidentally left it on a manual setting of daylight when you were shooting in a basement – it doesn’t matter. You can simply click a button in your RAW file-converter software and change it to the correct setting. If you’d done the same thing with your camera set to JPEG mode, you’d have to alter it manually, which is a time-consuming process (turn to p121 to see how it’s done).

Second on the list of advantages is something known as exposure latitude. It comes as a result of the fact that the data for each pixel in a RAW file is usually stored using 12 digital bits. Those 12 bits allow the file to record 4,096 possible levels of variation in each colour. A JPEG image, on the other hand, stores each colour using only 8 bits. It doesn’t sound much different but, because of the way binary maths works, the upshot is you can have only 256 different levels of brightness for each colour.

That becomes an issue if you need to rescue an image that, for instance, isn’t correctly exposed. If you have to make large brightness changes, you’ll quickly find that an 8-bit JPEG hasn’t stored enough detail in each pixel: you’ll get what’s called posterisation effects, and horrible stepping of colours where there should be smooth graduations. With a RAW file, the extra detail stored in the file means you get far more leeway to make big changes to the brightness levels of an image (using, for instance, the levels and curves controls – see p115) before the effects of stepping start to become visible. In technical terms, you can correct the exposure of a RAW image by up to one “stop”. If, for instance, the shutter speed was set to 1/125th second and it should have been 1/60th second, you stand a chance of being able to retrieve a usable picture in software. With a JPEG image, you’ll be lucky to get half a stop’s correction before horrible artefacts start to make their presence felt.

Even if you’ve perfectly exposed your JPEG shot, a RAW file is still superior. The extra bits mean more fine detail can be extracted that might be lost during JPEG compression. ►

CHAPTER 6

ADVANCED SETTINGS

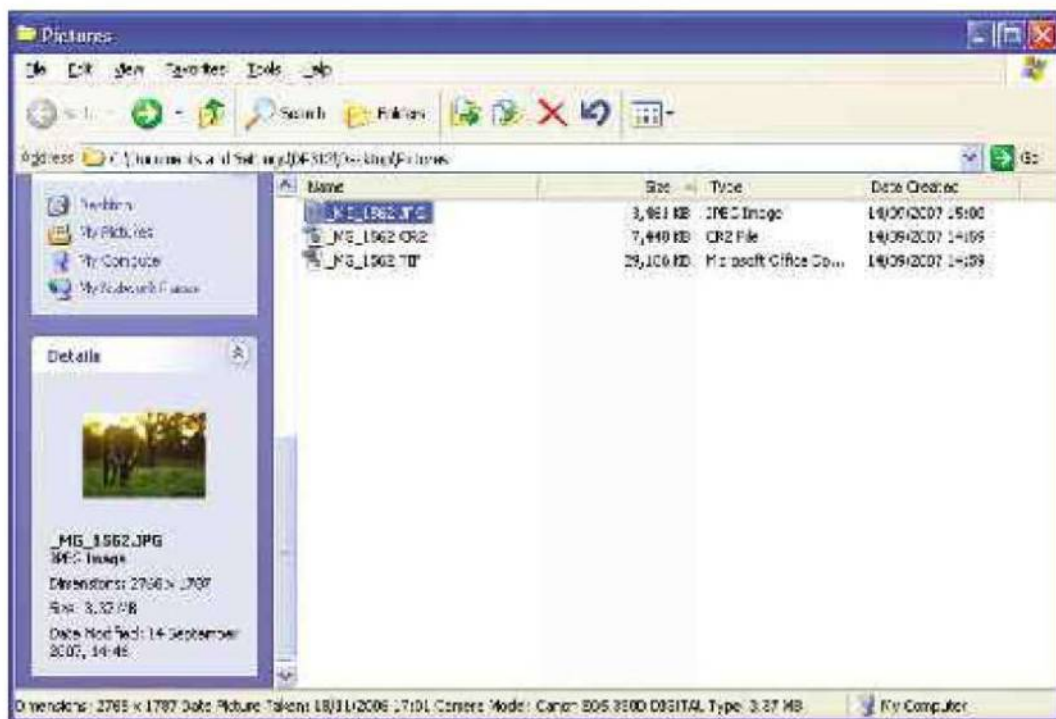
And there's one more advantage. The process of converting a RAW file to an image that a person can understand is complex, and the internal processing power of a camera is limited in what it can do in the second or so it has to process a picture into a JPEG and store it in the camera. With the power of a desktop PC, the conversion algorithms can be more sophisticated. In addition to that, conversion algorithms are still evolving, so in the future you may well be able to extract even higher-quality final images from your RAW files.

PITFALLS There's no denying, though, that shooting in RAW is less convenient than JPEG, and there are some problems. Although they're generically referred to as RAW files, there's no single format – every camera stores its RAW images differently and, unlike JPEG images, there are few apps that can open RAW files from any camera. In the past, there's also been some resistance to manufacturers making the details of their RAW file formats public, which leads to your digital photos potentially becoming obsolete and unreadable if a manufacturer drops support for them. You can guard against that, though, and still store your photos in their original raw form, by converting them to Adobe's DNG (digital negative) format. This doesn't decode your files to a normal format – it preserves the “rawness” but converts the data to a consistent RAW format, with an openly published specification that allows software writers to incorporate standard DNG support in their software. The converter is free, too: see the walkthrough opposite for more.

THE TIFF FILE FORMAT The final major file format in which digital photos tend to be stored is TIFF (Tagged Image File Format). The one great strength of TIFF over JPEG is that it's a lossless format – TIFF images can be compressed, but the compression doesn't throw away any data. A second strength is the fact that TIFF files can have a pixel depth of up to 16 bits per colour channel, as opposed to 12 bits for RAW and 8 bits for JPEG. That means that all the detail from a RAW file will happily “fit into” a TIFF image with no loss of data, making TIFF a perfect file format in which to save your RAW files once they've been converted and you've made adjustments to them. It also means that if you export from your RAW file conversion software into another photo editor for extra processing, there's lots of leeway to make sweeping changes – for instance, stylising the shot by hugely increasing the contrast – without posterisation and stepping creeping in.

The downside is that the lossless compression of a TIFF file is less effective than that of JPEG – far less so, in fact. Expect a TIFF image from an 8-megapixel photo to occupy as much as 40MB on your hard disk – that's 20 times that of the equivalent JPEG. A good way to work is to use TIFF as an intermediate format. Convert from RAW to TIFF, then make your final tweaks and edits and, when you're completely finished, save the result as a JPEG and delete the TIFF. That way, you'll still have the original RAW file plus the finished result of your labours, without the drawback of losing huge amounts of disk space to bloated TIFFs.

The same photo saved in three formats: JPEG, RAW (with Canon's .CR2 extension for RAW files) and TIFF. Note the huge differences in file size, ranging from around 3MB (3,461KB) for the JPEG to nearly 30MB (29,106KB) for the TIFF.



HOW TO... CONVERT RAW FILES TO DNG

Download Adobe's DNG converter from www.adobe.com/products/dng. You'll find it in Adobe's Camera RAW update for Photoshop package as a simple EXE file – just drag it to the desktop and double-click to launch it.

1

The tool is designed as a "one-shot" automated batch converter. Select source location and the converter works through and non-destructively converts every RAW file it finds, as long as that format is supported.

2

Hit the Select Folder button and navigate to the folder containing your RAW files for conversion. Note that you can select your "parent" folder containing subfolders with all your individual photo sessions' images in them.

3

Now select a destination folder for the converted DNG files to live in. You can also create subfolders in the destination folder that match subfolders at the source, or simply save all images flat into the destination folder.

4

Adobe Digital Negative Converter gives a raft of options for automatic file naming. It looks confusing at first, but if you select a couple of options at random then the Name Example field changes to show you what the result will be.

5

Hit the Change Preferences button. The setting of most concern is Image Conversion Method. Preserve Raw Image maintains the original pixel pattern of your RAW file; Convert to Linear turns it into a more standard format.

6

Now hit the Convert button. Note that if you've selected the option to embed the original RAW file in the DNG file, you can use the converter tool to re-extract the original file by using the Extract function at a later date.

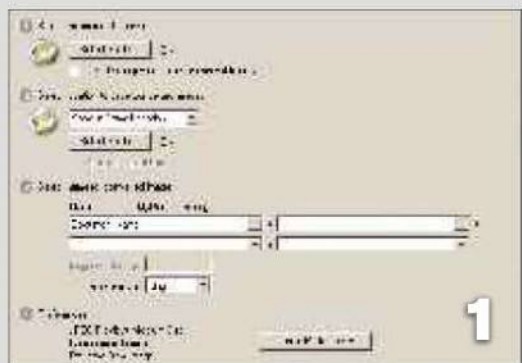


HOW HARD?

Straightforward, but some elements can be fiddly.

ESSENTIAL

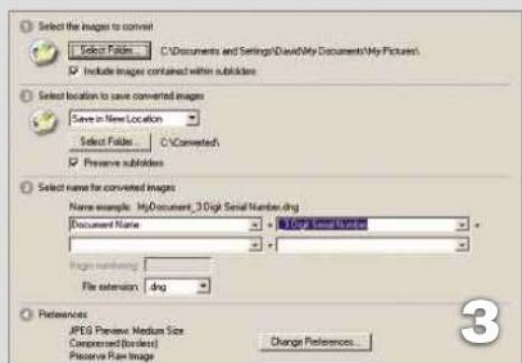
Concentration.



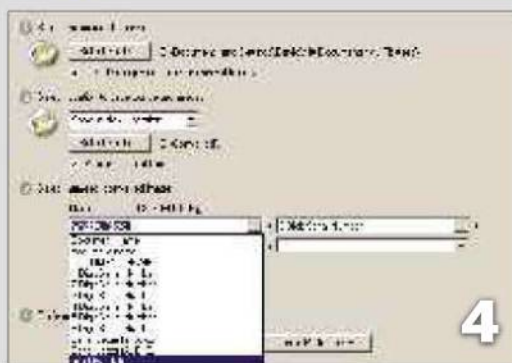
1



2



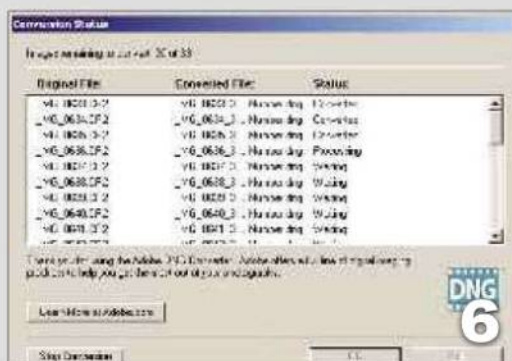
3



4



5



6

TIP

▶ If you open a JPEG and resave it, the quality will degrade. The more often you do this, the worse the degradation will be. If you're editing a photo, once you've opened it up save it to TIFF format, which is lossless, and only save to JPEG for final storage if you need to.

IF YOU'RE WORRIED THAT YOUR EXPOSURE SETTINGS FOR A SHOT AREN'T QUITE RIGHT, HEDGE YOUR BETS AND ENGAGE EXPOSURE-BRACKETING MODE.

Mastering exposure bracketing

A common technique in the days when traditional film photography was still king was something called exposure bracketing. The name sounds horrendously complex, but in fact the concept is simple. The idea is that if you're in tricky light conditions, where you think the camera's automatic exposure settings might be fooled and get it wrong – when you're shooting with bright light in the background, for instance, or shooting a very dark subject – you take more than one exposure. First, you take the one the camera thinks is correct, then usually two more – one with negative exposure compensation applied, and one with positive compensation. The idea is that, unless the camera really has things wildly wrong, by spreading the risk over three exposures one of them is likely to be correct (or close enough that it's salvageable).

Most digital SLRs – with the exception of the least expensive entry-level models – have an automatic exposure bracketing mode. You set the amount of compensation for each shot via the menu system and put the camera into burst mode. Now, when you hold down the shutter, instead of continuously firing, the camera

will take three shots, automatically setting the exposure compensation to bracket the exposures. Some DSLRs (such as the Nikon D80 shown here) also allow you to take just two shots – one uncompensated and one either under or over. You can also usually combine bracketing with exposure compensation, to bump up the whole set of three exposures. That means you can take three shots, all of which can be either under- or overexposed. This can be useful if you want to reel off a quick sequence to use in a composite HDR shot (see p146). If you use exposure bracketing frequently, it's worth checking out which cameras have a dedicated exposure bracketing button, so you can engage bracketing mode simply by hitting the button and turning the selector dial to set the amount of compensation – the Nikon D80, for instance, has one.

WHEN TO USE EXPOSURE BRACKETING The prime candidate for employing exposure bracketing is in situations where you won't necessarily have time to check your exposure between each shot, such as candid photography and

This squirrel monkey stayed still long enough for us to get a bracketed sequence. It's just as well, as the camera became confused and overexposed the middle, uncompensated exposure.

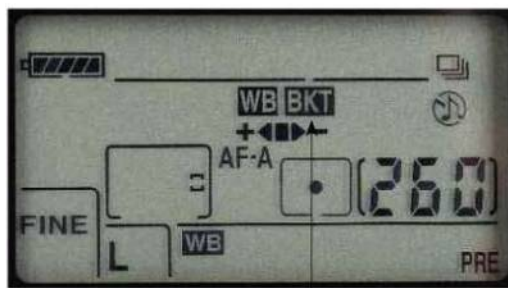


The uncompensated frame (left) shows blown-out highlights, and the +1EV frame (above) is clearly much worse.

The -1EV frame (left) turned out correctly exposed with plenty of detail. If we hadn't taken the bracketing sequence, the shot would have been difficult to save.



Digital SLRs sometimes offer a dedicated button to set exposure bracketing without resorting to menus.



A top-mounted LCD panel shows at a glance that bracketing is switched on.

DSLRs, high-end compact models and superzooms will all usually offer exposure bracketing.



outdoor events. It's a useful safety net to stop you getting home with what you hoped was the shot of your life, only to find that it was exposed incorrectly.

WHAT SHOULD THE BRACKETING BE SET TO? If you habitually use exposure bracketing in "safety net" mode, you're essentially trying to guard against the camera getting things pretty wrong. That means your bracketed exposures should be a long way from what the camera judges is correct. A good base setting is to go +1EV (plus one "stop") and -1EV (minus one "stop") over and under. There's a benefit to this: if the underexposure is fairly extreme, it can also help with shots in low light; when you're busy just trying to get the shot and not looking at the exposure times, sometimes the "correct" exposure is too slow to handhold the camera, but the underexposed shot is just fast enough to capture the shot without too much camera shake. In this situation, even though the exposure isn't ideal, you may be able to rescue the underexposed frame in software (particularly if you're shooting in RAW mode – see p74), and get a better end result that's free of camera shake. This is equivalent to the film photographers' old trick of underexposing to catch the shot and instructing the developers to compensate with the chemical process when producing the negatives.

THE DRAWBACKS The obvious situation where exposure bracketing isn't ideal is with sports or action photography. If you're using burst mode to try to get as many shots

as possible to capture that magic moment, exposure bracketing will just get in the way. If you have limited space on your memory card, you also won't want to use exposure bracketing – at least not habitually – since taking three exposures for every composition, only one of which you'll ever use, effectively cuts your storage space by two-thirds. It can also be annoying if you forget you're in bracketing mode and take just one shot, then move on. The next shot you take will be wrongly exposed, since the camera will still be in the middle of a bracketing sequence.

OTHER TYPES OF BRACKETING Exposure isn't the only setting you can bracket: most cameras that have exposure bracketing have a white-balance bracketing facility, too, although it isn't usually possible to combine the two. With white-balance bracketing, rather than under- or overexposing the shot, the two shots either side will be with the white balance set to a warmer (more yellowish) setting, and to a cooler (more blueish) one. If shooting in JPEG mode this can be a useful feature, since once the white balance is set in a JPEG shot it's hard to correct (see p121). It's less useful if you're shooting in RAW mode, as you can adjust white balance in a RAW file in a completely flexible way (see p74). Either way, if you're in doubt about your exposure, it's always better to go for exposure bracketing than white bracketing since you can't get back detail that's lost when a shot is incorrectly exposed.

BURIED IN THE MENUS OF MANY DIGITAL SLRs IS A RANGE OF SPECIALIST OPTIONS. HERE'S WHAT THE MAJOR ONES ARE USED FOR.

Specialist SLR settings

As well as providing the benefits of interchangeable lenses and generally better image quality, digital SLRs also tend to provide more in the way of specialist custom settings.

MIRROR LOCK-UP Buried in the menus of many DSLRs is this obscure-sounding setting. Its function is perfectly straightforward, but pretty specialised. If you're doing close-up macro photography it's worth looking at, though. All that mirror lock-up does is flip up the mirror in an SLR a while before actually taking the exposure, rather than flipping it up and immediately taking the shot. The mirror in an SLR has to flip up fast and it's relatively heavy, which means for very precise shots the vibration it causes can decrease the sharpness of the image. Some SLRs' lock-up simply flips the mirror two seconds before making the exposure, while others require two presses of the shutter (or, more likely, the remote release) – one to flip the mirror, one to take the shot. In all honesty, though, you

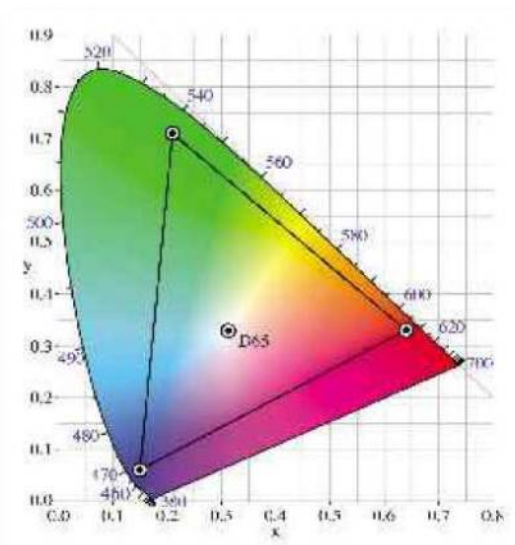
have to be taking extremely demanding specialist shots for mirror lock-up to be of any use at all, and even then it makes only the smallest difference.

COLOUR SPACE An increasing number of cameras allow you to select the colour space profile that's tagged into a shot. Colour space is a complex concept, but in essence it defines the gamut of an imaging device, whether that be a monitor, printer or camera. The gamut is the maximum range of hues a device can reproduce. The larger the gamut, the better able a device is to reproduce the colours in an image correctly.

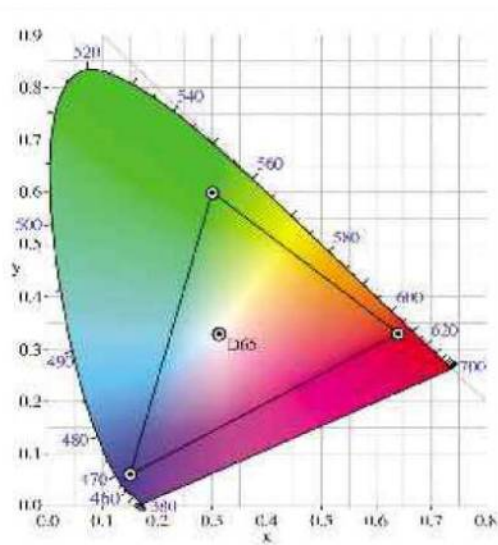
Traditionally, digital devices have used a colour space known as sRGB. The trouble is sRGB was developed over a decade ago to give consistent colour reproduction between devices of the time. It's a lowest-common-denominator colour space that's pretty limited in its gamut. With every passing year it becomes further out of date, as even low-end

Vibration can be a problem with extreme close-up macro photography. You can reduce it if your DSLR has a mirror lock-up function.





The triangle inside the colour graph above represents the limits of the modern Adobe RGB colour space.



This diagram shows sRGB. It's smaller and covers a more restricted range of hues, particularly in the deep greens.

devices can exceed the limits of sRGB. That's why many new DSLRs give the option to use the Adobe RGB colour space, which is a far wider space and gives better colour reproduction: in particular, it allows for richer and deeper greens (see diagrams above). By selecting Adobe RGB, you can ensure your shots aren't artificially limited in their colour range by equipment further down the reproduction pipeline. You should always select it if it's available.

AUTOFOCUS MODE The default autofocus setting for digital SLRs is often continuous (or servo) mode. This continually tries to keep the subject of your shot in focus, reassessing and refocusing if it moves. There are two problems with this: first of all, it doesn't do your camera's battery life any favours since autofocus requires a motor, and motors need large amounts of power. More significant is that it doesn't allow you to focus on a subject by pointing directly at it and then recomposing the shot – the servo focus will immediately refocus on what you're now pointing the camera at, which can be infuriating. Depending on how the focus area is set, it can also become confused by other objects moving in the frame and refocus on them apparently at random.

The solution is to drop the camera into single-shot focus mode. This means that when you half-press the shutter, the camera will focus on whatever falls into the sensitivity zone of its focus area and, thereafter, as long as you keep the shutter half-pressed the focus will remain locked. You can then reframe your shot confident in the knowledge that the focus won't change. DSLRs also offer a hybrid of single-shot and servo focus, whereby the focus will remain locked unless the camera detects significant movement, in which case it will drop into servo mode and attempt to track the subject. We've had limited success with this mode, as cameras simply don't have the intelligence to determine what the subject really is, but it can be useful for sports and wildlife photography (see p55).

LONG-EXPOSURE NOISE REDUCTION Most digital compacts and DSLRs offer a long-exposure noise-reduction setting. Long exposures suffer more from noise simply because there's more time for noise to build in the image. Noise reduction in this context isn't applied in software. The camera takes the shot, then closes the shutter and captures another frame (which isn't saved) over the same period. It then subtracts the noise from this "dark" frame from the image proper. In most cases, you'll want to leave this on, but if you're taking very long exposures it can be a problem. An exposure of a minute is inconvenient enough; another minute tagged on to the end of that is even worse. You may find that you can get away with turning off noise reduction; the main problem with long-exposure shots is often "hotspots" of noise – isolated bright pixels. These can be cleaned up using software on your PC (see p140).

SHUTTER CURTAIN SYNC Curtain sync is an important setting if you're into flash photography. It makes its presence felt if you're taking shots of moving objects such as cars at night, using long exposures to get interesting light trails along with fill-in flash to capture the car, bike or person in question. With standard curtain sync in a long exposure using flash, the flash will fire as the shutter opens, then stay open for, say, half a second to capture the light trails. But this will mean that the trails will precede the moving object – they won't look like trails at all.

Many DSLRs give the option to change this standard setup. The two options are known as "first curtain" and "second curtain" after the actual mechanism of some cameras, which consists of a pair of flexible curtains. To open the shutter, the first curtain slides across, exposing the light sensor. To close, a second curtain slides back over, shutting out the light.

By setting the curtain sync to second curtain rather than first, you'll get the effect you're looking for in night-trail shots. The shutter will open for the designated time, capturing the light trails. The flash will fire only as the shutter closes, illuminating the subject at the end of the light trail.

TIP

There's no point in using mirror lock-up unless you also have a remote shutter release, since pressing the shutter with your finger will produce far more vibration. Remote releases are available for all DSLRs and usually cost around £20.

DUST ON YOUR CAMERA'S SENSOR CAN RUIN GREAT SHOTS AND ADD HOURS TO THE EDITING PROCESS. HERE'S HOW TO TAKE CARE OF IT QUICKLY AND SAFELY.

Dust and how to deal with it

Being able to change the lens on a digital SLR is one of the major benefits of owning one, but frequent lens changing brings with it its own problems. Each time you take the lens off the body of your camera, dust can enter the body and find its way on to the sensor. With film cameras it was rarely a problem, since after every exposure the film was wound on so it could only ever affect one frame. But a digital sensor is always in there, and after a while it will start accumulating muck. A few specks you won't notice, but over the years you might find that areas of your images are disfigured by tiny black specks and shadows. The problem is exacerbated by the fact that the sensor in your camera is statically charged, so even if dust simply falls to the bottom of the mirror chamber there's a chance it will be picked up and stick to the sensor during normal use.

MINIMISING THE PROBLEM First, make sure the problem you have is actually dust and not some other problem such as image noise caused by shooting at high ISO (see p64). The way to tell for sure if specks and blotches on your images are caused by dust is to look at a series of shots. Dust marks will look the same and appear in the same place in each shot – image noise won't. Second, dust will usually be more visible (and sometimes only visible) in shots that were taken with a small aperture (say, f/16 or smaller). This is down to the same optical effects that give a deeper depth of field at small apertures (see p22 for more on depth of field). If you have specks on your image at small apertures but not at large ones, you can practically guarantee the problem is caused by dust.

Having established you have dust on your sensor, don't accept dust problems as a fact of life; there are plenty of steps you can take to avoid it when switching lenses. The first rule is location: ideally, you'll be inside, away from any open doors or windows, and away from contaminants such as animals and other people. If you simply must change lenses outside, make sure you shield the camera from the wind. And take care – never allow your fingers to get inside your camera. The best-case scenario is you leaving a dirty fingerprint on the mirror that reflects the image in the viewfinder. At worst, your tiny slip might permanently damage the sensor.

You can enlist gravity's help by keeping the camera pointing down to make sure nothing falls in it. This goes double if you're changing lenses outside: never point your camera at the sun.

Finally, make sure you're ready to swap lenses. Don't remove the unwanted lens before spending five minutes rummaging in your camera bag for the one you want. Have the secondary lens out, uncapped and ready to go. With a steady hand and a bit of practice (and, ideally, a

willing assistant) you should be able to go from one lens to another in less than 20 seconds.

SOLVING THE PROBLEM Once you've found dust on your lens, don't panic – professional photographers have been dealing with this problem for years and, in most cases, getting rid of dust is simple and safe.

But removing dust does involve working on your camera with its sensor exposed. Even though you won't be working directly with the sensor (there's a filter over it), you'll still be getting intimate with an extremely sensitive mechanical and optical system. Damaging your camera in an expensive or even permanent fashion is easy, so you should bear in mind some important tips.

First of all, never touch the sensor with anything not specifically designed for the job. This advice goes for fingers and promising-looking tools such as cotton-wool buds. Despite being good at picking up dust, they also leave tiny fibres in their wake, so you'll end up with more debris on your sensor than you started with.

So what should you do? First, you need to invest in some purpose-built tools. A manual air blower with a nozzle and bulb is the only kind of air you should introduce to your camera. Any high-street camera retailer will have a couple of options, and it shouldn't cost you more than about £8. Compressed air canisters might look temptingly professional, but it can be difficult to control the strength of the airflow, and they use propellants that can contaminate the airflow.

FIND THE RIGHT MODE Read your camera's instructions to find out how to enable its sensor-cleaning mode, which will flip up the mirror to expose the sensor. Don't just try to use a long-exposure mode: if the mirror snaps down, it will trap any tools you have inside the camera and very likely cause permanent damage.

For more stubborn dust you can buy purpose-built cleaning brushes. You statically charge the brush by blowing a few puffs of air on to it, and then gently pull the brush across the sensor. The static charge pulls off dust welded on to your sensor. This technique requires extreme caution and should only be used infrequently as a last resort. If you're in any doubt, there are plenty of manufacturer-approved workshops out there that will do the job for you.

Finally, if you've already taken photos that exhibit dust, getting rid of it is simple, particularly if the particles are small. Most photo-editing applications have a Clone tool, with which you can quickly draw over areas of your images by sampling nearby pixels. See p140-141 for more detail on getting rid of imperfections in software.

TIP

Many professional photographers recommend methanol-based solutions to clean sensors that have particularly stubborn specks of dust or – worse still – fingerprints on them. While these are certainly effective, bear in mind that methanol is extremely flammable, and so isn't something you'll be able to take abroad with you unless you intend to avoid planes.

HOW TO... GET RID OF DUST

If dust and specks of muck find their way into your DSLR, it's possible to deal with the issue yourself – you may not need to send off your camera to be repaired. But you need to be very careful: read every step before you start.

1 PREPARE YOURSELF This process requires great care and attention, so make sure you've found somewhere you won't be interrupted. You'll need to work on a stable desk, where there's no breeze, so close the windows and turn off any nearby fans or air-conditioning units. You also need plenty of indirect light – you should be able to see exactly what you're doing, without exposing your sensor directly to bright light. Use the camera's menu system to enable the sensor-cleaning mode; this flips up the mirror out of the way so you can reach the sensor. It doesn't hurt to make sure your camera has plenty of battery life left – if it runs out mid-clean, the mirror could unexpectedly flip down.

2 TAKE OFF THE LENS Next, you'll need to remove the lens. Find somewhere safe to put it and make sure you put the cap on the sensor end to prevent your lens getting grubby while it's out of the way. Your camera's sensor is now exposed, which is bad news if you make a mistake. You should bear in mind from here on in that your camera is in an extremely fragile state, and any significant mistakes could result in a huge repair bill. If you're in any doubt, close everything back up and take the camera to a professional.



3 GIVE IT A BLOW Take your manual air blower and give it a few experimental squeezes away from the camera to get rid of any dust that's accumulated in the bulb. Once you're happy you're getting nothing but clean air, hold it level with the camera's lens mount and gently blow around the sides of the sensor. Then – gently – blow air across the sensor itself. Each time you refill the blower, remove it from the camera first – you don't want to suck up dust only to redeposit it in the body. This should shift all but the most stubborn particles. If any visible specks remain, resist the temptation to blow much harder or – worse still – attempt to dislodge them with a fingernail.

4 PUT IT BACK TOGETHER Replace the lens and disable the sensor-cleaning mode. The mirror will flip down and your camera should be as good as new. To check, take a picture of a solid color with your lens zoomed all the way out, at a small aperture. View the image at 100% in your photo-editing application – any specks remaining will be prominent. If there are any visible, use the brushing technique described opposite. Finally, don't make cleaning your camera's sensor a regular habit. Occasionally, perform a check for dust, and clean the sensor only when absolutely necessary.



HOW HARD?

A simple process, but one that needs care and concentration.

ESSENTIAL

Handheld air blower, not an aerosol.

WARNING!

▶ This procedure could damage your camera's sensor. If in any doubt, use a manufacturer-approved workshop.

IN THIS CHAPTER

86 Mastering your monitor

An oft-ignored side of a PC's specification, for photo editing it's the most important component there is.

88 Mastering monitor calibration

Spent hundred of pounds on a fancy screen and not bothered to calibrate it? Time to correct this error.

90 Inside your PC

Here's the information you need to make sure your PC is up to the task of photo editing.

93 How much memory and hard disk space?

These are the two key factors when it comes to photo applications. Check you have it right.

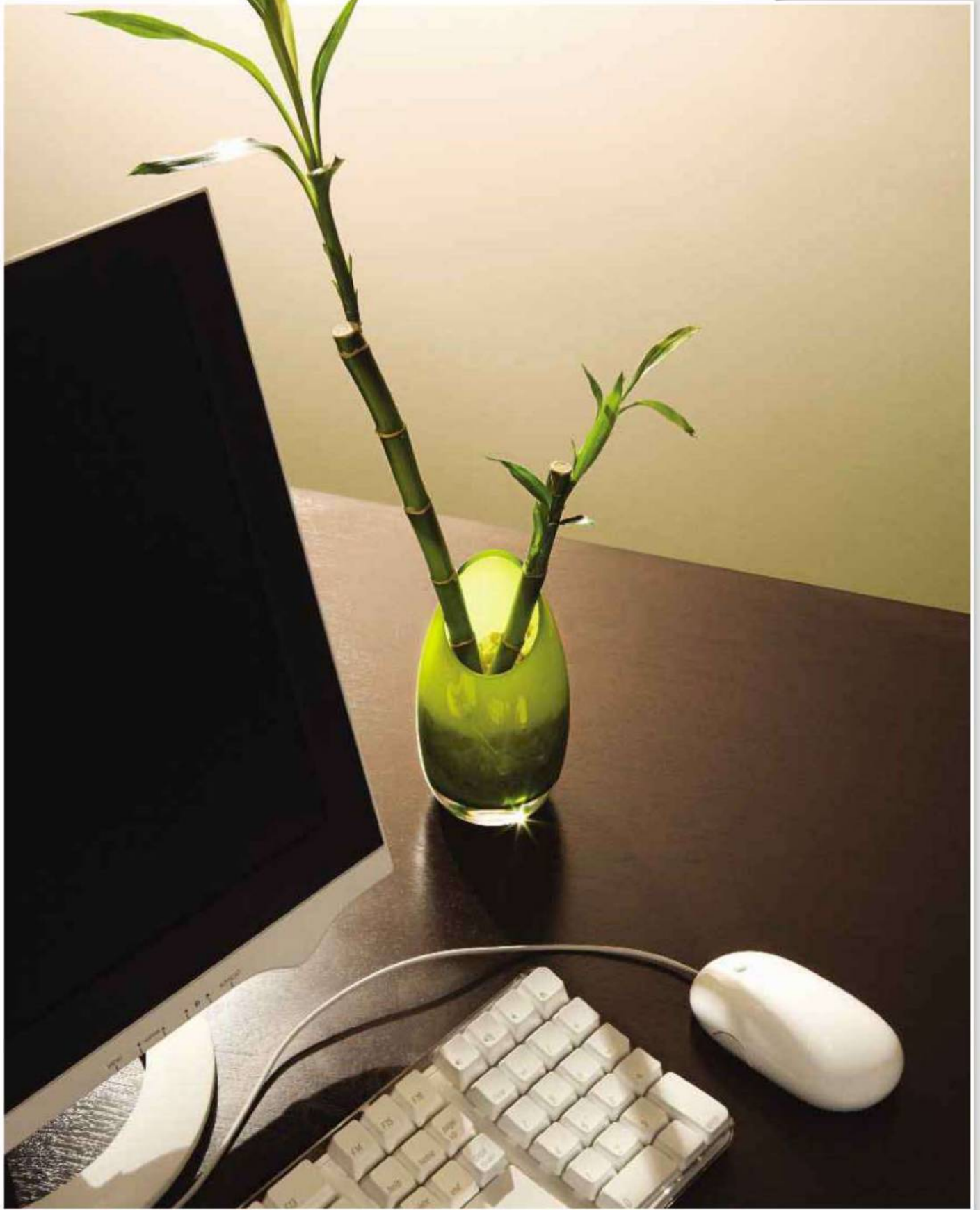
94 Adding a hard disk

If you're running out of disk space, try adding an extra disk. It isn't as hard as it seems.

CHAPTER 7

SETTING UP YOUR PC

There's a lot of talk regarding the specifications your PC requires in order to get started with photo editing. Internet forums are awash with people boasting about their quad-core computers with 8GB of RAM and 30in monitors, and how you absolutely must have something similar. It's all nonsense. The good news is that almost any modern PC is well up to the task. Over the next few pages, we'll explain which specifications matter and show you the ideal spec for a photo PC.



THE MONITOR IS ARGUABLY THE MOST IMPORTANT PART OF A PHOTO PC, SO MAKE SURE YOU CHOOSE WISELY AND SET IT UP PROPERLY FOR EDITING.

Mastering your monitor

The variables involved in choosing a monitor include screen size and resolution, inputs and connections and, most of all, budget.

SIZE AND RESOLUTION While many standard monitors remain in homes and offices, today's TFTs are predominantly widescreen. A 19in screen is the minimum you should be looking for, with a resolution of 1,440 x 900. The next step up is 20in and 1,680 x 1,050, but beyond that things become a little confusing. The resolution on 22in TFTs has traditionally been 1,680 x 1,050, but newer models have made the leap to 1080p (1,920 x 1,080). At 24in and 26in, the choice is between 1080p and the more useful 1,920 x 1,200, while there are a few 30in models with 2,560 x 1,600. Generally, more lines of pixels are better for editing, but a 1080p display may appeal if you also intend to watch or edit high-definition video. To pick the right model, read reviews such as those in PC Pro and look out for comments about colour accuracy.

CONNECTIONS A monitor usually connects to your PC via VGA (analogue) or DVI (digital) ports. The VGA port was originally designed to work with CRTs; as the scanning beam moves from line to line in the image, the voltage is varied to represent the desired brightness at each pixel.

With TFTs this is tricky since there's no longer a scanning beam, so the decoding process can result in distortion in the final image. With DVI, each pixel coming from the graphics card corresponds to one pixel on the display, so the resulting picture is accurate and sharp at all times.

Newer TFTs may also offer HDMI, which carries both audio and video and is commonly found on high-definition devices and games consoles.

MAKING ADJUSTMENTS A few monitors allow you to make adjustments to the picture through software, but most make use of the onscreen display, or OSD. Before you edit your photos, it's important to tweak your monitor's settings to ensure as accurate a picture as possible. You'll need to use some test patterns as a guide, and there are all sorts of utilities that provide them, such as DisplayMate (www.displaymate.com). But if you don't want to spend any more money, you can always create the test images yourself by following the steps opposite.

Monitors have a number of colour temperature settings. If your monitor has a 6,500K setting, you should use this as a base, and it helps to put a black-and-white image on the screen to see if there's any colour tinting. If there is, you should be able to adjust the red, green and blue levels on the monitor individually to eliminate the effect.



A widescreen TFT monitor such as this is ideal for photo editing, allowing you to see the whole photo and your software tool palettes at the same time.

HOW TO...

SET UP YOUR MONITOR

If you don't have any professional calibration tools or a copy of Photoshop, it's still possible to calibrate your monitor visually using free tools and your own created test images.

1

BLACK POINT TEST We're using the Gimp (www.gimp.org) for this example, as it's free. Create a new image with the same dimensions as your desktop and fill it with black, then create a new square somewhere within the image, out of the way of your monitor's OSD. With this square selected, open the Color Curves dialog and drag the starting point of the line from the bottom-left (0,0) position up to the (0,5) position. Click OK – the colour of your box will change to a slightly lighter colour, although this may not be visible at this point. Save the image. Open your monitor's OSD, reset to factory settings and choose the colour temperature 6,500K, or choose Native, Natural or your monitor's equivalent. Set the contrast level to 100% and then gradually decrease the brightness until the coloured box is only just visible over the black background.

2

WHITE POINT TEST Open the Gimp again and create another canvas the size of your desktop, but this time colour it grey. Create a medium-sized box within the image and colour it white. Then create a smaller box inside it, open the Color Curves dialog and drag the right end of the line from (255,255) down to (255,250). Click OK and maximise the image across your desktop. You should be able to distinguish

between the shades of the two boxes; if you can't, decrease the contrast of your monitor in the OSD.

3

GO BACK AND READJUST If you had to change your contrast level, this will have thrown the black test out a little. Go back to the black test image again and readjust the brightness until you can just make out the lighter box over the black background. Open the white test again to check that it hasn't altered results at the top end; if it has, readjust the contrast and keep going back and forth between the two tests until the results for both are satisfactory. If you have the time, it may be simpler to combine the two in one image, as shown below.

4

USE QUICKGAMMA Download the free QuickGamma tool (www.quickgamma.de/indexen.html), install and run it. Adjust the gamma level using the up and down arrows at the top right. The ideal is to have the patterns indicating a gamma of around 2 – that is, the patterns on the left converge at around that point on the scale, and the Black A bar only becomes visible over the black background at around that point. You can also adjust the gamma for each individual colour.

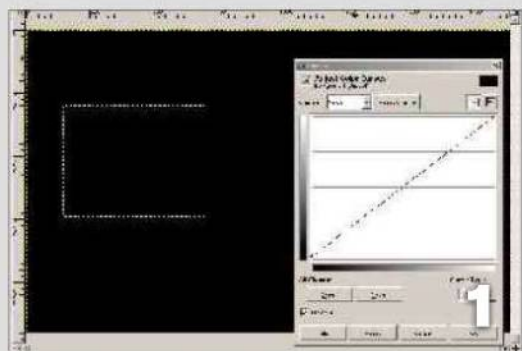


HOW HARD?

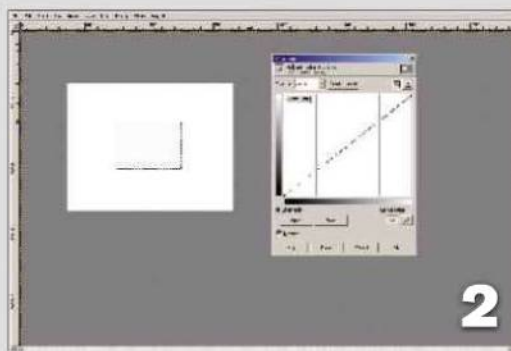
Simple enough, but it can be fiddly to get absolutely right.

HOW LONG?

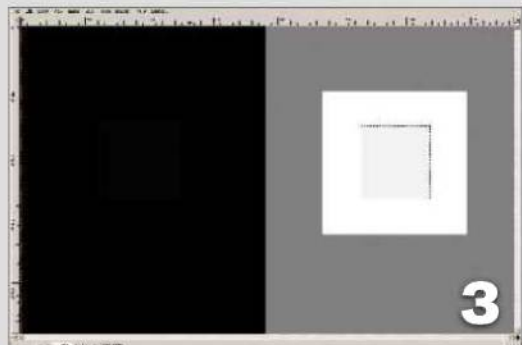
Don't get too obsessed – half an hour is fine.



1



2



3



4

EVEN AT HOME IT'S POSSIBLE TO CALIBRATE YOUR MONITOR LIKE THE PROFESSIONALS USING A SIMPLE PIECE OF HARDWARE.

Mastering monitor calibration

The human eye is phenomenally good at correcting white balance: if you see a white wall in shadow, you don't interpret it as a dark shade of grey, but as what you know it to be: white. In the same way, this makes it impossible to tell by eye if your TFT is displaying truly accurate colours. Even the most subtle of variations in colour can mean the difference between a lifelike skin tone and one that looks wrong.

The instructions on the previous pages don't cost a penny and will serve most users fine, but if absolute colour accuracy is required, there are ways of properly calibrating your monitor. The simplest is to buy a calibration tool, such as the DataColor Spyder3 (www.datacolor.eu), which is available in several versions to suit the home amateur right up to the photography professional. A device such as the Spyder3 eliminates the human eye completely from the calibration process, something software calibration utilities such as Adobe Gamma simply can't do. Instead, the Spyder3 uses its own test patterns and a colourimeter sensor to adjust the brightness, contrast, gamma and colour tones.

HOME BASIC As with all commercial hardware, you get what you pay for with the Spyder range. The basic Spyder3express has certain limitations, such as fixed gamma and temperature settings, plus a lack of multiple

monitor and projector support and RGB pre-calibration. But at around £77, it should more than meet the needs of the average home photographer with a single PC and a hard disk's worth of images.

The mid-range Spyder3Pro is nearer to £114, but offers four choices of monitor gamma and four of colour temperature. This makes it more accurate than Spyder3express, and it also supports RGB pre-calibration, comes with an embedded ambient light sensor, and can be used on more than one display.

THE TOP CHOICE Keen amateur photographers may want to splash out £160 or more on Spyder3Elite for the ultimate in monitor calibration. It offers unlimited choice of monitor gamma and temperature, supports multiple monitors and projectors (including a projector-mounting adapter), and offers ColorVision's Ambient PreciseLight function for increased accuracy.

If you need to calibrate only a single monitor, the price may make the Spyder3 overkill, particularly if you're simply tweaking your photo collection at home for your own enjoyment. But if colour accuracy is crucial, we recommend at least opting for the affordable Spyder3express version, especially if you intend to print your photos with any degree of colour accuracy.

Hardware calibration devices connect to a USB port on your PC, and take their power from the port, too.

During the calibration process, the hardware calibrator is positioned over the monitor to directly measure the colours.



The calibrator is supplied with custom-written software and communicates with the device itself during the process.

Any monitor will benefit from calibration, no matter how old.

HOW TO... CALIBRATE YOUR MONITOR

Make sure the colours you see on your TFT screen match those you see in real life by using a hardware monitor-calibration device. We show you how, using the Spyder range from DataColor.

1

PREPARE FOR CALIBRATION For the most accurate results, make sure there are no light sources shining directly on the screen, so turn off all desk lamps and close the blinds. Other than that, try to keep lighting conditions similar to how you usually view the monitor. Before you begin, reset your display to factory settings by going into the onscreen menu, using the buttons on your monitor. On your PC or laptop, disable any third-party monitor-calibration software you have running at startup (look in the Start menu | Startup folder if you're not sure), set the resolution to a minimum of 1,024 x 768 and colours to a minimum of 16 million (24-bit). Insert the CD, install the software, then plug the Spyder in via USB and run the application from the icon on the desktop.

2

CHOOSE THE DESIRED PROFILE It will give you a few preparation notes to follow, much as in Step 1, and allow you to select your display if you have more than one. Depending on your version of Spyder, you may then need to choose a desired colour profile: for most purposes, 2-2-6500 is the most suitable so, unless you have a particular profile in mind, select this and confirm all the settings when presented with the summary screen.

3

TAILOR IT TO YOUR MONITOR Different monitors have different settings in the OSD.

Tick the boxes to match yours, choosing from brightness, contrast and backlight. You'll then be presented with two screens allowing you to tweak your white and black balance if necessary. If you can't see four distinct shades of black or white you may want to tweak your brightness and contrast as instructed. Again, you'll be given tickboxes for your monitor's colour settings: select from RGB sliders, Kelvin slider or Kelvin presets. If you have Kelvin presets, it's preferable to use those and leave the RGB box unchecked.

4

RUN THE CALIBRATION Choose the temperature or RGB settings closest to the example given and hang the Spyder over the top of your monitor. Line it up with the onscreen example and click Continue to begin the calibration process. If you ticked the RGB slider box, you'll be presented with a read-out of the best way to alter your colours; tweak them as instructed, then keep clicking Update to recalibrate and see how close you are to the ideal. Once the process is complete, you'll be shown a before-and-after demonstration, then prompted to save the profile, at which point it will become your default colour profile.

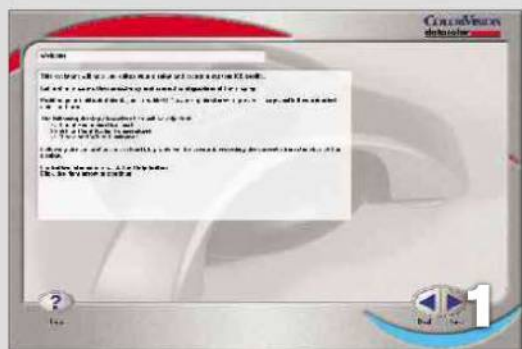


HOW HARD?

Novice.

ESSENTIAL

A hardware calibration device – see main text.



MOST RECENT PCs ARE UP TO THE TASK OF EDITING PHOTOS, BUT THERE ARE SOME KEY COMPONENTS THAT MAKE A REAL DIFFERENCE TO PERFORMANCE.

Inside your PC

If your PC is less than four years old, chances are it has the power to run photo-editing applications without breaking much of a sweat. Take the system requirements for the latest version of Adobe Photoshop Elements, for example: Microsoft Windows 7, Vista or XP, a 2GHz processor, 1GB of memory, 1.5GB of hard disk space, a 16-bit colour monitor with a resolution of 1,024 x 768, a DirectX 9-compatible graphics card and a CD-ROM drive.

Those are the lowest possible specifications, and naturally you'll see much better performance as your system's specification outstrips the minimum requirements. Look at the requirements for Photoshop CS4 and there are precious few changes: a 1.8GHz processor and at least 512MB of RAM, although Adobe recommends twice that for reasonable performance.

YOUR PC Compare your PC against this list and it's likely that the hardware exceeds it in most areas. The hard disk is likely to offer scores of gigabytes rather than just a handful, and that will prove useful since you'll be able to store just about every image you shoot instead of only being able to keep the best ones.

Bear in mind that – as mentioned on p74-77 – RAW files take up considerably more disk space than compressed JPEG files, usually around four to five times as much. If you're shooting in RAW and JPEG formats simultaneously, you'll quickly fill a gigabyte of disk space.

However, in terms of processing and editing photos on a PC, it isn't the capacity of a hard disk that really matters: it's the speed. As a rule of thumb, the newer the hard disk, the faster it will be. This is because data is packed more tightly on to the disk and can be read and written faster. That becomes important when you're opening multiple files in Photoshop – a faster disk will make this process much quicker.

Spindle speed plays a big part in hard disk speed, and this is particularly important if you have a laptop. While virtually all desktop PC hard disks spin at 7,200rpm, laptop hard disks vary between 4,200rpm, 5,400rpm and 7,200rpm. If you're buying a new laptop for editing photos, go for the fastest spindle speed.

Finally, don't believe anyone who tells you that a Serial ATA (SATA) hard disk is inherently faster than a Parallel ATA (PATA, or EIDE) version. The interface has absolutely

Your **hard disk** is likely to be plenty big enough to store all your photos, but if you're running low on space you can add an extra one – see p94 for more.

The **processor** is a vital part of a PC system, but almost any PC sold in the past couple of years will have more than enough processing power.

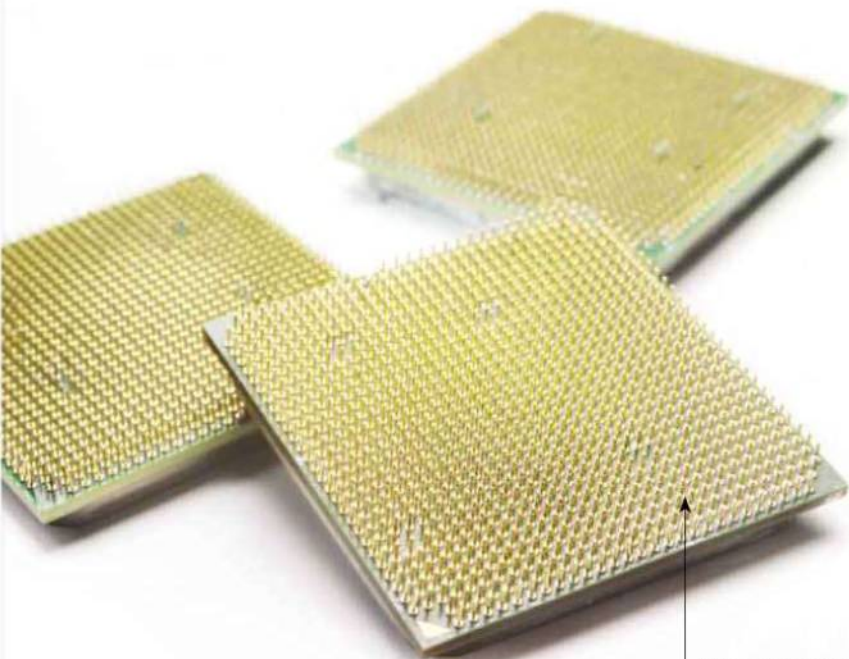
The amount of **RAM** you have is crucial – the more you have, the more responsive your photo-editing application is likely to be. Aim for 1GB or more.

You may find that you don't have a separate **graphics card** – some cheaper PCs have a **graphics chip** integrated into the motherboard, but this won't hold your system back.



TIP

► If you'd rather use a laptop, the same principles apply: lots of RAM, a big hard disk and a dual-core processor are all desirable. Consider adding an external hard disk to store your photo collection.



Modern processors are immensely powerful, and AMD's Phenom X4 range is both fast and incredibly inexpensive.

no impact on performance – the only reason a SATA disk might be quicker is simply because it's a newer model.

MEMORY When you open a photo that's stored on the hard disk, it's loaded into the PC's memory – it isn't manipulated directly from the hard disk. This isn't just an intensive process for your hard disk: it's also extremely demanding on your system's memory.

Memory technology has advanced quicker than hard disks, so you might find anything from DDR to DDR2 or even DDR3 RAM inside your PC. However, rather than worrying about the technical details of how fast your memory is (naturally, faster is better), be more concerned with how much of it you have.

Adobe recommends 1GB of memory for Photoshop Elements, but it's advisable to have 1.5GB or more if possible. Once Windows, your image-editing program and various other applications are running, the amount of free memory on a PC with 512MB of RAM could be as little as 200MB. That might sound as though it will be enough based on a 3MB JPEG image, but don't forget that this is a highly compressed file format. When an image-editing program opens a JPEG file, it has to decompress it: the real size is closer to 50 or 60MB. By the time you've opened three files you could easily find that your system has run out of memory.

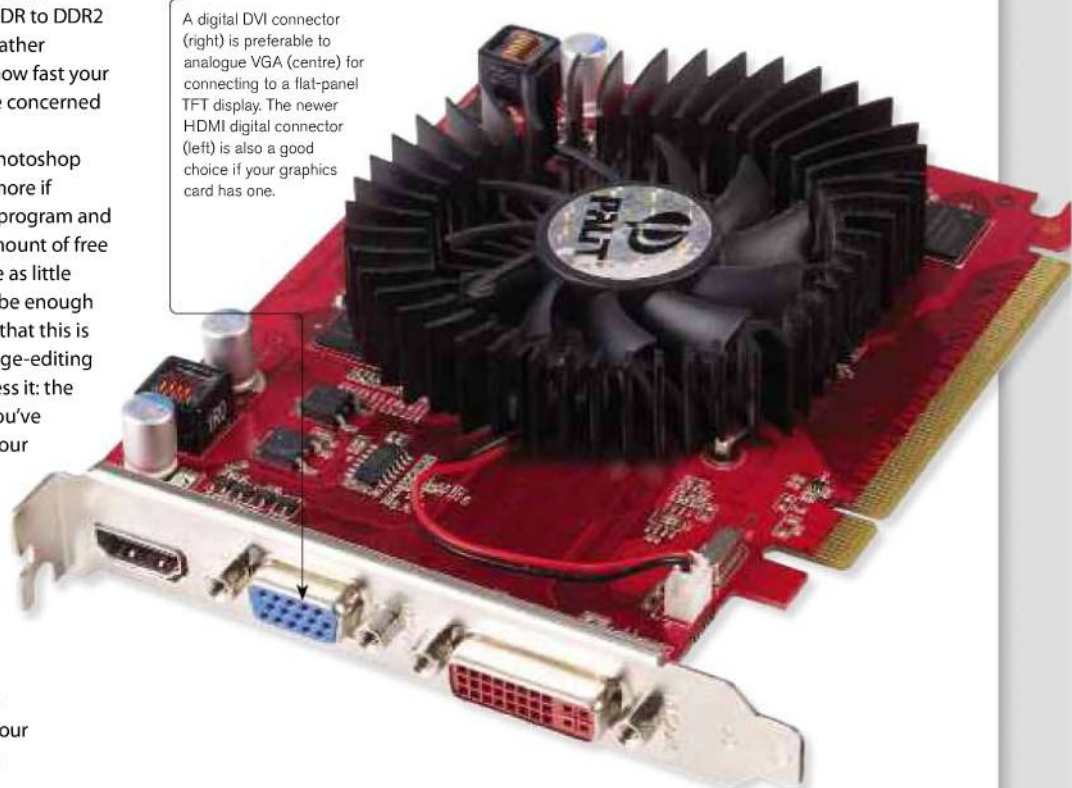
When this happens, the hard disk is used as an overflow area, but since hard disks are several dozen times slower at transferring data than RAM, it will lead to long waiting times if you try to open too many images.

Running out of RAM is the cause of your PC "thrashing", when the hard disk light seems to be permanently lit and doing anything takes forever, as data is frantically swapped between your RAM and the hard disk. This doesn't just impact

on your photo-editing application; the rest of your system will slow down as well.

PROCESSOR Your PC's processor becomes an important factor when you want to apply effects to images. Whether it's a saturation adjustment or a complex blur, there's a lot of number crunching that goes on behind the scenes to calculate what the colour of each pixel should be once the effect has been applied. When there are 10 million pixels in an image, there's more to do than you might at first imagine. Luckily, modern processors are hugely capable. The best processors around at the moment for a reasonable amount of money are AMD's Phenom X4 range. These have four processing cores, which means an application can run in one core while the rest of the OS and apps run in another. Even the low-end models have more than enough poke to keep your photo-editing software happy.

GRAPHICS CARD There's a popular myth in some quarters that for photo-editing work you need a high-end graphics card in your PC. This isn't true. A decade ago it made a difference, but for 2D work in Windows absolutely any modern graphics card will do. What's desirable is a card with a digital DVI-I or newer HDMI connector. This allows you to connect it directly to a flat-panel display without any loss in quality (see p86 for more). The only practical benefit between a low-end graphics card (or one that's integrated directly into your PC's motherboard) and a high-end one is a few features in Photoshop CS4 and CS5 – otherwise, you'll see a performance increase only in 3D games.



A digital DVI connector (right) is preferable to analogue VGA (centre) for connecting to a flat-panel TFT display. The newer HDMI digital connector (left) is also a good choice if your graphics card has one.

How much memory and hard disk space will I need?

Before shelling out on extra memory and a new hard disk, it's worth considering whether you actually need them. If your PC has only 256MB of RAM, you'll find that Windows runs sluggishly, never mind photo-editing applications. Generally, 512MB is the minimum you'll need to keep a Windows XP PC running smoothly, and 1GB is preferable to give you breathing space. If you use Windows Vista or Windows 7, double those figures.

If you find yourself waiting around for your editing application to redraw the photo after you've applied an effect or dragged it to a new position, you might benefit from more memory. Sluggishness can be caused by a slow processor as well, so adding lots of RAM to a PC with a 1.3GHz processor won't necessarily help. Although you can never have too much RAM, going beyond 2GB will usually help only if you're planning on having several images open at once or adding more than two or three layers in your image-editing application of choice.

If you need more memory, the good news is that it's easy to add to most PCs. Most motherboards have four memory sockets, and two are usually free. All you need to do is find out exactly what type of memory you already have so you can match the new RAM to it. A visit to www.crucial.com/eu can help here, as there's a System

Scanner that can advise you of recommended upgrades. Also visit Crucial's site if you have a laptop – the System Scanner will tell you how many sockets you have free.

HARD DISK SPACE If your PC is less than three years old, it's likely you'll have enough hard disk space to store all the photos you'll ever take. Although individual photos vary in size depending on what you're shooting, JPEGs rarely exceed 5MB, even with the latest 12-megapixel cameras. If an average JPEG is 3MB, a modest 250GB hard disk with 100GB of free space can store more than 30,000 photos. Even if you took 20 photos per day, it would take more than two years to fill 50GB.

Assuming you want to shoot in RAW mode (see p74) and store every single photo you take, a bigger disk is obviously better. In addition, newer disks are generally faster than older models, so you could benefit from faster loading times if you do upgrade. As with memory, adding a second hard disk is relatively straightforward – you can find a guide over the page.

An alternative is to archive your photos, or only those that didn't quite make the grade, to an external hard disk. These can cost well under £100 for hundreds of gigabytes of storage, and have the bonus of being portable.



TIP

▶ For Windows XP, 1GB of RAM is the "sweet spot". If you have Windows Vista or Windows 7, however, you should think about getting 2GB in your PC.

ADDING A SECOND HARD DISK CAN BE EASY AND INEXPENSIVE, SO HERE'S HOW TO INCREASE YOUR PC'S STORAGE IF YOU'RE RUNNING OUT OF SPACE.

Adding a hard disk

If you've never taken the side panel off your PC, installing a second hard disk may seem a daunting prospect. But the reality is that the job can be done in less than 20 minutes, and you'll gain gigabytes of fast-access storage for all your photos.

Most PCs are built so that you can access everything after removing the left side panel (when looking from the front of the computer). Usually, two screws at the rear are all that holds this panel in place, and some PCs may not even require a screwdriver to remove them as they can be unscrewed by hand. Other designs may require you to pull off the entire front panel (a good pull from the bottom usually does the trick) before the screws are accessible. Fewer still may have a key lock at the rear or side.

HEAD INSIDE Once the screws are out, simply slide off the panel (either rearwards or frontwards depending on where the screws were) and you'll have a good view of the parts that make your PC tick (see photo on p90). The large circuit board mounted on the opposite side of the case is the motherboard, and all the other components connect to this in some way. At the top of most cases is the power

supply; below it is likely to be a large, finned metal block with a fan on top – this is to cool the processor.

The long, thin circuit board(s) are the main memory, and usually at the lower front is the hard disk – a rectangular box around 1in high. There are two types: parallel and serial (or SATA). This simply refers to the interface by which the disk is connected to the motherboard. If your disk is connected by a wide ribbon cable, it's a parallel disk. If it has a thin cable around 20mm wide, it's a SATA disk. If your PC is less than four years old, it's likely to have a SATA disk.

TIME TO EXPAND Most PCs have spare bays to install two, three or even four hard disks, but you'll also need to check if there are spare power connectors on the power supply. And even if your PC has a parallel disk installed, the motherboard may have SATA connectors so you can install a more modern second hard disk.

Capacities and prices vary proportionately (see p93 to see how much space you'll need for photos), but expect to pay about £40 for a 500GB disk, £60 for 750GB and about £70 for a 1TB drive (1TB = 1,000GB). Currently, 2TB is the largest capacity available in a single disk.

TIP

Hard disks are delicate. Handle them with as much care as possible and never, ever drop, knock or bash them.

TIP

If you want to install a SATA disk but your power supply doesn't have any SATA power connectors, you can buy inexpensive adapters from all good computer retailers.



HOW TO...

ADD AN INTERNAL HARD DISK

The simplest way to increase your storage is by adding an external USB hard disk, but you'll get better performance and less clutter by installing an internal drive. It's also cheaper than an external disk of the same capacity.

1 TURN OFF YOUR PC Before you start, switch off your PC, remove the power cable and press the power button a couple of times to discharge any residual electricity. Remove the side panel and identify a space for the new hard disk to be mounted in. Also locate an empty SATA or parallel connector (the SATA connector is red in the picture, and parallel is turquoise). Even if there's no empty parallel connector, there may be a spare connector on one of the ribbon cables that's plugged in – each one can support up to two devices. Follow the route of the cable to find out.

2 MASTER AND SLAVE If you're installing a parallel disk, you'll need to set it as a "master" or a "slave". This is done using jumpers: little clips that you slide on to pins found on the back of all parallel hard disks. It's best to do this before sliding the disk into position, partly because it may be difficult to reach them once the disk is inside the PC, but also because the jumper settings guide may be printed on top of the disk, and this is even harder to read inside a PC. Assuming your PC already has a parallel hard disk installed, you'll want to connect the new disk to the same cable using the spare connector on it. The existing disk is probably set as "master", so the new one must be set as "slave".

3 CONNECT THE CABLES After you've screwed in the new disk, connect the power and data cables. Parallel cables take a bit of force to push them home, but make sure you have the connector the right way round first. The general rule is that the red wire should be closest to the power socket on the back of the disk, but there's usually a protrusion on the connector that slots into a notch on the hard disk's socket. Again, for SATA disks, note that the cable will fit only one way round. Since it's a male connector on the hard disk that fits into a female connector on the cable, be careful not to exert vertical force, otherwise you could break the hard disk's connector and render it useless. The same goes for the SATA connector on the motherboard.

4 FORMAT YOUR DISK Once Windows has booted, right-click on the My Computer icon and go to Manage. In the Computer Management console, click Disk Management. Your new disk will be unformatted and the space labelled as Unallocated. Right-click on it and choose New Partition. Run through the wizard to make it ready for use in Windows.

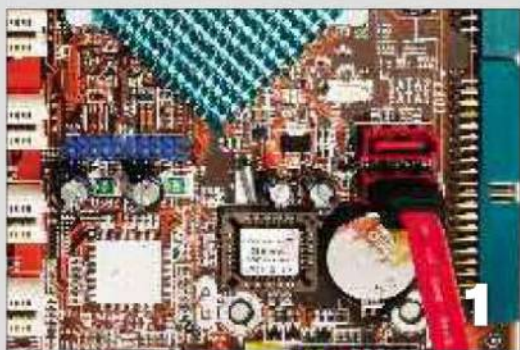


HOW HARD?

Not a task for those who are worried about opening up their PC.

ESSENTIAL

Crosshead screwdriver and mounting screws (these should be supplied with the disk).



IN THIS CHAPTER

98 **Introducing the Gimp**

Introducing the what? Yes, it has a funny name, but it's powerful and – best of all – it's free.

102 **Photo-editing software**

There are stacks of photo-editing applications out there. Which one should you choose?

103 **Adobe Photoshop CS5**

Expensive and complex, but there are plenty of reasons why Photoshop is the world number one.

104 **Adobe Photoshop Elements 8**

Photoshop's little brother, but it provides all the power most people will need for a lot less cash.

105 **Google Picasa 3**

You may have heard of a little internet search engine called Google. It does excellent photo software, too.

106 **PaintShop Photo Pro X3/Adobe Lightroom 2**

Once the most popular of editing tools, PaintShop Photo Pro is still a viable alternative to Photoshop Elements.

108 **Introducing Photoshop Express**

Edit and share photos for free online – our four-page guide reveals how.

CHAPTER 8

DIGITAL PHOTO SOFTWARE

Not so many years ago, the concept of editing high-resolution digital photographs was confined to science fiction and the realms of million-dollar supercomputers. Now you can walk into any high-street software retailer and pick up a photo-editing package to run on your home PC. The market is a fierce one, with plenty of heavy hitters fighting to try to get you to use their software to edit your photos. Is it worth paying for or should you use one of the free options?



NO GUIDE TO PHOTO-EDITING SOFTWARE WOULD BE COMPLETE WITHOUT A LOOK AT THE GIMP, THE FREE ALTERNATIVE TO COMMERCIAL PHOTO SOFTWARE.

Introducing the Gimp

The interestingly named Gimp – which stands for the GNU Image Manipulation Program – is one of the heavyweights of the open-source software movement. Open-source software is free for anyone to download and use, and the Gimp is no exception. In many respects, it's the match of the commercial packages you'll find on p102 onwards, and it has many of the same features.

Some people absolutely swear by the Gimp and wouldn't use anything else. It's been in development for more than a decade, and many of its features – for instance, its undo facility – were way ahead of their time when originally incorporated into earlier versions.

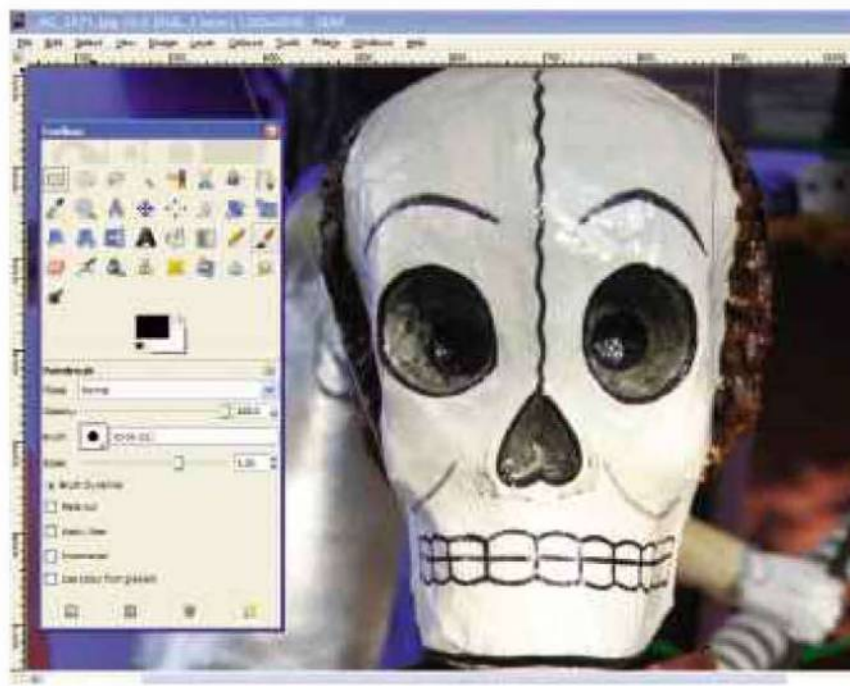
The drawback, however, is that its interface is a little idiosyncratic and not terribly easy to get to grips with. But since it's free, you may as well give it a whirl before you consider splashing out on a paid-for package.

INSTALLING The first hurdle is installation, which isn't quite a one-click affair. Although Mac or Linux users can download the Gimp from www.gimp.org, Windows users need to download a different installation package. Head to <http://gimp-win.sourceforge.net/stable.html> instead and download from there. The good news is that the installation routine has been massively refined in recent

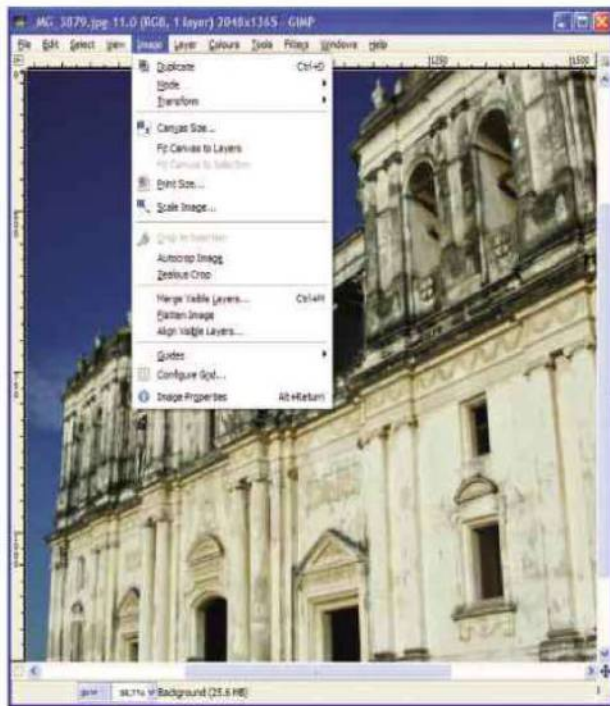
years, and where installing the Gimp was once fairly complicated, it's now pretty straightforward.

Once installed, when you first start up the Gimp it will feel odd: it doesn't particularly look or behave like a normal Windows application. You're presented with a free-floating toolbar palette and a floating window – known as a “dialogue” in Gimp terms (which is at odds with the usual definition in the world of Windows). There isn't the big, blank image window you'd expect and which you get from other image editors. But persevere: once you get used to the Gimp's unusual presentation and occasionally quirky menu behaviour, you'll quickly come to like the huge amount of power it has on tap.

OPENING AN IMAGE If you clicked through and accepted the defaults during installation, you won't be able to just double-click on an image to open it, since the Gimp is so well behaved it doesn't reassign file-type associations. So, to open an image you should click on File and select Open. You'll find that even this seems a little alien and doesn't look at all like a standard Windows dialog. This strange presentation and non-standard look and feel betray the fact that the Gimp's origins weren't in the Windows world – it was originally written for Linux and has



The Gimp offers a full range of editing tools, exactly as you'd expect from a package to rival Photoshop. There's very little missing.



The Gimp fully supports layers for advanced editing tasks.

been ported across. To some extent that's the price you have to pay for a powerful image editor that's free. Persevere for a while, though, and you'll get used to it.

It has its benefits, too; you'll notice in the Open Image dialog that the standard Windows XP locations such as My Documents and My Pictures that you'd normally find in the tree on the left aren't there, but a useful feature is the Add button beneath the left-hand device list. This lets you bookmark any folder, including My Pictures, so it will always appear in the left-hand pane from then on. Notice, also, that there are left- and right-hand scrolling arrow buttons; folders you're navigating to appear at the top and you can go directly to them using these buttons.

BASIC OPERATION Now try opening a photo by using the File | Open Image dialog. By default, the Gimp scales the picture to fit neatly into the window. The quickest way to zoom in and out is by holding down the Ctrl key and using your mouse's scroll wheel. You can also right-click on the image and select View | Zoom, or select the Zoom tool (the magnifying-glass icon) from the main toolbar palette. You can then either drag a zoom box, left-click to zoom in a step, or hold down the Ctrl key and left-click to zoom out a step.

Now that you actually have an image open, you'll see a range of menu options in the top menu bar of the image window; this is where things become more familiar to users of standard Windows applications. One of the advantages of getting to grips with the Gimp before you move on to more expensive photo-editing software is that, if you do upgrade to the likes of Photoshop, you'll find that the Gimp's menu options, toolbars and features are very similar.

LAYERS The Gimp is a fully layer-aware app. If you haven't encountered the concept of layers before, they're a very powerful way of doing advanced image manipulation. For instance, if you load two photos together and assign them to different layers in the same overall image, you can then easily adjust the opacity of the top-most image so the bottom image shows through. This mimics the old technique from film photography of double-exposure, where two pictures were taken on the same piece of film, leading to a ghostly merging of the two. As well as altering opacity, you can also blend layers together using any of 20 different pixel-evaluation schemes; the advantage of that may not be immediately obvious, but turn to p134 and you'll see how blend modes can be used, for instance, to help produce interesting cross-processed photos.

There are dozens of other uses for layers, too, which you'll discover as your experience in photo editing progresses. Layered images can consist of as many layers as you have the memory and hard disk space for, although remember that every layer you add to an image doubles the memory it requires – if you really start going to town with your layers, you may well need an extra helping of RAM in your system (see p93). The Gimp's layer features are flexible – by default, the Layers tab is open in the standard layout (see screenshot above). You can click and drag layers to change their stacking order, or drag a layer across to another open image to copy it into that image's layer stack.

HISTORY To the right of the Layers tab, you'll see a tab with a yellow arrow. Click this and you'll see Undo History. Every time you make a change to an image, the history is updated, with a small thumbnail image of the result of the change. To go back to a previous point in time and undo a change you don't want, all you have to do is click on

CHAPTER 8

DIGITAL PHOTO SOFTWARE

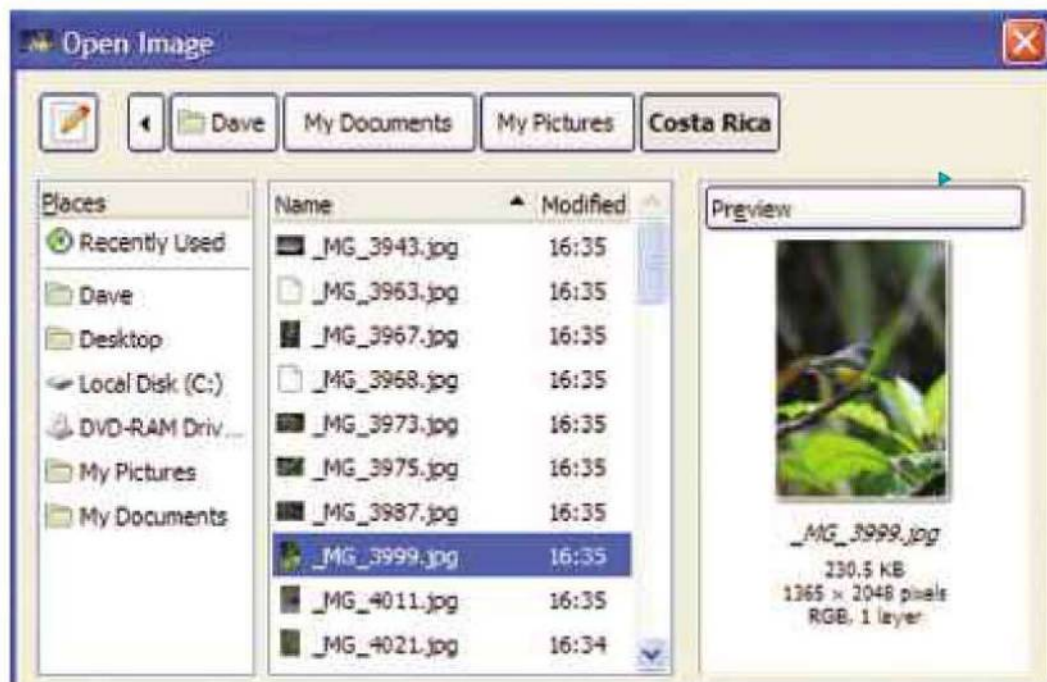
one of the thumbnails and the image immediately reverts to how it looked after that step. Going forward again to where you just were is a simple matter of clicking back on the thumbnail at the bottom of the list.

MODULES One of the key features of the Gimp is its plug-ins – software modules that extend its features and functions. In fact, almost all the features in the basic installation are provided by plug-ins written by various third parties in the spirit of open-source software. You're not restricted to the plug-ins that come with the Gimp by default, though – there are dozens more available for free from <http://registry.gimp.org>. If you have a photo open, you can get a glimpse of the power and range of operations on offer by selecting Filters from the image's menu. They range from simple but essential enhancements, such as Sharpen, to obscure specialist operations such as Max RGB. This is where the Gimp begins to look like a viable free alternative to Photoshop – practically every option available to a Photoshop user is also available in the Gimp. But filter modules can be far more than simple effects. Try, for instance, going to the Filters menu and selecting Render | Gfig. This obscure module is in fact almost a complete application by itself, allowing you to do vector drawing (drawing geometric shapes and lines). Selecting Gfig produces the Gfig interface, allowing you to draw a range of vector objects on to your image. This is another example of the power of layers, since the objects are incorporated into a new layer of their own, and don't affect the pixels of layers beneath, allowing you to quickly return to your original image.

SCRIPTING One menu option the Gimp offers that you won't see in any other photo application is the Script-Fu entry. This range of tools are, as the name suggests, automated scripts, again written by third parties and

automatically able to do any number of clever things to your photos that would normally take some time to do manually. For instance, with a photo open, try opening the Filters menu list and selecting Decor | Old Photo. This produces a small options window that lets you select a variety of operations and filters, all of which affect the image in certain ways to give a photo an aged feel. Run the script on one of your photos (click Work on a Copy first) and you'll see it working sequentially through a number of operations, which it invokes one by one to get the end effect. All you have to do is sit back and watch. The number of operations available is extensive – fancy a coffee stain on your photo to make it look as if it's been lying around for a while? Easy, just select Coffee Stain and off it will go.

SAVING YOUR WORK It goes without saying that when you're labouring over a photo to enhance it, you should regularly save your work (but always remember to make a backup of the original, so that no matter what happens you always have the unretouched "digital negative"). You can't simply save an image that's had layers added as a standard JPEG photo, as the JPEG format doesn't support it. Instead, the Gimp has its own file format for saving work in progress. These files have a XCF file extension, and save everything about your current editing session, right down to the positions of your windows. The only thing that isn't saved is the undo windows, so you can't save an image, come back to it later and return to a previous point. Once you've finished retouching your picture, you can then save it as a final JPEG by "flattening" the layers into one and choosing the JPEG format when you save. As with the Open dialog, the Gimp's Save dialog is initially cryptic to anyone used to Windows XP's "Save As" box. You need to click on the Select File Type label to make it display the file-type options.



Even opening an image can initially be confusing when using the Gimp. A bit of practice will go a long way.

HOW TO... INSTALL AND START USING THE GIMP

The price of a powerful piece of free photo-editing software is that the Gimp's presentation and operation is a little quirky. But don't give up – you'll soon find your way around.

1

Download the Gimp from <http://gimp-win.sourceforge.net/stable.html>. Installation is similar to most other Windows applications. Just pick your installation directory and you're done.

2

This is what you'll see when you first open the Gimp, and if you think it isn't particularly friendly, you'll find plenty of people to agree with you. The blank slate approach can be a bit off-putting, but you'll soon get used to it.

3

Click on the File menu and choose Open, which will produce the Gimp's very non-standard file-chooser dialog box. It doesn't have shortcuts to the likes of your My Pictures folder, but you can add those manually.

4

Once your photo is open, you'll see a more familiar set of menu entries in the top line of the image window itself. It's fairly standard stuff, with some of the Gimp's more esoteric features hidden beneath the surface.

5

Basic operations are simple. For instance, to crop an image, click Tools | Transform Tools | Crop. Then simply click and drag a box. A dialog box will pop up, but you can still use the mouse to drag your crop area.

6

Now hit the Crop button in the pop-up dialog. If you don't like the result, just undo the operation by clicking Edit | Undo Crop Image from the top menu, or using the shortcut <Ctrl-Z>.

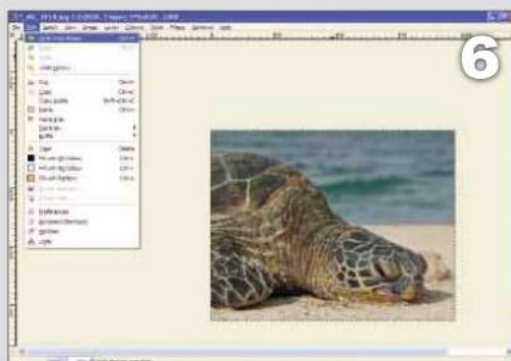
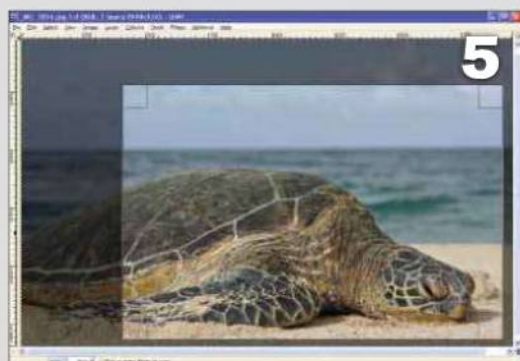
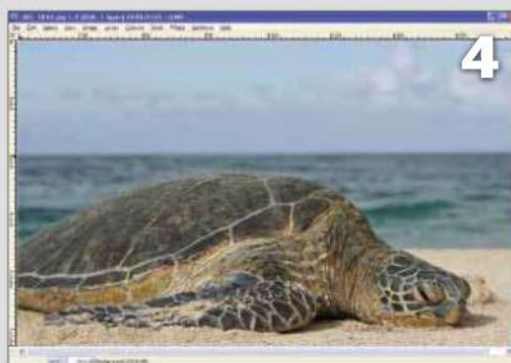


HOW HARD?

If you can download and install an application, you can do this.

HOW LONG?

As long as you have time to explore – it's a big application!



THERE'S PLENTY OF COMPETITION IN THE AREA OF RETOUCHING SOFTWARE. OVER THE NEXT FEW PAGES, WE'LL LOOK AT THE MARKET LEADERS.

Photo-editing software

Adobe Photoshop (opposite) may be the leader of the pack when it comes to high-end photo editing, but for many non-professional users it's too expensive and offers hundreds of features they'll never use. We've therefore rounded up the most affordable, easy-to-use software to help you make the most of your digital camera.

Value for money isn't just welcome, it's essential. While software can rescue poor images, it's ultimately your camera that determines end quality, and money you save here can be put towards a better camera and lenses. Ease of use isn't a luxury, either: you need to do what needs to be done as quickly and efficiently as possible. If this process can be made enjoyable, that's a bonus.

Dealing with potentially thousands of images also makes special demands in terms of features. For a successful PC photography workflow, image management is key, and your software should put you in full control of your collection. Simple and effective editing is also crucial, especially the ability to correct any glaring defects quickly and to bring out the best in each photo. Finally, for most users, the whole point of photography is to share your images with others.

TESTING TIMES We've looked at how each of the packages perform in the three key areas of photo management, photo editing and photo sharing. In each category, we've considered how the applications handle the basics, and then what they offer over and above that. We've also noted any special features, especially those that could save you hours over the course of a year. Most important, though, is the overall end-user experience.

PHOTO MANAGEMENT Your PC photography software needs to be able to handle any number of images, and we've investigated how each application coped with a collection of more than 10,000 photos. We've also looked to see how easy it is to add a typical batch of 100 new photos to the collection. Core features we've looked for include thumbnail handling, the different views on offer of your images, how easy it is to find images and how easy it is to tag and manage photos based on keywords. More advanced features include the ability to view and edit EXIF data, apply geographical tags, set up watched folders and automatically rename and convert files.

PHOTO EDITING Photo editing needs to be straightforward and effective. Core features include cropping, straightening, red-eye removal and efficient colour correction. More advanced editing features include professional photographic corrections, the ability to apply adjustments non-destructively, sophisticated retouching tools, layer-based compositing and creative options, including the ability to apply artistic effects and brushes.

PHOTO SHARING Being able to show off your photos at their best is fundamental, and starts with print and email support. More creative options include photo-based projects for print, and slideshows ready for output to video and burning to CD or DVD. Finally, the use of the web for sharing is important, and could well determine your choice of software. The best software is integrated with a web service, so you can upload your images straight from your software.

TIP

There's absolutely no point in splashing out several hundred pounds – or even £50 – on a photo-editing package straight away. It won't make you a better photographer. If you're new to photography, go with one of the free options until you've found your feet.



Just like a physical artist's toolbox, when it comes to retouching you need to choose the right tool for the job.

ADOBE PHOTOSHOP CS5

It's expensive and occasionally over-complicated, but there's a good reason it's the choice of professionals the world over. If you want to deal with more complex image manipulation, Photoshop has power by the bucketload.

It says something about Adobe Photoshop's universal recognition that its name has become a generic term for photo-editing: this is the most powerful photo-editing software available. At over £400 for the full version, however, only the most well-heeled and ambitious photographers need apply.

But, even given Photoshop's incredible power, it has to justify its high price, particularly compared to superb free offerings such as Google's Picasa 3 (see p105). Even Adobe's own cut-price photo-editing software, Photoshop Elements 8 (see p104) poses a threat.

The major differences start with the interface, which has been designed make the most of your screen real-estate. Images open in tabs (like websites in your browser), and there's no Windows title bar. In its place Photoshop CS5 sports an Application bar alongside the Menu bar, providing instant access to zoom controls, the Workspace switcher, a range of workspace presets and the Arrange Documents dropdown, where you can quickly choose from a selection of window layouts.

BRIDGING THE GAP Photoshop CS5's Application bar also provides quick access to the separate Bridge application for dealing with your image library. It's enormously powerful, allowing you to filter by such details as ISO rating, aperture setting and focal length. CS5 also adds a new Mini Bridge app which is less fussy for quickly viewing your shots, and is clearly aimed at rivals such as Picasa's image library for quick and simple use.

Bridge CS5 has just as much to offer when opening single images in Photoshop, allowing you to open them in the dedicated Camera Raw 6 utility supporting over 275 RAW file formats. Camera Raw 6 gives enhanced control over vignetting and sharpening, and excellent control over noise reduction.

For creating HDR photos automatically (see p146 for more on HDR) CS5 has arguably the most powerful tool anywhere. The new Merge to HDR Pro command has highly sophisticated alignment algorithms and the ability to remove "ghosts" such as people in the background who've moved between shots. Camera Raw 6 also has the ability to localise adjustments to particular areas of the image with its Adjustment Brush, which creates non-destructive and re-editable masks.

If you're concerned about getting the most accurate, distortion-free photos, Photoshop CS5 has a new automated lens-correction tool that will attempt to remove colour fringes (see p122), geometric distortions and vignetting (dark corners). Adobe has also released a lens profile creation tool: print out its special test pattern, take a photo of it and feed it into the tool and you can



profile each of your lenses, allowing the lens-correction feature to give of its best.

NON-DESTRUCTIVE EDITING With Photoshop CS5, the emphasis is on non-destructive editing – making changes to your images without affecting the underlying file. Instead, each time you make a change, a new layer is created. An Adjustments panel provides instant, icon-based access to each layer type: there are over a dozen in all, including a Vibrance option, which offers greater control over colour saturation while preserving delicate tones such as skin colours.

HIGHLIGHTS Photoshop CS5 also provides a couple of jaw-droppers that are eerily effective. First is its Content Aware Image Scaling. Using this, you can drag to resize your image in real-time and, while you do so, Photoshop CS5 automatically removes just the "uninteresting" areas. When you first see this, the effect is magical, leaving you wondering just how Photoshop manages it.

Even more amazing is CS5's Content-Aware Fill option. If you've removed a distracting object – particularly a large one – from a photo, filling in the remaining area so that it blends with the background and isn't visible is a time-consuming task. Not so in CS5: just select Content-Aware Fill, click on the gap and CS5 analyses the surrounding area, effectively generating a new area of the photograph. It's amazing to watch and works well even for large areas of a shot.

Photoshop can import RAW files via a dedicated module.

ADOBE PHOTOSHOP ELEMENTS 8

An enormously appealing all-in-one package for organising and editing your photos that doesn't cost the earth, Photoshop Elements is easy to use, very powerful and tempting for those on a budget.

There are plenty of choices for those who don't want to splash out the better part of £500 on Photoshop. The likes of Lightroom and Aperture (on Macs) are ideal professional tools for managing and editing a lot of photos, while free applications such as Picasa make a good fist of handling large image libraries and applying basic changes. Photoshop Elements occupies the middle of the range, costing around £55. But don't let that fool you into thinking this is a crippled editor riding on Photoshop's coattails: there are plenty of tools in here that professionals would be happy to use, and a top-notch library tool to boot.

GET ORGANISED Photoshop Elements is effectively two applications in one. The first is an advanced image library that is quick and responsive even with a library consisting of thousands of pictures. You can add tags to your images, which makes organisation easier.

The good thing about using Elements to flick through your pictures is that you'll never need to worry about your folder structure again. For instance, you can choose to "watch" a folder and, whenever new pictures are added, Elements automatically includes them in your library. Alternatively, you can import images directly from a camera. Once done, you can rate your photos, or drag them on to a world map to organise them by place.

The Organizer also allows you to share your photos. It can email pictures, automatically resizing them so they won't clog up people's inboxes, or you can upload to sites such as Flickr (see p174).

Elements also includes face detection and can automatically wade through your shots, picking out faces for you to name later. Its automatic picture recognition doesn't stop there; it even promises to pick out low-quality images based on things such as blurriness and contrast. These facilities don't always measure up to their promise; faces are missed and Elements' idea of good and bad photos won't always match yours. However, the ability to add tags to your images and browse them quickly using the text-based search bar is enormously powerful, and a tool you'll find more and more useful as your photo library grows.

EDITING The second part of Elements is its superbly featured editing function. The three options – Full, Quick and Guided – are incredibly powerful. Indeed, in terms of what you can do to a photo, Photoshop Elements matches the full version of Photoshop very closely. In Guided mode you're asked, "What would you like to do?", then given a series of choices such as "Enhance colors". Pick one and changes will be made to your picture with a single click. The next step up, Quick, gives you a series of sliders with which to edit your photos, which is great if you're not sure exactly how to fix a picture but want a degree of control over it. Finally, the Full option hands the reins to you entirely.

Two other major enhancements have been ported down from Photoshop. If you've taken multiple bracketed shots (see p78), the Exposure mode for Photo Merge analyses the images in the series and combines them to produce a "best-of" picture. Even more impressive is the new Recompose command. This lets you resize an image, leaving foreground subjects undistorted, while unwanted background areas are seamlessly removed. It works brilliantly, providing real-time cropping with a built-in sense of aesthetics. Otherwise, most of Photoshop's brushes and tools are included, and many of the walkthroughs in chapter 9 that use the full version of Photoshop are just as applicable to Elements, despite the steep drop in price.

It isn't just its raw power or organisational capabilities that make Elements such a great choice, though. The ability to access a wealth of editing tools so easily makes it a standout application particularly for photographers who are still learning the ropes – beginners will find correcting red eye or whitening teeth is a breeze, and you can graduate to tools such as the curves control as you become more confident. It's a superb tool for learning, as you can progress through the levels of complexity in the editor as you become more confident. At this price, it's hugely appealing.

Elements can be all things to all photographers – from the most basic, single-click fixes to far more complex jobs.



GOOGLE PICASA 3

It's a pleasure to use and surprisingly powerful – and incredibly, Google Picasa doesn't cost a penny. Its greatest strengths are its photo management and brilliant web-based photo-sharing capabilities.

Google's expertise may be in web search rather than photo handling, but this latest release of Picasa is designed to take the challenge directly to Adobe Photoshop Elements.

If it cost £50, Picasa 3 would still be incredibly appealing. It makes a great impression right from the off. The interface is modern, smooth and responsive, even with a library of thousands of images. Adding new images happens virtually instantaneously, making Picasa ideal for those who regularly add photos.

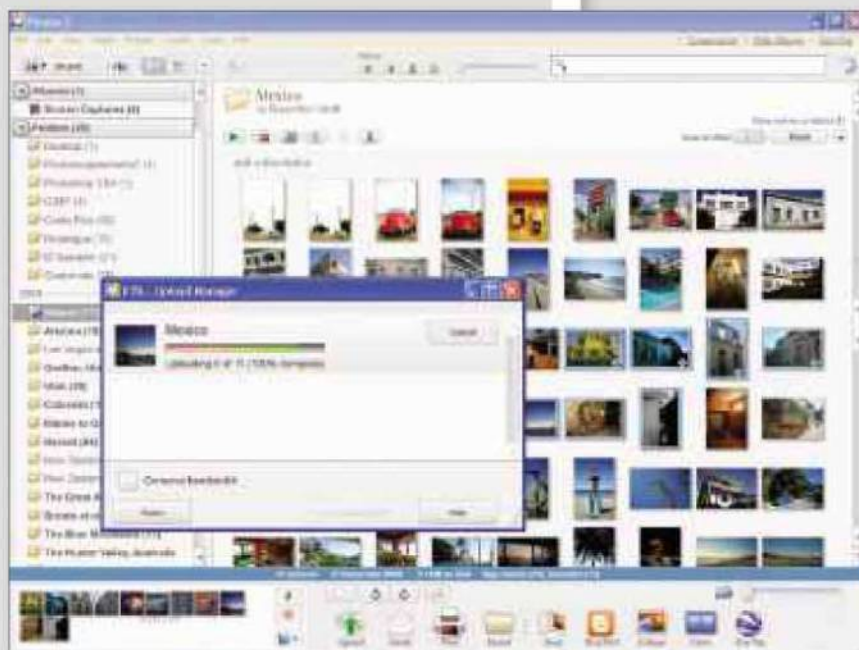
Folders and albums provide the backbone for Picasa's image management, but you can also add multiple-word tags to specific images. A new Face Filter allows you to display only photos with clear, head-on faces, which makes it easier to tag people. Finding specific images is easy as well: begin typing a term into the search box and the results narrow as you type; Picasa also shows you all the possible matching search-term options. Most importantly, because Picasa doesn't just search by tags but on caption, metadata and folder name, post-import tagging is optional – not mandatory.

In Picasa's central Library view, where the previews are smoothly resizable up to full-screen, you can use the Loupe tool to get a closer look at individual thumbnails. There are new options for creating and moving folders, which make the folder location view more practical.

CORE EDITING CONTROLS Picasa 3 makes Photoshop Elements' search capabilities look underpowered, but how does it fare in terms of photo editing? It doesn't offer anything like Elements' full-blown editor, but what it does do is put the core commands that you need to bring the best out of your images at your fingertips. The massive advantage this brings is that you can simply hit the cursor keys to move through your images, enhancing as you go.

Many of Picasa's core editing controls have been improved, with the Crop and Red Eye Reduction tools now making suggestions based on analysis of the current image; you can even batch-apply red-eye reduction. As with all Picasa's tools, edits are non-destructive, meaning that you can always undo or refine them later – unless you choose to save the changes.

Once you've enhanced your images, you'll want to show them off. Picasa's onscreen slideshow capability has been improved from previous versions, with greater control over transitions and zoom, and support for videos. The new Movie command allows you to turn your slideshows into videos and upload them directly to YouTube. However, with no pan and zoom handling, the power and results on offer are pretty basic.



Far more remarkable is the revamped Collage command, which lets you automatically create grid-based and randomised layouts of multiple images ready for print. There are now six collage types to choose from, as well as control over grid spacing and background colour or image. What takes the Collage feature to a new level is the ability to customise Picture Pile layouts interactively, quickly moving, rotating and resizing images. And for general printing you can now output captions and filenames alongside your images.

ONLINE SHARING Picasa's print output is impressive, but what really makes the program stand out is its online sharing. This has always been a massive strength, with Picasa letting you quickly upload selected files to Google's Web Albums, which provides 1GB of free online storage. Once uploaded, you can then visit the site to invite friends and family to view your images. Alternatively, you can invite or email images, using the new streamlined Share command.

More powerful than this is the ability to sync your folders so that whenever you make changes to images locally these are automatically updated online. And you can also set it up so that only starred images are synchronised.

Picasa 3's most impressive feature is its Web Albums.

COREL PAINTSHOP PHOTO PRO X3

A reasonable attempt at an all-in-one application for organising, editing and sharing your prints, but other applications are significantly easier to use.

Like Photoshop Elements 8, PaintShop Photo Pro X3 (which costs around £69) divides its efforts into organising your shots and helping you edit them. It may cost around the same as Photoshop Elements, but its organisational talents are much less advanced. The Organiser allows you to add tags to your shots, but you can forget about potentially handy touches such as geo-tagging or face recognition.

The editor is far more fully featured, as the rather cluttered interface suggests. There are a number of automatic tools, such as the HDR merge feature, which creates a high dynamic range image from a few bracketed exposures.

The Smart Carver feature allows you to resize an image by adding or removing the background while preserving foreground areas. You can also mark up areas you want to keep or remove, and while it isn't as flexible as Elements' magical Recompose function, it's useful nonetheless.

PaintShop Photo Pro X3 comes with PaintShop Photo Project Creator, which lets you create projects such as cards, photo books and collages, and share



PaintShop Photo Pro X3 offers a huge amount of editing power, but it's a fairly basic organisational tool.

your photos with a range of popular websites, including Facebook, Flickr and YouTube.

Unfortunately, PaintShop Photo Pro is hard to use. The interface is a confusing mess of icons and text, and it can be very slow when dealing with large libraries – a problem you don't need to worry about with Elements.

ADOBE PHOTOSHOP LIGHTROOM 2

Lightroom is an all-in-one organisational and editing tool. It's expensive, but those who take hundreds of shots will love it.

Despite the Photoshop name in the title, Lightroom is a totally separate application to Adobe's flagship image-editing software. The difference is instantly noticeable: where Photoshop is an editor designed to make small, per-pixel changes to your images, Lightroom is all about the big picture.



Lightroom is a one-stop shop for all things digital photography.

The program is split into five modules: Library, Develop, Slideshow, Print and Web. Library and Develop are where you'll spend most of your time. As the name implies, Library allows you to organise your shots. You can organise by date, folder, keyword or camera metadata such as focal length. It also supports multiple hard disks, and allows you to tag your pictures en masse as they're imported. Because you can import pictures straight from your camera, you don't need to worry about manually creating folders in Windows.

The Develop module is where all the hard image-editing work is done. All the usual image-editing tools are there, and the latest version adds gradient masks to add punch to your landscape shots. There's also a very fast red-eye removal tool and an even better dust-removal tool. It's extremely intuitive and it's possible to go from a mediocre-looking shot to a great one in just a few minutes, and certainly faster than if you were to attempt the same in Photoshop. The problem with Lightroom is price: at more than £200 it's more expensive than Elements 8, although it provides better workflow management.

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Introducing Photoshop Express

It used to be the case that decent photo-editing software would cost you hundreds of pounds and hundreds of megabytes of hard disk space. Photoshop Express isn't only one of the best in the business, it takes up hardly any disk space on your computer and, best of all, it's free.

WHAT IT IS AND DOES Adobe Photoshop is one of the most venerable names in photography: speak to any professional photographer and they'll tell you how they couldn't live without it. But for all Photoshop's undisputed power, most people will only ever scratch the surface of this professional's tool. Instead, you need access to Photoshop's core tools: the ability to retouch photos and perform tasks such as removing red-eye. Software such as Photoshop Elements gives you these kinds of features, but why pay for it when you can have it for free? Enter Photoshop Express, which gives you core features at no cost.

Photoshop Express uses Adobe's Flash technology to run a well-featured photo editor from your browser. Its chief benefits are that it's fast, has the kinds of features that you'd expect from expensive software and, because it runs from a browser, you can access your editing software – and up to 2GB of your photos – from anywhere in the world.

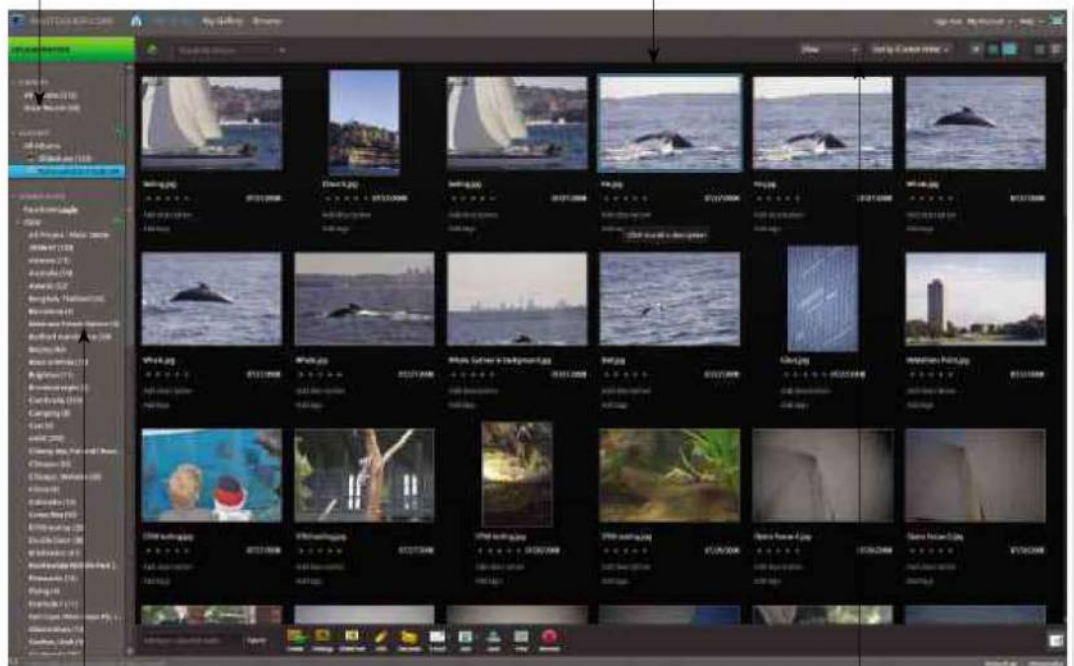
Getting started could hardly be easier. Head to www.photoshop.com/express and set up a free account. Accounts come with 2GB of storage, which is enough for a few thousand photos, and are activated within a few minutes. Once that's done, grab a few photos (see Create and share your photos, p111), and you'll see them in your thumbnail gallery ready to access.

THE GOOD BITS Photoshop Express's biggest selling point is its power. Fire it up and send it into full-screen mode (using the button in the top-right corner) and you'll

Your **library** is where your images go once they've been imported into Photoshop Express. You can edit any photo that Photoshop Express can access, but only those in your library can be shared.

These are the **thumbnail-size buttons**. With them you can change how big your thumbnails appear, depending on whether you want to see detail or an overview.

This is the **full-screen button**. Push it and the borders of your internet browser vanish, leaving PSE more or less indistinguishable from a fully blown desktop application.

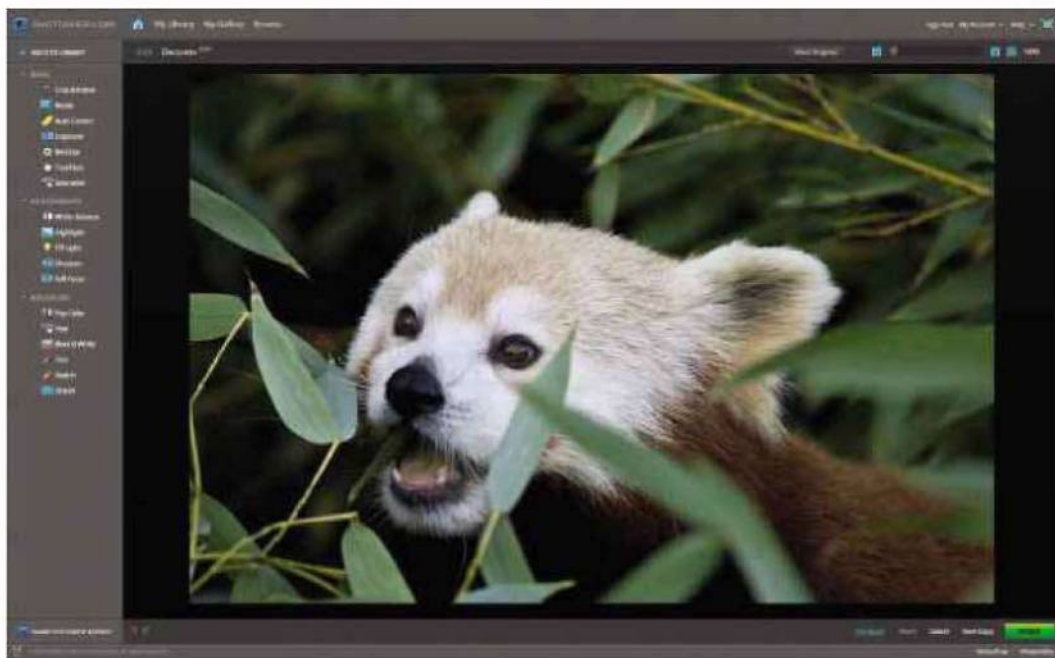


TIP

Remember that despite Express's convenience, for the best results possible you should still go for a standalone package such as Photoshop or the Gimp (see p98).

If you don't upload photos from your PC, the **Other Sites** bar can be used to get your images into PSE. It can connect to Facebook, Flickr, Photobucket and Picasa.

The **show button** determines which information is shown alongside your photos, while the **sort by** button determines the order in which they're displayed.



Photoshop Express's image-editing abilities are surprisingly fully featured for a free online application.

be hard-pressed to tell you're using an application that exists only in your web browser. Once your images have been uploaded you're presented with a scalable set of thumbnails, from which you can launch any individual image for editing. The tools available are widespread: you can alter the saturation of your image, crop and rotate it, resize it and alter the exposure. There are also red-eye removal and touch-up tools that are useful for removing blemishes from your photos: for dust spots, the latter is even easier than using the clone stamp in Photoshop. You can also change the white balance of your photos or convert them to black and white.

Best of all, the changes you make to your images are non-destructive, so if you return to a photo the day after you've changed it, you can undo all your edits without altering the original file.

Another of Photoshop Express's major draws is its ease of use. Everything is attractively laid out and easy to reach, and even inexperienced users will find their way between the gallery and editing modules with no fuss. In comparison, the full version of Photoshop can take some time to get your head around. Those with a good working knowledge of Adobe Lightroom (see p106) will be in heaven.

Photoshop Express also supports a wealth of online photo services, including Flickr (see p174), Facebook, Photobucket and Picasa (see p176). If you already have images hosted on these sites, you can import them into Photoshop Express without needing to go through the hassle of uploading them twice.

Finally, once your images are uploaded and edited, sharing them is simple. Photoshop Express allows you to create a slick online gallery that you can invite your friends to, or even create a slideshow that you can embed in your own website. If you want people to drop by and

see what's new in your photo galleries, Photoshop Express even gives you your own URL, in the format <http://yourusername.photoshop.com>.

WHAT'S BAD Some would say that the idea of a free online photo editor is too good to be true, and to an extent those people are right. This is particularly so for users who want to print their photos: Photoshop Express doesn't offer any way to print your shots locally, although you can opt to have them professionally printed.

The lack of printer support might be a blessing in disguise, though, since Photoshop Express's other failing is its handling of high-resolution images. You can't upload images larger than 25MB or 6,000 pixels x 6,000 pixels. This doesn't preclude shots from most cameras, but might stop you uploading stitched together panoramic photos, for instance. What's more, photos larger than 2,880 x 2,880 will be shrunk after editing. Photographers who use their camera's RAW mode (see p74) will also be disappointed: Photoshop Express works only with JPEGs.

A complaint more advanced users will have is that Photoshop Express doesn't allow you much flexibility when it comes to adjusting your images. In full-blown editors, for instance, you can make either extremely large or extremely small changes to your images: Photoshop Express allows only medium-sized corrections, so if you're a perfectionist and want to make the very small change that turns an image from very good to perfect, it won't be for you. The final drawback is speed. On a quick broadband connection – 2Mbps/sec or faster – Photoshop Express works superbly. If you have a slower broadband connection, however, you'll find it frustrating. Uploading takes hours, and although the processing is all done on Adobe's servers, downloading the results will take a long time. It goes without saying that dial-up users needn't apply. ▶

CHAPTER 8

DIGITAL PHOTO SOFTWARE

HOW TO... EDIT YOUR SHOTS WITH PHOTOSHOP EXPRESS

Photoshop Express gives you an amazing number of editing tools. Here are the key features and how to use them.

1 CHOP AND CROP Selecting Crop & Rotate produces a grid that sits over the top of your image. Grab the handles on one of the edges and drag to cut out extra bits of the image. Using the Aspect dropdown box in the lower-left, you can make sure your image retains its original proportions, which is a must if you intend to send your images to be printed.

2 ADJUST COLOUR The ability to alter a shot's saturation makes it stand out more, particularly when viewed on a PC screen. Clicking the saturation command produces a filmstrip of seven different versions of your image, ranging from totally desaturated (black and white), to a rather oversaturated version. When you hover your mouse over one of the images, the main image changes to show what the results will be when you click.

3 GO MONO The same goes for Photoshop Express' powerful Black & White option. These don't just de-saturate your image, they adjust the contrast to give the final monochrome shot more pop. Again, move your mouse over each of the available variations for a live preview.

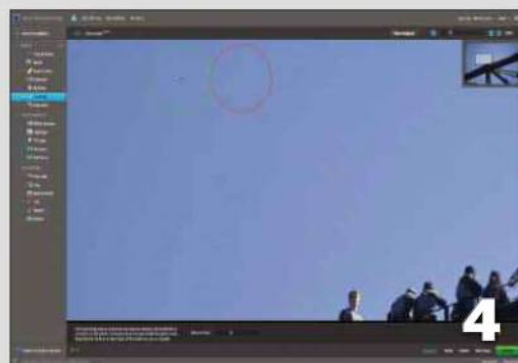
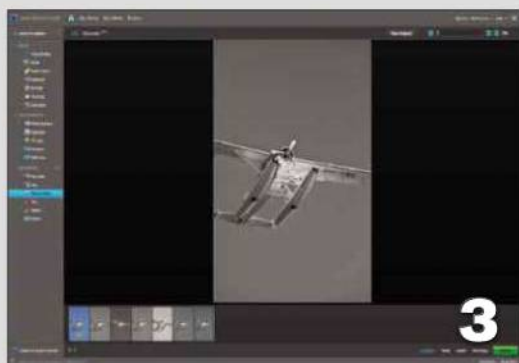
4 THERE'S MORE Photoshop Express can even handle fairly advanced jobs such as touching up an image. If you spot a blemish on an image, choose "Touchup" from the Basic menu and click on it. The software will choose a nearby piece of the photo and replicate it over the top of your problem area. This works particularly well for irritating dust spots (see p140). You'll also see some tools located at the top-right of any image you're editing. The blue buttons control zoom: the plus and minus zoom in and out of your image, while the zoom-to-fit button centres your image and zooms it to fit your screen, no matter what your resolution. It's a great help when reviewing your changes from afar. The pink and green buttons are Undo and Redo controls. Elsewhere, the circular orange arrow at the lower-right is for resetting your image: use this if you're unhappy with your changes and want to start afresh. The big green Finish button accepts your changes, saves your photo and returns you to the image library. Alternatively, click My Library at any time and you'll be prompted to save or discard your changes. Finally, click on Save Copy in the lower right of the Photoshop Express window to create a copy of your image, should you wish to keep both the original image and your modified version.

HOW HARD?

Easy. The tools are aimed at novices

HOW LONG?

About 30 seconds per photo



TIP

Remember not to rely too heavily on internet-based tools for storing your shots. You should always keep backups of the originals somewhere safe – see p164 for more on backup

HOW TO... CREATE AND SHARE YOUR PHOTOS WITH PHOTOSHOP EXPRESS

There are lots of ways to share your images with friends and family online, but few do it with as much pizzazz as Photoshop Express.

1 GET STARTED Once you've uploaded your images into Photoshop Express, create a new album. If you're importing images from another website such as Flickr, you don't need to import your images first.

2 SELECT YOUR SHOTS In the My Photos pane, select the images you want in your slideshow and drag them on to your new album. Unless you have Photoshop Express in full-screen mode, standard Windows commands such as <Shift-Click> and <Ctrl-Click> to select multiple photos will work.

3 PREVIEW Once you've chosen your images, select the album in the left-hand toolbar. This gives you an overview of your slideshow-to-be. Remember that you can zoom in or out of each shot with the slider in the top centre of the screen, and that you can change the order in which your images will appear. You can do this either by dragging them around manually, or by the date they were taken. Alternatively, if you've taken the time to rate your photos, you can sort them by how many stars you've given them.

4 CHOOSE YOUR POISON Once you've picked your images, there are a few ways to share them with the world. By default, Photoshop Express assumes that you want your images to remain private, which is why a tiny padlock icon appears next to your shots. To turn it off and allow the Photoshop Express community to see your work, head to My Gallery. Then, click the padlock to the side of your latest album. The options are self-explanatory: you can make your album available to people you've nominated as either friends or family, or make them private, which means only people logged in to your user account can look at them. You can also choose whether others can download your image, or send them to be printed. But that's not all: for the truly ostentatious, you can host a slideshow of your new album on other sites, so if you have your own blog you can host a slideshow there without needing to use any of your webspace. Step one is easy: with your album visible in My Photos, click on the Embed Album button at the bottom of the screen. This will copy a chunk of HTML to your PC's clipboard. When writing your blog's next post, just right-click and select Paste, and the HTML will appear. Once your entry is published, your album will load automatically in its own player and start playing.



HOW HARD?

A poodle could do it

HOW LONG?

Half an hour to an hour if you're sharing a lot of photos



IN THIS CHAPTER

114 Mastering the basics

Improve your shots with the three fundamentals of photo enhancement: levels, curves and sharpening.

120 Fine-tuning colour balance

Shots come out looking a bit odd? Your colour balance is probably awry. Here's how to fix it.

122 Dealing with colour fringing

Digital photos can show some nasty colour artefacts, but you can cope with them using software.

124 Creating photographic panoramas

Producing one picture by stitching together several shots can give spectacular results, and it's great fun.

128 Dealing with red eye

It's the curse of party snaps the world over, but your photo-editing software can help.

130 The power of black and white

It's a colourful world, but sometimes a photo can have far more impact in black and white.

134 Having fun with effects

Occasionally it's good to throw subtlety out of the window and apply some extravagant effects.

138 Reducing noise

Quantum fluctuations can lead to unpleasant speckles in your images, but there are ways to reduce them.

140 Dealing with imperfections

When you mention photo retouching, this is what most people think of: getting rid of blips and blotches.

142 Remove an object completely

It's magic! With a bit of patience and practice, you can eliminate whole areas that are spoiling your picture.

144 Enhancing colour saturation

Give your photos extra punch by making their colours more vivid, or give them a more moody atmosphere.

146 High Dynamic Range photos

It's something only digital photographers can do; learn how to create stunning results.

150 Simulating depth of field

Creating depth of field in a photo takes lots of planning. Here's what to do if you miss the moment.

152 Vignette effects

A well-executed vignette effect can lead the eye into an image. If your lens doesn't create the effect, you can do it manually.

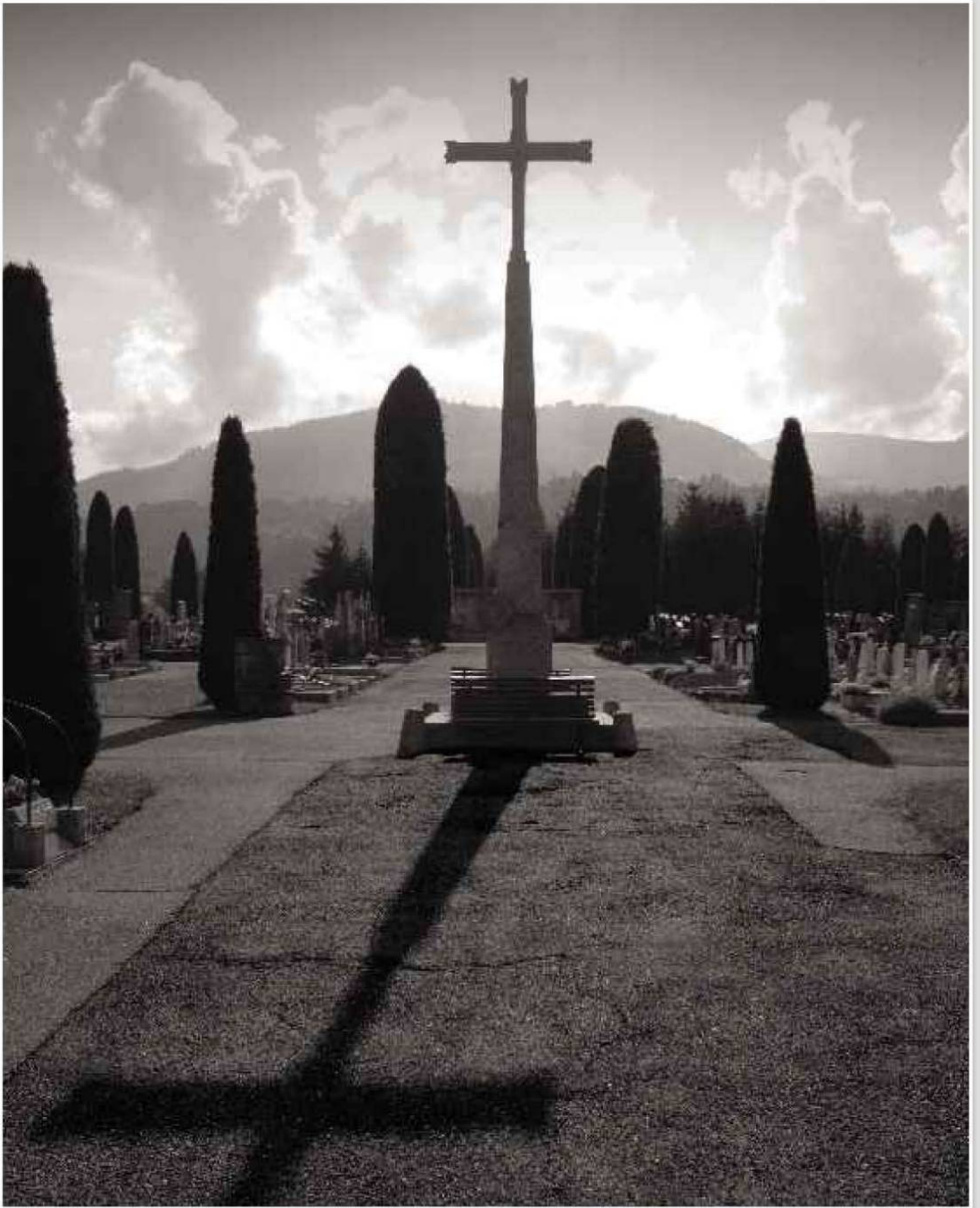
156 Soft focus portraits

It's an effect that needs to be used carefully, but a soft focus can lend an emotional tone to a portrait shot.

CHAPTER 9

EDITING AND RETOUCHING

The world of photo retouching may seem to be a realm only computer experts can master. Fortunately, that's nonsense: any modern – and not so modern – PC can easily cope with photo enhancement and retouching in software, and the software isn't particularly difficult to get to grips with. It takes time to become a photo-editing expert, but mere hours to get to grips with the basics and improve your shots. And you can do it without spending a penny.



THERE ARE SOME BASIC STEPS THAT YOU SHOULD APPLY TO ALL YOUR DIGITAL PHOTOS THAT WILL ENHANCE THEM ENORMOUSLY IN JUST A FEW SECONDS.

Mastering the basics

Over the next few pages, we'll introduce you to digital photography manipulation with the three mainstays of basic image improvement: sharpening, levels and curves. Bear in mind that digital photos, like conventional film photos, need to be processed. This means the image as captured by the camera isn't the end of the story; you can significantly enhance the results with just a little work.

DIGITAL CAPTURE It's tempting to imagine that when a digital camera captures an image, what's recorded is an absolute record of what was there. In fact, the data captured by the sensor is little more than a digital mess. To extract an image that approximates what you've seen takes much processing – this is why, until a couple of years ago, most digital cameras suffered from lag between shots; they couldn't take another one until the camera's internals had finished processing the last image, which typically took several seconds. New cameras still have just as much processing to do – they simply do it faster.

IN-CAMERA PROCESSING Camera manufacturers don't tend to advertise the fact that a camera with, say, a 6-megapixel rating doesn't have 6 megapixels at all. It would be more accurate to describe it as having 6 mega-subpixels. Although there are six million photo-receptive sites in the sensor, each one is covered by a filter, so it's sensitive to either red, green or blue light. This means that for each pixel location, the other two colours are guessed, based on the values of its neighbors. Consequently, the raw data from the sensor is no more an image than the raw data that hits your eyes before being processed by your brain. Cameras apply default processing that works for most images, but by spending a few minutes inserting human intelligence into the equation you can correct these guesses and improve an image no end.

SHARPENING By default, the images that come from a standard digital camera are relatively soft. That means the edges are poorly defined for a number of reasons relating to the camera's optics, the way the sensor converts light energy into electrical energy, and interactions between the optics and the sensor. To overcome this, most consumer digital cameras apply a software technique called sharpening. To sharpen an image, the camera applies an algorithm that compares the intensity and colour of adjacent pixels. If the difference is over a certain threshold, the camera guesses that it must represent the edge of something, so it alters the intensity of the pixels to enhance the edge, increasing the apparent sharpness of the image.

The vast majority of cameras have a setting in their menu system to control the amount of sharpening that's applied. However, you can apply sharpening more effectively at the PC once you've downloaded the pictures, since you can use a more sophisticated algorithm known as Unsharp Mask. This is a technique whereby the image is split into two layers: one containing colour data and one only brightness data (in other words, a black-and-white image).

Sharpening only the brightness-based image and then recombining with the colour layer is more effective than simple in-camera sharpening, bringing out fine detail and reducing the white halo effect that in-camera processing causes. Since camera manufacturers assume you won't want the burden of a few minutes' post-processing, sharpening is often set too high by default. If you want the best quality from your new camera, tweak the sharpening settings down a notch and then follow the walkthrough on p118 to apply the Unsharp Mask filter using PC software. The exact levels of in-camera sharpening will vary, so take a few experimental shots of the same subject at various sharpening settings, then have a play on the PC to see which gives the best results.

FAQ

Q How long will preparing my shots take?

A With practice, the basic steps you need to enhance a picture using the techniques on the next few pages will take only a few seconds. More advanced operations such as removing an object (see p142) can consume several hours to get a really good result.



Photos fresh from your camera can be improved from this...



...to this in a few seconds.

HOW TO... USE THE LEVELS CONTROL

If you've never encountered it before, the levels control will amaze you with its ability to make a flat, lifeless shot suddenly spring to life. Not only is it one of the most effective tools to use, it's also one of the quickest.

1

It's often the case that a shot you thought was going to come out looking great will end up with a net-curtain effect. The reason for this is a lack of contrast. Fortunately, it's easy to correct using the levels control.

2

Any half-decent photo-editing package includes a levels tool. Here, we're using the free, open-source package the Gimp. First of all, select the levels tools from Tools | Colour Tools | Levels.

3

The histogram that appears represents the distribution of pixel intensity in your image. A low-contrast shot will have most of the pixels clumped together. We can use the levels tool to remap them.

4

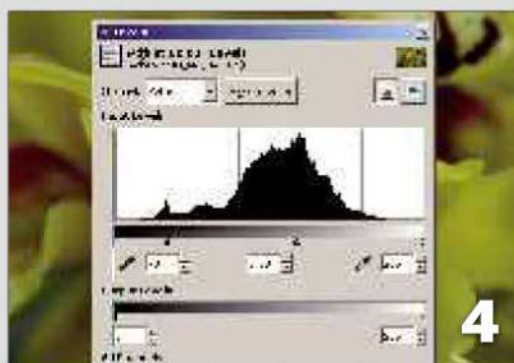
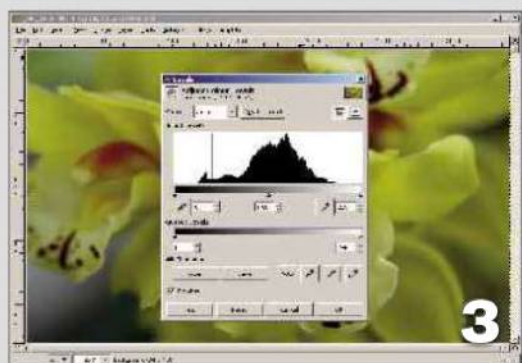
Just drag the left-hand slider beneath the graph inwards until you reach the point on the histogram at which the concentration of pixels increases. This remaps what were dark greys down to black, immediately boosting contrast.

5

Now try the same with the right-hand slider, although you may find that when you start pulling it to the left, overall image brightness increases too much. If that's the case, slide it back until the unwanted effects disappear.

6

That's all there is to it. The levels tool works wonders for some images, but will improve almost every shot you use it on, which is why you should apply it to every photo you want to print or display on the web.





It's a clichéd shot that every visitor to Australia takes...



...but you can make it stand out from the crowd.

HISTOGRAMS AND TONAL RANGE It's easy to switch off as soon as people start mentioning concepts such as tone, but expanding an image's tone to cover the full dynamic range available is the most important overall adjustment you can make. The concept of tonal range is, in fact, simple: it means the darkest pixel levels of an image in comparison to the brightest.

You can assess the tonal range of an image by using the histogram display. Like the levels and curves controls, any decent photo-editing package will let you see the histogram (see picture below). It's a bar graph showing the number of pixels at each intensity, from totally black to maximum white. A standard JPEG is what's known as an 8-bit image; this means the lowest pixel intensity value is 0, while the highest is 255 (representing bright white). 128 is mid-grey.

Typically, the intensity of a shot as it comes out of the camera will be clumped in a central part of the range, assuming it's properly exposed (see p70). If it isn't, the histogram will have most of the pixels clumped to the right for an overexposed (overly bright) picture, and to the left for an underexposed (overly dark) one. In a typical image, most of the pixels may be in the range 70-180, for instance. That means the image isn't taking advantage of the full

range of pixel values and, when it's rendered onscreen or printed, the highlights and white areas will look greyish.

In short, the image will lack contrast. So we need to expand the tonal range, so that (in our example) pixels with a value of 70 in the original image are brought down to 0, and pixels with a value of 180 are increased to 255 (the maximum value in a standard 8-bit image such as JPEG). Then the pixels in between are redistributed proportionately. The upshot isn't only an increase in richness and impact: detail that may not have been obvious is also brought out, since pixels that were clumped together are separated. The result is a much-improved image, which can be achieved in just a few seconds.

Since the tonal range and its adjustment are so important, there are two standard tools to adjust it that are available in any decent photo-editing application: this includes the free open-source Gimp, Paint Shop Pro Photo and Photoshop. The simplest and quickest is called the levels control. Its primary purpose is expanding the tonal range evenly across the full width available. At its simplest, it requires that you adjust only two sliders. See the walkthrough on p115 for how to use it. You'll note that we've only talked about the overall intensity of pixels here: in fact, an 8-bit colour image is made up of three 8-bit values between 0 and 255 to represent red, green and blue components of the picture. You can alter the levels individually in most software, but usually you'll end up with a hideous mess, since the colour balance will immediately be thrown completely out of whack.



The histogram shows the tonal range of a photo.

CURVES The second and most powerful tonal control is called the curves tool. This can either replace the levels control or be used in conjunction with it. The advantage over the levels tool is that, as well as expanding the dynamic range of an image, it can manipulate the tonal response across the whole range. While levels simply expand the response evenly across the image, with curves you can control the response so that, for instance, shadow detail is reduced to black, while highlights are increased, but midrange tones remain unaffected. In fact, this is the classic use of the curves control, known as the S-curve. It boosts contrast and increases the impact and mood of a shot. Curves is often the first adjustment any professional or serious amateur photographer will make to an image. See the walkthrough opposite for more.

HOW TO... USE THE CURVES CONTROL

Once you're confident with the levels control, you can try using the curves tool instead. It achieves the same basic effect but with more power and precision, and gives you a lot more creative control over the mood of a photo.

1

Although the levels tool gives great results, you can achieve better control over your pictures by using curves, and potentially rescue dodgy shots such as this Great Wall of China effort. Again, we're using the Gimp here.

2

Select the curves tool from the Tools | Colour Tools menu. You'll be presented with a straight diagonal line over a histogram, similar to that from the levels tool. The line will shortly become a curve, hence the name of the tool.

3

To make the line a curve, click once beneath the line. This creates a control point and is the first step in the S-curve adjustment. It serves to boost contrast in a similar manner to levels, but with more control.

4

Now click above the line in the top-third of the tool. The S-curve appears. This is now pulling down the intensity of dark areas of the image and boosting near-whites. The result is increased contrast and a moodier picture.

5

The advantage over the levels tool is that you can click and drag the two control points to fine-tune the mapping of pixel intensities. You can simulate the function of levels by dragging the top-right and bottom-left outwards.

6

Our final image has more impact and better tonality. You can combine curves with levels, too – do levels first. You don't need to do an S-curve, and you can have any number of control points.

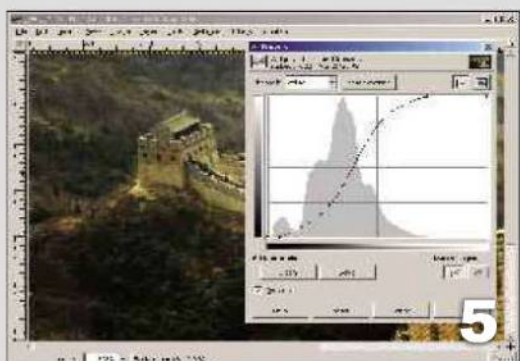
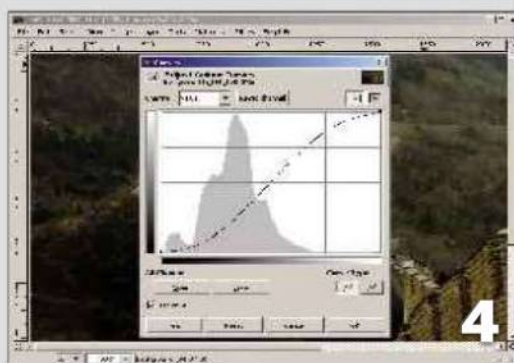
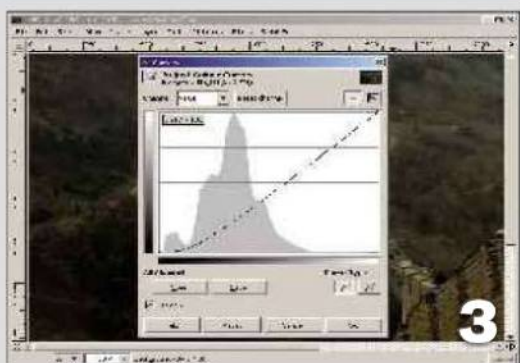
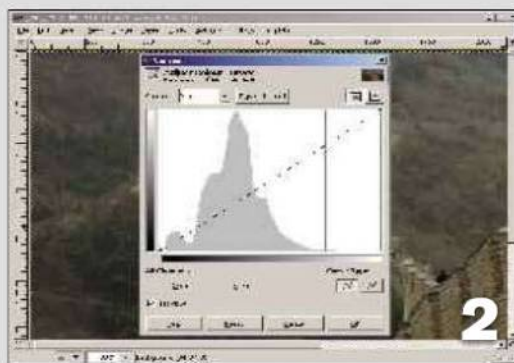


HOW HARD?

The near-infinite possibilities of the curves control mean it takes some practice to get used to it.

HOW LONG?

The basic adjustment here takes just seconds. But fine-tuning the results can become time-consumingly addictive.





HOW HARD?

The Unsharp Mask tool can be a tricky beast, but stick to the guidelines here and you won't go far wrong.

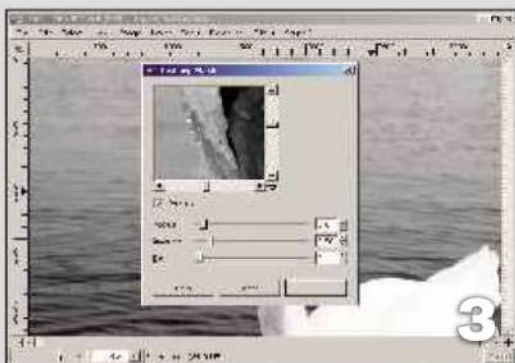
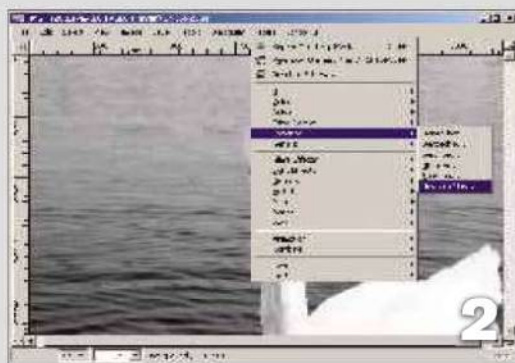
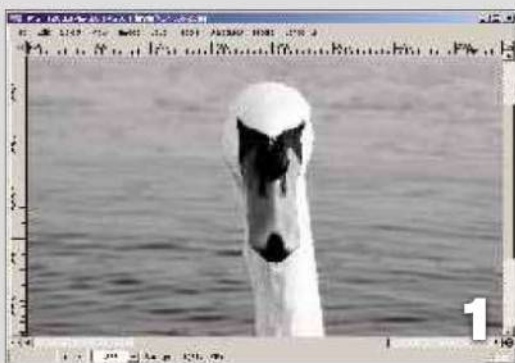
HOW LONG?

Mere seconds once you've done it a few times.

HOW TO... SHARPEN IMAGES EFFECTIVELY

It's essential to apply digital sharpening to your photos to get them looking as crisp as conventional film photos. The trick is to strike the right balance between effective sharpening and overdoing it.

- 1** Sharpening is usually done in-camera when you take a shot, but is more effective if you do it afterwards using Unsharp Mask. Here, we have a shot taken with in-camera sharpening switched off, ready to be sharpened up.
- 2** With the photo open in the Gimp, select Filters | Enhance | Unsharp Mask. A dialog box will appear with four main components: an image preview box and sliders labelled Radius, Amount and Threshold.
- 3** The operation of Unsharp Mask is complex, but with only three parameters to tweak you can't go far wrong in practice. However, at default settings of 5.0, 0.5 and 0, the detail in your image may not look very good.
- 4** Drag the dialog box's corner to enlarge the preview, then try adjusting the Radius control down to 1.0. This should reduce any halo effects, which is the whole point of using software rather than relying on the camera.
- 5** Now try altering Amount to between 0.5 and 1.5. You're aiming to get the sharpest-looking picture with the most detail, but without undesirable artefacts – a side-effect of over-zealous sharpening.
- 6** With settings of 0.9, 0.8 and 0 for Radius, Amount and Threshold respectively, our swan shot is now pin-sharp. Remember, though, that Unsharp Mask can't put in detail that wasn't there in the first place or was blurred.



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IF YOUR SHOTS COME OUT LOOKING RATHER UNUSUAL, YOU'VE PROBABLY SET THE WHITE BALANCE WRONG. HERE'S A LITTLE ON COLOUR AND HOW TO FIX IT.

Fine-tuning colour balance

We've already talked about the joy of RAW files (see p74) and how they let you alter the white balance of a shot (see p66). The world isn't perfect, though, and if your camera doesn't support RAW you'll eventually come across a situation where your JPEG shot just doesn't look right. Sometimes it's because you've taken a shot in a hurry and forgotten that you manually set the white balance outside and then came indoors; more often, it's because the camera got its auto white balance wrong. A camera has to guess what objects in a scene are really white, and if there's little or no actual white, or the light is unusual, it can latch on to the wrong colour and skew the whole shot. Outdoor scenes are prone to this problem: a landscape shot taken in a field will consist mainly of a blue sky and green grass. With no white objects, the tendency is for shots to come out with a blue cast.

COLOUR MODELS Once you start altering colours in software, you'll realise there are various ways of describing them. A computer screen displays a colour using an additive model – it combines components of individual colours to achieve any shade. The base colours a computer works with are red, green and blue, usually shortened to RGB; from these three shades, any colour in the spectrum can be produced. Consequently, any colour your computer can display can also be expressed as a set of three values representing the levels of red, green and blue.

RGB is good for computers, but not intuitive for humans to work with. There's no simple way for a person to work out how to manipulate the RGB values for a given colour to make that colour appear more saturated and vibrant. This is where the HSV colour model comes in. It uses a mathematical formula to convert RGB numbers to three more people-friendly components known as hue, saturation and value or brightness. The hue component identifies the essential colour, the saturation component defines the richness or vibrancy of that colour, and the value component how light the colour is. Splitting up the colour in this way makes it easy to provide sliders in a software package that you use to quickly go from the colour you see onscreen to the colour you see in your head without too much trial and error. It also allows the use of the user-friendly colour triangle (see image 3).

Paper needs a different model again. This is where the CMY (cyan, magenta and yellow) model comes in. Whereas a screen starts out black and adds RGB to produce its colours, CMY goes the opposite way. You start with a white piece of paper and add CMY components (in other words, ink), eventually ending up with black. Put another way, cyan, magenta and yellow are the colour opposites of red, green and blue, which is why you'll see them on opposite ends of colour-adjustment sliders, such as in the colour-balance controls in the walkthrough opposite.



The Gimp offers five ways of choosing the same colour: the native Gimp method is a hybrid, allowing colour choice by HSV or RGB.



CMYK is the traditional printer's choice of colour selection.



The colour triangle is very intuitive, allowing you to choose hue from the outside ring, and the saturation and brightness levels from the inner triangle.



The watercolour chooser lets you mix colours like paint rather than choosing one directly.



Techies will appreciate the scales option, allowing you to enter colours directly as numbers.

HOW TO... CORRECT COLOUR BALANCE

It's always best to get the colour balance right when you take a shot, but if you didn't manage that, software can come to your rescue. Set aside some time, though – it isn't the quickest task in the world if you want to get it right.

1

One of the most annoying accidents in digital photography is having the camera's white balance set incorrectly. Here, the camera was on the wrong preset for this indoor shot.

2

If the shot had been taken in RAW mode, we could have done it in two clicks. With this JPEG shot, it's more complex. First load up the image – we're using the Gimp. Now click on Tools | Colour Tools | Colour Balance.

3

The colour-balance tool works in shadows, midtones and highlights. Start with the wall, which we know should be grey. Its tonal range falls between midtones and highlights, so select each and pull the yellow/blue slider to blue.

4

With skin tones, it's about assessing which of the colour pairs is out – cyan/red, magenta/green or yellow/blue, and tweaking them. Skin falls in the midtones, but it's a combination of hues, so small adjustments are necessary.

5

Our subject's shirt collar shows some blown-out blue highlights – these should clearly be white. We need to bring down the blue level, while compensating a little by upping the magenta bias slightly.

6

The final image took ten minutes of juggling with the colour sliders in all three tonal areas, but the result looks almost completely neutral. If you think the shot benefits from a bit more warmth, you could opt for that instead.



HOW HARD?

This is one of the tougher editing tasks.

HOW LONG?

You'll need at least ten minutes for each shot you want to correct.



TIP

When SLR lenses are sold as being designed for digital, the manufacturers will have paid more attention to applying coatings to the lens to reduce the effects of fringing. Lenses not specifically designed for DSLRs often work absolutely fine, but you need to watch out for fringing effects in bright conditions.

Look familiar? This camera-phone shot shows the classic symptoms of fringes.



DIGITAL PHOTOGRAPHY ISN'T PERFECT – LENSES CAN CAUSE OFF-PUTTING COLOUR FRINGING, BUT YOU CAN DEAL WITH THEM IN SOFTWARE.

Dealing with colour fringing

The phrase “chromatic aberration” sounds horrible, and it looks as bad as it sounds. It’s an image artefact that affects certain classes of photo worse than others, but when bad it can spoil an otherwise great shot.

You may not recognise the name, but you’ve almost certainly seen the symptoms of chromatic aberration, also known as colour fringing. It manifests itself mainly along the edges of objects in a photo: rather than the edge looking clean and sharp as it did in real life, there will be a coloured fringe along it. It’s offensive in two ways: first because it introduces colouring into the image that wasn’t there in the first place, and second because it makes edges appear less sharp. Since human visual perception is very keyed into detecting edges – it stops us bumping into things and falling off cliffs – the loss of sharpness at the edges of an image is exactly what you don’t need and gives the whole picture a fuzzy look that’s a million miles away from the punchy crisp, clean images we all want.

The effect of fringing is often more noticeable in digital compacts than SLRs, but both can suffer, particularly if a DSLR has a cheap lens. The lens is the key here: fringing isn’t a phenomenon that’s confined only to digital photography, but the unique construction of a digital camera makes the effect more pronounced. On a digital sensor, each pixel is covered with its own microlens to maximise the amount of light reaching the photosensitive area. This is vital to get acceptably low noise levels, but the microlenses add their own refractive effects to the natural amounts of chromatic aberration contributed by the main

camera lens and, since there’s one microlens for each pixel, the effects aren’t limited to the edges of the frame as they tend to be with traditional film photography. The aberration occurs because different wavelengths of light are refracted to a different extent when they hit a transparent medium at an angle: the classic splitting effect seen when light goes through a prism.

You’ll most often see fringing in high-contrast areas; in other words, where there’s a bright and a dark area right next to one another. A typical example is where you’re shooting with a bright sky in the background – the branches of trees are reduced to an ill-defined coloured mess and the edges of things such as houses against the skyline are affected, too. Wherever you have bright, contrasting conditions you should be aware that fringes can creep in.

DEALING WITH FRINGES IN SOFTWARE Some software packages – notably the higher-end types such as Photoshop (see p108) – now have dedicated controls to deal with fringing. They only work across the whole image, though, and a better method is often to do it manually by desaturating parts of the image appropriately – see the walkthrough opposite for how to do it.

REDUCE FRINGING AT SOURCE With a digital compact in automatic mode, you can’t do much to avoid fringes when you take a shot – just try not to shoot against a bright sky. Bright doesn’t mean clear, sunny skies: an overcast but bright day is just as bad, since the sky tends to be blown out to white – the worst conditions for fringing. Where changing the shot composition isn’t feasible, you can try underexposing the shot slightly; use your camera’s exposure compensation to reduce the autoexposure setting to either -0.5 or -0.3EV. Since it’s overexposed image highlights that tend to be affected most by chromatic aberrations, underexposing to ensure there are no blown-out areas of the image can sometimes help. Once you’ve taken the shot, you can use the levels or curves control in software to increase the apparent exposure level again (see p117), or simply use your software’s brightness control (although that can be a bit of a blunt instrument – levels or curves give you more control).

With a digital SLR, or a compact that allows you control over aperture, you can also sometimes mitigate the effect by “stopping down” the lens; in other words, using a small aperture (say f/11 or smaller). The effect of this varies according to the lens and camera you have; the basic rule of avoiding very high-contrast edges applies, but you can often get to know the particular conditions in which certain combinations of camera and lens will produce objectionable levels of fringing. There’s sometimes no substitute for experience.

HOW TO...

REDUCE COLOUR FRINGES

Colour fringes are one of those annoying artefacts that won't show up on your camera's screen, but are gratingly obvious when you bring up the shot on your PC or print it. You can reduce their impact substantially in software, though.

1

Colour fringes are the curse of digital photography, showing up as blue, red or purple fringes. Our swan picture is prime territory for this. At first glance, reproduced as a small image here it looks fine.

2

But when the image is printed at 100%, you'll see the fringes at the edges of the neck, and around the droplets of water falling from the swan's beak. Using the Gimp, we can reduce them so they're almost impossible to see.

3

The basic method is to use the hue/saturation tool. But, since the fringes are red and the swan's beak contains a lot of red too, we need to be more sophisticated. First, click the lasso tool in the Gimp's tool palette.

4

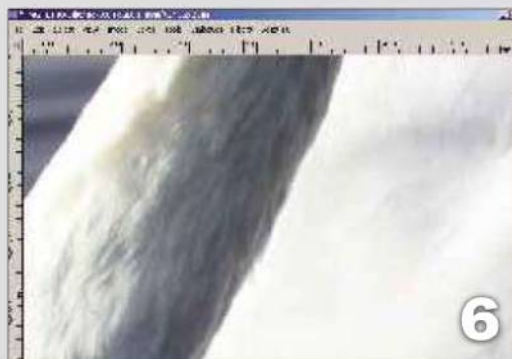
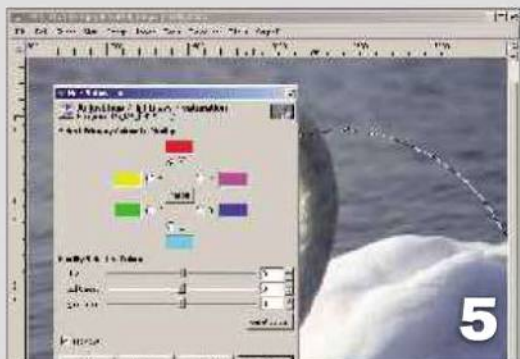
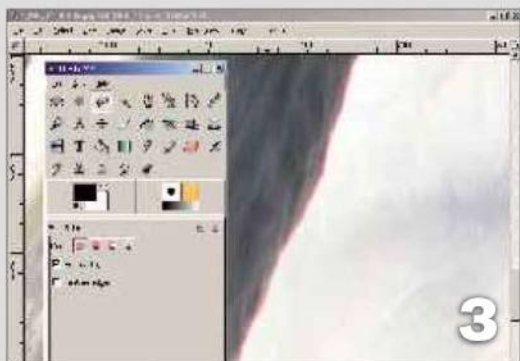
Now we need to select the offending area and isolate the parts of the image we don't want to affect. Most of the image is blue water, so we've just drawn a big coarse selection around the body and water droplets.

5

Select Tools | Colour Tools | Hue/Saturation. Since the fringes are red, we'll select the red radio button under Primary Colour to Modify. Now, drag the Saturation slider to zero so that the red fringes become grey.

6

Hey presto, the horrible fringes have disappeared. And because the swan's beak was isolated from the filtering, the overall apparent colour balance of the shot has been preserved.



HOW HARD?

It takes some care to get the selection area right, but the basic process needs very little skill.

HOW LONG?

Five or ten minutes should be plenty.

STITCH YOUR IMAGES TOGETHER SEAMLESSLY TO CREATE GORGEOUS
PANORAMIC SCENES BY HAND.

Creating photographic panoramas

The obvious use of a panorama is that familiar scenario: you find yourself presented with a stunning photographic vista on your holiday, and your camera's lens isn't quite wide enough to fully encompass the scene in one shot. Taking several pictures and subsequently merging them effectively simulates a very wide-angle lens that would otherwise cost several hundred pounds.

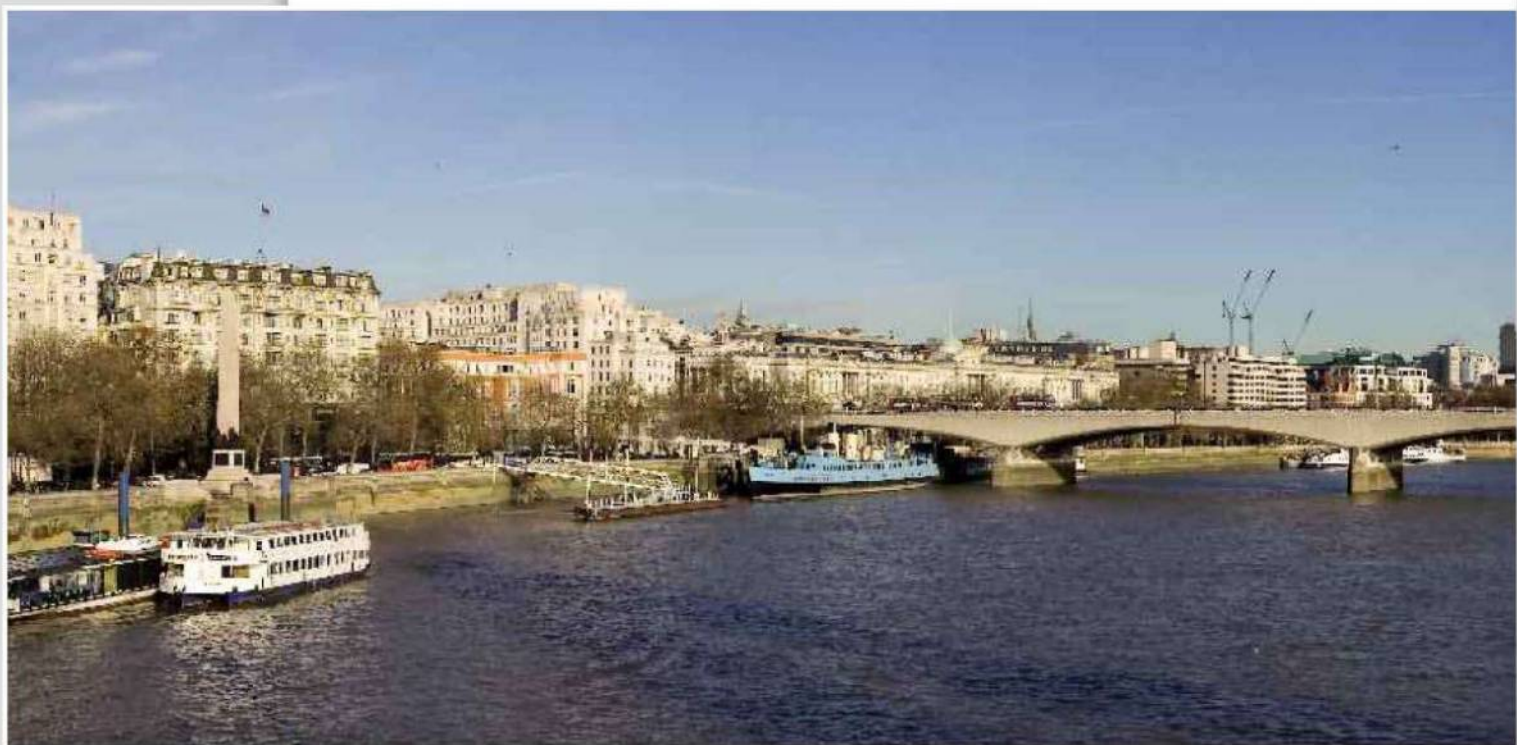
That isn't the only reason for taking panoramic shots, though; the more pictures you stitch together, the more pixels you have and the more detail there is in the final composite panorama. This means you may want to try a stitched-together shot of a scene even if your camera's lens can cover it in one go, by zooming in slightly and taking several shots. But you need to follow some strict rules for panorama shots if you're going to get the best results.

COMPOSITION AND FRAMING From a composition and framing point of view, it's wise to mount the camera on a tripod. This allows you to keep it dead level and frees you to concentrate on getting the correct amount of overlap between shots. You need to overlap each frame by quite a bit: about 30%. This is because the edges of the frame are far more prone to distortion, due to natural optical effects

and imperfections in lens design. Moving towards the centre makes it far easier to align the shots correctly when it comes to stitching.

One technique that seems counter-intuitive but can help to reduce alignment problems later is to try shooting a horizontal panorama with the camera in portrait orientation, and vice versa. Depending on your camera's lens, there's usually less distortion in the vertical direction. It does mean you'll need to take more shots for any given scene, but since shooting digital costs nothing you may as well give it a whirl.

CAMERA SETTINGS AND EXPOSURE The golden rule when shooting a panorama is to keep your camera's settings as close as possible to identical between shots. There are three primary settings to consider: exposure, focus and white balance. Exposure is the main problem, since few point-and-shoot cameras have fully manual modes and it's crucial that exposure remains constant between shots. If it isn't, you'll find it hard to get a convincingly seamless stitch no matter how hard you try. If your camera does have a manual exposure setting or exposure lock between shots, you then need to determine



the exposure. Remember that if you're exposing to show detail in a dark subject, the highlights will tend to be blown out to bright white, and exposing for a bright subject such as the sky will mean dark objects are turned to silhouette. For a panorama, the same principle applies across its constituent shots. You need to decide which of the shots you mainly want to expose for.

You should generally choose the shot that you judge to be in the middle of the brightness range; if you're shooting a panorama of a cityscape with the sun low on the horizon to one side, for instance, the central image will be the one you should expose for. Point the camera at that area and note the exposure settings. Then put the camera on manual, using those settings.

Focus is less critical than exposure for the simple reason that most panoramas tend to be landscapes: even set to automatic, the camera will usually set the focus at infinity. If there are other near-field objects in the shot, though, you need to make sure you're not focused on those. If focus changes, not only will it look odd having a different point of focus between images, the size of the images will differ slightly, again making it harder to get seamless alignment in your shots.

Then there's white balance to consider. This is normally the least of your worries, since almost every camera has a manual white-balance feature; just don't forget to take it off automatic and set it to match the conditions you're shooting in (see p66).

FOCAL LENGTH It might seem sensible to zoom out as far as your camera will go; that way, you may be able to take in a scene with only a couple of shots. In fact, this isn't a good idea. With a zoom lens on a very wide-angle setting,

perspective distortion effects are hugely magnified, which once again translates into a lot of difficulty when it comes to alignment of your composite image. Conversely, zooming right in will reduce distortion and make stitching easier, but you're likely to end up having to take dozens of shots to cover a scene. It's best to find a compromise: try to set the zoom to its middle setting, so that for every 45 degrees you turn the camera you take three or four shots.

Avoid getting moving objects in the frame if you can: sod's law dictates they'll end up on the transition between two shots, half there, half not. And keep an eye on the cloud cover on overcast days – if the sun keeps partially breaking through the clouds, light levels will tend to change between shots and ruin the exposure for the sequence.

CREATING THE PANORAMA There are lots of programs that will automatically stitch images together for you. Most of them are effective much of the time, especially if you're not looking too carefully. But one thing they all lack is human perception, and that goes a long way when it comes to making panoramas. An automatic stitching program can't subjectively assess whether an image looks right, and you'll often get results that simply don't look correct or are warped or distorted in some obvious way. But given almost any competent image-editing package that's able to cope with layers and layer-mask editing, you can achieve amazing results by doing it manually. If you've followed our advice on composing and shooting, you can easily make a panorama in which it's impossible to discern the transition between individual shots.

All you need to do is create a blank canvas in your favourite photo editor, then drag in the individual pictures ►



Stitching together multiple shots let us create a stunning panoramic photo of the River Thames packed with detail.

CHAPTER 9

EDITING AND RETOUCHING

as unique layers. Set the layer opacity to 50% or so on each of them and then manually line them up so they match as closely as possible. This is the point at which, if you're doing it for the first time, you'll assume you've done something terribly wrong: if you manage to line up that building there, then that bridge over there is misaligned. In fact, it's impossible to avoid these misalignments completely, which is where the next step comes in.

First, set all the layer opacities back to 100%. Now let's say you're stitching together a four-shot horizontal panel as in our walkthrough opposite, and you're working from

left to right. Put the left-most image at the bottom of the layer stacking order, the right-most at the top and the intermediate ones in correct order left to right.

The left-most image you can leave alone. The next one to the right you need to create a layer mask for. Now drop into mask-edit mode and, by painting white on the layer mask, you can erase that part of the image and allow parts of the image below to show through. This gives you a way of making a variable seam so you control exactly where the left-most image stops and the one to its right begins.

Now take a look at the obvious areas of conflict in the composite image where prominent features don't line up. You need to paint the layer mask with a medium-hard-edged brush, so as to "cut" between them. The idea is that the layer transition should take place in as indistinct an area as possible, with few notable details so it isn't obvious. Where you can't avoid differences – such as in large areas of solid colour that perceptibly differ from one shot to the next – you need to use a large, gently feathered brush to even out the transition gradually. In our example opposite, the large areas of sky and water showed slight variations between shots, despite keeping the camera on manual. Painting down the seam of the image with a very large, very soft brush creates a gentle blend between the two that's impossible to see – the eye simply isn't sensitive to it.

NOT AS ODD AS IT SEEMS It sounds a crude way of stitching together images, but with about half an hour's practice you'll begin to see that the layer-blending method is far more effective than its simplicity seems to suggest. It's completely non-destructive, too: if you erase too much of the area you're working on and a misalignment shows through from underneath, simply switch to painting black on the layer mask and that area will magically reappear.

With the manual technique, you're using your own perception to allow the unavoidable mismatch between scenes to take place in areas where they're not noticeable. Take a close look at the stitched shot on p124-125. At first glance, and indeed second and third, the shot looks perfect. This is because the eye focuses on the foreground details and edges, such as the arch of the bridge, its pontoons and the blue boat. But take a very close look underneath the bridge between the pontoon and the boat and you can see the mismatch: there's a floating structure that's vertically displaced and repeated.

You didn't notice it and never would have if it hadn't been pointed out; that's the art of stitching by hand. If you're intent on getting as close to the original scene as possible, you can flatten out the image once it's been stitched and then use copy, paste and cloning tools to pull the mismatch into alignment manually and fill in the gaps with cloned water detail (see p142).

Bear in mind that this technique works best for straight-line "panel" panoramas, whether horizontal or vertical. If you want to stitch a tiled image with both horizontally and vertically displaced shots, you're working in two dimensions and it becomes harder to hide geometric distortion, so image-stitching software may be required. But for your normal grand vista-style panoramas, give this technique a whirl. Not only is it effective, it gives a great sense of satisfaction to craft a gorgeous panoramic scene by hand.



A super-wide-angle lens? No, a shot stitched in software.

HOW TO...

STITCH A PANORAMA BY HAND

There are plenty of pieces of software around that will stitch together your panorama shots automatically, but you can often achieve a much better effect if you do it by hand. On top of that, it's immensely satisfying.

1 Here, we're going to stitch together a four-shot panorama taken from London's Hungerford footbridge. We used a digital SLR and took a meter reading for the middle shot of the sequence, then dropped into manual mode, using the same metered exposure for all four shots. Focal length was around 50mm. First, import all four images into layers in an image-editing program – we're using Photoshop here but the Gimp will work, too.

2 With layer opacity set to 50%, line up prominent features in the shots as best you can. You'll soon find out you can't get it perfect: here, for instance, with St Paul's Cathedral aligned, the buildings and bridge on the right are significantly out of whack. If you're working left to right, favour getting features on the left lined up, and vice versa.

3 Set layer opacity to 100% and create layer masks for every layer except the bottom one. Go into white mask-edit mode and create the image transitions by painting from the left edge in, covering prominent details to avoid them clashing in the final composite. Also, use a very large, soft brush to smooth out the transition in sky and water, as we've done.

4 With practice, you'll be able to get results as seamless as this, with no discernible transition between images and no obvious mismatches. Remember, when you're editing the image masks, you don't want any partial transparency around clearly discernible details such as buildings on the horizon, since mismatches will clearly show through this way.



HOW HARD?

Not particularly intellectually demanding...

HOW LONG?

...but you'll need lots of patience and possibly an hour or two. Or three.



OF ALL THE THINGS THAT BETRAY A CASUAL AMATEUR SNAP, THE PRESENCE OF PEOPLE WITH DEMONIC BURNING RED EYES IS THE BIGGEST GIVEAWAY.

Dealing with red eye

The bizarre effect of red eye is the bane of holiday snaps and drunken party shots the world over: people are rendered with satanic glowing eyes that seriously spoil the shot. The cause is simple: the very bright light of the flash goes into the eye, reflects off the retina (which is red because of the blood vessels) and back into the lens. It isn't something you can see with the naked eye, since it needs a light with the power of a camera flash to be noticeable.

You'll notice that red eye only ever occurs indoors. If you're outside using fill-in flash to take someone's portrait, you'll rarely see it. That's because the light levels outdoors, even if someone has their back to the sun or it's a cloudy day, are enormously brighter than you'll ever get indoors using standard artificial lighting. Your eyes are incredibly good at adapting from the massive changes in light levels between daylight and artificial light. When we're indoors, our eyes are adjusted to the very low light levels without us realising our pupils are wide open to allow as much light to enter the eye as possible – the exact same reason that a wide aperture is needed to take photos in low light. With a fully dilated pupil, there's a nice big area of our retina exposed and the light from the flash has no trouble going straight into our eyes, bouncing off the retina and back into the lens. When we're outdoors, the pupil is far more constricted and there's less of the retina exposed and less reflection from the flash, hence no red eye.

IN-CAMERA RED-EYE REDUCTION For a couple of decades, traditional film cameras have sported red-eye reduction modes. Obviously, this isn't down to digital trickery. Instead, the camera cleverly uses human reactions to reduce the effect by pre-firing the flash before taking the shot. Although it normally takes a few seconds for our eyes to adjust to different light conditions, the very bright pre-flash is enough to cause a partial constriction of the iris, reducing the aperture of the eye and making it less likely for red eye to appear.

OTHER WAYS TO REDUCE RED EYE The effects of red eye are usually only felt in digital compacts. This is because to reflect directly back off the retina and into the lens, a light source needs to be more or less in line with its axis. The flash on a digital compact (or traditional compact film camera) is just such a source – it's physically very close to the lens itself. The solution to red eye is to move the flash as far from the centreline of the camera as possible. That's the reason the external flash units are as tall as it's feasible to make them, while still being mechanically able to attach to a camera's external hot-shoe connector without being ripped off by the first knock or bump. It's also the reason that the flash in digital compacts sometimes pops out a little way from the body. The sure-fire way to avoid the problem is to bounce the flash indirectly off the ceiling, which is again possible with external flash units.



TIP

► If you're stuck with a compact camera without an external flash, you can still avoid red eye. Ask your subjects to look at your shoulder rather than directly at the camera and the effect should be eliminated or at least much reduced.

HOW TO...

REMOVE FLASH RED EYE

If you have a shot that's been spoiled by red eye – and it's likely that most of us do – there's absolutely no cause for concern, as you can deal with it in just a matter of minutes.

1

Our shot ticks all the boxes for typical red-eye conditions: it was taken indoors at night, using the flash on a digital compact camera. The result is that familiar devil look, which we can assure you our subject doesn't really have.

2

We're using the Gimp, but you could download Google Picasa to do this job, too (see p105). First zoom in to get a good view of the eyes by right-clicking on the photo and selecting View | Zoom | 4:1 (400%).

3

Dealing with one eye at a time, we'll use the lasso tool to draw a free-hand selection around the offending area of red. Once selected, hit the Ctrl key and draw around the white twinkle in the eye, to exclude it from the selection.

4

With the red eye selected, in the image-window menu bar click on Tools | Colour Tools | Hue/Saturation. Drag the Saturation slider to near zero. Pull the Lightness slider down, too, until the shade matches the rest of the eye.

5

Hit <Ctrl-Shift-A> (or click Select | None in the top menu) to deselect the area. At full magnification, the results won't look perfect, but they're good enough. Repeat steps 3 and 4 for the other eye.

6

If you want to experiment with getting the eyes looking even better, you can try using the Hue slider in the hue/saturation tool to change the colour of the red portion to the actual colour of the subject's eyes.

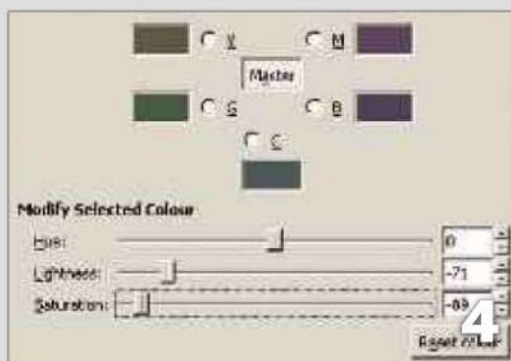


HOW HARD?

One word: easy.

HOW LONG?

A matter of minutes, even if you fiddle with the settings.



BY TAKING THE COLOUR OUT OF PHOTOS, YOU CAN TURN A BLAND PHOTO INTO A STUNNINGLY DIFFERENT IMAGE.

The power of black and white

Black and white can carry the mood of a subject better than colour, and it can produce a mood when there was none to start with. It can give images more abstraction while, in a strangely contradictory way, making them seem more real. A mundane shot can suddenly become far more interesting when the extraneous visual information that colour provides is stripped away. It can also improve a shot that's otherwise spoiled by annoying superfluous detail: the negative impact of things such as cars in the background – especially if they're red – can be hugely reduced by removing their colour.

SHOOTING The first thing not to do when taking monochrome photos is set your camera to monochrome; this will limit the possibilities for the final image. Traditional black-and-white film photographers often use colour filters over the lens when shooting. It sounds counter-intuitive, but by blocking certain colours from reaching the film you can significantly alter the mood of a shot. By capturing in full colour, you can effectively apply virtual colour filters to your shot after the fact.

If you're specifically taking shots destined for black-and-white conversion, remember to concentrate on the aspects of a scene that don't depend on colour. It's initially

difficult to "see" in monochrome, and particularly to imagine a scene that's been treated with high levels of contrast adjustment. But the key to this is practice: make sure you review your results, learn from your mistakes and do it again. And more often than not, the best shots come by accident – many people get frustrated by this and think they should be able to see an image before they take it rather than happen upon it during processing, but accidents are how many of the best shots are taken.

MAKING THE CONVERSION When choosing which of your shots to convert to black and white, look for strong curves and lines; the best candidates for conversion are often the simplest shots with interesting texture. The best photos of people are ones in which the subject looks either very happy or very reflective. Converting these brings out the emotion, whereas in-between expressions tend to look bland in black and white.

One method to avoid when converting your image to black and white is choosing an image editor's Convert to Greyscale option. This strips out all colour information, and you're left with an image that may as well have been taken with your camera set to black and white. It's preferable to use a layer-based approach, leaving the colour



A fairly well-exposed but dull shot...



...is far more dramatic in black and white.

image intact and adding manipulation layers to strip out the colour information selectively. All modern image editors such as Photoshop, PaintShop Pro and the Gimp can handle layers.

There are a couple of approaches you can use to remove colour, but probably the easiest and most effective is to use a channel-mixing layer, with the monochrome option checked. A channel mixer can convert your image to monochrome by combining the red, green and blue information into a single brightness value for each pixel according to a ratio you specify. So, by using 100% of the red channel and setting the green and blue channels to zero, you can simulate a red filter over the lens. The natural way to do it – mixing all three channels at 33% to produce the monochrome shot – tends to produce results that are a little flat, with low contrast. You'll find that much of the time, discarding all the green and blue information and going for 100% red gives great results, particularly with landscapes, which look far more dramatic, with dark, moody skies (see picture, right). It's best to introduce small amounts of green and blue to fine-tune the look, pulling out any desired details that don't show up using the red channel alone (see overleaf).

CONTRAST One of the defining characteristics of much black-and-white photography is high contrast. High contrast goes hand-in-hand with black and white, since both effects tend to reduce detail and simplify the image, putting the emphasis on simplicity and form. High contrast can work really well for both architectural-style shots and portraits, although if you want to flatter someone's looks it isn't the best way to go, since it tends to lend shots a gritty, hyper-real look.

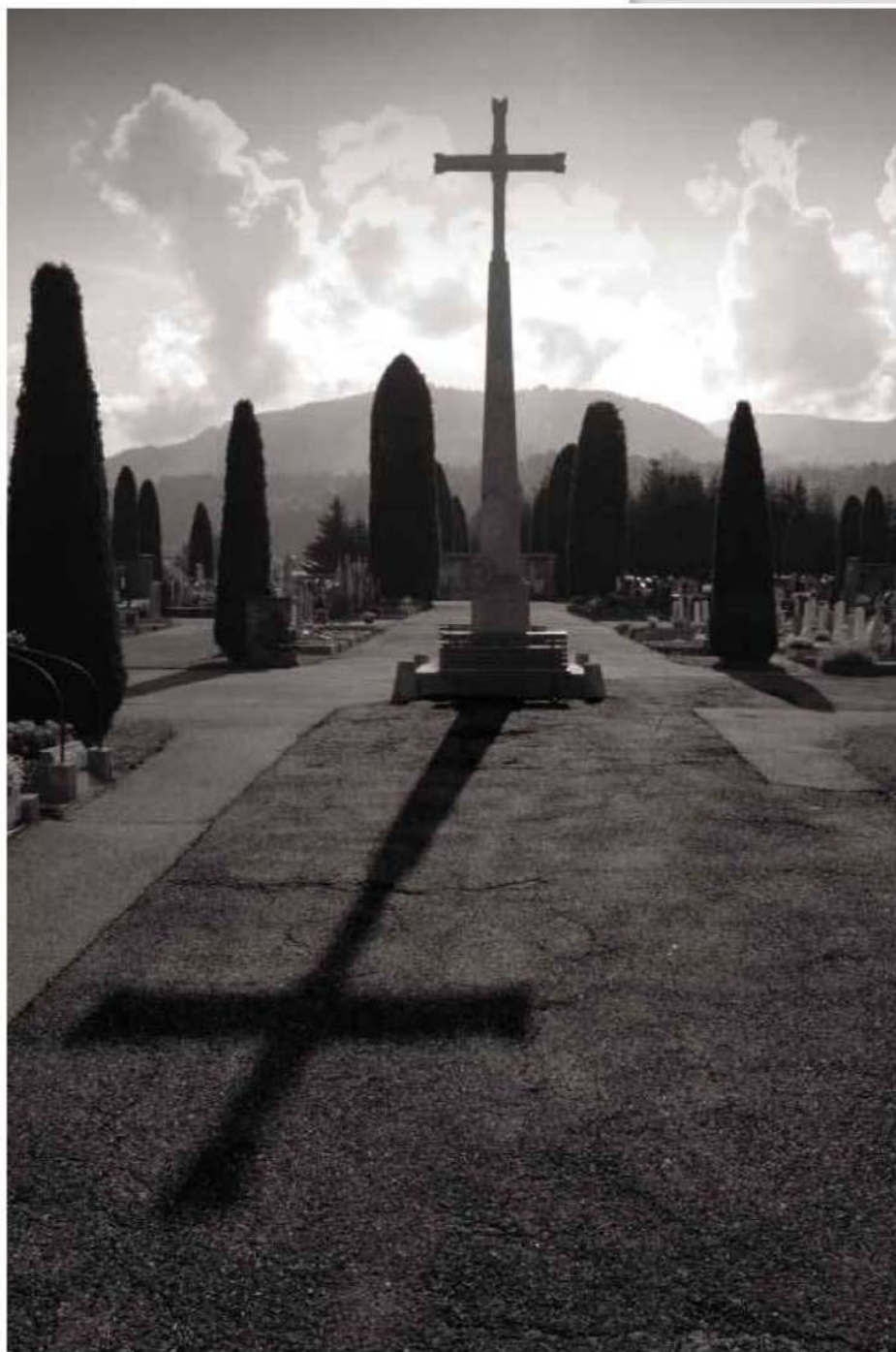
Increasing contrast is best done in the usual way with a curves layer; put control points at one-third and two-thirds of the way up the curves line and create an S-shape; the bottom kink of the S makes shadow detail darker, the top kink boosts highlights, and the straight middle section means midtones are less affected.

But unlike the usual contrast adjustment – in which you normally aim for a subtle boost to add punch – try being more extreme and pulling shadow detail right down, while boosting the highlights up to white. This will give the shot a stylised, stark look while increasing the apparent detail in the midtones; for a portrait shot, this will enhance every line and wrinkle on a face. If you go even more extreme – to the point where the curve looks like a steep, straight line in the middle of the dialog box – the shot will end up looking particularly stylised, which can work for very abstract or atmospheric shots.

TONING Traditional black-and-white film photographers often develop their own photos, and spend inordinate amounts of time with different papers and chemicals to

get the desired tint to their shots. A completely neutral greyscale often isn't the ideal tone; the most recognisable is a sepia tint – a warm effect that gives yellowish browns. Toning effects are easy to achieve in software, either via a dedicated black-and-white toning filter or by using generalised editing tools. In Photoshop, for instance, simply add a new Hue/Saturation layer and check the Colorize box. Leave the Lightness slider at 0, and initially set the Saturation slider to +25. You can then move the Hue slider anywhere between 0 and 360 to get any colour ►

Taking only the red channel of an image can give dramatic dark skies.



CHAPTER 9

EDITING AND RETOUCHING

effect you like; the most traditional-looking results are found with Hue set between 30 and 40.

SHARPENING Many black-and-white photographers use large or medium-format film cameras, which produces shots with ultra-high levels of detail. You can simulate this effect – although, of course, you can't actually create more detail than is already there – by judiciously overdoing your sharpening. This has fewer negative effects on a black-and-white image than a colour one, since the colour noise that oversharpening a colour shot produces isn't a problem in monochrome. Luminance (brightness) noise will tend to be enhanced, of course, but it's much less objectionable and tends to look like film grain.

Remember, the best way of sharpening shots is to not use the in-camera settings; the appropriate level of

sharpening depends on the subject and needs a human eye for the best results. Set your in-camera sharpening to 0 and use software. Remember, also, that the best way to sharpen an image is to use the Unsharp Mask filter (see p118). This is far more controllable than a simple sharpen filter and gives better results. Another thing to remember is that you can't apply a sharpening layer, so Unsharp Mask affects the actual pixels in an image. For this reason, it should be done at the end of the manipulation workflow. Always preview Unsharp Mask at 100% (actual pixels) magnification; if it doesn't appear to be doing anything, check that you have the actual image layer selected in the layers tool palette.

Done properly, black-and-white conversion is probably the most effective type of digital manipulation you can do, and a great deal more satisfying than adding silly borders and excessive effects. Give it a try.



The best candidates for black and white have strong shapes and form, such as these deers' antlers.

HOW TO... CONVERT TO BLACK AND WHITE

Whatever you do, don't just set your camera to black and white mode to take monochrome pictures. Shoot in colour, then you can take advantage of all three colour channels to fine-tune the final look of the shot on your PC. Here's how.

1

The effect of black and white is to enhance the mood, so go for an appropriate picture. This image, with a thoughtful-looking subject, is a prime candidate. We're using Photoshop in this walkthrough.

2

We'll use a Channel Mixer layer here. Choose Layer | New Adjustment Layer | Channel Mixer. Check the Monochrome box, and activate the preview box. Now try experimenting with the ratio of green, blue and red.

3

Create a new curves layer and form an S-curve – remember that, by default, bringing down the bottom part of the S reduces the level of shadow, while making the top hump higher brightens the highlights.

4

Notice how increasing the contrast and taking out the colour information has reduced the level of distraction from the background. One side effect of the conversion is to make the image look cold. So we need to tone the image.

5

Create a Hue/Saturation layer and play with the Hue and Saturation sliders until you get a result you like. In this case, a hue of 32 and saturation of 30 gives a nice warm result, with a hint of red so it doesn't look too old-fashioned.

6

The result isn't hugely different from the starting photo, but it nonetheless conveys the mood far more effectively than the original colour shot. The trick is applying the appropriate effects according to the subject of the shot.

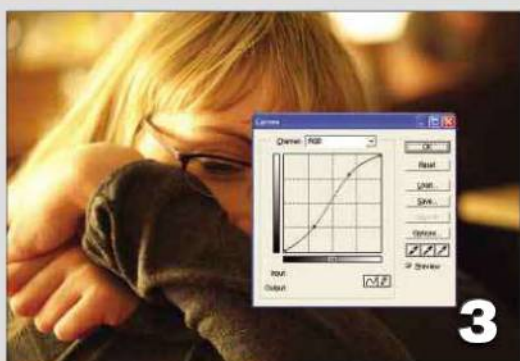


HOW HARD?

It can be tricky to determine the balance of each colour in the channel mixer.

HOW LONG?

10-20 minutes.



SUBTLETY ISN'T ALWAYS THE KEY TO PHOTO PROCESSING. WHEN YOU GET TIRED OF BEING SENSIBLE, TRY SOME EXAGGERATED STYLISING.

Having fun with effects

While some photography purists might complain it isn't what real photography's all about, using software to alter a picture radically can be great fun and produce excellent results. Here, we're going to show you how to make your modern photos look like film shots from a couple of decades ago. The standard way to simulate old photos is using a film grain effect – you can see how to do that on p137. But before that, we're going to look at a technique known as cross-processing. These are both tricks that play to the tendency for people to like what are, technically, undesirable side effects and limitations of photography, but develop into artistic effects in their own right.

You may not have heard of cross-processing, but you'll almost certainly recognise the look of cross-processed images. Originally, the effect came from using the "wrong" chemical process to traditional chemical-develop film, often by developing colour negative film using the process that's supposed to be used for slide film. The result is images with their colour balance completely skewed: usually a strong green/yellow cast to highlights, and blue shadows. It's an effect that, with a bit of practice, you can apply in software and it's great for adding a nostalgic 1980s feel to a shot, since it's a similar effect to the less-than-perfect processing that you generally got from taking films to the chemist in the dim and distant past.



Cross-processing can give interest to otherwise fairly flat shots.

Since cross-processing images affects reds and turns them magenta, it's popular among fashion photographers because it accentuates people's lips. There's no one definitive look to a cross-processed shot, though, as it depends on exactly which processes you're crossing, and with digital imaging there's no limit to what you can do. That said, the defining characteristics tend to be a high-contrast image with blown-out highlights (again, something photographers traditionally go to huge lengths to avoid), but cross-processing can also produce a low-contrast pastel look. However it's done, it's a very different effect from traditional toning methods such as sepia, since although green and yellow are predominant it doesn't produce one overall hue.

HOW TO DO IT Like so many techniques, the basis of simulating cross-processing in software is the use of the curves control. Ordinarily, though, curves is used in its default RGB mode, making equal adjustments to all three colour channels at once, and the only effect on colour is an increase in apparent saturation. Cross-processing requires more advanced use of curves, layers and colour-blend modes, and as such it's a great way to get to grips more fully with the possibilities of image-editing software.

The idea is that we use the curves control to adjust the colour response of the red, green and blue components of the image individually, to simulate accurately the response of a cross-processed print. We want, for instance, to achieve shadows with a blue cast: to do that, we need to accentuate the response at lower luminance (intensity), but keep the response normal in the highlights. Conversely, the greeny-yellow cast in the highlights means we need to increase the levels of green and red. The curves control is tailor-made for this, since you can define precisely how each pixel value is mapped across the luminance range by drawing individual curves for each channel (see walkthrough overleaf).



The effect of the blend control: on the left is the original image. The right-hand picture has had the curves control applied in normal mode, while the middle image has its blend mode set to luminosity, so its colour saturation isn't affected.



You can easily give your shots a stylish fashion-photo look with a "cross-processed" effect (see overleaf).

BLEND MODES An important concept to get complete control over the cross-processing effect is the proper use of blend modes. Ordinarily, when you adjust an image using curves, you'll leave the mode set to normal. This means the individual red, green and blue channels are manipulated equally according to the adjustments you make. The standard use of curves is to increase contrast, but because human colour perception is different for each colour across the intensity range, you may have noticed this has the side effect of altering the apparent colour balance, too.

Usually, the effect is desirable, since it leads to a boost in saturation, but this linking of contrast and colour effects can get in the way if you're trying to achieve specific colour effects, which is what we're trying to do with the cross-processing method. The way to get round the problem is to set the blend mode of your curves layers. There are a couple of dozen modes available, but the ones we're interested in are the colour and luminosity options.

If you create a new adjustment layer in Photoshop and set its mode to luminosity, you can still increase the contrast by applying your S-curve, but Photoshop mathematically manipulates the pixel values according to well-established models of human colour perception, so that the apparent colour balance remains the same. The opposite is the case when setting the blend mode to Color: the luminosity isn't affected, and that's the mode we want to use for getting the cross-processed effect exactly to our liking. By separating out the colour and luminosity values in this way, you don't end up chasing your tail due to manipulations in one tool or layer affecting the overall balance in another.

Once the colours are correct, we can make use of curves in the more traditional way, by adding another curves layer, but with the mode set to luminosity and using the composite RGB channel rather than each channel individually. By applying the standard S-curve in this mode, we can set the

contrast precisely, but without mucking up the carefully adjusted colours we've set up with our individual colour-channel manipulations.

A second use of layers and blend modes comes when we've finished adjusting the colour and luminosity curves. To get the final look just so, it can often help to apply a yellow cast to the image as a whole. This is easy to do using a fill layer, which sits at the top of the layer structure with its opacity set to around 10-15%. But simply placing that over the image in normal mode will affect the contrast of the image, which you've just carefully adjusted with your luminosity-mode curves layer. By setting the blend mode of the colour layer to Color, that problem is solved.

CROSS-PROCESSED EFFECTS IN OTHER SOFTWARE We've used Photoshop for our walkthrough, since it's the most flexible and precise way of achieving the cross-processed look easily, but if you don't have it it's perfectly possible to achieve a similar effect using the free Gimp package. It's trickier, though, as the Gimp doesn't support adjustment layers, so the curves control is destructive in the sense that it permanently alters the pixels of the basic image, meaning successive adjustments will quickly make the image degrade into garbage. That means you have to get it right by making the adjustments, then undoing and redoing the command until you're happy. As well as that, the Gimp's inability to work in 16-bit-per-pixel mode means it's easy to introduce stepping and posterisation effects if you're not careful.

Don't rule out other software routes, though. If, for instance, you have a Canon digital SLR and download the latest version of Canon's free Digital Photo Professional software, you'll find it has a very capable facility for adjusting curves on each channel individually as well as the composite tool, and if you're adjusting a RAW image it works in 16-bit mode, too.

CHAPTER 9

EDITING AND RETOUCHING



HOW HARD?

One of those jobs that's tricky at first, but much easier once you understand the principles.

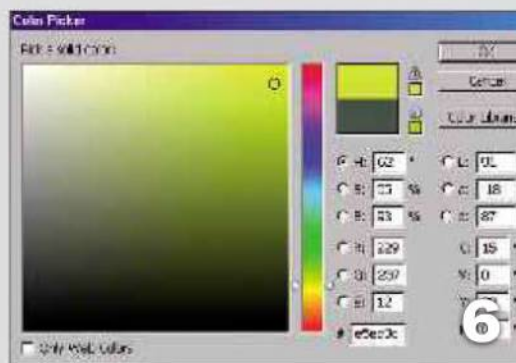
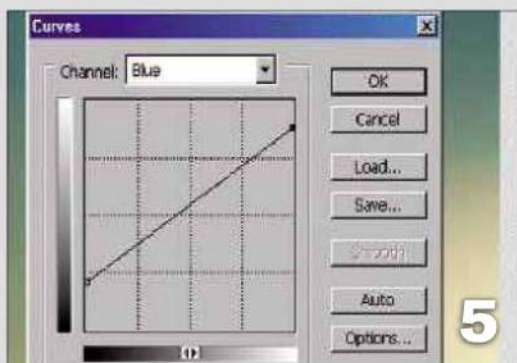
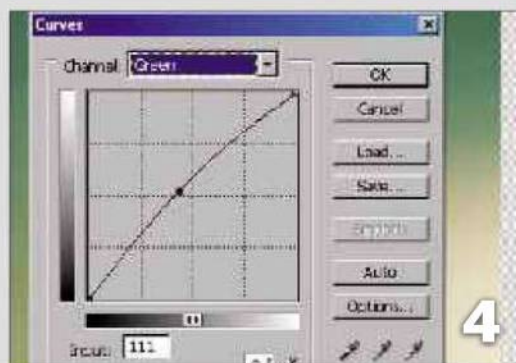
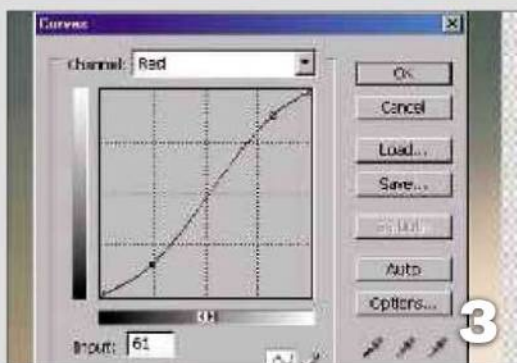
HOW LONG?

10-15 minutes.

HOW TO... CROSS-PROCESS IN SOFTWARE

You don't need to dig out your time machine to get the retro cross-processed look. A few minutes' work in your favourite image editor will achieve the same effect as the dodgy processing from your local chemist's circa 1980.

- 1 Our original image is ripe for rendering into something with more of a dated Polaroid feel: our subject was captured at an 1980s party wearing a fetching pair of deely-boppers.
- 2 We're using Photoshop CS2 here, but the principles work with other editors. Select Layer | New Adjustment Layer | Curves. Don't immediately hit OK; instead, click on the Mode drop-down and select Color Burn.
- 3 The default curves view is the RGB curve, but don't touch that. Instead, click the Channel drop-down and select red. Apply an S-curve by clicking below the line at one-third along and above it two-thirds.
- 4 Now select Green in the drop-down – the red adjustment is automatically stored. The green adjustment is the most subtle yet most important. Click above the curve halfway along. This will boost greens across the whole image.
- 5 Select the Blue channel. Click the point at the bottom left and drag it up the left-hand side of the graph. Now, to allow the yellow cast to come through, pull down the blues at the top by grabbing the top-right and pulling it down.
- 6 Finally, to add a yellow cast to the whole image, select Layer | New Fill Layer | Solid Colour, changing the blend mode to Colour and then reducing opacity to around 10-15%.



HOW TO...

ADD FILM GRAIN TO YOUR IMAGES

Another effect from the past that modern digital photography can still benefit from is that old-style film-grain look. It's a simple process, but getting it right needs some care and attention.

Ordinarily, the presence of noise in digital images is unwanted. It presents itself as multicoloured grain, and becomes worse the higher the ISO sensitivity is on your camera (see p64). But sometimes, film grain can add a classic air to an image. Atmospheric images shot in low light benefit in particular: the image becomes moodier and details obscured by the darkness are enhanced.

WHEN TO USE FILM GRAIN Adding noise is also desirable for black-and-white images. With a black-and-white image, you're already reaching for a particular genre of photography, and adding noise will make your final image feel older. Or, if your image is composed of largely smooth, featureless surfaces (such as a tall, modern building), noise can make it more interesting to look at. Finally, if you have a digital camera that introduces unwanted JPEG artefacts into your images, adding noise with a dedicated photo-editing application can make your images less obviously digital, enabling you to print at larger sizes.

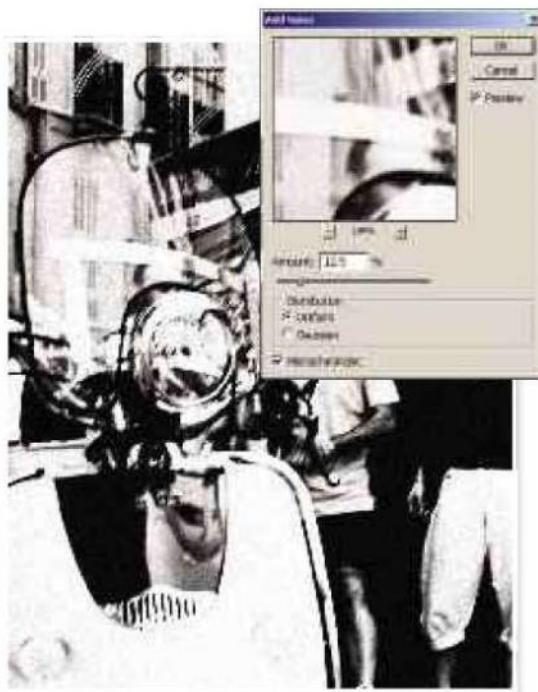
HOW TO DO IT Most image-editing software, including Photoshop and the Gimp, is capable of both adding and removing film grain. In Photoshop, adding film-like grain is as

simple as clicking on Filter | Noise | Add Noise. The changes you make affect the open image in real-time, but you should pay close attention to the preview box in the Add Noise dialog box. Move the preview image to a focal point in the picture, but keep it zoomed to 100%. As with most digital editing, a little goes a long way. If your changes are based on the image when it's zoomed all the way out, you'll add far too much noise, which means you'll miss the desired effect, possibly obscuring important details. By viewing the image up close and making small changes, the effect will be far more subtle. Finally, bear in mind that the noise added by Photoshop is in colour by default, so if you're working on a black-and-white image check the option to add monochromatic noise.

Photoshop also offers tools for adding film-like grain. The end result is much the same, but there are a few more options for perfectionists. Simply click on Filter | Artistic | Film grain. You can change the highlight area, for instance, to alter how coarse the grain effect is. The intensity control allows you to adjust the highlights in your image – set it low and the highlight level high to give your photos an aged look. Finally, the grain option determines how much noise is added. Like before, make small changes. You'll thank us when the final image is printed.



This black-and-white shot is fine, but a little grain will make the tone of the shot fit a little better with the classic styling of the scooter. Note we've zoomed in to make sure our effects are kept subtle.



We've kept the amount of grain to be added to a bare minimum – you want it to be noticeable, not distracting. When the image is viewed in its entirety, the effect is subtle but effective.



HOW HARD?

Simple.

HOW LONG?

Five minutes.

TIP

▶ When editing your images, keep in mind that if an effect looks a little clumsy onscreen, it will be horribly jarring when it's finally printed.

IT'S A FACT OF LIFE IN ALL DIGITAL IMAGES, BUT YOU CAN REDUCE THE EFFECTS OF IMAGE NOISE USING SOFTWARE.

Reducing noise

While the best way to reduce image noise is to tackle it at source by using a low ISO setting (see p64), that isn't always possible if you're shooting in low light without flash or you need a fast shutter speed to capture the action. If you do find you have an image with lots of noise, you can apply some software trickery to reduce its effect. If you're shooting in RAW mode (see p74), you should first check if the RAW converter software you're using has a noise-reduction setting – applying noise reduction in the RAW domain is often the most effective method.

SOFTWARE If you don't have a RAW noise-reduction facility or you were shooting in JPEG mode in the first place, there are various third-party software tools around that are dedicated to reducing noise. One of the best is called Noise Ninja (www.picturecode.com). It isn't cheap for a single-function program, at £25 to £45 depending on the version you buy, but it works exceptionally well. It does so by allowing you to “train” the software by manually identifying areas of an image that contains mostly noise without any fine detail, such as areas of sky or highlights in the image. It then assesses the noise in those areas, which allow it to reduce the effects across the whole image.

If you don't fancy shelling out just to make one or two of your best shots less noisy, you can reduce noise by hand in any image-editing software that supports layers – that includes the free Gimp editor (see p98), as well as the likes of Photoshop. The theory of reducing the effects of noise manually takes advantage of the fact that the

human eye detects colour and brightness separately. Parts of the retina called rods detect brightness, while cones are what allow us to see in colour. The interesting part is that colour noise – coloured speckles and blotches – in an image is more offensive than brightness noise (also called luminance noise). By separating the colour and brightness components of an image into different layers in software, we can apply blurring to the colour layer to even out the noise and make it less obvious. Since we have far more brightness-detecting rods than colour-detecting cones and are therefore more sensitive to brightness, if we then merge the colour and brightness layers back together it's very difficult to tell that the colour layer has been blurred, but the image noise is effectively reduced.

IMAGE SENSORS If you have a digital compact camera and you're becoming frustrated that your images are noisy even at low ISO settings, you should bear in mind that noise levels are an area where digital SLR cameras win out over their smaller cousins. This is because the image sensor in an SLR is far larger than the tiny sensors in a compact. A larger sensor means larger photo-detector elements, which are less easily overwhelmed by noise. The most expensive professional DSLRs can boast “full-frame” image sensors, which are as big as a conventional frame of 35mm film, which gives them exceptionally low noise. Lower-end models – in this context, that means any DSLR costing less than £2,000 – usually have what's known as an APS-sized sensor, which is smaller than 35mm but still much larger than what compacts can squeeze into their diminutive bodies.

TIP

Rather than applying the technique on the opposite page for reducing noise, you could think about converting the image to black and white instead (see p130). Noise is far less annoying in monochrome images.



Tools such as PictureCode's Noise Ninja are worth considering if you want really effective noise reduction.

HOW TO... REDUCE COLOUR NOISE MANUALLY

There are several techniques you can use in image software to reduce noise; this one enables you to get to grips with layers. We're using the Gimp, but any package that allows layers will be essentially the same.

1

Open your image. We want two copies so we can split brightness and colour. In the image window, select Layer | Duplicate Layer.

2

The bottom-most layer will be our brightness (or luminance) layer. Make sure the layer is selected in the layers window, then in the image window select Layer | Colours | Desaturate to turn it black and white.

3

To use the colour values from the top layer, click on the layer and in the Layers windows select Colour from the Mode drop-down list. The image doesn't appear to change, but it's now using the brightness values from the bottom layer.

4

Now we want to reduce the noise in the colour layer by blurring. Click on the top layer in the Layers window, then in the image window select Filters | Blur | Gaussian Blur.

5

The default radius settings of 5 pixels in the horizontal and vertical needs to be upped – try 15 pixels. You may want to increase this to cope with noisier shots or decrease it for cleaner ones. Hit OK.

6

The final image is now composed of the slightly blurred colour layer, but the brightness is coming from the sharp bottom layer. Click the eye icon next to the bottom layer to remove it, and you'll see the blurring. The colour noise is effectively reduced, but the image still looks sharp.

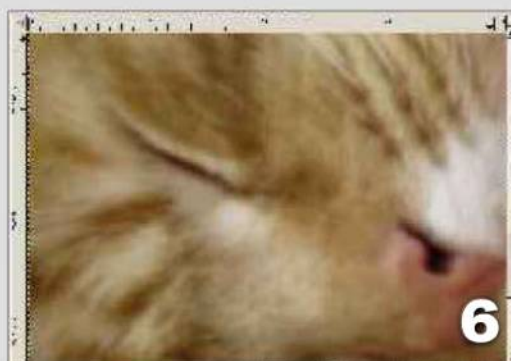
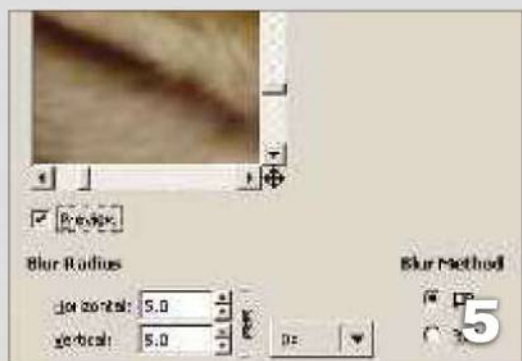


HOW HARD?

Understanding the concept of blurring the colour layer is much harder than actually doing it.

HOW LONG?

It's a little fiddly – set aside half an hour the first time you try it.



ONE OF THE JOYS OF DIGITAL PHOTOGRAPHY IS YOU DON'T HAVE TO PUT UP WITH MINOR FLAWS IN YOUR IMAGE. HERE'S HOW TO DEAL WITH THEM.

Dealing with imperfections

Taking the perfect picture is hard work. Even if you get your camera's settings right when you actually press the shutter button, you'll find frequent reasons to curse tiny blemishes on the final image. Let's say you've got a picture of Great Aunt Betty: you might have a wonderful, full-frame portrait, but she isn't going to thank you if the picture blows up those few hairs on her chin to poster size. Likewise, dust, either on the lens or on the sensor (see p82 for advice on how to clean it), can show up on images once they're full size on your monitor or printed out.

Help, of course, is at hand. Whether it's getting rid of the bags under someone's eyes or clearing up unsightly skin problems, most photo-editing apps come with tools for dealing with imperfections, and you'll get the best results from using these tools conservatively. Always remember that although your efforts might be barely perceptible on the screen, once they're printed, careless image editing will be painfully obvious. Be prepared to spend time with each image you want to fix, and use the undo tool if you make a change you're not happy with.

CLONING The clone tool is perfect for removing specific imperfections with an image and works by sampling a pre-selected area of your image. When you brush over the part of the image to be removed, the pixels are copied directly over the problem area. This lets you remove an unsightly spot by copying adjacent pixels over the offending area. The clone tool is also ideal for pictures with dust on them – you can simply paint over the problem and the dust vanishes.

The clone tool can be difficult to use properly. The brush size you use will depend on what you're sampling. In the example on p142, we use a relatively large brush, as there are lots of repetitive geometrical shapes, so we can make light work of getting rid of large objects. But for tiny blemishes, particularly on parts of an image that has lots of other detail, you need to be more careful. Avoid clicking the mouse a lot – each time you click, you'll start sampling from your pre-selected spot again, which means you can end up with an area of your image that uses the same textures over and over. If you end up with this effect, use the undo tool to get back to where you started.

DODGING AND BURNING The terms dodge and burn are leftovers from the days of film – dodging makes the image lighter, burning makes it darker. So, for instance, if there's a distracting light in your image, you can use the burn tool to tone it down. Or, if your subject has tired bags under their eyes, you can lighten their skin using the dodge tool. Both tools can be useful for dealing with lens flare, too, when light scattered across the lens produces unsightly reflections. The dodge tool can also reveal detail in an area otherwise obscured by shadow.

As well as being able to set the brush size with dodge and burn, you can change the exposure level. So an exposure level near to 100% will result in huge changes to the areas you brush over, while an exposure level near to zero will mean you'll have to make lots of brushstrokes to have an effect. Using the lowest level of exposure, you stand to avoid making obvious changes to your image.

TIP

▶ When tackling a problem area, decide whether you want to get at the texture under the problem – as with removing lens flare – or replace the problem with another texture from an adjacent part of the image. This will determine which tools you use.



Removal of annoying blotches that would have ruined a picture in the bad old days of film are all in a day's work for a modern digital photographer. Learning the technique isn't nearly as hard as you might think.

HOW TO...

REMOVE DUST SPOTS IN AN IMAGE

Here's where we introduce a tool that seems like magic the first time you use it. The dodge tool is the first port of call for fashion photographers removing spots on models' faces and any other small defect, dust included.

1 THE BASICS Keep in mind that you need to work both fully zoomed in and zoomed out. Viewing your image at 100% magnification will help you do a thorough job; looking at the whole picture will ensure your changes aren't obvious in the final image. This image has an obvious dust spot in the top right – it wasn't clear when the picture was taken, but it's large enough to disfigure the final print. Also bear in mind that you'll want to make lots of very small alterations – this is going to take a while, but the result will be worth it.

2 FIRST STEPS Before you start, make sure you've got a copy of the original image somewhere. In the event that you dislike the final result, a safe backup will always save any unfortunate mishaps. In this case, the dust spot shows up only as a darkened patch – it isn't actually hiding any texture, so there's no need to use the Clone tool to cover it up. Instead, we'll use the dodge tool to change the exposure level of that part of the image. Zoom in so you can see all of the dust patch as well as some of the surrounding area for reference.

3 BRUSH SIZE Don't use a brush large enough to get rid of the imperfection in one go. Brushes in Photoshop don't have perfectly defined edges, so a large brush will affect parts of the image you'd rather leave untouched. Use a brush size about two-thirds of the size of the spot you want removed. When it comes to brushing over the problem area, experiment a little and make plentiful use of undo. In Photoshop, a new undo point is added each time you click the mouse.

4 DODGE AND BURN The exposure level affects how powerful the dodge tool is. Turned right up, a few light brushstrokes will go a long way. Set it to minimum and you'll need to brush over the offending area a lot before it vanishes. Set the exposure level to 50% and try brushing a corner of the dark spot. If it reaches the same brightness as the background in a few strokes, you've got the right setting. Repeat over the entire offending area and you'll have a clean image. The dodge and burn tools are useful when areas of your shot aren't obscured, just the wrong brightness. For getting rid of specks or objects that obscure other detail, you should use the clone brush – see the next page for how.



HOW HARD?

Very easy for small defects such as dust spots, trickier for larger areas.

HOW LONG?

Only a minute or two to remove a blotch such as this.



TIP

▶ If you find dust occurring repeatedly in your shots, it could be time to clean your camera's sensor. See p82 for how.

CHAPTER 9

EDITING AND RETOUCHING



HOW HARD?

Pretty tricky. Once you've got this off pat you can call yourself an editing expert.

HOW LONG?

An hour or so at least. If you rush it the results will look terrible.

TIP

Despite what Hollywood would have you believe, it's impossible to recreate detail if it isn't there to begin with. Very large objects are hard to deal with effectively, as you'll need to paint in the detail behind them by hand – the more complicated the detail, the harder you'll have to work to keep your changes invisible.

HOW TO... REMOVE OBJECTS COMPLETELY

Fixing minor imperfections is fairly straightforward: with a photo-editing package and a lot of practice, you can make big changes to your photos to get the composition you really want.

Whether it's an electricity pylon ruining a picture of a rustic barn, or a passing aircraft destroying an evocative sunset, unwanted objects creeping into the frame are the bane of a photographer's life. Not only can they ruin an otherwise perfect composition, but the mood of a picture can be entirely changed by unwanted clutter. The good news, of course, is that the majority of photo-editing software packages can get rid of unwanted objects in a short time. The principles are the same as dealing with minor imperfections (see previous page), and the tools are similar.

In many cases, if there's an unwanted object somewhere near the edge of the frame it's simpler to correct your image's composition by reframing it using the crop tool. But if you want to keep the overall composition of your image, or there's an unwanted object slap in the middle of the frame, you should get to grips with the clone brush. This is a powerful tool – available in every photo-editing package from the Gimp to Photoshop and all the packages in between – that allows you to choose an area of a photo and then "paint" that area over another area. For instance, if a power line runs against an otherwise perfect

sky, you would select an area of the surrounding sky to clone from, and then carefully draw over the power line. Since you're not simply colouring in the problem object with a solid colour, your changes are much less obvious. The clone tool obviously works best if you have a large area of reasonably solid colour to clone from, but with a carefully chosen brush size and clone point it's possible to remove all but the very largest obstructions.

But the clone tool isn't something you can simply attack your images with. Removing a small imperfection is easy: you're working on an area of your shot that's just a few pixels wide. Removing an entire object is an enormous challenge, principally because you're working on a much larger scale.

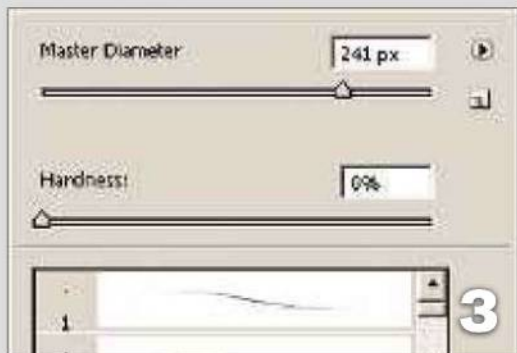
Simply removing the object is straightforward: the challenge is to make it look as though it was never there to begin with. This means it's very important to work slowly and methodically. Save your work often, and make liberal use of the undo command if you do anything to your images you're not 100% happy with. Always remember: if it doesn't look convincing on screen, it will be 50 times worse by the time you've printed your shot.



1



2



3



4

1 **PHOTO TYPE** This shot of a man and his son on a motorbike is evocative, but it will be better without the distracting surrounding objects. The image is a perfect candidate for cloning – the ground has a repetitive geometric texture, which means we'll be able to cover distracting objects convincingly by cloning.

2 **SOLIDS** There's no such thing as a perfectly solid area of colour in a photo, and that's definitely the case here. This means we need to clone from an area roughly adjacent to the area we wish to cover up. Don't worry about keeping the geometrical shapes in your textures identical, unless a particularly strong line passes behind the object you want to remove. If that's the case, clone from the line and try to keep it as straight as possible.

3 **SOFT OR HARD?** You don't need to accept the default brush size or style. In Photoshop, for instance, brushes vary in hardness. If you're trying to replicate complex details, such as a solid line that runs behind the object you want to get rid of, use a hard brush to allow you to be precise. In this image, trying to reproduce every line perfectly will take far too long to be practical, so using a softer brush means the beginning and ends of our editing will be harder to spot. Also, try to use a brush size appropriate to the object you're removing.

4 **POINT TAKEN** Set the point you're going to clone from by holding Ctrl and clicking. Remember the clone point moves in relation to the brush, so if it wanders over an area of detail, such as another person, that detail will be repeated over the area you're trying to

clean up. Also, if you release the mouse button and then start brushing again, the clone point will move, beginning to clone from a point relative to the mouse cursor.

5 **THINK SMALL** Use a relatively small brush size. Even with a soft brush edge, you need to make small, precise changes to your image, and although it takes longer, editing will be harder to spot if changes are kept small.

6 **DON'T POINT** If you only have a small area to clone from, avoid continually clicking the mouse to select a new clone point. A better way of working is simply to reselect a new clone point. If you make repetitive, small brush strokes, you'll end up with an unpleasant and jarring textured effect.

7 **KEEP PERSPECTIVE** Zoom into the area you wish to clone from in the name of precision. But always keep in mind that people will see your image as a whole, so zoom out as often as possible. The larger you intend to print your image, the more painstaking you should be in your changes. If you go about editing your image in a heavy-handed or slapdash way, the end result could be worse than the original.

8 **NO REGRETS** The undo tool is your friend. If you find you've made a change you'd rather lose, resist the temptation to cover it up with yet more cloning. Undo your wayward steps and start again. Make frequent saves of your image under different filenames to make sure you can go back to an earlier point.



TIP

▶ The clone tool is great for getting rid of obstructive objects, but remember that most photography competitions ban the use of any tools other than levels/curves and saturation. There's nothing quite like composing your shot right first time – see Chapter 3 for more on composition.

GIVE YOUR PHOTOS A LIFT BY ENHANCING THEIR COLOURS, OR GO THE OPPOSITE WAY TO GIVE A SHOT A MORE MOODY ATMOSPHERE.

Enhancing colour saturation

The saturation level of colours in a photo determines how vivid they look. Saturation is key to conveying the mood of a shot; in the days of film photography, photographers often looked at the saturation of films when choosing what to load in their cameras. These days, however, you can choose the level of saturation.

HELPING SATURATION AT SOURCE It isn't all down to software, though: one way to increase the saturation of your images if using a DSLR is to use a polarising filter. The downside of this is that it reduces the amount of light entering the lens, leading to a slower shutter speed and problems with camera shake. In bright conditions, however, it can increase saturation and contrast.

Flare can also reduce saturation. This usually happens when you take shots against the sun, particularly when it's low in the sky. The light is thrown around inside the elements of the lens, reflecting and refracting. Sometimes, there'll be an obvious sign: the tell-tale geometric shapes overlaid across the picture or streaks of light from one corner. Often the effect is more subtle, though, reducing contrast and, along with it, saturation. This is why lenses often come fitted with a lens hood – it stops light entering from an acute angle. You can also reduce flare by hand simply by looking through the viewfinder (or the digital monitor of a compact) and shading the lens from the direct light. It can be difficult to hold the camera with one hand while shading the lens with the other and making sure your hand isn't visible in the shot, but as ever the joy of digital is you get several stabs at it (and for free).

SATURATION IN SOFTWARE It will come as no surprise that saturation can also be altered in software. Almost all software packages have a dedicated tool for the job. You can use the saturation control not only to increase the vividness of your images but also to cut back on the punchiness of the colour, giving your shots a sombre mood. You can also cut saturation right back to zero, which is one way of converting a photo to black and white, although it isn't the best way if you want to control the mood of the resulting monochrome shot – see p130 for a better way of converting your pictures to black and white.

Remember that if you use the curves control to tweak the contrast of your shots, the default normal blend mode will mean that applying the standard S-curve will increase saturation – if you'd rather set it independently, make sure you set the mode to luminosity (see p135).

If you want to get creative with your shots, a popular technique is to selectively desaturate areas of a photo, leaving a central portion either normally saturated or with enhanced or altered colour. This is currently a popular effect in wedding photography, where the bride is rendered in blossoming colour while the rest of the shot is in black and white. This is easy enough to do – just select the lasso tool (also known as freehand select or, in the Gimp, merely free select). Draw around the object you want to isolate and invert the selection (from the Select | Invert menu in most packages). Then simply follow the walkthrough opposite to reduce the saturation – the inverted selection will mean the whole image except the area you originally selected will be desaturated.



An increase in saturation gives photos a vibrant, "happy" feel.

HOW TO... ADJUST SATURATION

The saturation control can be an effective way of increasing the impact of an image. It's used heavily in commercial photography to give photos a larger-than-life look. However, it's something that shouldn't be overdone.

1

Applying the effect is easy. We're using the Gimp (see p98), but every photo editor worth its salt has a near-identical control. Our example photo is a prime candidate for receiving a bit of a lift via increased saturation.

2

In the image window, simply select Tools | Colour Tools | Hue/Saturation. Although the tool window looks complicated, you can ignore all the buttons and controls except the slider marked Saturation.

3

In general, nudging the Saturation slider up to about 5-10 will give a subtle lift to the shot; you shouldn't go beyond 15 in normal circumstances. If you do, things will look artificial and seem like the picture from a badly set up TV.

4

With a setting of +10, our picture has more vibrancy. Remember that you should apply extra saturation after applying the curves control, since increasing contrast using curves will also increase saturation (see p117).

5

The saturation control doesn't need to be confined to increasing the "happiness" of photos: you can use it to make a shot more sombre. Here, we start with a very vibrant-looking image of the Italian flag.

6

By setting the saturation to around -70, we've produced a shot with a sense of the timelessness of the national flag. Desaturating often has the effect of giving shots a more aged, "permanent" feel.



HOW HARD?

Pretty much as simple as it gets.

HOW LONG?

20 seconds.



THE NEW DISCIPLINE OF HDR PHOTOGRAPHY CAN PRODUCE STUNNING IMAGERY, BUT NEEDS SOME PREPARATION. WE SHOW YOU HOW.

High Dynamic Range photos

As we saw in Chapter 4 (see p42), if there's a wide range of light conditions in your shot – from deep shadow to bright sunlight – then traditional photographic techniques have limitations. You must decide which area you want to expose for and accept that some of your shot will be blown out to white with no detail or, at the opposite end of the scale, almost completely black. This is an inherent limitation of cameras.

The answer to the problem of a camera's inability to fully capture the range of light in many real-world situations is the relatively new technique of High Dynamic Range (HDR) photography. It isn't as fearsome as it sounds and doesn't require any special hardware, apart from ideally a tripod. The basis of HDR photography is that, rather than settling on the compromise of a single middle-of-the-road exposure, you take several shots of the same subject with a range of exposure values and combine them digitally afterwards.

The classic scenario where HDR comes into its own is when you have a dramatic dusk sky in the background and a foreground with no direct lighting, since the sun is near or below the horizon. To capture the sky effectively without blowing it out to white, the foreground will have to be in near silhouette; conversely, to get the foreground subject correctly exposed, the sky will be a sheet of white

and dramatic colours and cloud banks are lost. This is where HDR can save the day. It's also useful in indoor scenes with a wide contrast range, such as the inside of a church. You want to capture the detail in the bright stained-glass windows, but also in the dark interior. In a conventional photo, it's impossible; with HDR, it can be done.

HDR ESSENTIALS For an HDR sequence to work effectively, you need to make sure the only thing that changes between shots is the exposure setting; in other words, how long the shutter is held open. The aperture mustn't change, nor must the focus, white balance or anything else; otherwise, your shots won't marry together properly. For this reason, it often isn't feasible to take HDR images using a digital compact, since fully manual shutter control isn't usually on offer.

It's wise to take between five and seven shots for an HDR sequence, particularly if you're using Photoshop to merge them (see How to use dedicated HDR tools, p149). But how do you know where to start with your initial exposure setting if the camera is on fully manual? The answer is initially to pop it into aperture priority mode – the A setting you'll find on the top-mounted mode control switch on most DSLRs (see p62 for more

TIP

▶ HDR won't produce stunning results with all types of photo – it pays to experiment and get some experience of where it's likely to work best.



HDR photography can create stunning images; all you need is a camera with a manual mode and a tripod.

HOW TO...

MAKE AN HDR IMAGE MANUALLY

Although it's best to set up an HDR shot carefully and shoot several frames, you can still improve the dynamic range of a shot with just two frames if that's all you have. You don't need expensive software, either – we're using the Gimp.

1

Here's a quick-and-dirty version of HDR if you've only got two images – one exposed for the foreground, one for the sky – and you don't want to buy dedicated HDR software. First, open up your two shots in a decent editor.

2

Our method blends the parts of both images we want to show through and hides the rest. Select the darker of your images (exposed for the sky), hit <Ctrl-C>, select the lighter image and hit <Ctrl-V> to paste it in as a layer.

3

In the Layers palette, right-click on the italicised Floating Selection layer and select New Layer. Now right-click on the dark image layer and select Add Layer Mask. In the dialog, click the Greyscale copy of layer button and OK.

4

The layer mask allows the lighter areas of the bottom image to show through. There might not be enough of the top image detail showing through – apply curves or levels control to up the brightness of the top layer.

5

There's some residual masking that's darkening the boat in the foreground. We eliminate this by painting out the mask – ensure you're editing the mask by clicking its thumbnail, selecting black and choosing a large brush.

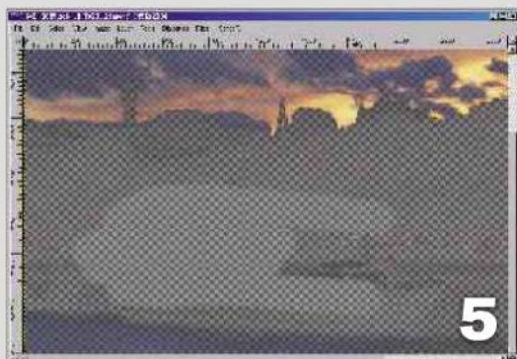
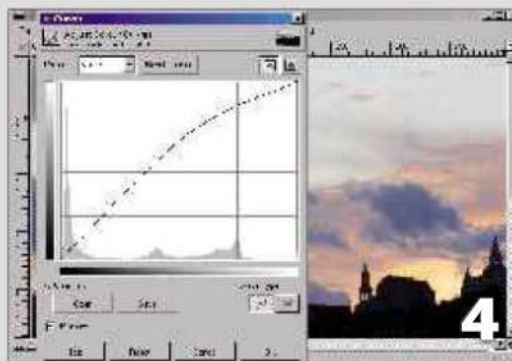
6

Once you're happy with the combined results – you'll probably have to adjust the layer masks a little – you can apply all the usual processing such as saturation and curves to get the final image looking the way you want.



HOW HARD?

A fiddly process – you'll need to have mastered layers, curves and levels first.





Blank skies can be cured by cutting and pasting the foreground...



...rather than resorting to HDR.

on aperture priority). If the camera has the ability, put it into spot-metering mode, or partial metering if you have a Canon DSLR such as an EOS 350D. Point the camera at the darkest part of the scene – in our standard example of a sunset, that would be the foreground – and to get the whole scene in focus select a small aperture such as $f/11$ or $f/16$. Half-press the shutter and note the shutter speed the camera has decided on in the viewfinder. It's likely to be quite long – maybe a few seconds – since in spot-metering mode the camera will be attempting to correctly expose only the dark part of the scene.

Now set the camera back to fully manual mode, adjust the aperture to what you just had and set the shutter speed to the setting the camera recommends. Recompose the shot and take five to seven shots, each time decreasing the exposure by one stop. Decreasing by a stop basically means halving the exposure value each time. So if the camera recommended a second for the first exposure, you'd take one shot at this value, then one at half a second, then $1/4$, $1/8$ th, $1/16$ th, $1/30$ th, $1/60$ th, and for luck you may as well do $1/125$ th, too. Obviously, while you're adjusting the exposure between shots, you need to be careful not to move the camera. Don't hang about after you've initially selected the exposure, either, since at sunset with clouds moving around the lighting conditions can change very quickly.

THE QUICK-AND-DIRTY METHOD If you're out with your camera but have no tripod, you can still try to get an HDR sequence, albeit a less comprehensive one, using your camera's automatic exposure-bracketing facility. Most DSLRs have this facility, with the exception of entry-level models such as Nikon's D40x. Exposure bracketing is designed to compensate for shots in tricky lighting that are likely to fool the auto-exposure, by automatically taking three exposures – one at the value the camera deems correct, one overexposed and one underexposed (see p78).

Usually, you'd set the compensation for the bracketed exposures to something subtle, between 0.3-0.5EV, but you can press it into service for HDR instead by cranking up the compensation. If it will go that high, try setting the bracketing to ± 2 EV. Then make sure the camera is set to burst mode, compose the shot and press the shutter. If you have a steady hand, the minor camera alignment differences across the shots should be minimal.

THE PROCESSING STAGE With the shots in the bag, you need to turn to software to combine them into your final HDR shot. There are a number of ways to do it, from the free-but-laborious approach using software such as the open-source Gimp package to dedicated HDR merging software such as Photomatix (www.hdrsoft.com). The middle way is to use Photoshop CS or above, which has a built-in Merge-to-HDR function that can work very well. If you're going down the manual route, there are a few ways to get the same effect. All of them involve pasting each individual exposure as a new layer, then blending the relevant parts (see p147).

ALTERNATIVES TO HDR As we've said, the standard use for HDR photography is to get both the sky and foreground looking detailed in a shot – check out www.flickr.com/groups/qualityhdr and you'll see some great HDR images, almost all of which are landscapes with dramatic skies. But if you have an image that has that irritating washed-out blank sky so typical of shots taken in the UK and you didn't take an HDR sequence, you can cheat. A washed-out sky makes it easy to cut out the rest of the picture and lay it over a more interesting background. If you're using Photoshop, it's even easier, since you can employ the magic wand tool to autoselect the transition between the sky and the subject, hit <Ctrl-C> to copy the selection contents, open up your sky picture and lay the foreground over the top. HDR without the effort!

WHEN NOT TO USE HDR Remember that in HDR you're not really increasing the dynamic range of the final image – you're compressing the range into displayable limits. That means the final image isn't what was there; it's an artificial reconstruction. In fact, in some instances, limited dynamic range is a good thing. Silhouettes against a sunset look dramatic, and having detail in a whole scene can lessen the impact of a shot, since there's no single subject to focus on.

Second, there's a tendency for HDR shots to look unreal, as they essentially show impossible lighting conditions. HDR is one of those effects you should only use when it's necessary; otherwise, it can look as tacky as any other effect that's been applied for the sake of it.

HOW TO... USE DEDICATED HDR TOOLS

As well as doing it manually, you can combine HDR images using dedicated software tools. These are currently confined to the more expensive software packages – we're using Photoshop CS2 – but they'll filter down before long.

1

Although doing it manually can be fun (see p147), it's quicker, easier and more effective to use dedicated tools to produce HDR imagery. Here we're using Photoshop CS2's HDR tool to merge a batch of images.

2

The HDR tool is under File | Automate | Merge to HDR. Adobe recommends you have five to seven images for your HDR efforts. If you took your shots handheld, tick "Attempt to Automatically Align Source Images".

3

The tool will now attempt to align and process the shots. If it's able to extract enough dynamic range information and align the images successfully, you'll eventually be greeted by this preview window.

4

In the preview, you can select and deselect the images that contribute to the composite HDR, and also set the White Point Preview. Once you're happy, click OK and the image is loaded into Photoshop proper.

5

By default, Merge to HDR produces 32-bit-per-pixel images. You want the Exposure control, from Image | Adjustments | Exposure. The Exposure slider is the most effective control for getting the right look.

6

Once you've adjusted the exposure, go to Image | Mode and select 16-bits/Channel. This reduces the HDR image's bit depth and allows you to apply the standard final image adjustments such as curves and sharpening.

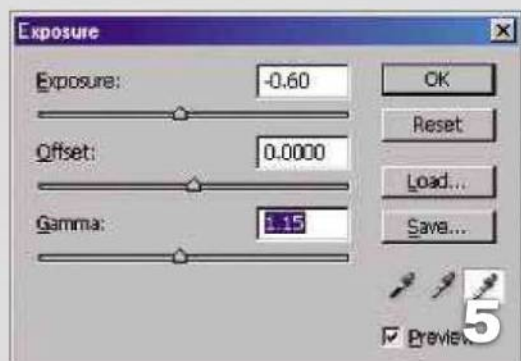
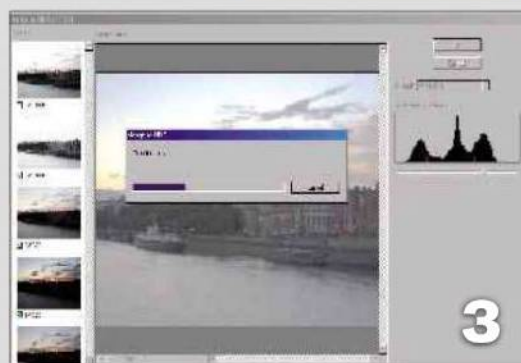
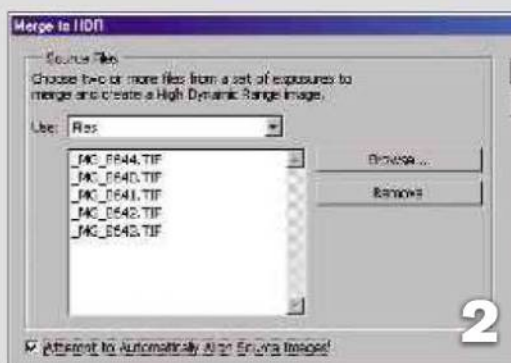


HOW HARD?

The tricky bit is getting the original images right.

ESSENTIAL

Tripod and Photoshop.



**HOW HARD?**

This is a fiddly operation that needs time and patience.

HOW LONG?

At least half an hour for a really good treatment.

HOW TO... SIMULATE DEPTH OF FIELD

If you didn't manage to throw your background out of focus, software can come to your rescue.

One of the true creative benefits of an SLR camera is the ability it gives you to control depth of field. It's an effect that's very hard to achieve with a digital compact. The reason for this is two-fold: first, the range of apertures available on an SLR lens is very wide. With a good-quality lens it often stretches from f/2.8 to f/22 with all points in between. That's in contrast to digital compacts, which may only offer two apertures, often f/4 and f/8.

The second reason is the long focal length for a given field of view. A wide-angle lens on a digital compact might have a real focal length of only 8mm, compared to 28mm for the same view on a DSLR. The complexities of optics means that depth of field is decreased with increasing focal length. That means it's very hard to throw the background out of focus in the way you can with a DSLR: everything tends to be pin-sharp from close-up all the way to infinity.

That said, even with a DSLR it can sometimes be very difficult to take a shot with a restricted depth of field. A shallow depth of field requires a large aperture, and that, of course, lets a lot of light into the lens. In very bright sunlight you may well find that with the required aperture, there's too much light entering the lens for the camera to be able to cope, even at its absolute minimum shutter

speed (this is one of the areas where more expensive, semi-professional DSLRs cameras can be superior – they tend to offer minimum shutter speeds of 1/8000th of a second to the 1/2000th or 1/4000th of consumer-grade models).

While it's always preferable and will give you a far better sense of satisfaction to achieve depth of field by using the correct camera settings in the first place, if you've not been able to for whatever reason, you can simulate the effect in software. The effect works better on some images than others: it's best if the subject you want to be in sharp focus isn't on the same plane – in other words the same distance from the lens – as other objects. If they are, the apparent effect will just be a blurring of the picture rather than depth of field. The best choice of shot is where the subject is clearly in the foreground and there's nothing else around them. That way, the effect can look almost completely natural.

There are a few ways to achieve the effect depending on the application you use. The method we're using below is one you can apply in almost any layer-capable editor. More advanced photo editors such as Photoshop CS and above have a dedicated "lens blur" filter than you can use instead of Gaussian blur to get a slightly more realistic effect.

**TIP**

▶ Using software to add depth of field works best if the subject you want in sharp focus is a different distance from the lens than other objects in the shot.

1 OPEN UP YOUR IMAGE Have a look to see if the effect is likely to look realistic. If there are other objects at the same distance from the lens it's less likely to be effective. The best results will come from a subject standing well clear of any clutter, a clear distance from other objects in the shot.

2 DUPLICATE THE PICTURE Now, create a new layer that duplicates the background (in other words a copy of the photo). In Photoshop you can do this by clicking Layer | Duplicate layer and hitting OK in the dialog box that pops up.

3 BLUR THE FOREGROUND The idea behind the technique is that we blur the whole foreground layer, then use the eraser brush tool to carefully reveal the still-sharp layer underneath, in only the area around the subject that we want to stand out. The first part of this process is to select the top layer by clicking on it, then select Filter | Blur | Gaussian Blur.

4 CONTROL THE BLURRING The Gaussian Blur filter has just one control, the Radius slider. This simply determines the extent of the blur: the higher it is the more detail is smeared out across the image. As always, it's best to err on the side of subtlety, so a radius of about 8-10 pixels is a good starting point.

5 REVEAL THE BOTTOM LAYER With the foreground layer blurred, we now need to carefully reveal the main subject by exposing the layer underneath. The ideal way to do this is using a layer mask, but not all

applications support this. Instead you can use the eraser brush. Just select it and trace around the outline of the subject using a narrow brush. Then you can "fill in" the rest of the outline with a broader brush.

6 USE A LAYER MASK If your application supports it, a layer mask is the better option since it's non-destructive and you can "paint back" the blurred foreground. In Photoshop CS2, for example, just make sure the top layer is selected and click the Layer Mask icon. You'll then be in Layer Mask mode. Select a brush and paint in 100% black and the bottom layer will show through; paint in 100% white and the top layer can be painted back on. Grey shades give you transparency proportional to the shade.

7 FOCUS ON THE DETAILS Fine detail around the edge of the shot will be the most difficult part to get looking natural – in particular the fine hair of the girl in this picture is difficult to keep sharp without an obvious shading difference. To make a tonal difference between blurred background and sharp foreground you can make judicious use of the dodge and burn tools on the background image itself. Subtlety is the key – keep the exposure control to around 50%.

8 FINE-TUNE THE RESULTS The final result has a significantly less distracting background and looks as natural as true depth of field caused by a wide aperture. It's essentially impossible to tell the shot has been manipulated unless you directly compare it to the original image.



TIP

▶ As with many adjustments made using software, the best results are gained through attention to detail, fine tuning and practice.

ONCE AN EFFECT PHOTOGRAPHERS TOOK GREAT PAINS TO AVOID, ADDING VIGNETTING IN PHOTO EDITING CAN HAVE DRAMATIC RESULTS.

Vignette effects

If you're a frequent visitor to sites such as Flickr, you'll probably notice certain trends in the way that photos are processed and presented. Just like any popular pastime, photography is subject to fashions and fads that pop up everywhere. One of the most prevalent at the moment is the trend for images to be treated with heavy contrast and artificial vignetting applied in software.

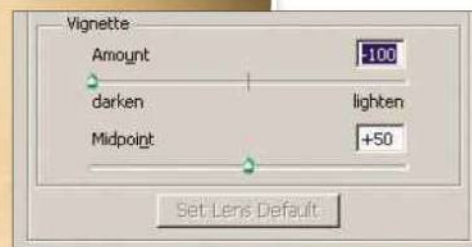
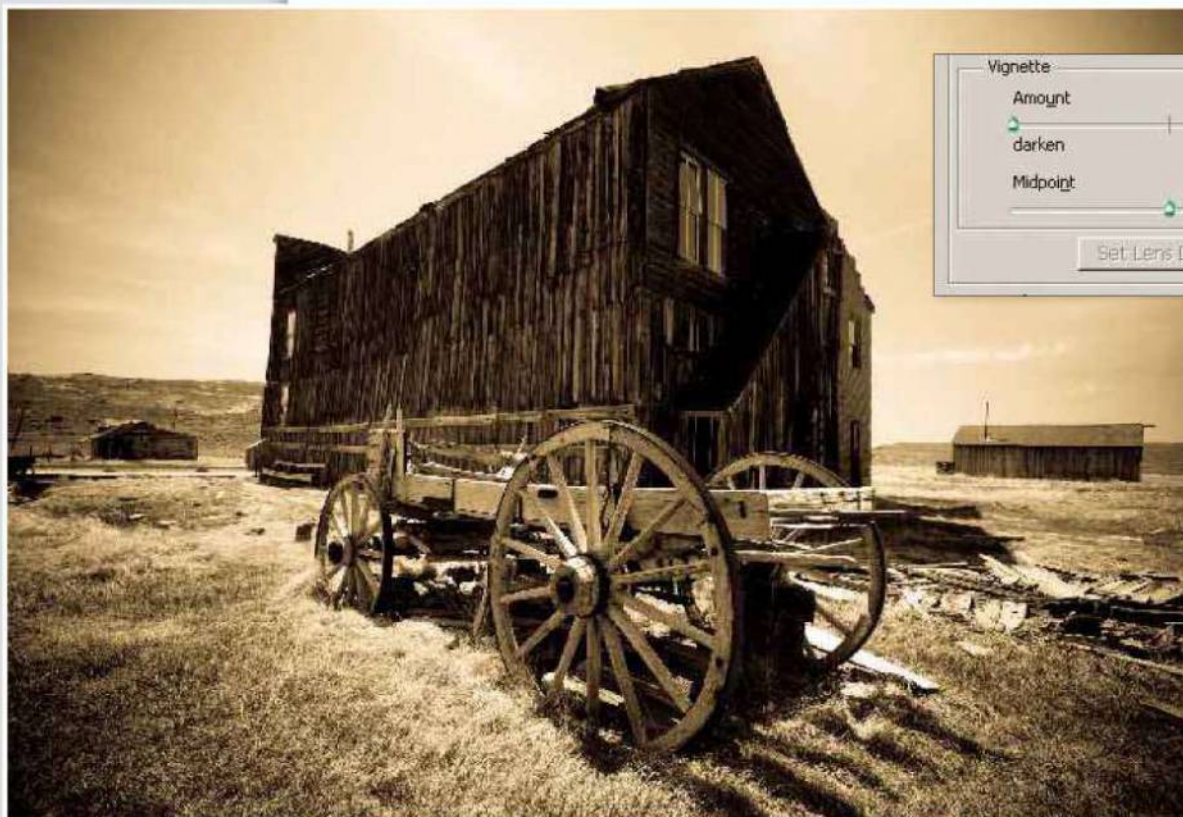
Ironically, vignetting is something that lens manufacturers go to huge lengths to avoid. It simply means a darkening of the corners of a frame, and was a common side-effect of early cameras and lenses but has been more or less eliminated in modern times. By applying a subtle vignette – particularly in conjunction with high contrast – the effect is a more vivid-looking shot, with the stronger emphasis on the subject. It's an easy effect to overdo and the look gets tiring very quickly, but there's no doubt it's effective and very popular.

Vignetting works best on shots that have the subject fairly central to the frame. If you get it right the actual darkening of the edge of the shot won't be immediately

noticeable, as the emphasis on the subject appearing to pop out of the frame should be the part of the image that people notice. With landscape shots without a central subject the effect is different – the vignette will be more obvious and the impression will be of an old-fashioned look, much like the effect of sepia tinting, which is often combined with vignetting to get a vintage look. If you really want to get a photo looking old-fashioned you can give an extreme vignette so that the image simply looks oval, but unless you want your shots to look like they belong on a chocolate box or exceptionally naff birthday card, it's not an effect you should aim for.

With the very latest versions of Photoshop, you can apply a "real" vignette effect that simulates the actual effect of vignetting from a substandard lens. All you need to do is select Filter | Distort | Lens Correction, then adjust the Amount and Midpoint sliders (see inset).

With other packages it's easy to achieve the effect using a new layer, an oval selection and judicious application of blur and layer opacity tools. Check out the walkthrough opposite for more detail.



You can apply a quick vignette with the Lens Correction tools in Photoshop CS2 and later, as shown above.

Applying a vignette effect in conjunction with high contrast and monochrome toning can make for a very dramatic image.

HOW TO... CREATE A VIGNETTE EFFECT

Judicious use of vignetting in your photo-editing software can have a subtle but impressive effect. The key is to keep the levels reasonable and carefully balance the amount you use when altering an image.

1

Load up your shot, remembering that the best types of scene that work with this technique have a strong central subject that vignetting can help accentuate. As you can see from the example, this needn't be a vintage-style image, although this type of shot can work well.

2

Create a new blank layer in your image. We're using Photoshop here, but you can do this in pretty much any layer-capable application. In Photoshop you do this by choosing Layers | New Layer on the toolbar.

3

With your new layer created, click on it in the Layers palette to make sure it's selected. Now select the ellipse selection tool, and draw an oval that reaches almost to the edges of the frame.

4

You now need to invert your selection – in Photoshop this is via Select | Inverse. Then fill in the selection using the paintbucket tool, after first making sure black is selected as the background colour. Remove the selection using <Ctrl-D> in Photoshop.

5

Now, to get the effect more subtle, first apply a heavy Gaussian blur to the vignette layer via Filter | Blur | Gaussian Blur. You'll probably need a pixel radius of at least 40 to get the best effect.

6

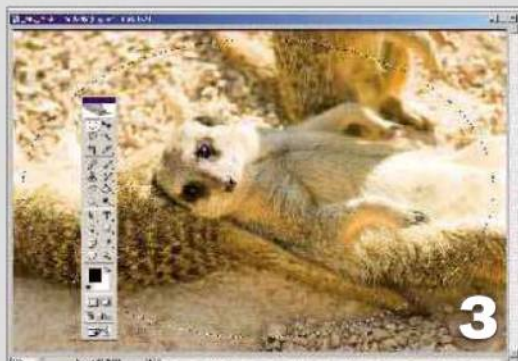
Once that's done, to fine-tune the effect you can adjust the opacity of the vignette layer. You can also convert the shot to monochrome for extra impact. Increasing the saturation also works well with vignetted shots.



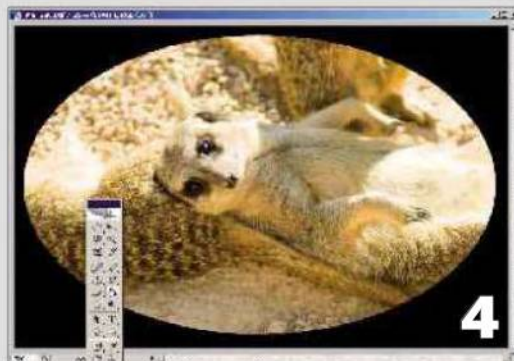
1



2



3



4



5



6



HOW HARD?

The invert process is a bit fiddly if you don't know Photoshop.

HOW LONG?

Not longer than a few minutes, unless you spend a long time adjusting to suit.

BY GETTING TO GRIPS WITH THIS COMPLEX SUBJECT, YOUR PHOTOS CAN
ACHIEVE THAT LITTLE EXTRA SOMETHING.

Introducing... Lab colour mode

One of the blessings and curses of photo-retouching and image-editing software in general is that there are usually several ways to achieve any given effect. To make an image black and white, for example, you can simply choose the Desaturate control in your photo-retouching software, which is easy but usually gives mediocre results. Or you can take the more complex, long-winded but much more effective route of using the Channel Mixer to mix the Red, Green and Blue channels of your image down into the final monochrome treatment (see p133).

Once you're at the stage where you're comfortable using tools such as curves and channel mixing, it makes a lot of sense to get to grips with Lab colour. It's admittedly a little complex and difficult to get your head around at first, but you'll find that, like most things in photo retouching, that effort pays off with better-looking images.

TIP

▶ Lab colour is difficult to get used to at first. To get the concepts in your head, the best thing to do is simply experiment with the likes of the Curves control while in Lab mode, to see the interactions between L, a and b channels.

WHAT IS LAB? It's nothing to do with laboratories, although its definition is pretty scientific. Lab is way of representing colour that's based on the way humans perceive it. You use an image in Lab mode as opposed to RGB (red, green and blue) or CMYK (cyan, magenta, yellow and key). RGB modes and colour spaces are mentioned and talked about a lot in digital imaging and digital photography. That's because RGB is the way machines represent colour – by mixing together different levels of red, green and blue dots to make a given hue. CMYK is the way that printers make

colour, with varying levels of cyan, magenta, yellow and the key (usually black).

Lab, however, doesn't do it like that. It mimics the eye's way of doing things, separating brightness (luminance) from colour. This is the way that rods and cones, the light-sensitive cells of the human eye, function. Rods are sensitive to brightness but can't distinguish colour; cones are what allows us to distinguish one hue from another. Incidentally, this is the reason why it's impossible to distinguish colours in very low light – the rods are more sensitive and keep functioning when your cones no longer work to perceive hues.

Lab colour is so-called because a Lab-colour image is split into L, a and b channels. The L channel is the brightness information; the a and b channels represent colour information.

It may not sound exciting, but you can do some neat tricks with Lab colour, and it's a staple tool in most fashion photographers' retouching armory. With the brightness and colour channels separated, you can make large alterations to one without affecting the other. Applying an unsharp mask (see p118) to the L channel, for instance, can sharpen up the image without affecting colour detail. You can also achieve colour effects that are very hard in RGB mode. For instance, you can saturate an image more than you'd be able to in RGB, without artefacts setting in – see the walkthrough opposite for how to do it.



One of Lab colour mode's many uses is getting superbly saturated images, without nasty side effects such as posterisation creeping in to ruin the effect.

HOW TO...

INCREASE SATURATION USING LAB COLOUR

A gloriously easy way to see the benefits of Lab colour is to use it to perk up an image by oversaturating. Here's how.

1

ADDING MORE COLOUR The standard way to increase the colour saturation and richness of a colour image is simply to edit the image in the usual RGB mode as it comes out of your camera. But if you convert it to Lab colour mode first you can get higher saturation than you can achieve in RGB mode, without unwanted side effects such as "stepping" of tones. You'll need an image editor that supports Lab colour to use the feature. The most obvious candidate is Photoshop; we're using the CS2 version here, to treat this nicely composed but slightly dull landscape shot which is in serious need of a saturation boost.

2

THE PROCESS IS SIMPLE From the top menu bar, select Image | Mode and choose Lab colour rather than RGB. If you have adjustment layers in your image, Photoshop may warn you that it needs to discard them since they won't work in Lab mode. Otherwise, nothing obvious will change.

3

ADJUST THE CHANNELS Now, in the layers palette, select just the 'a' channel, but with the other channels visible – your layers palette

should look like it does here, with the 'a' channel selected and the other layers visible but not highlighted. Now simply choose Image | Adjustments | Brightness/Contrast. Increase the Contrast slider to around +50%. Accept the changes (the image colour will look odd for now). Do the same for the 'b' channel – select it and increase contrast by the same amount as you increased the 'a' channel (otherwise you'll get a colour cast).

4

RETURN TO RGB MODE You should now find you have a very highly saturated image and – as long as you kept the 'a' and 'b' channel contrast adjustment to sensible limits – there should be no unpleasant artefacts. The same saturation in RGB mode would be almost impossible – you'd end up with obvious stepping, pixellation and posterisation effects.

Once you've finished making adjustment in Lab colour, you can simply pop the image back into RGB mode again via the Image | Mode menu. It's worth nothing that Photoshop CS3 and above have clever algorithms built in to the Brightness/Contrast control that prevent artefacts – just pop the image into Lab mode and whack the Contrast sliders up to 100%.

HOW HARD?

Lab colour can be a difficult beast, but this particular adjustment shouldn't pose any problems.

HOW LONG?

It needs very little judgement, just a few clicks and a couple of slider adjustments. Two minutes tops.



HOW TO... CREATE SOFT-FOCUS PORTRAITS

Get that chocolate-box look with a touch of soft focus. If used sparingly and with the right shot it can really improve the atmosphere of an image, and give it an idealised sheen.

Soft focus is one of those familiar effects that was originally accidental, but turned out to be quite pleasing. As well as making an image less harsh and giving it a dreamy quality, it has the effect of smoothing out blemishes, making it especially good on improving the look of skin tones. That in turn makes it very popular for portraits and, in particular, shots of children and brides. You also get a blooming, halo effect around highlights. It all adds up to an angelic, ethereal nature to portrait shots.

The original cause of the soft-focus effect was a technical imperfection in early lenses known as spherical aberration, but with modern software it's relatively easily to apply it digitally.

It's a common mistake to try to get a soft-focus effect by just applying a blur filter. That doesn't work. If you do simply apply blur, all you'll get is a blurred picture, which is not a true soft-focus effect. The soft-focus caused by spherical aberrations doesn't throw the subject out of focus – it's actually still sharp. To get true soft focus you have to be a little more canny and use layers, plus a layer blend mode known as Screen. The Screen effect lightens the image and partially blows out highlights, giving the

smooth, unblemished look to skin. In combination with that, you need to apply a Gaussian blur filter, but only to one layer. With the sharp and blurred layers blended together via the Screen blending mode, focus detail is retained and the soft focus looks correct.

Because the Screen blend mode has the effect of lightening the whole image, the final step is simply to bring down the exposure a little using the Levels tool.

It's easy to get carried away with retouching effects, but soft focus is one you should be particularly wary of. Save it for your best shots, with decent backgrounds, rather than a way of trying to rescue a shot that's poor in the first place. Background clutter kills the dreamy effect of soft-focus shots. Flowers and leaves in the background are fine; cars, garden rakes and space-hoppers less so.

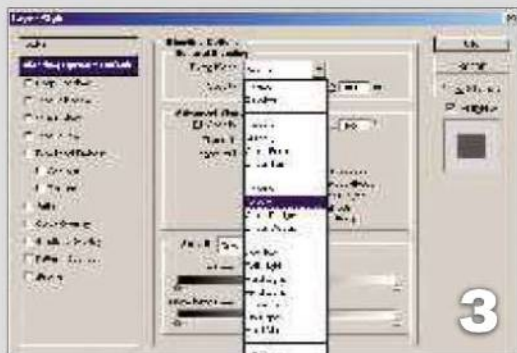
That said, if you experiment with the effect on other subjects – architecture, for instance – you'll probably recognise the results. The screen-blend effect is used surprisingly often in modern advertising shots (although usually only in conjunction with very subtle Gaussian blurring) to get the very clean, futuristic look that's currently very popular.

HOW HARD?

Fairly advanced. Get yourself familiar with the basics first to make the best job of it.

HOW LONG?

You'll probably want to spend a good half an hour to get the shot as a whole looking the way you want.



1

GET STARTED Soft focus is easy to achieve but it does need a photo-editing package capable of handling layers and screen blending effects.

We've used Photoshop here; the GIMP will also work just fine. We're going to apply soft-focus to this unprocessed shot of a little girl, as well as applying some other tweaks to enhance it and give it more of an idealised look.

2

LAYER DUPLICATION The first thing to do is duplicate the image into itself as a new layer, so that we can begin blending them. In Photoshop select Layer | Duplicate Layer, or just use the shortcut <Ctrl-J> which has the same effect.

3

SCREENING Now double-click on the new, top-most layer, and in the Layer Style dialog, select the Screen blend mode. This means that the pixel values of the top layer and one beneath will be multiplied, brightening the image as whole.

4

DON'T PANIC The image will now look overexposed, but don't worry, we'll deal with that in a later step. You'll probably notice that highlights are now blown out, but in a fairly soft way that's not like normal, undesirable highlight clipping. This blooming is a key part of the soft-focus effect, simulating what happens to the light in a physical soft-focus lens.

5

CHOCOLATES With the top layer still selected, click Filter | Blur | Gaussian Blur. Then adjust the Radius control. The higher the radius, the more extreme and "chocolate box" the soft-focus effect will be.

6

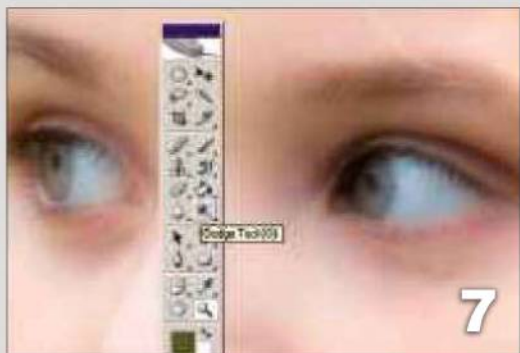
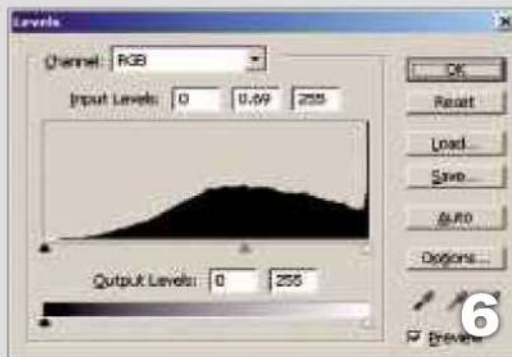
EXPOSURE We now need to bring the exposure levels down a bit. You can use the Curves control if you like, but it's more straightforward to use Levels. All you need to do is drag the grey, mid-point slider to the right to reduce the brightness of midtones while keeping the highlights.

7

COMPENSATING The shot wasn't taken in the best light – ideally there would have been fill-in flash (see p56) – so we're using some extra retouching tools. The dodge tool is used to lighten up the shadows around the girl's eyes – it removes the effect that light from the side tends to have of making the subject look as though they've not slept for a week. If you want to get a really clean-looking, idealised portrait completely devoid of all defects, you can also try using the spot-healing or clone-stamp tools to get rid of every blemish. Be careful about going overboard, though; there's a fine line between a dreamy-looking portrait and an artificial photo that looks like the face of a plastic doll.

8

THE RESULT The original photo was a captured moment that wasn't ideally set up or planned. To enhance it beyond the soft focus we've cropped it slightly, and done the usual steps of applying a Curves layer with an S-curve to boost contrast, and adding a Hue/Saturation layer to give the colours a bit of a boost via increased saturation. With the extra saturation and cropping in conjunction with the soft focus, the final result is far more striking than the original, and mitigates the effects of the relatively harsh midsummer afternoon sunlight in which the picture was taken.



TIP

▶ Because soft focus is an easy effect to overdo, once you've finished processing a shot, try going away and doing something else for a while, then opening the image again to give yourself a fresh look at it.

IN THIS CHAPTER

160 **Order from chaos: introducing workflow**

Sort out your digital life and make your shots easier to find by getting a workflow going.

164 **Introducing PC backup**

If you're not yet familiar with ways to back up the photos on your computer, read this immediately!

166 **How to use Windows XP Backup**

If you've got Windows XP on your computer, you've already got a free backup tool. Here's how to use it.

168 **Windows Vista and Windows 7 backup**

Windows 7 and Vista make it even easier to automate your backups, helping keep your photos even safer.

170 **Introducing online backup**

Backing up your shots to the internet gives you an extra layer of security. Here are some pointers.

CHAPTER 10

ORGANISATION AND BACKUP

It isn't the most exciting part of digital photography, but there's no point in spending hours or even days trying to get decent shots if they then get lost on your hard disk. Even worse is the possibility that you could lose them completely through a hardware failure or virus: it's one of those things that people think won't happen to them, but it can. In this chapter, we'll introduce ways to organise your photos, and add that vital layer of security by backing them up.



ONCE YOU BECOME INTERESTED IN PHOTOGRAPHY, YOU CAN FIND YOURSELF DROWNING IN A SEA OF IMAGES – IT'S TIME TO ESTABLISH A WORKFLOW.

Order from chaos: introducing workflow

In the world of digital photography, there are three factors that separate a beginner from a professional. The first is talent, which unfortunately doesn't come bundled with new cameras. The second is an assistant to do most of the hard work for you: not an option for the amateur. But the third, which anyone can get themselves, is a decent, methodical way of organising and editing your shots in place to ease the extra burdens of digital photography. In other words, a proper workflow.

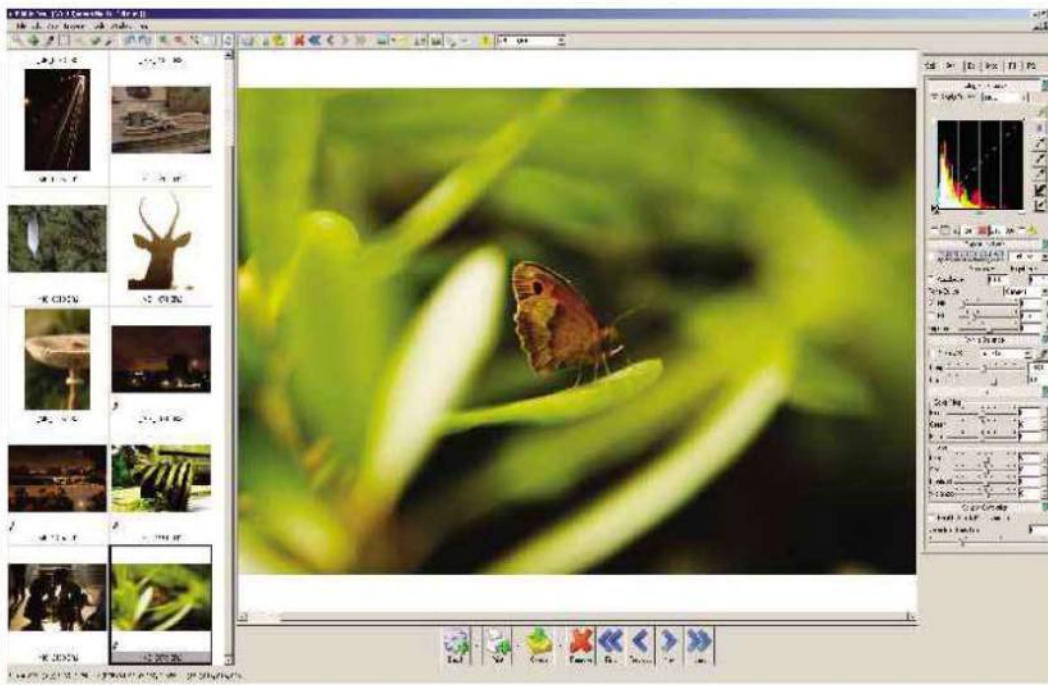
WHAT EXTRA BURDENS? Digital is a marvellous thing, but it does have drawbacks. One of the problems is that the zero cost per shot of digital – in other words, the fact that you can take as many pictures as you like and it won't cost a penny – is a double-edged sword. It's a boon that you can rattle off dozens of shots when you see a photo opportunity (or even when you don't) without worrying about your film running out or the price of having your shots developed. It's a curse in that many people who've been into digital photography for a while can regale you with tales of a hard disk containing thousands of photographs. How do you find the right photo? You need to be disciplined about where and how you store your shots, because once you lose track they can get completely lost.

And that's not all. Whereas once upon a time you took the film out of your camera and relegated the business of turning it into a set of actual pictures to someone else, the digital world has effectively turned everyone into their own branch of Boots. As we saw in Chapter 8, digital shots must be processed in software to make the best of them – a set of steps not completely unlike the traditional need for processing with chemicals – and then prepared for print. Again, an ad hoc approach is fine for one or two pictures, but to give yourself the best chance of seeing the potential in one shot among the 400 you've just pulled off your camera – and not spend a week doing it – it's best to adopt a consistent, fluid and fast method of processing your images.

SHOOTING PREFERENCES If you're serious about getting a workflow up and running, we're going to assume that you're using a digital SLR and shooting in RAW mode. If you're not shooting in RAW, turn to p74 to learn about why you should be. To recap briefly, a RAW file is the naked data from the sensor and this allows you to alter the white balance of the shot after it's been taken; a huge bonus. Second, RAW files give you far more leeway when it comes to image adjustments, especially levels, curves



Adobe Photoshop Lightroom is a sophisticated tool, but it's by no means essential to a good workflow process.



Bibble Pro is an unconventionally named but comprehensive workflow tool, with full support for RAW files.

and basic alterations such as brightness. Third, software for processing RAW files on a PC can be more sophisticated in processing the image than the time and power-limited electronics in the camera.

WHICH WORKFLOW SOFTWARE? The big software companies haven't failed to pick up on the increasing need for an all-in-one tool to deal with the digital photography workflow. Mac users stole a march on the PC with Apple's introduction of Aperture, a very well-featured tool. Adobe hasn't been caught napping, either, with Photoshop Lightroom (see p106). Although it bears the Photoshop name, this isn't simply a version of Photoshop – it's a completely separate application that's focused on providing a decent workflow for digital photography. Lightroom's interface is split into four modules – Library, Develop, Slideshow and Print – with each providing tools for these distinct aspects of the workflow.

One of the major challenges for workflow software is editing images in a non-destructive manner. Rather than having several copies of each image – the original "digital negative", a copy of the original in a lossless format for editing and a final high-quality JPEG (keep reading for more on these concepts) – Lightroom keeps all image changes in its own database. When you make a change to an image, that change doesn't alter the original file at all – it's stored in the database and applied on-the-fly. It's analogous to working with layers in Photoshop or the Gimp, but applied to every operation.

The downside is that Lightroom places a big strain on your PC. As it's keeping track of a large database and applying changes to images as they're viewed rather than simply writing them to disk, the performance of Lightroom with a large image library can be slow.

There are alternatives, though: one of the most popular options is produced by Bibble Labs (www.bibblelabs.com) with Bibble Pro and Bibble Lite. Bibble started out as a relatively simple tool for viewing and converting RAW files, but it's grown into a fully fledged workflow and editing tool as time has progressed.

THE FREE ROUTE You don't necessarily need to pay anything, though: don't ignore the software that came with your digital camera. If you have a Canon digital SLR, it will have come with a CD containing its Digital Photo Professional software. Like Bibble, this has developed over several years to become a comprehensive and useful tool for workflow. It allows you to tag images; apply curves adjustment, white-balance correction and sharpening; and it provides a noise-reduction tool and the ability to crop images. It's what we'll use to illustrate the workflow process.

In many ways, though, workflow isn't about software; it's about establishing a disciplined routine to keep track of your shots and get the most from them, as well as making sure you don't leave an undiscovered gem of a shot lying around on your hard disk simply because you didn't see it. Remember that some of the best images are taken accidentally – you need to make sure you look at every single frame, even the shots you took off-the-cuff.

There are three primary steps in a good workflow: acquisition, assessment and processing.

ACQUISITION The first step in getting a sensible workflow is to be disciplined and consistent in downloading images from your camera. It's essential to make sure they're all stored under one common subfolder. Windows' Pictures folder is the obvious choice, although if you have other images already in there make a subfolder below that and ►

CHAPTER 10

ORGANISATION AND BACKUP

call it something like "Photo archive". Then you need to set your camera's image download software to always use that folder for downloading shots, but also always to create a subfolder.

Practically every camera's download software allows you to create a folder name based on the date: make sure you use that facility. This simple bit of discipline means that over time you'll build up a library of images you can easily search and refer to, using nothing fancier than Windows Explorer. Having your photos sprayed across your hard disk isn't an option, and you're likely to lose shots completely through accidental deletion or simply forgetting they're there.

ASSESSMENT Now that you have a consistent place to keep your shots and you've downloaded the latest batch, the first thing you must do is sit down and quickly go through every shot, rating each one according to whether it's worth more attention.

Digital Photo Professional, like most similar packages, allows you to flag each image with a rating from one to three. Going through each shot is an important step: without it, you can end up wasting time processing a shot when one taken a couple of frames later is better. It also means you can quickly find the decent shots among hundreds of mediocre ones when you come back to the folder in the future. Make sure you view them at 100% magnification before flagging: thumbnails hide poor focus that, when you view the shot at its full size, can turn out to have ruined the image.

PROCESSING Although there are dozens of different ways of processing and retouching an image, as we saw in Chapter 8 there are three steps that should be carried out for every shot you've rated as decent and want to continue processing: you need to look at the histogram and alter levels (or curves) to expand the tonal range as much as possible (see p117); check and alter the white balance if necessary (see p66); and then apply sharpening (see p118). You can see exactly how to do

that by turning to the relevant page – the point we're making here is that you should get into the habit of assessing and/or altering those three aspects of the image, since they have by far the biggest effect on the look and impact of the final picture.

Once you've practised it yourself on your own images, you'll soon see that an image you passed over can suddenly take on a new dimension once it's been corrected, especially when the levels control has been applied.

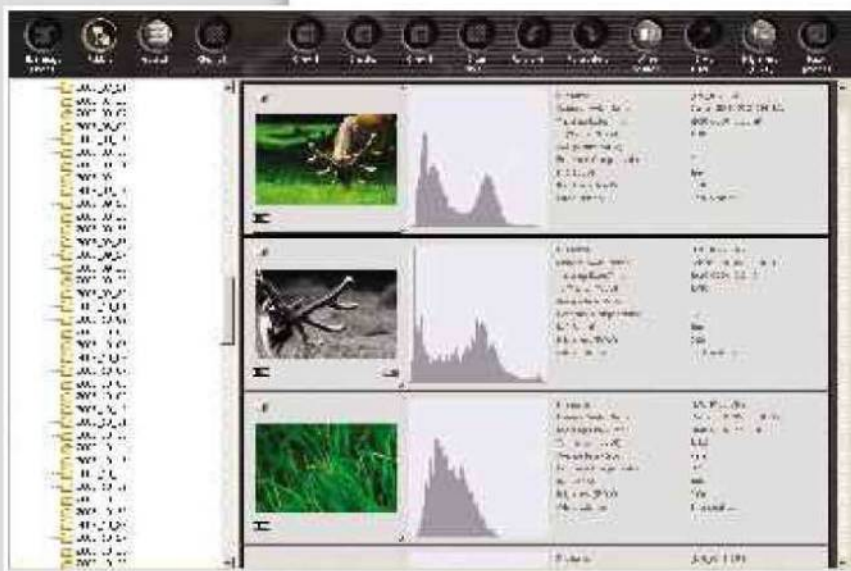
KEEPING TRACK OF THE BEST One technique that can work very well is to keep in mind the concept of a digital negative and a digital print. We're not talking literally here – clearly, a digital photo is simply a collection of bits: ones and zeros, stored on a memory card or hard disk. But if you treat your RAW files or processed lossless TIFFs (whichever you choose to store) as your negatives that live in the cupboard, and then after each session choose the best ones you want to turn into prints (figuratively rather than literally), you can then save them as high-quality final JPEGs.

Keep all of your best "print" copies in one folder on your hard disk: they won't take up much room, since even a JPEG saved with a 95% quality setting should only be 2MB or so. And if you haven't tinkered with the filename, to find the original lossless set they came from you only have to do a search on that filename using Windows' standard Search facility.

Having all your best shots as properly processed and polished high-quality JPEGs also means you can quickly back them up to a DVD or, since there won't be hundreds, even to CD (see p164 for details of carrying out complete backups of all your pictures).

A good way of backing up your most precious print shots is to upload them to an online service such as www.photobox.co.uk – see p178 for more on this. Aside from being able to order quality prints, you can also share them. But most of all, if the worst happens and your house burns down, you'll at least have copies of your best shots online.

Canon's Digital Photo Professional tool is a useful piece of software supplied with its digital SLR cameras. Note the consistent folder naming in the Explorer pane on the left.



A POINT TO REMEMBER There's a lot of verbose talk on internet forums about the relative merits of one RAW file converter over another, whether you should save your final processed shots as JPEG or TIFF and so on. A lot of forum rants include screenshots blown up to 500% showing slight differences between individual pixels in images converted by software package A against software package B. Our advice is not to get hung up on the tiny details. Spend some time getting the basic workflow right and be disciplined so you don't forget – for instance, apply sharpening when you're processing your images and they'll appear noticeably better to anyone who looks at them. However, spend half a day wondering whether the patch of foliage in the background is better with 0.6 as opposed to 0.7 pixel-threshold Unsharp Mask settings and you've wasted your time; the only person who'll possibly be able to see the difference is you. Photos are about experiencing, not scrutinising: spend the extra hours taking pictures instead.

HOW TO... ESTABLISH A WORKFLOW

There's no single approved way of establishing a workflow: the key is to be consistent about your approach. That said, here are a few pointers to ways in which you can go about taming your wild collection of shots.

Getting a workflow going is about establishing a consistent way of acquiring, assessing and performing the essential processing steps on your shots. We're using Canon's Digital Photo Professional package to illustrate the idea here, but you can use the likes of Photoshop Lightroom or a bit of self-discipline and Windows Explorer in conjunction with the likes of the Gimp to perform the processing.

1 PREVIEW AND TAG Preview and tagging is an important step: go through your photos and mark those you judge worthy of processing further. In Digital Photo Professional, you can right-click an image thumbnail and choose to add a check mark rated between one and three. You can delete shots, too; however, it's good practice only ever to delete those shots that are hopeless. Hard disk space is cheap so it makes sense to keep even the mediocre shots. If you're low on disk space, turn to p94 to see how to add more.

2 START PROCESSING Once you've been through all the shots and tagged the ones that look worthy of more attention, you can start processing the best ones. The first step should be to correct the white balance if it looks incorrect. If the Automatic setting doesn't work and you're shooting in

RAW mode, click on the drop-down box and you can select from the standard list of white-balance types – this is one of the joys of working with RAW. Correcting the white balance can really improve a picture.

3 SET THE MOOD Now you need to apply the levels and/or curves adjustments to improve the tonal range and set the mood of the shot.

Digital Photo Professional, in common with many other editing tools, provides levels by showing the image histogram and allowing you to drag the high- and low-point sliders in to give the maximum possible tonal range (see p116 for a full explanation).

4 SAVE OR EXPORT Then, set the level of sharpening for your image. Some people prefer to do this using a more sophisticated tool, but for convenience, doing everything in one package simplifies workflow. Digital Photo Professional's sharpening control, while simple, is effective.

The basic steps that you should perform for every flagged image are now complete. If you're happy with the results, you can then batch-convert them into JPEGs for printing. Alternatively, save them as lossless TIFFs for export to a sophisticated retouching tool such as Photoshop or the Gimp for more advanced editing.



HOW HARD?

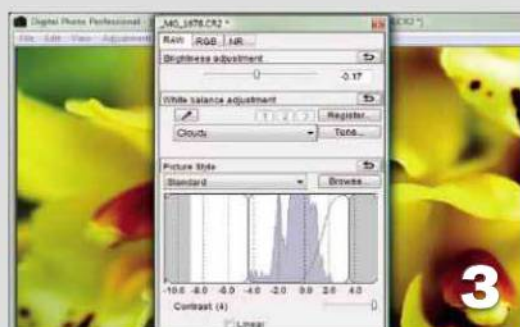
All you need is a little bit of patience and self-discipline.

ESSENTIAL

Any software you feel comfortable with.

DESIRABLE

A dedicated workflow package, such as Adobe's Photoshop Lightroom.



BACKUP ISN'T EXCITING, BUT WITHOUT IT YOU RISK LOSING EVERYTHING.
HERE'S HOW TO ENSURE YOUR PHOTOS STAY SAFE.

Introducing PC backup

Photography is all about getting yourself out there and being creative, so it may seem boring to talk about the nitty-gritty task of PC backup. But just imagine losing days, months, even years of memories when something as mundane as a hard disk fails, and you'll appreciate why it absolutely must be done if you want to guarantee that your photos will last a lifetime.

Backup needn't be a chore, though, as even the most basic of utilities – such as Windows XP Backup – can be set up to protect any file you choose automatically. All you need is some form of external storage on which to keep your backed-up photos. Although it's possible to store them on a spare section of your PC or notebook's internal hard disk, this defeats the point, as you're looking to keep them in two (or more) different physical locations to minimise the risk of loss.

CHOOSE YOUR MEDIA If you're just looking to back up your collection of digital photos, there are several possibilities when it comes to choosing your media to back up to. The simplest method would be to use a blank CD or DVD and burn all your files across, label the disc and keep it in a safe place. This works best with holiday snaps, where you'll often have a few memory cards' worth of photos that will fit on one disc; it also makes them very easy to catalogue. However, it doesn't account for any future editing of your photos, and it's a pain – if not impossible – to add photos to the discs at a later date.

Using a USB stick is a more flexible solution, as you can very easily copy files back and forth from the stick to your PC, and add edited photos to a collection without any difficulty. Memory sticks aren't easy to catalogue, though, and they're expensive in terms of the capacities you can buy for your money.

The best solution is simply to buy a second hard disk, whether to put inside your PC or to use as an external disk (see p94). Costs per gigabyte are lower than ever, and the huge capacities now available give you the option of backing up not only your photos, but also any other important files on your PC.

Better still, you could buy a network-attached storage (NAS) device, which is essentially an external hard disk that sits permanently connected to your home or office network, but needn't be in the same location as your PC itself. This gives you all the benefits of an extra hard disk, without the inconvenience of having to connect it directly via USB or FireWire every time you want to use it. It also stays on at all times, so you can access your stored photos from any PC or laptop on the network, making it a great way to share your files, too. And being a network-attached device, you don't need to put it near your PC: if you're prepared to go to a little effort with network wiring, or you go for a model with wireless capabilities, you can put the disk itself out of the way somewhere. That means not only will you not be distracted by the noise of the hard disk whirring away, but it also gives

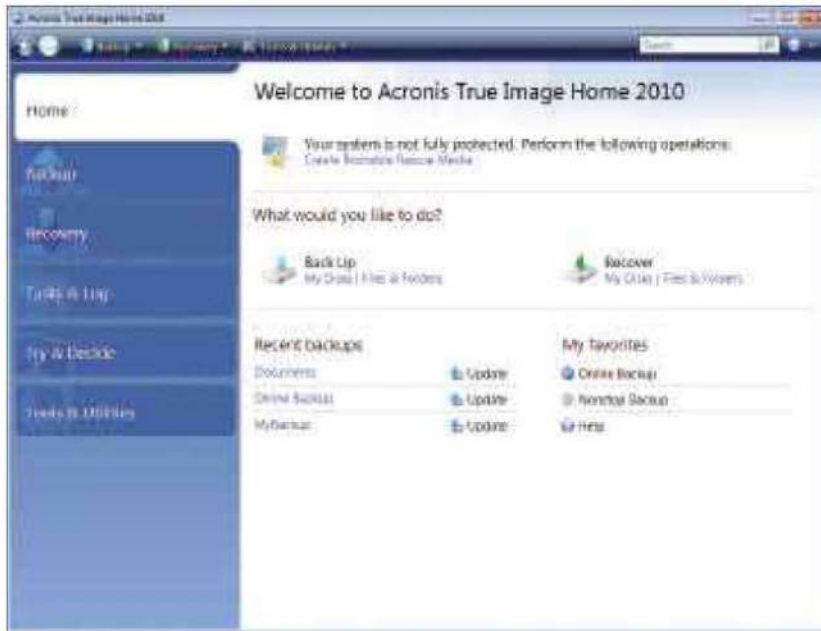
TIP

► If you have a PC or laptop with Windows 7 or Vista installed, you can take advantage of a much more fully featured backup utility (see p168). The new version of Windows Backup has a cleaner, glossier interface that makes it easier to use, it gives more control over precise scheduling of tasks and also allows you to select specific file types to save – a feature that makes tasks such as photo backup an absolute breeze.

The **XP Backup Utility** is free with Windows XP. It's a straightforward, if somewhat limited, tool for **scheduling backups** of your PC's files and folders, and for simply backing up your photos it does the job. Most users will only need to follow the wizard that launches automatically, but there's an Advanced mode for those comfortable enough to delve deeper.

XP Professional users can select this option to create a **basic recovery disc** in order to restore the system should the hard disk fail. It's a little limited, but it's an extra layer of protection.





you some measure of protection if the worst happens and you're burgled. The chances of the average thief looking in the airing cupboard are remote.

BACKUP BASICS The Windows XP Backup utility is a good starting point for backing up your photos, as it allows you to create scheduled automated backups, and is available for free with Windows XP. The walkthrough overleaf shows how to quickly set up a backup job to encompass all of your photos. If your PC has Windows 7 or Vista, turn to p168 for a look at the more advanced Windows Backup.

Your initial backup will be a full protection of all the files you select, while all further backups will most likely be either incremental or differential. An incremental backup saves those files that have changed since the last backup of any kind; this leaves you with lots of minor incremental backup sets to restore from, so it's great for making sure you keep all the versions of a photo, but can get messy since you need to keep every increment if you want to restore. A differential backup saves all changes since the last full backup, so it keeps just one larger differential file.

XP's Windows Backup Utility also gives a few other options. If you choose copy mode, it will simply copy the selected files and folders to your chosen destination rather than compiling them into a backup set. This is a useful option if you have your photos well organised, or you don't have enough of them for disk space to be an issue.

You should verify the data after a backup to ensure all your files were handled correctly. The utility is also capable of backing up open files, so even if you're working at the time it shouldn't be an issue. You can also ensure your laptop doesn't try to back up when the battery is low, and you can have previous backup sets deleted to manage your hard disk space efficiently.

OTHER SOFTWARE If you want more power over your backups there are several good alternatives, but you'll

Acronis True Image Home 2010 offers impressive power, allowing you to copy an entire hard disk and make recovery discs. It's worth paying the extra if you have more than just photos to protect, then if the worst should happen, you have a way to rebuild your hard disk on a new PC.

have to pay for them. Advanced backup software gives you more control over your files: varying levels of compression can be applied to your backup sets to manage the resulting file size; password-protection and encryption helps to keep your backups secure; and some utilities go beyond backup to protect your entire system against failure, with restore partitions and recovery discs, and even boot managers for the ultimate in operating system independence.

Acronis True Image Home 2010 (www.acronis.com) is one of the best utilities currently on the market, allowing you to protect not only your individual photos and folders, but also the vital system files and applications on the rest of your PC. Firmly in the budget price range, it kills several birds with one stone, since it can also rebuild the contents of your PC on a new hard disk should yours fail.

Norton Ghost 15 (www.symantec.co.uk) is an even more user-friendly way to "ghost" your entire hard disk on to a spare one to protect yourself against disaster, but it doesn't offer the same flexibility as Acronis in choosing individual files and folders to back up, and it's more expensive, too.

All good backup utilities let you schedule **automated backups**, so make sure you pick an interval that suits your usage. If you edit your photos every day, it's a good idea to run a backup each night to match, and if the photos are an important part of your job you could even increase that to every few hours. Otherwise, a weekly, fortnightly or even monthly backup should suffice.

Norton Ghost 15 is similar to Acronis but focuses more on protecting your entire hard disk from failure. The user interface is incredibly simple, much more so than True Image, but it doesn't offer the option of picking and choosing individual files and folders to back up. It therefore isn't ideal for small home photo collections, and it's also quite a bit dearer.

Keeping just one copy of your photos on your hard disk leaves you dangerously vulnerable to disaster. From a simple hard disk failure to burglary or even fire, it's important to back them up to a second location. Here's how...

START XP BACKUP If you have Windows XP Professional, the Backup utility is installed and ready to go. Go to Start, All Programs, Accessories, System Tools and click on Backup to begin the process. If you have Windows XP Home Edition, you might find it's not there – don't panic, though. You simply need to install the utility from the installation CD. To do this, insert the CD, click Perform Additional Tasks in the Windows XP screen, then click Browse this CD. In Windows XP, you'll open the ValueAdd folder that appears then go to the folder named "Msf1" then "Ntbackup" within which you'll double-click the NTBACKUP.MSI file to begin the installation process, which will start up a standard installation wizard just like installing any other application in Windows. Once installed, the welcome window gives you the option of entering advanced mode if you wish, but for now we'll back up our photos using the simple wizard. Clicking Next gives you the choice between backing up or restoring your files: if you already have a backup and need to access your old photos, you'd click on Restore and follow that wizard. We want to protect our photos, however, so choose "Back up files and settings". The wizard focusing on our photos only in this backup set, so click the option "Let me choose what to back up".

SELECT YOUR PHOTOS This is the most important step, as it's here that you must ensure you've selected all your photo files. XP is a basic utility, so you'll need to know where – if possible, have them organised into sensibly – folders – ideally this should already be part of workflow anyway (see p162). Use the folder tree to go to your photos and put a tick in the box beside all to add them to the backup set. You can choose from individual files to folders, right up to entire – be careful not to add any files you don't need.

3 FINISH OR DELVE DEEPER On the next screen, you're asked to name your backup set and select your destination; use the Browse button to navigate to your chosen storage device, be it a second hard disk, DVD or – best of all – a network-attached storage (NAS) device. Technically you've now finished, so feel free to go ahead and leave it to run, which will give you a one-time-only backup. However, you'll notice an Advanced button at the bottom of the summary window: click on it to configure the options that will enable you to protect your data more effectively and, more importantly, do it automatically on a regular basis.

Pretty easy, but this is your data we're talking about. Make sure you fully understand both the backup process and what to do if you need to restore from the backup.

Windows XP on your computer – either XP Professional or XP Home Edition (Windows 7 and Vista also have a similar utility – see overleaf).



4 CHOOSE BACKUP TYPE The first time you run the utility you'll want to run a normal backup or, if simply copying to another hard disk, perhaps a basic copy of the selected files. After that, though, either incremental or differential backups can be made to save time and disk space. Turn back to the previous page for an explanation of the difference between incremental and differential backups.

5 EXTRA OPTIONS You can make XP Backup verify the integrity of the data after the task has been run to ensure the backup set is usable; it's worth doing, as there's nothing worse than thinking you're properly protected when you're not. The volume shadow copy option allows the utility to back up files that are open and being worked on – if you disable this option those files will be skipped so make sure it's enabled. The following screen allows you to choose whether to overwrite previous backups if any exist. It's a good idea to keep a close eye on your backup sets, as it's all too easy to fill up your destination disk with backups without realising it. Then you're given the option to run the backup now or schedule it for later.

6 SET A SCHEDULE The scheduler is one of the most vital parts of a backup routine, as you need to ensure your photos aren't just saved once, but backed up on a regular basis to keep up with your editing and additions to the collection. XP Backup gives you the choice of daily, weekly or monthly backups. A precise time can be chosen, and the Advanced button allows you to force the task to repeat every few hours for a set duration, which can be useful if the photos are a vital part of your working day.

7 SCHEDULE SETTINGS The Settings tab lets you fine-tune the schedule with some final options. You can have the backup task deleted once it completes, stop it if it runs for too long – indicating a problem – or have the backup process run only in idle time, so it doesn't get in the way when you're using the PC. For mobile users, the power options are vital, as you can make sure the backup process doesn't try to run when the system is on battery power – risking data loss if it dies midway through – or force it to wake from hibernation when the scheduled backup time is reached.

8 FINAL STEPS You should carefully check the details on the summary screen to make sure everything is correct – after all, your photos depend on this task – then go ahead and run your backup task. Depending on the number of files involved, it could take anything from a few seconds to a few hours, but you're kept informed throughout by the progress window.

Although XP Backup is a reliable application, if you have an automatic schedule set you should never blindly trust that your data is being backed up. Every so often, check that the backup is current. You can do that by right-clicking on the backup file itself, selecting Properties and looking at the Modified date in the information dialog that appears. While you're there you should also check that the backup file is the right sort of size. Again, you can check that via the right-click Properties dialog and looking at the Size entry. If you have several years' worth of files and it comes to only a couple of megabytes, something is awry – it should probably be a few gigabytes. Also bear in mind that if it encounters an error, XP Backup has a tendency to exit silently, so make sure you keep regular tabs on it.



TIP

Don't underestimate the power of System Restore if your PC or laptop goes haywire. If you have Windows Vista Business or Ultimate Edition installed, you can also use System Restore's Previous Versions capability, which lets you roll back a particular file to a saved point in the past. This makes it a great way to keep up with multiple changes made to a photo without having to keep renaming the files.

WITH THE LATEST VERSIONS OF WINDOWS, MICROSOFT HAS UPGRADED THE BUILT-IN BACKUP UTILITY TO A MUCH MORE POWERFUL PIECE OF SOFTWARE.

Introducing Windows Vista and Windows 7 Backup

If you've upgraded your old Windows XP system to Windows Vista or the newer Windows 7, you're in luck. Both include a much-improved Windows Backup utility, which makes it far easier to back up your photos. All you need to run it is some form of storage media: a spare hard disk, network drive, CD or DVD or even a large USB memory stick. The shot of Windows Backup below is the Vista version; Windows 7's version (opposite) looks slightly different but has exactly the same features and functions.

If you've used the XP backup utility you'll be familiar with how it works. If not, the wizard-based process takes copies of your chosen files, compresses them into a smaller file and stores it externally. If you need to retrieve the files, the wizard lets you browse through them like a normal folder and restore them to your hard disk. You also have the advanced option of browsing and restoring backup sets created on other Vista or Windows 7 PCs, giving you a useful way to manage the files on several PCs at a time.

SET UP AND FORGET When you create a new backup task, Windows Backup will save every file of the types you select – in this case, your photos. Each further time the same

task is run, it will add only new or edited files, saving both time and disk space. The original file and folder structure is retained, which is vital for saving something as organised as a photo collection in the order you want it.

Windows Backup includes a comprehensive scheduler, so you can set up your task as you require then leave it to run automatically. It can be set to run monthly, weekly or even daily at a specific hour. More importantly, if your PC is off at the specified time, the backup task will run as soon as you log back on, and it runs in the background so as not to disrupt your daily routine.

PROTECTING YOUR ENTIRE PC Users who purchase the Starter, Home Basic and Home Premium editions of Vista or Windows 7 must make do with Windows Backup, but the Ultimate, Business and Enterprise editions, plus Windows 7 Professional, also include a separate option that images your entire hard disk, so you can restore your system to exactly the state it was in before it failed. This will slow your system as it runs, so it's a good idea to run it every month as a safety net and use standard Windows Backup on a more frequent basis to protect individual files.

TIP

Files can also be backed up automatically by the System Restore service, much like in XP. However, now the versions of files saved by this method are available to the user, and can be restored in a similar way to a backed-up file. To restore, right-click on a file, select **Restore Previous Versions**, and choose from the list of dated copies. This is ideal for retrieving those files you accidentally save over, or edit and later change your mind. If the right-click option isn't available, go to **Control Panel, System and Maintenance, System, System Protection** and make sure that particular hard disk is included in the System Restore option.



Status This shows if your last backup task failed and lists the storage medium and next scheduled time.

PC Protect Vista Ultimate and Windows 7 Ultimate and Professional also offer full drive imaging for the best possible data protection.

Organise You can restore photos from backup sets created by this utility on other PCs, allowing you to share files easily.

System Restore

System Restore also takes its own copies of files, giving you a second line of defence for those photos edited very recently.

HOW TO... BACK UP IMAGES AUTOMATICALLY

Windows 7 and Vista's backup program is simple and fast, and you can select particular file types, making it ideal for first-time users.

1 RUN WINDOWS BACKUP Go to Start | All Programs | Maintenance, and click on the Backup and Restore Center to begin. The window that appears is the hub for backing up and restoring files, so choose the Back Up Files option. You'll be offered a choice of all connected disks – hard disks, CDs and DVDs and USB drives – as well as a link to any available networks where more storage may be found. Choose your external storage medium from the first dropdown menu. If your PC has more than one hard disk installed you'll then be asked to tick all the disks that contain files you'd like to protect. Your main Windows disk is always ticked by default.

2 CHOOSE FILE TYPES Rather than selecting individual files and folders to save, Windows Backup splits the process into eight groups of file types. So ticking the Pictures option will result in your selected hard disks being searched for all JPEGs, TIFs and so on. Bear in mind that if you work in RAW mode, these files aren't included. You'll need the final option at the bottom to include all other files not in the previous seven categories, which will essentially result in everything on your hard disk being backed up, with the exception of system files, executables and temporary files. Folder structures will be retained during backup.

3 SCHEDULE THE TASK As you're creating a new task it will run immediately once you finish setup, but you should also schedule it to run automatically on a daily, weekly or monthly basis. Windows has an option for you to choose a day of the week and to select a particular hour of day from a dropdown list to run a backup. Once you've scheduled the task, click Save Settings and Start Backup to begin the process. It may take anywhere from ten minutes to several hours, depending on the amount of data involved.

4 RESTORE YOUR FILES If you lose any photos, it's easy to restore them. Open the Backup and Restore Center again and choose the Restore Files option. Choose whether you want files from your most recent backup task, or look back through past tasks to find the appropriate one. You'll then be presented with an empty list of files to restore. Use the Search button if you know which file you need, or click Add Files or Add Folders to bring up a standard Explorer window. Your backup job will appear in the tree, with its contents laid out in their existing folder structure, so you can browse through and choose the data you want. Then restore them either to their original location or specify a new one, and click Start Restore to bring your priceless data back from the dead.

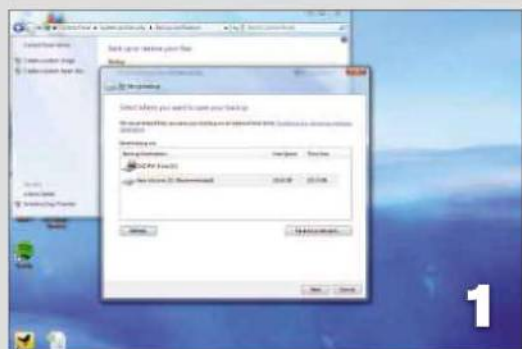


HOW HARD?

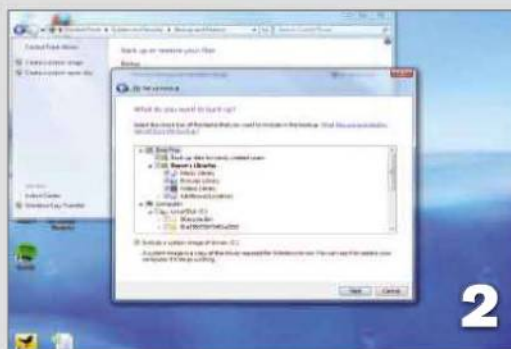
Very easy. The utility is entirely wizard-based.

HOW LONG?

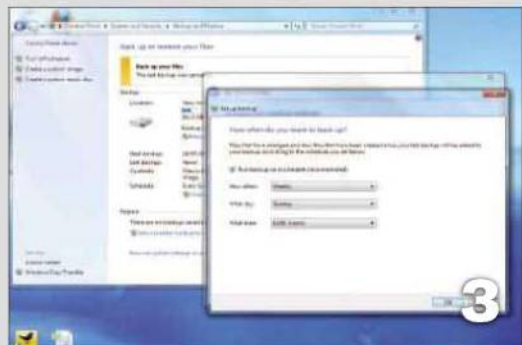
Half an hour to several hours, depending on the amount of data.



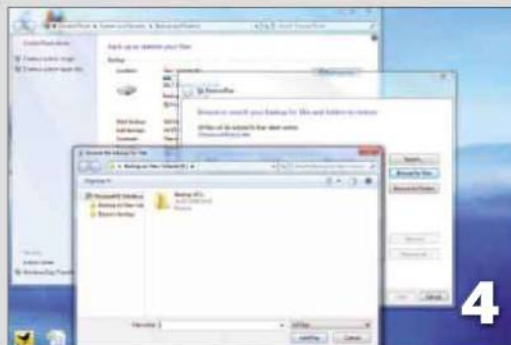
1



2



3



4

ON-SITE BACKUP IS A GREAT START, BUT THE GROWTH OF BROADBAND MEANS BACKING UP PHOTOS OVER THE INTERNET IS NOW A SECURE ALTERNATIVE.

Introducing online backup

Off-site backup is the ultimate in data security, giving you complete protection against burglary, fire, floods and everyday user error. It used to be the preserve of big businesses, but as broadband speeds have increased and internet use has sky-rocketed over the past few years, a new range of affordable online backup services has emerged. While some essentially offer only disk space, many others are proper all-in-one backup solutions capable of protecting all the files on your PC, and some even extend to system protection and file synchronisation as well. Pricing plans and capacities on offer are being updated all the time, so it's worth looking around for one that suits your needs.

WHAT TO LOOK FOR There are many factors to consider when choosing an online backup service, but – particularly if you're backing up more than just your photos – one of the most vital is security. Look for a service that will encrypt your files as soon as they leave your computer and store them on mirrored servers in multiple locations to give an extra layer of protection against disaster.

Capacity is another stumbling block, particularly as good-quality photos from even the most affordable of today's digital cameras are at least several megabytes in size. It's frighteningly easy for a single short holiday to fill a 2GB memory card, while a longer travelling trip is

likely to require several cards and a laptop in tow to empty them on to, so make sure you're aware of these backup services' pricing plans for higher capacities before you sign up. Ideally, you should look for one that offers unlimited storage to give you the peace of mind that you'll never hit an upper limit.

The final feature to look for is automation. Most of these backup services come in the form of a client application that you download and install on your PC, but there are different types. Some work in a similar way to standard backup software – with scheduled backups of chosen files – while others sit in the background and scan your PC for changes to designated files, backing them up when necessary. The latter is a much simpler method and keeps fuss to a minimum, as well as ensuring that your edited files are backed up sooner than with a rigid backup schedule.

WHAT'S THE COST? You may think all this sounds unnecessarily expensive, but the more home-focused offerings are actually reasonable. A free version of Mozy (www.mozy.com) provides 2GB of backup space as a teaser to attract you to the higher-capacity subscription plans, while the tremendously user-friendly Carbonite (www.carbonite.com) will back up an unlimited amount of data – not just photos – for just \$54.95 (around £37) a year.

TIP

Services such as ProtectMyPhotos offer an added bonus for photo editors, as they will automatically save multiple copies of the same file. Whenever ProtectMyPhotos spots a change to a photo it will upload it to the remote server, but give it a different name. This means if you overwrite a photo with any changes that you subsequently wish you hadn't made, you can retrieve the older versions off the server and start again.



Carbonite is a user-friendly online backup application that works in the background, monitoring your files and sending them to its remote servers once a change is detected.

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IN THIS CHAPTER

174 **Sharing photos online with Flickr**

The internet makes it easy to showcase your snaps. Learn how to share your shots in a few easy steps.

176 **Sharing with Picasa**

Owned by the mighty Google, Picasa is another great way to share your hard work.

178 **Online photo printing**

A picture on a website is no match for a beautiful high-resolution print. Eliminate the fuss by ordering online.

180 **Printing at home**

If you want ultimate control over the look of your photos, a home inkjet printer is the key.

182 **How to print using Windows XP**

Windows XP offers a surprisingly good way to print photos, but be careful with the settings.

184 **How to print using Photoshop**

For fine control over your end results, switch to the experts' tool: Adobe Photoshop.

186 **Using Windows Photo Gallery**

Viewing your images in Windows 7 and Vista is easy: simply fire up the Photo Gallery.

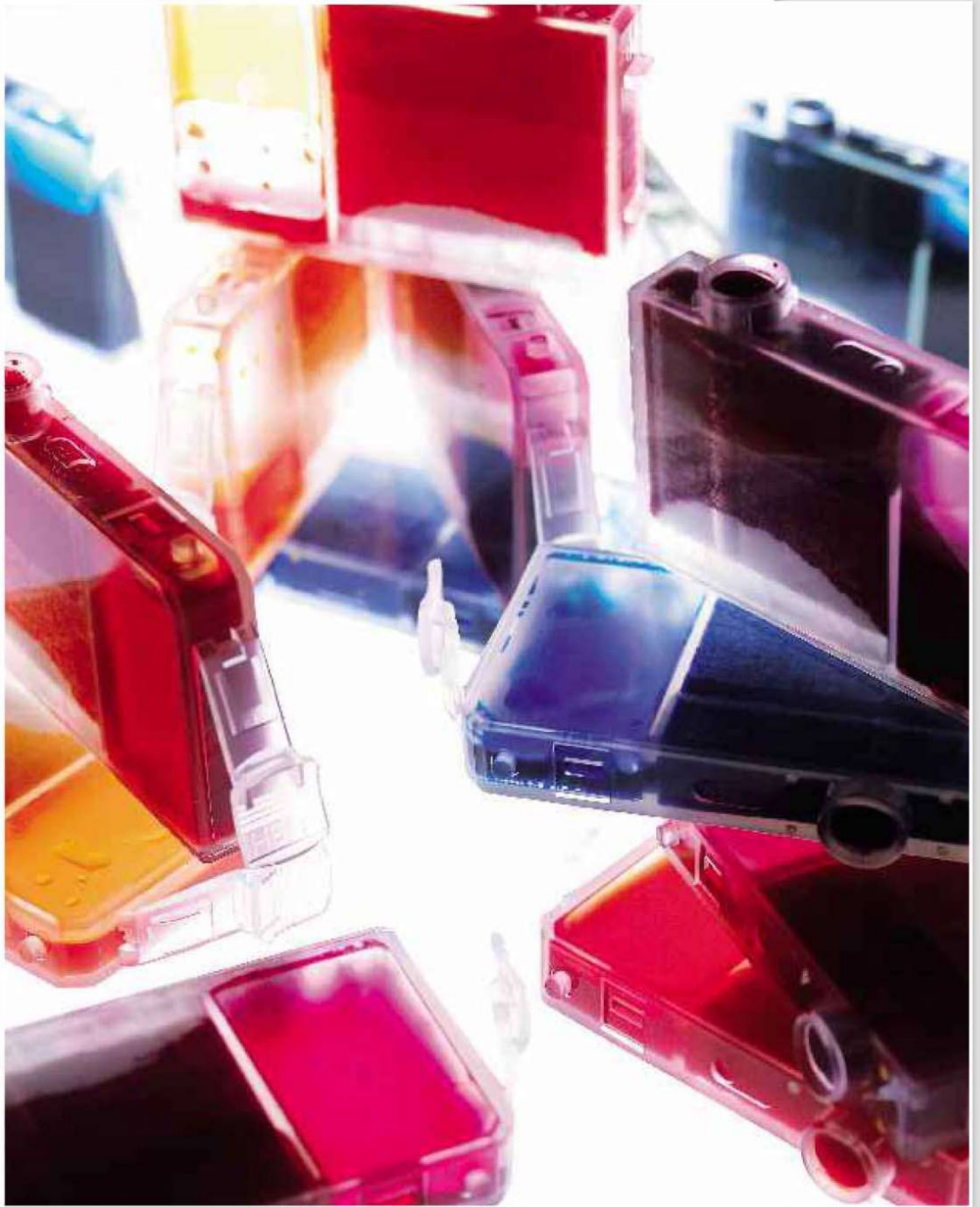
188 **Calibrating your printer**

If you're serious about printing colour-accurate photos, it's vital to calibrate your printer.

CHAPTER 1

SHOWING OFF YOUR PHOTOS

There's a horrible tendency for even dedicated photographers to squirrel their shots away and not show them to the outside world. Sometimes it's out of modesty, sometimes laziness. Whichever way, don't fall into the same trap. With that marvel known as the internet, you can share your pictures with the world in seconds, while modern home printers actually exceed the quality of traditional film labs. If that sounds too much like hard work, order your prints online.



IF YOU WANT YOUR PHOTOS NOTICED, UPLOAD THEM TO FLICKR.COM. BUT BE PREPARED FOR HONEST COMMENTS FROM OTHER PHOTO ENTHUSIASTS!

Sharing photos online

Once you have a decent portfolio of pictures built up on your PC, you'll want to show them to the world. The internet offers a wealth of storage and sharing options.

THE BENEFITS The principal benefit of an online photo gallery is that you decide exactly who can see them. Storing your shots online also opens up a wealth of other possibilities – you're not confined to storing and displaying shots. There are numerous companies out there that will help you make things with your best images, and they offer everything from T-shirts to business cards and books.

FLICKR Flickr (www.flickr.com) is the king of online photo storage and organisation. It offers a huge amount of power and flexibility, but its main strength is that it allows you to upload your shots quickly and painlessly to a community of millions. You can sort your images by sets (Flickr's term for an album) and tag them with keywords. Alternatively, you can post your photos to groups. And, since Flickr makes it possible for other websites to access its content – so, for instance, a business card maker can use your images if you want it to – there are plenty of ways of taking your photos out of Flickr and on to various printed media.

SETTING IT UP Getting into Flickr takes just minutes. Flickr is owned by Yahoo, so if you have a Yahoo account you're halfway there already. If you haven't, simply click Sign Up at www.flickr.com and enter the relevant details. Using Flickr is free, but there are some restrictions for those unwilling to pay the \$25 a year (around £17) subscription fee. You can post your images to a maximum of ten groups, only get 100MB of uploads per month, and can view only your 200 most recent uploads. You do at least get an unlimited amount of storage space, and a maximum size limit per photo of 10MB (plenty for a high-quality JPEG). Upgrade to the Pro account and all these limits are removed. The maximum file size is raised to 20MB, too.

USING IT Flickr is surprisingly addictive. And, because you can comment on each photo individually, you can ask more experienced photographers about technique and equipment to develop your own skills. The best way to do this is to simply get involved – upload all the pictures you can and take the time to tag them descriptively. This will ensure that others will come across them. Also, join groups involved with your interests: when we last looked, there were 3,071 groups devoted to aircraft and 3,858 for kitten-lovers...

Groups: This is where you can start looking for images from like-minded photographers. Groups for a mind-boggling number of subjects are available.

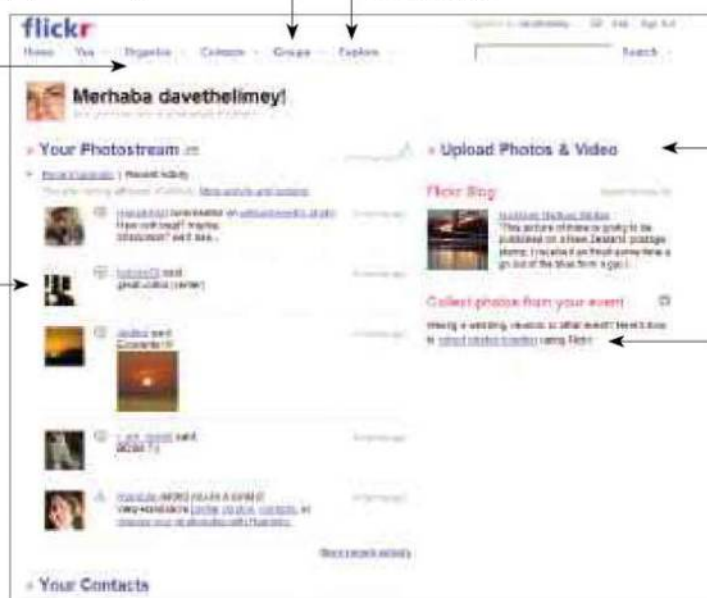
Explore: The starting point for delving into Flickr's incredibly rich archive of images.

Organize:

The organiser is a powerful tool for tagging images and sorting them into sets. It's a great way to keep on top of things.

Your Contacts:

Pictures from people you know, either from the real world or acquaintances made through Flickr.



Upload Photos: Start here, and get some of your best images onto Flickr.

Updates: Keep an eye on this area of Flickr – it changes each time you log in and keeps you apprised of changes being made on the site.

HOW TO... UPLOAD YOUR SHOTS TO FLICKR

You may feel some understandable inertia when it comes to getting round to signing up to yet another website. But Flickr is worth the effort, and once you're up and running it's easy to upload your photos. Here's how.

1

Having signed up, click on Upload Photos on your homepage. Now select Choose Photos. In the Windows dialog box, if you right-click and select View | Thumbnails, you can preview your shots before sending.

2

If you need to resize your shots before uploading them, use the Flickr Uploadr, available from www.flickr.com/tools. This allows you to select a batch of photos and then resize all of them before sending them to Flickr.

3

Select your privacy settings here. You're missing out on the best features of Flickr if you don't allow others to see the fruits of your work, but in some cases you'll want to restrict who has access.

4

Once your images are uploaded, give them descriptive tags. The more tags you find, the easier it will be to locate images in your library. It also raises the chances of other Flickr users stumbling across them by accident.

5

You can use the Organizer feature to add more tags if you like, and to add the location of your images – you'll find this useful if there's no geotagging information already there.

6

Voilà! Your pictures are uploaded. But this is just the beginning. From here, you can send your images to groups and turn your weekend fling with Flickr into a full-blown obsession.

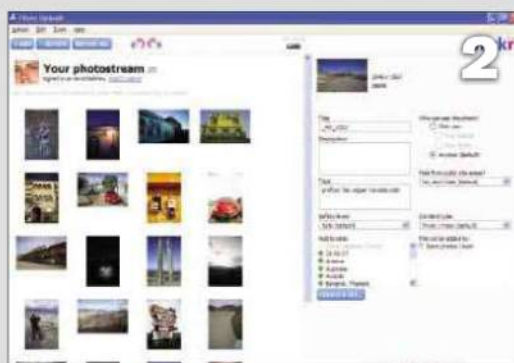
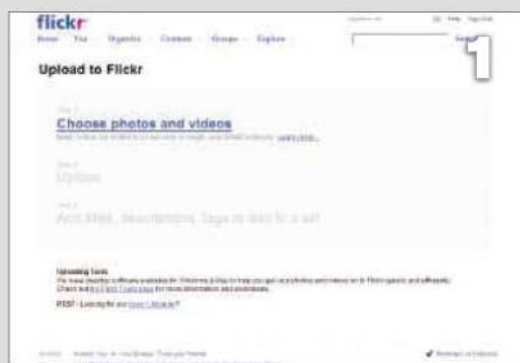


HOW HARD?

As easy as clicking a mouse. And a basic account is free.

ESSENTIAL

An internet connection (preferably broadband).



FLICKR MAY BE THE KING OF PHOTO-SHARING SITES, BUT IF THE COMMUNITY ASPECT ISN'T A PRIORITY, ONE OF THE BEST ALTERNATIVES IS GOOGLE PICASA.

Sharing with Picasa

You could easily be forgiven for thinking that a powerful, smooth-running photo organiser costs money. And, before Picasa, you'd have been right. But, whether your hard disk has 100 JPEGs on it or 2,000 RAWs, Picasa will breeze through them effortlessly – for free.

Picasa gathers all your shots into the same application, presents high-quality thumbnails and allows you to go from folder to folder with ease. You can store photos in custom albums or mark them as favourites. You can even select a group of photos and apply the same keywords to them.

Picasa also gives you dozens of processing and batch options. Want all your images resized and exported to a folder on your hard disk? Simply drag them all to the Photo Tray and click Export. Alternatively, if you have a Gmail account, clicking Email will resize all the images in the Photo Tray and send them wherever you choose.

COLLABORATIONS The tie-ins with useful Google products don't end there. Click Blog This and you'll be taken to the sign-up page for a Blogger account, making adding images to a photo blog a one-click process. Alternatively, fans of Google Earth (<http://earth.google.com>) can hit Tools | Geotag. You'll be taken to Google Earth, where you can use a giant crosshair to embed geographical information in your images.

Whether you print your images yourself or have them printed by online developers, Picasa can help there, too. The Print command is as self-explanatory as it gets, but Order Prints allows you to choose from seven different online printers, and Picasa will upload your prints without you needing to export them.

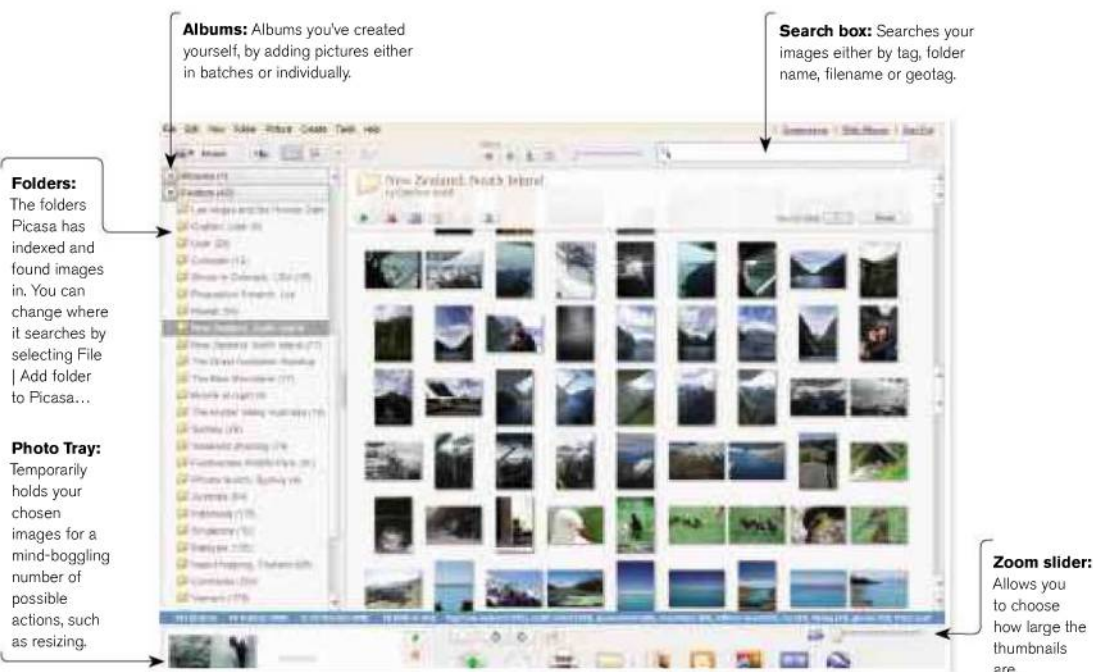
If emailing relatives your prize shots seems a bit low tech, you can always hit Gift CD – Picasa will combine your shots and compile them into a slideshow. There are also ways for you to use your images on your own PC, for creating desktop wallpaper or a screensaver.

All this, of course, is before even mentioning Picasa's powerful image editing. Double-click on an image and it will be shown on its own. Besides cropping and automatic red-eye tools, you also get Picasa's I'm Feeling Lucky button. This applies a random effect to your image: often, the final image produced conforms to the fashionably oversaturated images to be found on Flickr (see p174). There's even a colour temperature (white balance) control, plus a "picker", which allows you to pick the white point in your image.

Finally, the Effects control allows you to add basic styles to your image. You can adjust saturation, convert your images to black and white or sepia, or apply effects such as monochrome or blurring to parts of your shots.

TIP

Take some time to learn Picasa's keyboard shortcuts – they'll save an unbelievable amount of time. <Ctrl-H> adds a shot to your Photo Tray, the spacebar adds a Favourite star to a shot, and holding down Ctrl while you use the scroll wheel on your mouse zooms into a shot, but there are lots more shortcuts to learn.



HOW TO... CREATE AN ALBUM WITH PICASA

Flickr isn't the only way that you can share photos online. Google's Picasa lets you create a photo album – and much more besides – from one simple-to-use interface, and all for free.

1 PHOTO TRAY Select the images you want to use. This will be the images in the Photo Tray. If you click on an album without selecting a specific image, all the photos in that album will be added to the Photo Tray. The same goes for your favourite images and pictures in folders. You can change the order of the images later, but remember these are the shots you'll be showing to the world, so you'll need to be completely finished with them in terms of processing. There's no way to password-protect your Picasa album, so never upload anything you wouldn't want the world and their mum to see.

2 WEB ALBUMS Hit Upload on the bottom toolbar. If you already have a Google account, you'll be taken to a page where you can confirm you want to use that account for uploading images. If you don't have a Google account, you'll be invited to get one. It's free, and the account can be used across all of Google's web services and applications. Take note of how much free space you have remaining, but bear in mind that Picasa will always prompt you to buy more space, even if you have plenty left.

3 NAMING AND VISIBILITY Once you're done, you'll be taken to this page, where you can give your album a name and description. You can also choose the size of image you'd like to upload. By default, you get 1GB of storage space, so choosing a smaller image size will make more of that space and make uploading quicker. Note the Visibility setting as well – by leaving it to the default (Public), anyone who goes to <http://picasaweb.google.com/yourusername> will be able to access your images. Choosing Unlisted generates a URL that's less likely to be stumbled upon by strangers.

4 ACCESS Click View Online from the upload dialog box and you'll be taken to your newest album. Familiarise yourself with various options available to you through the web interface – Settings is particularly important. Here you can choose whether your photos are available on search engines, and whether people viewing them can download the entire album, instead of just the individual images. If you have a blog or website, try the Embed Slideshow button, which will automatically generate the HTML code you need to embed your album as a slideshow on an external website.

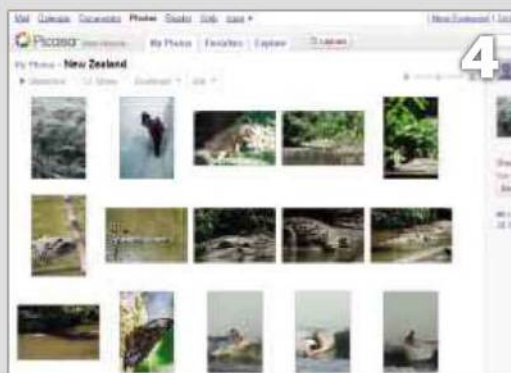
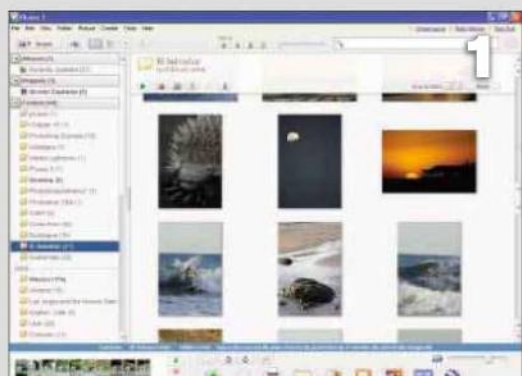


HOW HARD?

Once you know how, it's like falling off a log.

ESSENTIAL

An internet connection (preferably broadband).



PRINTING PHOTOS ONLINE IS LESS FUSS THAN DOING IT WITH A HOME INKJET,
AND THE RESULTS CAN BE JUST AS GOOD IF YOU CHOOSE THE RIGHT SERVICE.

Online photo printing

Uploading your shots to a website is an easy way to share them with friends, but the colour reproduction and brightness of monitors varies enormously. The shot you've tweaked to look dark and moody can end up black on a different screen.

Hard copies of your photos ensure everyone sees them the way you want. Home inkjet printing is one way to go (see overleaf), but uploading your shots to an online printing service is a lot less fuss, and most photo-printing sites allow you to share your shots with family and friends.

To test the services, we uploaded the same batch of high-quality 8-megapixel test photos to each, and ordered both 6 x 4in standard glossy prints and a 10 x 7in (10 x 8in if available) gloss enlargement.



SIZE	BONUSPRINT	KODAK GALLERY	SNAPFISH	PHOTOBOX
6 x 4in	1-99, 10p; 100-199, 7p	1-99, 10p; 100-249, 9p	9p regardless of order size	1-199, 10p; 200-349, 8p
10 x 7in/10 x 8in enlargement	£1.20	£1.19	99p	£1.22



BONUSPRINT.COM Bonusprint's front page boasts prints from 5p, although unless you're seriously prolific with your photos it isn't that cheap: the 5p figure applies to orders of only 200 or more 6 x 4in prints. For small batches of up to 99 prints, it's 10p, which is the same as PhotoBox and a penny more than Snapfish. The upload process is fairly intuitive, with a browser-based upload window that allows you to sort through your Windows folders and pick your shots. There are other, lower-tech ways to upload your images, but these involve picking each shot by hand, which isn't much help if you want to upload 100 shots.

Bonusprint is a good choice if you don't usually process shots yourself in software before uploading, since the pictures came back with quite a lot of extra sharpening applied to give them a crisper look (see sidebar, opposite). This isn't a good thing if you like complete control over your images, but it saves time. The downside to the quality is overly high contrast, giving a flat, blown-out look.

RATING: ★★★★★



KODAKGALLERY.COM The default choice for uploading shots to Kodak Gallery is the basic file upload facility that's a standard part of HTML. This is fuss-free and works with any browser, but it's slow if you have more than a few shots to upload, since you need to do it on a file-by-file basis. The alternative is to download a standalone utility; we prefer the Java-applet method of PhotoBox or Bonusprint. Prices for 6 x 4in prints are par for the course for small orders, although you can get it down to 5p a print if you're prepared to order more than 500.

Print quality with both 6 x 4in and 10 x 8in prints was very high, with colours properly balanced and detail well rendered. Some sharpening and an increase in contrast appeared to have been applied, but it was far more restrained than the Bonusprint images. If you don't want your shots subject to extra processing PhotoBox still wins out, but the consistent quality and lack of borders on prints mean Kodak Gallery will suit many people.

RATING: ★★★★★



PHOTOBOX.COM PhotoBox has gained a reputation for speedy dispatch of orders, and we weren't disappointed when we tried the service. An order-despatch email arrived four hours after placing our order, and the prints were the only ones out of all the services on test to arrive the following day. As far as processing is concerned, there was no extra sharpening added, so you might initially find your shots look a little less punchy and sharp than you'd hoped: if that's the case, follow our tips to bring up the level of impact (see Optimising your shots for printing, right).

To help you achieve the best results, PhotoBox sends a calibration print with your first order. You then download the same image from the company's website and adjust your monitor to get the best match between the print and what you see onscreen. You can use it in combination with monitor calibration to get the closest match possible (see p88). Along with Snapfish, PhotoBox uses Fuji Crystal Archive paper and, in terms of quality, the 6 x 4in prints had the deepest blacks and most accurate colour gamut – the greens in our deer shot really stood out. The 10 x 7in enlargement wasn't as impressive, with colours looking more lacklustre, but it was still clean and detailed.

RATING: ★★★★★



SNAPFISH.COM Initially uploading shots to Snapfish isn't straightforward, as you need to install an ActiveX control, but once that's done the process is painless. Costs are good for 6 x 4in prints, starting at 9p for up to 249 images. It's possible to pay even less for larger batches, but only if you pay for them upfront. Enlargements are good value at 99p for a 10 x 8in enlargement.

First impressions of the prints were excellent, with great vibrant colours. However, on closer inspection our high-quality original JPEGs were clearly recompressed, leading to obvious compression artefacts that didn't affect the 6 x 4in prints, but ruined the 10 x 7in enlargement – the subtle detail of our flower was lost in compression blocks. It's a shame, since the colour balance and gamut for the enlargements are the best we've seen.

RATING: ★★★★★



OPTIMISING YOUR SHOTS FOR PRINTING

If you've been used to editing and viewing your shots onscreen only, or even if you're quite experienced in printing with an inkjet at home, there are some points to bear in mind when sending pictures to a web-based service. The technology used by their high-volume industrial printers is fundamentally different from that employed in an inkjet. Big printing operations tend to use laser-based continuous-tone printers, and the first set of images you get back might lack punch and vibrancy compared to a high-end inkjet. This is down to two main factors. First, the colour gamut – the total range of hues the printer can produce – is different. Second, the level of apparent sharpness is lower. The dot-based nature of an inkjet means the eye perceives more delineation in edges than it does when viewing the continuous, dotless variation in a laser-based high-volume industrial photo printer. So, to get results that look as pin-sharp as those from an inkjet, you need to apply more sharpening than you might think.

SETTING CONTRAST You may find your shots benefit from a curves adjustment layer with a little more contrast than you'd ordinarily use with an inkjet. Simply bring up a curves dialog box in your image editor and apply a mild S-curve to the image (see the walkthrough on p117). Alternatively, if you're using a more basic point-and-click photo package or just want to print straight from your camera, try selecting a contrast setting or preset that's one step past what you think looks correct onscreen.

COLOUR COMPENSATION Next, apply a little extra colour saturation, particularly in the greens, which high-volume printers tend to leave looking a little muted (see p155). No amount of increased saturation will allow a printer to reproduce colours that aren't in its gamut: sometimes, you may just have to live with an image that doesn't look as vibrant as it did onscreen.

SETTING SHARPNESS To get the same perceived sharpness as an inkjet print, you need to oversharpen your shots by using the Unsharp Mask tool (see the walkthrough on p118). Try a pixel threshold of between 1 and 2, and tweak the sharpening amount to the point at which you can definitely start to see white halo artefacts onscreen. If you want to get things just right and really obtain a feel for the online printer of your choice, try being systematic and uploading several versions of the same image, with the contrast, colour and sharpness settings incrementally increased for each version. Give them meaningful filenames that will allow you to distinguish which is which when you get them back – the names will be on the back of the prints. The free 6 x 4in prints that online services give you when you first sign up are perfect for a calibration run like this.

PRINTING PHOTOS AT HOME IS MUCH MORE CONVENIENT THAN AT HIGH-STREET SHOPS OR ONLINE PRINTERS, AND THE RESULTS CAN BE EVEN BETTER.

Printing at home

There's little wrong with viewing your photos on a computer screen, but nothing beats a set of prints that you can share with friends and family. There are many options for turning your digital files into hard copies, but the convenience and immediacy of printing photos at home is unique.

Modern inkjet printers can produce photos that are indistinguishable from traditional chemical film prints from your local chemist. Colours are true to life and, unlike older inkjet printers of a few years back, it's now almost impossible to see the tiny dots that make up the image – there's no hint of grain. Plus, depending on how you store or display them, they can last for more than 100 years without a hint of fading.

Colour laser printers are now almost as affordable as inkjets, with some costing less than £150. They'll print photos at a push, but don't be tempted to opt for a laser because of their superior print speeds: even the best models can't produce a photo that looks half as good as one printed on a £30 inkjet.

CHOOSING THE RIGHT PAPER Always bear in mind that you'll need to use photo paper in an inkjet printer to get the best results, and it isn't necessarily cheap. Although you can print photos on plain office or photocopier paper, they won't look or feel like a proper photo, they'll tear easily and will fade quickly; overall, it's a false economy. Since photo paper is expensive, try to buy in bulk to keep down costs.



Modern inkjets can produce stunning prints in less than a minute – which beats waiting a day for online photo services.

While it sounds like a marketing trick, each manufacturer's paper and ink are designed to work together – they're chemically matched. It means you'll get the best results in terms of quality and fade resistance if you stick to the recommended paper and ink.

Often manufacturers offer several choices of paper, and whether you choose a matte or glossy finish the results will be good on both. You can also try panoramic photo paper, greetings cards, iron-on transfers, sticker sheets and even canvas. As long as your printer can handle the thickness of the media, it should be able to print your photos on it. Paper and card are measured by weight in gsm (grams per square metre), and your printer manual should tell you the maximum weight it can accept.

FAQ

Q There are thin white lines across my photos. How can I fix this?

A These lines are usually caused by blocked nozzles in the print head. In the printer driver (accessible from the Print dialog of any application that can print), have a look for a Maintenance tab. If there's an option to print a nozzle check, try this first and see if there are any gaps in the pattern that indicate blocked nozzles. There's usually an option to clean the print heads by flushing ink through to clear any blockages; try this and reprint the nozzle test – or print a photo – to see if the problem is any better. Remember, cleaning uses up ink, so only do it if you have visible print-quality problems.



Ink isn't cheap. You can preserve it by running wasteful cleaning routines only when necessary.

CHOOSING A PRINTER Your first consideration should be to decide whether you want to be able to print documents as well as photos. If you do, an A4 inkjet is likely to be the best option, but there are several affordable A3 models if you want to have the option to print larger photos. If you only want to print 6 x 4in or 7 x 5in photos, there are plenty of dedicated photo printers to choose from. As far as the quality is concerned, if you stick to one of the top brands – notably Canon, HP and Epson – you'll get excellent results regardless of which model you choose.

If you want an A4 printer, there's another decision to make: standalone or all-in-one. A standalone printer is simply a printer, while an all-in-one has a scanner and sometimes a fax machine built in. The latter option is the best choice if you don't already own a scanner, since having the two devices combined into one obviously saves space, uses only one power socket and means you can photocopy photos and documents quickly and easily. In fact, most photo all-in-ones can produce borderless copies – photos printed right to the edge of the paper with no white border at all – or enlargements without even needing a computer. You can simply place the original on the scanner, use the buttons and screen to select the right options and just wait for the photo to appear.

It's worth choosing a printer with a colour screen and a memory card reader; it lets you print photos directly from your camera's memory card, although if you have time you should always process them in software first to get the most vibrant results (see Chapter 8). A fringe benefit is the fact memory card readers usually automatically appear as a removable disk drive in Windows, in the way that a USB flash drive does, so you can insert your memory card into the printer and copy the photos to your hard disk without needing to connect your camera to your PC.

If you'll be printing a mixture of photos and documents, look for a printer with a separate 6 x 4in photo paper tray. This way, you won't have to remove the plain A4 paper when you want to print a 6 x 4in photo. Some printers have a separate 7 x 5in photo tray that offers the flexibility of using 6 x 4in or 7 x 5in photo paper.



WHAT'S IT GOING TO COST?

The downside of printing at home is that it tends to be more expensive. The only way to completely control the cost of home printing is to use a dedicated 6 x 4in or 7 x 5in printer; the photo paper and ink for these models is always available as a bundle, including enough ink to print on every sheet. If you buy the largest pack available (usually between 100 and 150 sheets), the cost per photo can be as little as 10-15p. That still isn't quite as attractive as the 10-15p you can achieve with online services, but it isn't far off and, unless you're making online orders of more than 50 prints, it's about equal.

For all-in-ones or standalone inkjets, the ink and paper have to be bought separately. Again, buying in bulk will keep the price down, so look for cartridge value packs and large packs of paper (whether A4 or 6 x 4in). If you get carried away and print a lot of full-sized A4 enlargements, it can become expensive: including the cost of both ink and paper, you can expect the cost to work out at around £1 per page. But, again, that isn't too far off the cost of online services, whose charges also increase rapidly if the size goes above 7 x 5in.

CARTRIDGE TYPES There are essentially two types of ink cartridge: those with integrated print heads and those without. Printers that take the former have the advantage that, even if lots of nozzles become clogged up, replacing the cartridge will fix the problem since it will have a fresh print head. But such cartridges usually combine three ink colours – cyan, magenta and yellow. If you don't use these up in equal amounts, you'll have to throw away unused ink when the first colour runs out.

Printers that take individual ink tanks that don't have built-in print heads have the opposite advantages and disadvantages. You could end up using a lot of ink to clean blocked nozzles (see FAQ opposite), but you can replace individual colours as and when they run out, which can make these cheaper to run overall.



Manufacturers' inks and papers are usually the best guarantee of fade-free results, but there are plenty of third-party offerings.

HOW TO... PRINT SHOTS USING WINDOWS XP

Windows XP's built-in Photo Printing wizard is the simplest way to print photos, and offers plenty of different sizes and layouts, from full A4 images right down to wallet-sized prints.

1 CHOOSE PHOTOS To print one or more images using the Photo Printing wizard, navigate to the folder where your images are stored (usually the My Pictures folder within My Documents). Right-click on an image you want to print and then click on the Print option in the menu that appears to launch the wizard.

Alternatively, instead of right-clicking on a single image in your chosen folder, you can pre-select the images you want to print first. Pressing <Ctrl-A> selects all the photos in a folder, but if you just want to print a few hold down the Ctrl key and click on the images individually. You can also hold the Ctrl key and click on individual files after using the <Ctrl-A> combination to print all but a few photos in a folder.

2 REFINE YOUR SELECTION Clicking the Next button on the welcome screen will take you to the Picture Selection screen. Thumbnails of the images you chose in step 1 will be shown, and you're given the option of checking or unchecking them depending on the method you used to launch the wizard. Here, the Select All or Clear All buttons are useful. If you pre-selected images, note that you can't add any photos at this stage, so simply click the Next button again.

3 PRINTING OPTIONS From the drop-down menu that appears, choose the printer you want to use. There's also a button here to install a printer if you haven't already done so. Below this is a Printing Preferences button that we recommend you click to check that the settings are all correct, since only the selected paper type is shown on this screen.

4 SIZE AND QUALITY Although your printer options may vary from the images shown here, the basic principles will be the same. Make sure to check that every option is set correctly; otherwise, you could end up wasting expensive photo paper. Paper size, source, type and print quality are all important. Pay particular attention to choosing the correct paper type, since the wrong setting can lead to a drastic reduction in quality.

If you're not using the manufacturer's own brand of paper, choose the most appropriate option and do some test prints using small images before printing a full-sized A4 photo; otherwise, you'll needlessly use up paper and ink. Also watch out for printer drivers that automatically change settings when you choose certain options. For example, selecting a particular type of

HOW HARD?

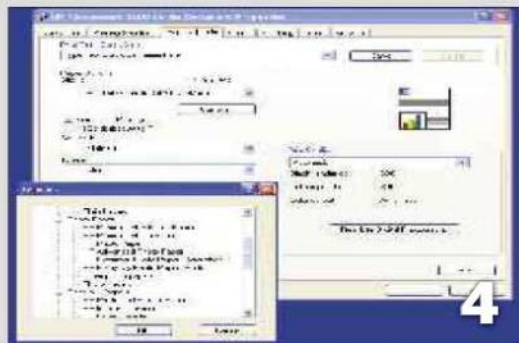
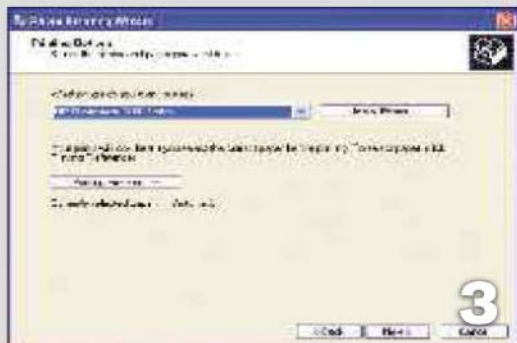
Pretty easy, but you might want to experiment a little with different papers and inks before you're completely satisfied.

ESSENTIAL

Windows XP and an inkjet printer.

TIP

In Vista and Windows 7, printing photos is made even simpler – virtually all you need to do is select the paper type (see p187).



paper – glossy photo paper, say – might change the print quality setting to best. If this isn't what you intended, just change it back.

5 ADDITIONAL OPTIONS Many modern printers offer photo enhancements that can remove red eye, correct colour, improve apparent focus or sharpness and even smooth low-resolution images that may have been downloaded from the internet. As with the paper type settings, perform some test prints with default and modified settings to find the optimum for the images you're printing. If you've chosen a mixture of high-resolution and low-resolution images, for example, it may be better to print them in two sets: the high-resolution photos without any enhancements, and the low-resolution set with smoothing turned on.

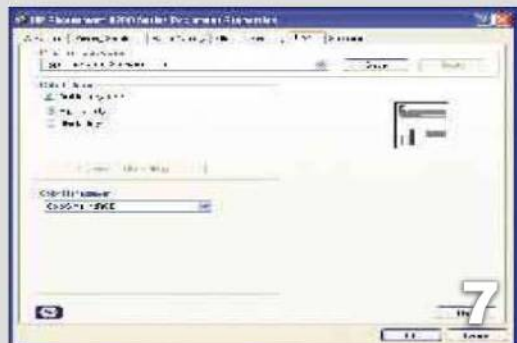
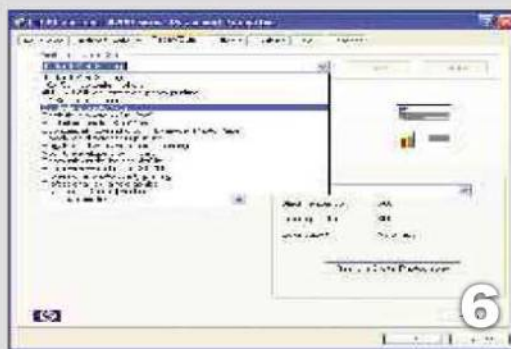
6 BLACK AND WHITE It's best to do it yourself in software (see p133), but you can easily print a colour photo in black and white using your printer driver settings. Depending on the particular printer, there may be one or two options. In this example, there's a high-quality mode that blends all the colours to form different shades of grey, or a black-only mode that uses only black ink.

7 SAVE SETTINGS When you're happy with your settings, it may be possible to save them as a profile. This way, you can quickly load the profile each time you want to print a photo, without having to alter every setting again. Usually, you can create any number of profiles, so if you regularly print different types of photos – black and white or colour, for example – you'll save yourself some time. Many printers,

such as the HP Photosmart 8250, have a list of preset profiles, one of which might be suitable as it is, or could be a good starting point from which to create your own.

8 SELECT A LAYOUT After selecting the printing preferences, click OK in the dialog box and then click Next to go to the Layout Selection screen. Here you're presented with a list of nine options, all of which are relevant to the paper size you've already selected. So, if you've selected borderless printing on 10 x 15cm paper and want each photo on a separate sheet, you should choose the second option: full-page photo print. Alternatively, if you're using A4 paper, you can opt for a contact sheet of 35 thumbnails, a single 20 x 25cm photo, two 13 x 18cm prints, three 10 x 15cm images (or two on one page), four 9 x 13cm photos or nine wallet-sized ones. Beneath the list is a box where you can choose how many copies of each photo you want, while clicking on the different layout styles will bring up a print preview of how it will look in the window on the right. Clicking the Next button will send the images to your printer, and all you have to do is sit back and wait for your pictures to emerge.

If you haven't printed many shots using an inkjet before, you may find your ink levels drop at what seems a terrifying rate. This does depend a great deal on the subject you're printing, however. The worst shots in terms of cost per page are ones that have a black background (for instance, night shots, such as our traffic trails on p54). The reason is obvious: paper is white, so the printer has to cover the entire surface in ink. Whatever the subject matter, it (literally) pays not to print your shots until you're pretty sure you're happy with the final result onscreen – pixels are free!



TIP

▶ You can also use the Photo Printing wizard to print photos directly from a digital camera or scanner.

HOW TO... PRINT USING ADOBE PHOTOSHOP ELEMENTS 8

Photoshop Elements makes organising, editing and printing your photos straightforward, but there are a few things to bear in mind before jumping in.

1 PREPARE YOUR IMAGE Before you even open the Print dialog, you should make sure your image is suitable for printing. Images from a camera with a low megapixel rating could end up looking blocky when you print them out over a certain size. To find out how large you can print a particular photo, right-click an image and then click Properties. This will display a dialog showing the pixel dimensions of the current photo. First click the blue "i" button, then Complete. As long as the number next to the Resolution field is 240 or higher (the case for almost all digital cameras), you'll be fine. Most inkjets need around 240 pixels per inch (also known as dots per inch or DPI) to create a smooth-looking image.

Another way to work out the maximum size at which you can print any given image is to use maths. Take the horizontal number of pixels in your image – 3,872 for a Nikon D60, for instance – and divide it by your desired DPI, which is 240. The result is a little over 16 – this is the maximum width in inches of your final print. The other side of the image has 2,592 pixels, which you divide by 240, giving 10.8. So, on a printer at 240dpi, the largest common size photo you can print at is 15 x 10in.

2 ASPECT RATIO If you crop your photos, it's important to keep things in perspective to stop your shots looking squashed or not taking up a full page. Normal photos have an aspect ratio of 3:2 – so for every three centimetres they go one way, they go two the other. To set this, select the Crop tool, and select Fixed Aspect Ratio under Mode. Then enter 3 and 2 for a landscape picture, or 2 and 3 for a portrait one.

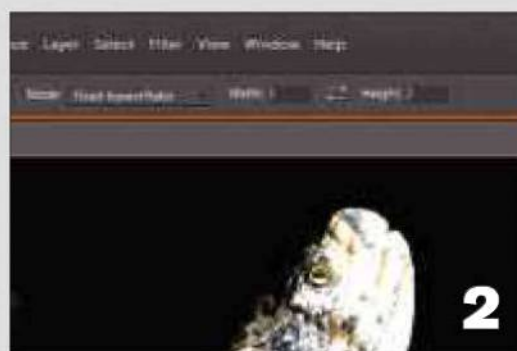
3 IMAGE SIZE Once you're satisfied your image is big enough to print properly, head to the Print Centre. Click on the green Share button in the top-right of any Elements window, then select Print. It's possible to select several images at once and print them as a batch with the same settings from the Organize panel. Under Media Type is a list of different types of paper – if you see one that exactly matches the brand of paper you have, select that, and bear in mind that most inkjet manufacturers recommend you use only their paper for best results. The next task is to pick your paper size – remember that paper size and the size of your image are not the same here. Paper size is merely the size of the physical sheet you're feeding into the printer: the image can take up all of the page, or less if you want to squeeze

TIP

▶ Since inkjet printers use liquid ink, you have to remember that even the very best have drying times. These aren't normally more than a minute each, but you could find that your photo smudges or smears if you grab it the second it's dropped by the printer – an expensive mistake.



1



2



3



4

a few images on to the same sheet. Remember to make sure that your exact printer is selected in the Select Printer box: the options available change depending on the capabilities of different printers. Finally, Elements' default setting is to print photos with borders around the edge. These tend to look better on a wall, but worse in a photo album – pay attention to this option since there's little worse than printing 50 shots and finding you've got it wrong.

4 ADD PHOTOS The Print screen starts with pictures you had selected in the Organize view. To add more, click the green Add button at the bottom left of the Print Photos screen, and you can choose a place from which to add photos. You can select photos in specific albums, or even those with specific tags. To select a range of photos, click the first image then hold down Shift and click on the last one.

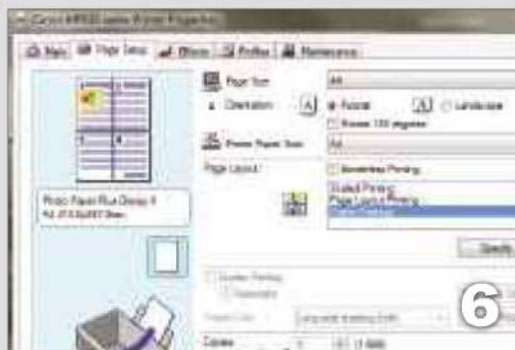
5 TYPE OF PRINT By default, Elements wants to print each picture on its own sheet of paper, but if you want smaller images, you can select Picture Package from the dropdown box, and then choose a layout from the dialog box underneath. Elements allows you to print up to 25 photos on the same sheet, but annoyingly, you can't choose your own layout. There's some flexibility, though – you can print one large picture, and then a random assortment of other pictures at various sizes that are useful for popping into a wallet. Alternatively, you can select Contact Sheet, which prints a sheet of thumbnails. This is handy if you have a number of similar shots that you want to see printed before deciding on a final image for printing at a large size. You can print up to 90 thumbnails on a single sheet,

but for the sake of intelligibility we'd recommend you stick to around a dozen per page.

6 PRINTER OPTIONS Click on the white icon next to the name of your printer and your printer driver will load. Here we're using a Canon printer, and there are plenty of effects and details to experiment with behind the scenes. Of potential interest are options such as Poster Printing, which prints a certain amount of a photo – a quarter, for instance – on a single sheet of paper, allowing you to assemble a giant final photo from the result. And if your printer has more than one paper tray you can often nominate which one you want to use, which is useful if you keep your photo paper in one tray and your plain A4 in another.

7 DO MORE You're not limited to Elements' standard photo layouts. Click the pink Create button and select a handful of photos, then choose Photo Collage... from the right-hand side. Under Choose a Layout you can select a scattergun approach to your masterpiece, with up to 22 images on the same piece of paper. Depending on the images you choose, you can achieve striking results – and you can drag your images around to perfect your montage before printing it. In addition, under More Options in the Create menu, you can generate CD jackets and DVD labels.

8 PRINT Once you're happy that your chosen options are going to produce a decent-looking image, hit Print. You can expect to wait a while for the results – most photo printers take at least 30 seconds to produce a top-quality 6 x 4in glossy print, so this is a good time to put the kettle on.



TIP

► It's important to remember that monitors display images using light, but printers create photos using inks or dyes. It means that even an expensive desktop inkjet printer can't reproduce all the colours your monitor can. If you want to get as accurate colour reproduction as possible, you'll need to calibrate your monitor and printer. For more, see p88 and p188.

Introducing Windows Photo Gallery

For users of Windows Vista and Windows 7, the viewing and printing controls are a little more friendly than XP's. They're based around the Photo Gallery, which is a great-looking application for basic viewing and organising of JPEG photos. Windows 7 users need to download the application from the Windows Live installer, but it's easy: just type 'Photo Gallery' into the Start search box and click the download link that appears. The image below is Vista Photo Gallery; the Windows 7 version looks slightly different but it's functionally almost identical.

EASILY ORGANISED Vista and Windows 7's metadata tags are integrated into Photo Gallery, making it simplicity itself to view only the shots taken in a particular month or with a custom tag you've defined, such as "kids" or "holiday". All you need to do to filter the current view is click on a date, tag or star rating. You can filter by more than one category or tag, too: if you want to see just the holiday snaps you took in July, click on your "holiday" tag, simply hold down the Ctrl key and click on "July".

Photo Gallery integrates with the Windows DVD Maker application as well. Just select the pictures you want, hit the Burn button and select Video DVD to make a DVD slideshow you can view on a domestic DVD player.

SLIDESHOWS AND THEMES At last, Windows has a decent built-in way to show off your photos. Hit the big button in the middle of the control bar at the bottom of the screen (or the Slideshow button at the top in Windows 7) to start the show. The slideshow uses all the images in the current view, so you may first need to filter the view – for instance, by expanding the Tags filter and clicking on a subject.

Alternatively, if you just want to show a few shots from the current view, you can select a group in the usual way: click on the first item, then hold Shift and click on the last, or <Ctrl-click> to select any number of individual images. Once your slideshow has started, you can select a theme. The default option simply displays photos one after the other, but click on the Themes pop-up list at the bottom left of the slide show and you can make things a bit jazzier. Our favourite is Collage, which arranges several shots together at jaunty angles in scrapbook style.

This is certainly no Photoshop, though. The image-manipulation tools in Photo Gallery are very basic and largely automatic, with no advanced manual modes. But for snaps of family and friends you're not too fussed about processing that you want to keep track of and might occasionally like to show off, Photo Gallery is a fairly useful tool.

TIP

If you've formed an unnatural attachment to the classic Windows Paint application – which has been around since the days of Windows 3.1 in the 1990s – don't worry, it's still there. It's in the same place it's always been, under Programs, Accessories, Paint. Or just type 'Paint' in the Instant Search box and it'll magically appear.



HOW TO... PRINT USING PHOTO GALLERY

It's not the ideal way for the best quality, but for quick and convenient results, Windows Photo Gallery is a perfectly good method to print your shots.

1

You can access the printing options from within Windows Photo Gallery itself, so simply double-click on the picture (if it's a JPEG) and Photo Gallery should open it by default. If some other application opens, close it, right-click on the file itself, and choose Open With | Windows Photo Gallery.

2

To print your photo on your local printer, click the Print icon and choose "Print..." again. This will start the photo-printing wizard, a simple and pretty comprehensive little gadget for getting your photos on paper.

3

Make sure you've selected the correct printer from the drop-down list at the top right of the window. Windows will communicate with the printer for a second or two, then you can choose relevant options such as paper size.

4

Click on the small Options... link in the bottom right of the window and you'll see a window with two check boxes. You might want to uncheck "Sharpen for printing" if you've already taken that into account when applying sharpening as part of your workflow.

5

All you need to do now is make sure you have the correct paper type selected, and choose whether you want full-page prints or several pictures on the page. Unchecking the "Fit picture to frame" box will ensure that the image isn't cropped.

6

Windows also has the ability to send your photos to an online printer rather than your inkjet. Click the Print icon and then select Order Prints. A dialog box will appear that will populate with online services relevant to your area.



HOW HARD?

Easy, but make sure you've got the correct paper loaded before you print to avoid expensive colour errors.

HOW LONG?

Just a few minutes will have you a pile of attractive printouts.



TIP

► If you want the best print quality, use your printer manufacturer's own ink. Don't try to save money by using refurbished ink cartridges or by refilling your own, as results will almost always be inferior. You get what you pay for.

TIP

► Allow prints time to dry. Even though they may feel dry immediately, leave them for at least 24 hours before framing them or putting them in an album to prevent the ink smearing.

YOU'LL GET THE BEST-QUALITY PHOTOS FROM YOUR PRINTER IF YOU CALIBRATE IT. HERE ARE SOME TIPS ON HOW TO DO EXACTLY THAT.

Calibrating your printer

Regardless of how much money you've spent on a digital camera, monitor and printer, you won't get accurate colours in your printed photos if you don't calibrate your hardware. And there's no point in calibrating your printer without first calibrating your monitor, since it's your working reference; you can't match printed colours to your monitor if it isn't displaying accurate colours in the first place. See p88 for a guide on how to calibrate your monitor.

ALIGN THE PRINTHEADS There are several aspects of printer calibration, and the first place to start is to align the printheads. Many inkjet printers do this automatically when you install new cartridges, but not all have this feature. Inkjet printers work by firing minuscule dots of ink out of a printhead onto the paper. Although there may be only three (or possibly five or six) ink colours, the printer can fire a different number of dots from each colour to reproduce millions of shades. But, if the printheads aren't aligned, edges of objects could look fuzzy, as the different colored ink dots aren't laid down in precisely the right place.

You'll find the tool to align the printheads in your printer driver. The simplest way to get to this in Windows XP is to click Start, then Printers and Faxes. Right-click on your printer and choose Properties. Look for a tab called

Device Settings and you'll find all your printer's settings. There'll usually be a maintenance or toolbox section where you'll find an option to align the printheads. Most printers will then print a page comprising sets of patterns in both colour and black. Instructions onscreen will ask you to choose a pattern from each set, usually the one where the markings line up the closest. Entering this information tells the printer how to adjust itself, so it can place the tiny dots of ink from each colour in the same place.

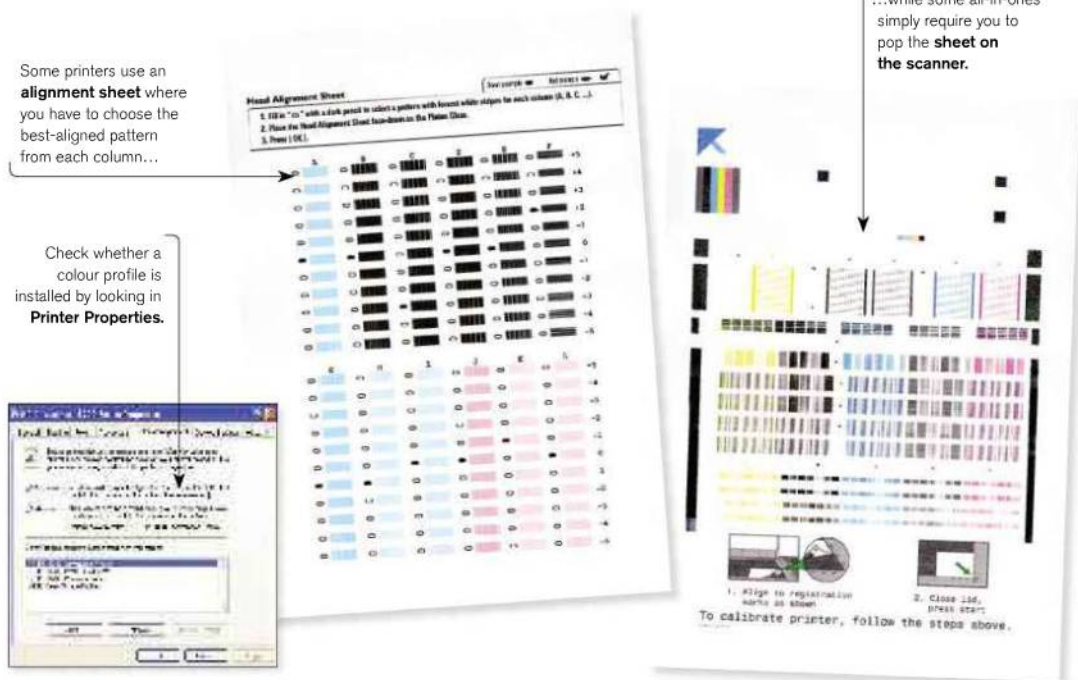
As the tiny nozzles in the printhead can easily become clogged with dust or dried ink, it's worth getting into the habit of printing a test photo at least once a fortnight to prevent blocked nozzles. You'll know that nozzles are blocked when you see fine white lines across your prints, a phenomenon known as banding.

WHY COLOURS DON'T MATCH If you find that colours in your printed photos don't look like the original scene – skies that look more purple than blue, for example – it's possible to tweak them to be more faithful. There are various ways of doing this and, unfortunately, none of them is quick or automatic.

One of the reasons why a printer's colours don't match a monitor's is because monitors produce colours in a different way to a printer. A monitor adds red, green and blue light together to produce all its colours (with no light producing

Some printers use an **alignment sheet** where you have to choose the best-aligned pattern from each column...

Check whether a colour profile is installed by looking in **Printer Properties**.





If you don't want to depend on whether a photo "looks right" when calibrating, you can try printing a **test pattern** instead to get a more formal idea of how the colours are being reproduced. You can try a pattern such as this or get a specific photographic test pattern. If you're cheeky you can do a small order from www.photobox.co.uk, which will send you a calibration print with your first order. You can then print the file and compare the results with the official test print.

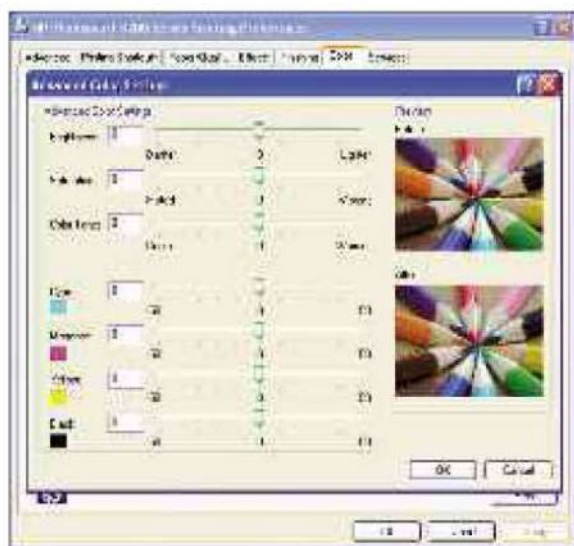
black), while a printer mixes cyan, magenta, yellow and black inks to achieve the same, except that no ink on the page produces white. Generally speaking, monitors can produce more saturated colours than printers, and monitors also have higher contrast, meaning there are colours that can be displayed on a screen that can't be reproduced by a printer, regardless of calibration.

It's also important to bear in mind that the paper you choose to print on will affect the colours you see. Not all white paper is the same: some paper is yellower than others, while some is more reflective and therefore brighter than others. Paper is a key factor in the resulting colours, so make sure you calibrate your printer using the same paper on which you'll print photos.

HOW TO CALIBRATE Before starting the calibration, make sure you've installed the correct printer driver for your printer. Using a standard Windows driver for your printer will almost certainly mean you're missing out on many of the advanced controls (including colour settings), but it could also mean it isn't using the right colour profile.

Manufacturers usually provide colour profiles that add another layer of colour processing in between your imaging software and the printer driver itself. You can check if a profile is installed by clicking on the Color Management tab in Printer Properties. Sometimes there may be more than one profile installed, so you can try each one in turn to see how they affect printed colours.

The next step is to use any colour adjustments in the printer driver. From the Printer Properties dialog, click on the General tab and then Printing Preferences... The printer driver will then launch and you should look for a Color tab, although it may be called Advanced or something similar.



Adjusting colour settings manually can be a time-consuming practice, and you may find yourself wandering off into a colour cul-de-sac, unable to home in on the right combination of adjustments. Keep at it and you'll get there in the end.

Adjusting these settings is an iterative process. Only adjust one slider at a time, using small increments; print a test image and then note down the settings used on the back. Compare the printed colours to those on your calibrated screen; if the change doesn't improve things, reset the slider and try a different one. Rather than printing a photo as a test image, either print a test pattern from an application such as DisplayMate (www.displaymate.com) or create your own in an image-editing program.

Ideally, the test pattern should have blocks of solid colour, so you can see the effects your changes are having; most photos are too complex to compare visually. Remember that you may never be able to match the colours exactly, but using the controls in the printer driver will certainly go a long way to printing better photos.

Glossary

A

APERTURE

The variable-diameter opening in the centre of a lens, analogous to the pupil in a human eye, which can increase or decrease in size to vary the amount of light hitting the digital sensor. See p22.

B

BEYER PATTERN

A method of arranging the red-, green- and blue-sensitive photo sites on a digital image sensor. A Beyer-pattern sensor – which the majority of cameras use – has a greater number of green sensors, since human vision is more sensitive to green than red or blue.

BLOWN HIGHLIGHTS

See clipping.

C

CAMERA SHAKE

Blurring of a photo caused by the movement of the camera; often a problem when the camera is handheld with shutter speeds of less than 1/60th second or so. The effect is exacerbated with telephoto lenses.

CCD

Charge-coupled device, the technology used in many digital camera image sensors.

CLIPPING

When too much light falls on parts of a digital camera's image sensor, the photo-site corresponding to pixels in that region will hit the maximum value they're able to record. When the light is "off the scale" like this, the sensor will simply output a flat maximum signal no matter what the actual light levels. The resulting pixels will be pure white and contain no image information. This is known as clipping or blown highlights.

CMOS

Technically standing for complementary metal-oxide semiconductor, CMOS technology is used by some manufacturers – mainly Canon – for their camera image sensors rather than the alternative CCD.

COLOUR GAMUT

The gamut of either a recording device such as a camera or a reproduction device such as a printer or monitor refers to the range of colours it can cope with. The gamuts

of different reproduction devices vary, so it isn't always possible for a given device to accurately reproduce colours recorded by another.

COLOUR CHANNEL

A colour image from a camera is composed of pixels comprising red, green and blue elements to make any colour of the spectrum. A colour channel is simply the isolated red, green or blue components of each pixel for the image. Individually manipulating colour channels can be useful for various things, including producing black-and-white images from a colour original (see p133). In addition, photo-editing software adds a fourth transparency or alpha channel, to indicate whether a given pixel should allow colours from image layers beneath it to show through.

COMPRESSION

The process of reducing the storage needed for computer data – including digital photos – by encoding that data into a different form. See JPEG.

CRT

Cathode ray tube, the technology that televisions and monitors were based on before LCD and plasma flat-panels took over. Many photographers still favour their bulky old CRT monitors – which are now almost impossible to buy new – since they prefer their colour reproduction and claim the gamut is better. Newer TFT monitors, however, can equal or exceed CRT gamut.

D

DEPTH OF FIELD

Also sometimes known as depth of focus, this is the area in front of the camera that's in crisp focus. A wide aperture reduces depth of field, making accurate focusing more critical but blurring the background of shots. This reduces the effect of distracting backgrounds. A small aperture



DEPTH OF FIELD, P22





gives a broad depth of field, with both foreground and background objects in focus. This can be useful for landscape photography.

DIGITAL COMPACT

A class of digital camera distinct from the digital SLR. See p12.

DYNAMIC RANGE

In a digital camera, the dynamic range is the range of brightness, and thus total image detail, that a sensor is capable of accurately recording. The limited dynamic range of image sensors in some digital cameras is the underlying reason for the phenomenon of clipped highlights. More expensive digital SLRs usually have a higher dynamic range than digital compacts.

DSLR

Digital single-lens reflex, a type of digital camera. See p14.

E

EQUIVALENT FOCAL LENGTH

The focal length of a given lens expressed in terms of the field of view that length would give in a 35mm-film camera. This allows lenses for different camera designs to be expressed in terms of their real-world field of view. For instance, a 28mm-equivalent focal length lens will always be a wide-angle lens, no matter what the actual focal length of the design involved.

EXPOSURE

In photography, exposure is generally used to talk about the process of opening the camera's shutter and allowing light to fall on the camera's sensor in order to take a picture. A perfect exposure is one in which the aperture settings, shutter speed and ISO sensitivity have been correctly chosen to produce an image with the same level of brightness as it appeared to have when the image was taken. See underexposure and overexposure.

F

F-NUMBER

The f-number is a universal measure of the size of aperture set on a camera lens. It's the ratio of the aperture to focal length. The fact that f-number is a ratio means that, like equivalent focal length, f-numbers are consistent no matter what the individual design or size of the lens. So, any lens with an aperture of, for instance, f/2.8 will always give the same exposure for a given shutter speed. See p22 for more on aperture.

F-STOP

An f-stop is one of the standard f-number settings, chosen because increasing by one stop doubles the amount of light entering the lens. Thus, increasing aperture by one stop halves the necessary shutter speed for a correct exposure. The standard aperture stops are f/2.8, f/5.6, f/8, f/11, f/16 and f/22. Modern digital cameras, however, have finer control, allowing you to change aperture in increments of a half or a third of a stop.

FOCAL LENGTH

Technically, the distance between a camera's lens and its digital sensor when focused to infinity. In practice, it's used to express the field of view of a camera: the shorter the focal length, the wider the field of view and vice versa. See equivalent focal length.

FLASH MEMORY

A non-volatile type of computer RAM (random access memory). Unlike normal RAM, flash memory retains its data when power is removed, making it the preferred medium for digital camera memory cards. All types of memory card use flash memory technology.

G

GIGABYTE (GB)

A gigabyte is roughly one billion bytes of computer memory. It's

sufficient to store around 500 high-quality JPEG photos from a typical 8-megapixel camera.

H

HARD DISK

The permanent data storage device used by computers. Hard disks have a much larger data capacity for a given price than flash RAM.

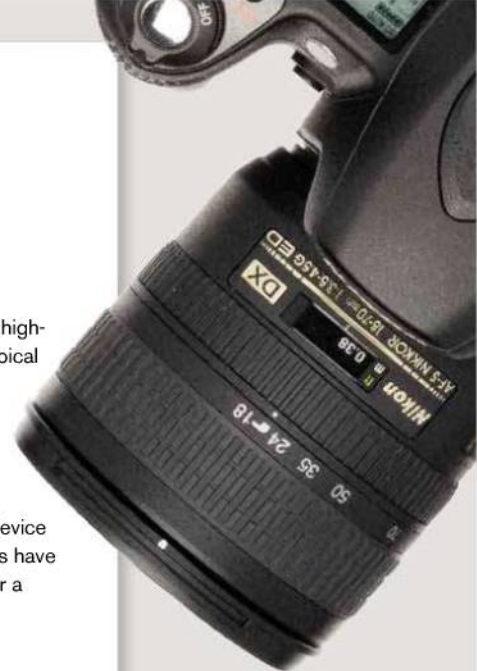
I

IMAGE STABILISATION

A technique designed to compensate for the effects of camera shake. Image-stabilisation systems physically move elements of the lens in response to movement of the camera body. They can provide between two and four stops of stabilisation, allowing for a shutter speed of between one and four times slower than would be possible without it.

ISO SENSITIVITY SETTING

Also sometimes known as ASA, this refers to the sensitivity of a digital sensor (or film) to light. The higher the ISO setting, the less light is required to get a correct exposure, so shutter speed can be higher to avoid or reduce camera shake and capture fast action. However, increased ISO also increases image noise – see p64.



GLOSSARY

J

JPEG

JPEG is a highly effective file format, developed specifically for storing digital photos. It uses a lossy compression scheme, throwing away certain data the human eye isn't sensitive to. Since it discards data, however, JPEGs are subject to generational losses: editing a picture then saving it to a JPEG, then opening, editing and saving in JPEG again will progressively degrade the quality. For this reason, editing should be done with a photo converted to lossless TIFF format and only saved back to JPEG once editing is complete.

L

LOSSY COMPRESSION

See JPEG.

M

MEGABYTE (MB)

A megabyte is one million bytes of computer memory. The average image file produced by a digital camera will be several megabytes in size, ranging from 2MB for a JPEG from a typical compact camera, up to 6-7MB for a file saved in RAW mode from a digital SLR.

MEGAPIXEL

Simply a count of the number of millions of pixels in an image. An



8-megapixel camera will produce images with 8 million pixels.

MICROLENS

Microlenses are employed in digital camera sensors to collect as much available light as possible. They're needed because between photo sites on a sensor there are gaps where light falls and is lost. Placing a microlens over each site directs that light onto the photo-sensitive area to maximise the amount of light captured.

MONITOR

Generic term for any type of computer display.

OVEREXPOSURE

If the aperture setting of a camera is too large, the shutter speed too slow or the ISO setting too high (or a combination of all three) for the current lighting conditions, a camera's image sensor will be overwhelmed when the picture is taken, resulting in a picture that's too bright – often with the brightest parts of the image blown out to solid white. This is known as an overexposure. See exposure and underexposure.

P

PHOTO SITE

The elements of a digital camera image sensor that convert light falling onto them into the electrical signals that allow the camera to assemble the image into a digital representation.

PIXEL

A contraction of "picture element", a pixel is the smallest unit in a digital image; it's simply a dot of a single colour. All the dots together produce

SHUTTER SPEED, P24



a coherent image. Each pixel is described in terms of its red, green and blue primary colour values, often called colour channels.

PRIME LENS

A lens with a fixed focal length that can't be zoomed in or out. Prime lenses have mostly been replaced by zooms, but they still have advantages. The lack of a complex zoom mechanism means they're more robust, often lighter, and can give better image quality at less cost.

POSTERISATION

When a photo is manipulated excessively in software – for instance, with large levels of adjustment (see p116) – the numeric values of adjacent pixels can start to be so different that it's obvious there's a step between them. The effect looks pixellated and unphotographic. This is called posterisation. It can be reduced by recording images in RAW mode and editing them in 16-bit-per-channel mode. The larger numeric range of a 16-bit image decreases the likelihood of large changes making pixel gradations obvious. See TIFF.

R

RESOLUTION

The resolution of a camera technically describes how much detail it can reproduce. In practice, the term is used to describe the number of pixels it produces for a given frame (which isn't necessarily the same thing). Pixel resolutions are usually described in terms of the number of pixels in the horizontal and vertical direction. A 10-megapixel camera, for instance, will produce images with a resolution of around 3,800 x 2,500 (3,800 pixels in the horizontal direction by 2,500 in the vertical).

S

SHUTTER SPEED

The length of time that the digital sensor is exposed to light when capturing a photo. The longer the shutter speed, the more light reaches the sensor and the brighter the resulting image.

T

TELEPHOTO

A telephoto lens or telephoto setting on a zoom lens corresponds to a narrow field of view, giving a high magnification that's useful in sports and wildlife photography. It corresponds to a long focal length. Compare wide angle.

TFT

Technically standing for thin-film transistor – the type of transistors used in modern flat-panel computer monitors – the term has now become generic shorthand for flat-panel displays themselves.

TIFF

The most popular intermediate file format for editing digital photos. Unlike JPEG, the TIFF format is a lossless format, so files can be edited and saved to disk without loss of quality. In addition, TIFFs can be saved and manipulated in 16-bit-per-channel mode. This increases the dynamic range available and reduces the chance of posterisation from excessive editing.

U

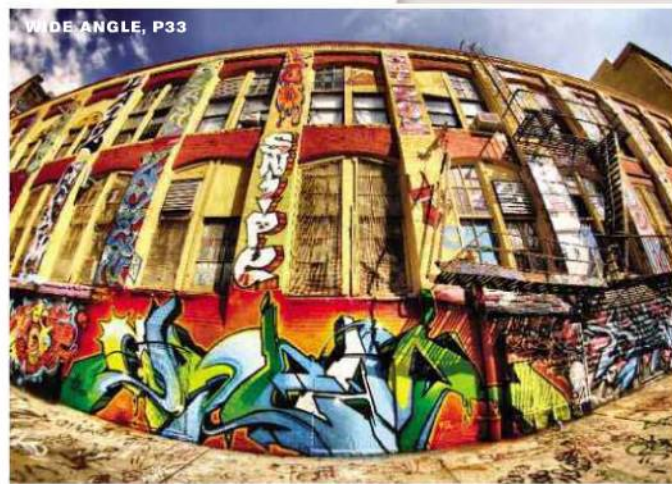
UNDEREXPOSURE

If the aperture setting of a camera is too small, the shutter speed too fast or the ISO setting too low (or a combination of all three) for the current lighting conditions, a camera will be unable to capture enough light when a picture is taken. The result is a picture that's too dark compared to the real scene. This is known as an underexposure. See exposure and overexposure.

W

WHITE BALANCE

White balance, or white point, affects the colour balance of a photo. The actual numeric values from a digital sensor when photographing a white object under different colour light can vary: white balance settings compensate for this so that white objects really do look white in the final image, as printed or displayed onscreen.



WIDE ANGLE

In terms of lenses, wide angle means giving a large field of view. Wide-angle photography can encompass landscapes and street photography. It corresponds to a short focal length. Compare telephoto.

Z

ZOOM

A zoom lens is one with a variable focal length, allowing the field of view to change, effectively increasing or decreasing the magnification of the lens. Compare with prime lens.





THE ULTIMATE GUIDE TO PHOTOGRAPHY

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* Up to 60MB/sec read/write speed. Based on SanDisk internal testing; performance may be lower depending upon host device. 1 megabyte (MB) = 1 million bytes. 1 gigabyte (GB) = 1 billion bytes. Some capacity not available for data storage. © 2009 SanDisk Corporation. All rights reserved. SanDisk, the SanDisk logo, CompactFlash and SanDisk Extreme are trademarks of SanDisk Corporation, registered in the U.S. and other countries. The SDHC mark and logo is a trademark of SD-3C, LLC. † This image has been stitched in post production.

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