# Digital Photography

## *The Complete Guide*

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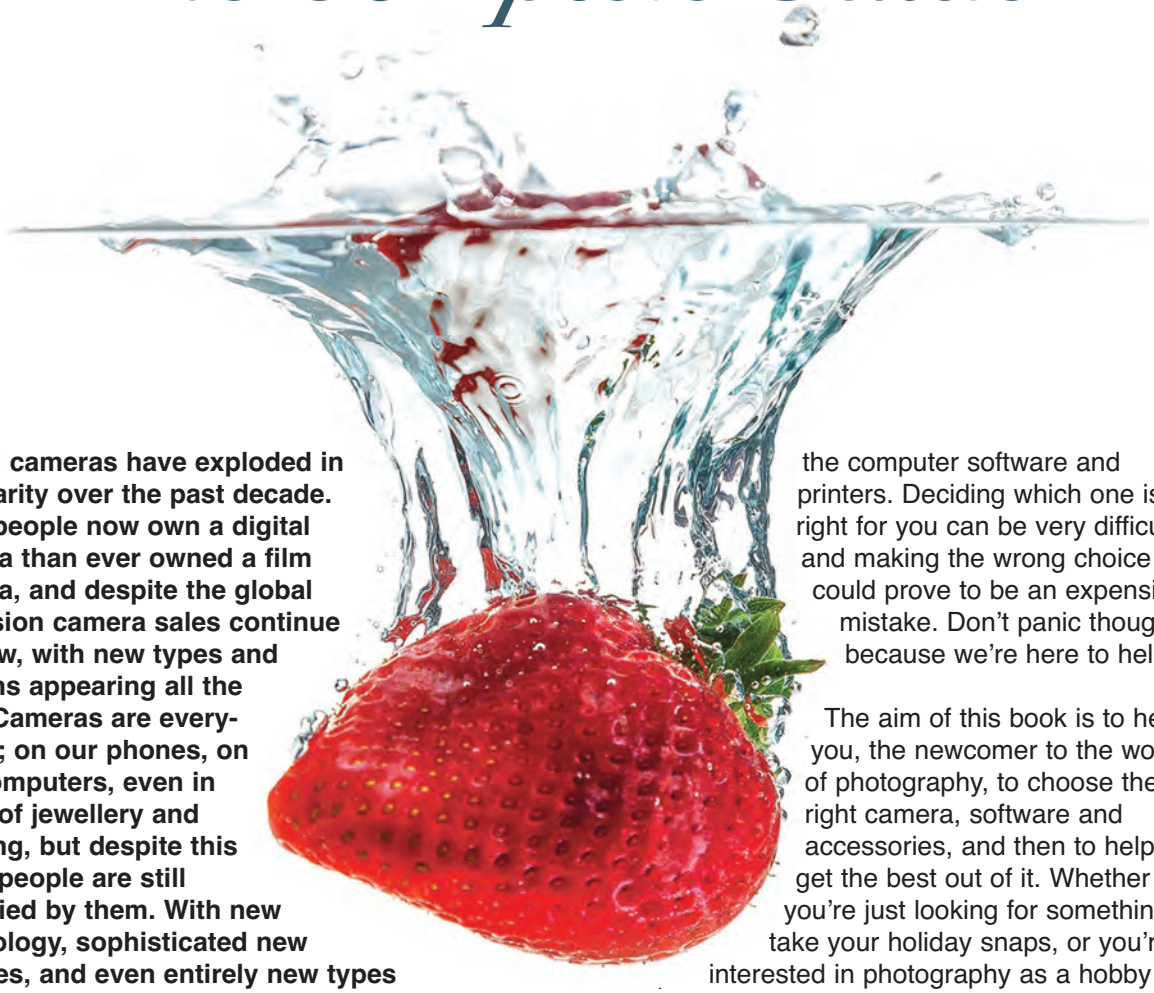
# Digital Photography

## *The Complete Guide*



**Digital cameras have exploded in popularity over the past decade. More people now own a digital camera than ever owned a film camera, and despite the global recession camera sales continue to grow, with new types and designs appearing all the time. Cameras are everywhere; on our phones, on our computers, even in items of jewellery and clothing, but despite this many people are still mystified by them. With new technology, sophisticated new features, and even entirely new types of camera appearing every few months, the ever-changing world of digital photography can seem pretty daunting, especially to the beginner.**

A trip to your local camera shop or a quick browse of the Internet will reveal that there are hundreds of different cameras available ranging in price from under £80 to over £30,000, everything from simple pocket compacts to top-of-the range professional equipment, as well as a bewildering array of lenses, flashguns and other accessories, not to mention all the computer software and printers. Deciding which one is right for you can be very difficult, and making the wrong choice could prove to be an expensive mistake. Don't panic though, because we're here to help.

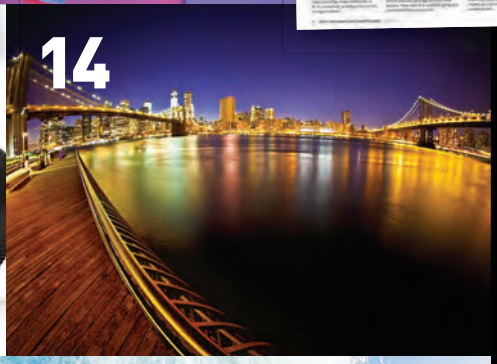
The aim of this book is to help you, the newcomer to the world of photography, to choose the right camera, software and accessories, and then to help you get the best out of it. Whether you're just looking for something to take your holiday snaps, or you're interested in photography as a hobby and would like to know more about it, we're here to help you. Starting from the basics we'll guide you though the world of digital photography, and hopefully help you to enjoy using your camera and take better photos with it. Who knows? We may even start you on a whole new hobby, or even an enjoyable and profitable career.

If you find this book useful, please look out for our other titles in this series which will be appearing over the next few months, and remember to always enjoy your photography!











## GETTING STARTED




## USING YOUR CAMERA



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## CREATIVE PHOTOGRAPHY



## IMAGE EDITING



# GETTING STARTED

## Choose the right camera and accessories for you

**It's a popular myth that more choice is always better. In fact too much choice often just leads to confusion and poorly-informed decisions, particularly when it comes to buying things like cameras. With hundreds of different cameras of many different styles and capabilities to choose from, and a substantial quantity of your hard-earned money at stake, choosing the wrong camera could prove to be an expensive and frustrating mistake. In this first section we'll try to help you clear away some of that confusion and give you the information you need to choose the right camera.**

If you wander around your local camera shop or browse any of the dozens of online photographic retail sites, you'll quickly become aware of the bewildering array of hardware that is available, much of it very expensive. There are shelves and web pages full of cameras of all shapes and sizes, as well as lenses, flashguns, tripods and more; and deciding which one is right for you can be a nightmare. Good advice is essential, and that's why we're here to help.

Over the next few pages we'll look at the many different types of camera that are available, explain a little about how they work, and also look at some of the accessories that are available to help you take better photos.

> "Good advice is essential, and that's why we're here to help."

# Types of digital camera

## There are many kinds of digital camera, so which one is right for you?


**Digital cameras come in all shapes and sizes, with a wide variety of different features and functions. They can vary in price from under £100 to over £30,000, so if you want to buy a new camera it's important to know what sort you need. Buying the wrong one could prove to be an expensive mistake! Let's take a quick look at the different types of camera that are available.**

## Compact cameras

**The category of Compact Cameras covers a wide and varied range of camera types. The term "compact" in this context has nothing to do with the size of the camera, and merely means a camera with an integrated, non-removable lens. The distinctions between different types of compact camera have become rather blurred of late, but broadly speaking they fall into the following sub-categories:**


### Standard compact

➤ Most compact cameras fall into this category. They tend to be fairly small and light, measuring about 100 x 50 x 25mm and weighing around 120-130g. Modern standard compacts are normally fully automatic, although some may offer basic manual exposure options. They usually have a zoom lens of up to 10x which folds flush with the camera body and an LCD monitor of about 7cm diagonal size. Prices start at about £60 for budget models, up to around £300 for luxury models. Extra features may include such things as HD video recording, image stabilisation or Wi-Fi connectivity, and they often come in a range of colours.


### Zoom compact

➤ Zoom compacts, also sometimes known as Travel Cameras, are broadly similar to standard compacts, but are equipped with more powerful lenses, some as large as 30x zoom. Most have robust metal bodies, high-capacity batteries and large monitor screens; many also feature HD video recording and optical image stabilisation. They are usually larger than standard compacts, with bodies that incorporate a small handgrip for more comfortable handling, and the lenses do not usually fold completely flush with the body. Many models now also have optional manual exposure features, and some include built-in GPS for automatic geotagging of your travel pictures. Prices start at around £150, going up to around £400 for luxury models.


### Adventure cameras

➤ A category that has been growing in popularity, Adventure Cameras are designed to be used outdoors in extreme conditions. They are waterproof, many are also shockproof, and a growing number are also advertised as being "freezeproof", although that seems to be taking things to the absolute extreme. In terms of capabilities most adventure cameras are similar to standard compacts, with up to 5x zoom lenses that are usually non-protruding and protected behind toughened glass ports. Prices start at around £90 for basic models, up to around £400 for the most capable models.


## Advanced compact

Advanced compacts are designed for more experienced photographers, and offer superior photographic versatility and quality, as well as advanced creative features such as manual exposure controls, manual focusing, optical viewfinders and external flash connections. They are considerably more expensive than other types of compact, with prices ranging from around £300 to over £500. There are relatively few models in this category, with examples including the Olympus XZ-2, the Panasonic LX5 and the Canon PowerShot G15. There is an even more rarefied category that has appeared more recently of advanced compacts with larger sensors. Notable examples include the Sony RX1, the Fujifilm X series and the Canon G1 X Mk2. Prices range from around £500 to well over £2000.


## Super-zoom

Super-zoom cameras used to be called "bridge cameras", since they were seen as half-way between compact cameras and DSLRs, but they have been falling out of favour over the past few years as zoom compacts and CSCs encroach ever further into their traditional territory. Nonetheless there are still a number of super-zooms on the market, and most of them are very capable cameras. They are usually quite large, with SLR-style bodies including big hand grips and electronic viewfinders. All offer powerful zoom lenses, some as much as 50x zoom, and usually include optical image stabilisation. Most also feature advanced HD video recording, often with stereo audio, and some also include advanced photographic features such as manual exposure and flash hot-shoes. Prices start at around £170, going up to nearly £400 for the more advanced models.


## Compact system cameras

Compact system cameras (CSC) have interchangeable lenses, allowing photographers to choose a particular lens for a particular task, and also have a range of other accessories such as flashguns. The first compact system camera was the Panasonic Lumix G1, launched in 2008. They offer most of the versatility and image quality of digital SLRs, but in a smaller, lighter and in most cases less expensive package. They are a good choice for the hobby photographer who wants to extend their range, but who doesn't want to be dragging a heavy bag of full-sized lenses around. There is a wide variation in quality and capability between the various brands and models though, and prices range from less than £300 to over £1,200. Some ranges have only released a few extra lenses as yet, so it pays to do some homework and read product reviews before making your choice.

## Smartphone cameras

There is no getting away from it, the smartphone has turned the idea of a point-and-shoot camera on its head. These days, if you are after a quick, no nonsense, shot like a selfie or some random event where trying to set up a DSLR is too slow, then these are ideal. Smartphone imaging technology has come a long way and your average smartphone is now capable of shooting 16 megapixels with impressive low-light capability for such a compact device. Moreover, many smartphones now have the main camera backed up with a front-facing, lower resolution, 'selfie' cam as well. All the major players such as Apple, Samsung, LG and HTC have a wide range of phones with increasingly complex camera technology built in as standard.

## Digital SLR

The first digital SLRs (DSLR) were introduced in the late 1990s, and were based on earlier film cameras. They have interchangeable lenses, and most digital SLRs can use the same lenses as their older film-based predecessors. With specialist lenses available for particular tasks. SLR systems are the choice of most serious amateur and professional photographers, and most offer superb image quality. Most DSLRs use a sensor size called "APS-C" but a few top-end cameras use larger "full-frame" sensors the size of a 35mm film frame. Prices start from about £400 for an entry-level APS-C model with a standard lens, while a top professional full-frame model such as the Canon 1DX seen here costs £4,800 just for the camera body!


## Medium Format

If even a full-frame DSLR isn't quite good enough for you, you could always try a digital Medium Format camera, which has an even larger sensor. The Hasselblad H4D-60 shown here has a resolution of 60 megapixels and amazing picture quality, but it doesn't come cheap; with a standard lens it will cost you around £32,000!


# Choosing the right camera

## How to avoid spending more than you need

**There are many different types of digital camera, and choosing the right one for you is a difficult decision. Depending on what type of camera you're looking for you could be spending hundreds or even thousands of pounds; a significant sum of money for most people, so it's important to make the right choice.**

The first question is how much do you want to spend? Naturally you want the best camera you can afford, but there's no point spending more than you need. The best option is to set yourself a budget and stick to it. As with any gadget there's always the temptation to spend a little bit more to get that one extra feature, but when it comes to cameras this could quickly become very expensive. Decide what features you actually need, then start looking for the camera that meets your needs within your budget.

> "With any gadget there's the temptation to spend a bit more to get that extra feature, but when it comes to cameras this could quickly become very expensive."

Remember also that you have to consider the cost of more than just the camera. You also need to budget for things such as memory cards, cleaning kit, maybe a bag or case, and even extra lenses or a flashgun if you choose a DSLR or compact system camera. If you blow all your budget on the camera you may find yourself unable to afford these useful extras.

To decide what features you need, think about what kind of photos you are most likely to take. If you do mainly casual social photography, such as holiday snaps or pictures of your friends on a night out, and only ever share the results via email and Facebook, you don't need to spend hundreds of pounds on a high-spec super-zoom camera or digital SLR. Any decent fully-automatic compact will do the job perfectly well for under £100, and be much easier to carry.

A typical basic £100 compact camera these days will usually have a 12 to 14-megapixel sensor, a 4x or 8x zoom lens with a 28mm-equivalent wide-angle setting, a 2.7-inch monitor screen and 720p HD video recording. Expect to add 20 percent to the price for any additional features such as a higher resolution sensor, a wider angle or longer zoom lens, a bigger or sharper monitor, full 1080p HD video recording or any type of mechanical image stabilisation. Top-of-the-range automatic compacts typically cost around £250-£300. If you want more versatility but don't want the bulk or complexity of a digital SLR then maybe a long-zoom compact or super-zoom camera would be more suitable. Many include optional manual controls, as well as extra features such as image stabilisation or built-in GPS positioning. There are also a few high-spec compacts that feature very high quality lenses and larger sensors, models such as the Canon G series, the Panasonic LX series or the Samsung NX series. Depending on brand and features a camera like this will cost between £200 and £500.

On the other hand if you are a keen hobby photographer you'll want a camera with a good quality lens, full manual controls and superb picture quality. Also factors like build quality and the availability of accessories will be major selling points, so you're likely to find an all-auto snapshot camera to be much too restrictive. You should be looking at a digital SLR or compact system camera, with interchangeable lenses and creative accessories. The price range on these types of camera starts at around £500 and has no real upper limit. Knowing what you want out of your camera is the first step to making the right choice.

The best advice is to read as many product reviews as you can. There are many websites that have good expert reviews, as well as many good photography magazines. Not everyones' thoughts will be the same, so it makes sense to read several reviews of a range of cameras , to get a feel for the prevailing opinions. Reading reviews will help you to become familiar with the current models that are available, what features are useful, what problems to look out for and how much you should expect to pay. ■

**Types of digital camera range from simple budget compacts costing less than £100, to professional-grade digital SLRs costing over £10,000.**


OLYMPUS


PowerShot G1 X
Mark II


SAMSUNG
HD
Wi Fi
4.0-72.0mm
24mm


MENU
WB
ISO
QUAL
AE-L
AF-L
Nikon


Wi Fi
COOLPIX
OPTICAL ZOOM 4.3-21.5mm 1:2.8-4.9 ED VR
m/100ft SHOCKPROOF 2.1m/7ft Full HD


Canon
CANON ZOOM LENS 30X IS
HD
30x
SX
400 IS


FUJIFILM
SUPER EBC FUJINON LENS
42x ZOOM


OLYMPUS LENS


SONY

GETTING STARTED


# DSLR and CSC lenses

## Expand your system with extra lenses

Building a collection of lenses for your DSLR kit can be expensive. To buy the complete range of Canon lenses would cost well over £100,000!

**The major advantage of SLR and CSC type cameras is the ability to change lenses to suit different photographic needs. In most cases the lens is attached using a bayonet-type mounting system, and can be quickly removed by pressing a release button and twisting. The longer-established camera systems (primarily Nikon, Canon, Pentax and Sony) have wide ranges of different lenses available, and are also compatible with many older lenses designed for use with film cameras. Although Sony is a relative newcomer to the digital SLR market, launching its first model in 2006, it uses the lens mount system it inherited from Konica-Minolta and current Sony DSLR cameras can use many old Minolta lenses.**


Olympus abandoned its old OM-system lens mount when it switched from film to digital SLRs, opting instead for the smaller Four-Thirds mount and sensor system co-developed with Panasonic. As a result older Olympus OM lenses are not compatible with the company's modern DSLR cameras, although the current Olympus E-system lens range is quite extensive.

Some of the newer systems, particularly compact systems such as the Samsung NX and Sony's NEX still have comparatively few lenses, but more are being added to these ranges on a regular basis. The popular Panasonic G-Micro system already has 11 lenses, including a unique 3D binocular lens. Sony has got around this problem to some extent, because an adapter is available that lets its compact NEX cameras use existing Sony Alpha and even old Minolta A-mount lenses.

## Prime versus zoom

Lenses can be divided into two main categories; zoom lenses, which have a variable focal length, and prime lenses, which have a fixed focal length. Zoom lenses have the advantage that they are more versatile, so just a couple of lenses can cover a wide range of focal lengths, but they also have several disadvantages. They are heavier than prime lenses, the optical quality is usually not quite as good, and they usually have a smaller (slower) maximum aperture. Prime lenses, conversely, are lighter and usually of better optical quality, but you have to carry more of them to cover a range of focal lengths. Both types of lenses are available in a huge range of sizes and prices, from cheap standard 50mm lenses to ultra-fast telephoto zooms costing over £10,000.

There is actually relatively little difference in price-per-focal length between zooms and primes; both vary widely depending on quality, focal length and maximum aperture, with both popular and premium varieties of both types.

Some photographers prefer the convenience of zoom lenses, others prefer the superior performance of prime lenses, while others (myself included) prefer to use a mixture of prime and zoom lenses depending on the circumstances.

Digital SLR systems include a wide range of lenses to suit all sorts of different needs, such as sports, macro or architectural photography.

## BUYING USED LENSES

➤ Lenses have few moving parts, so if they're well-looked-after there's no reason why they shouldn't continue to be useful for many years or even decades. Nikon and Pentax still use essentially the same lens mounts for their DSLRs as they did for their film cameras, and Pentax cameras in particular are backwards-compatible with all previous Pentax bayonet-mount lenses, giving users access to nearly 40 years of legacy lenses. Nikon F-mount lenses can also be used with modern FX and DX mount cameras, although in both these cases many older lenses will require manual focusing and aperture setting. Canon changed from its old electro-mechanical FD mount to the all-electric EF mount in 1987, and then to the EF-S mount with the introduction of digital SLRs. EF lenses can be used on EF-S cameras, but functions such as automatic aperture setting may not work. FD mount lenses require a special adapter, and may not be able to cover the full range of focusing distances.

Apart from mount compatibility, things to watch out for when buying older lenses include, fairly obviously, signs of external damage. Knocks and dents on the lens barrel can push the glass elements inside out of alignment, which will affect image quality. Another hazard is contamination, both from general dust and dirt that finds its way inside the lens, and from fungal growth on the surface of the glass elements, a sign that the lens has been stored for a long time in damp conditions. It's easy to spot; simply set the lens on its widest aperture and look through it at a brightly lit window or white surface. Fungal bloom will be visible as feathery threads, usually around the edges of the lens. Lenses suffering from fungal bloom can be cleaned, but this will most likely have to be done by a specialist and can be expensive, so it's best to avoid it in the first place.

> "Zoom lenses have the advantage that they are more versatile... Prime lenses are lighter and usually of better optical quality."

## CONVERSION FACTORS

➤ Since most digital SLR and CSC cameras use sensors that are considerably smaller than a frame of 35mm film, when using lenses designed for older film cameras the field of view is reduced by a certain amount. This has the effect of increasing the apparent focal length, so what had previously been a wide-angle lens becomes closer to a standard view lens. This "crop factor" or "conversion factor" is an important consideration when buying a lens. To convert the focal length of a digital SLR lens to the equivalent focal length of a lens for a 35mm camera, it must be multiplied by the conversion factor. For APS-C cameras this is approximately 1.5:1, so a standard 18-55mm zoom lens, as supplied with many DSLRs, is roughly equivalent to 27-82mm, close to the 28-80mm that is a standard zoom on 35mm cameras. If one were to use that 28-80mm lens on a DSLR it would be the equivalent of a 42-120mm zoom.

Olympus and Panasonic Four-Thirds systems have a conversion factor of approximately 2:1, so a standard zoom for these systems is usually 14-42mm, again roughly equivalent to the 28-80mm full-frame standard.

## TYPES OF LENSES

Most photographers will have at least a couple of lenses, while a keen enthusiast or professional might have a dozen or more, possibly from more than one system.

Most entry-level and some mid-range DSLRs and CSCs are available in kits including one or two lenses. These will usually be a standard wide-zoom, such as an 18-55mm (for APS-C), and a medium telephoto zoom, such as a 55-200mm, and these represent the most popular focal lengths.

### STANDARD ZOOM

TYPICAL FOCAL LENGTH: 14-42mm (Four-Thirds systems)
18-55mm (APS-C systems), 28-80mm (Full-frame 35mm systems)

➤ This is the most common focal length, suitable for general photography and useful for everything from landscapes to portraits. Most systems will include a couple of lenses in this focal length range, usually a cheaper, slower version often included as a kit lens with a new camera, and a premium lens often costing a lot more but with a much larger maximum aperture and/or much higher optical quality.

### MEDIUM TELEPHOTO ZOOM

TYPICAL FOCAL LENGTH: 50-150mm (Four-Thirds systems)
55-200mm (APS-C systems), 80-300mm (Full-frame 35mm systems)

➤ The second most popular type of lens, the medium telephoto zoom is useful for amateur wildlife or sports photography, or portraits at the shorter end of its focal length range. Telephoto zooms are usually slower (have a smaller effective aperture) than standard zooms, but there are specialised (and very, very expensive) telephoto zooms available for professionals that can have very fast apertures.

### ULTRA-WIDE ZOOM

TYPICAL FOCAL LENGTH: 9-18mm (Four-Thirds systems)
10-22mm (APS-C systems), 16-35mm (Full-frame 35mm systems)

➤ Ultra-wide-zoom lenses are primarily used for landscape photography. They are more specialised than standard zooms, and consequently are usually more expensive, although some systems include both standard and premium types.

### SPECIALIST LENSES

➤ As well as common types of lens such as those listed above the larger DSLR systems include specialist lenses used mainly by professionals and advanced enthusiasts. These include both zoom and prime ultra-fast telephoto lenses used by sports and wildlife photographers, shift lenses used by architectural and landscape photographers, and fish-eye lenses, used to create ultra-wide-angle shots with a peculiar distortion effect.

> "It's important to choose the right lens for the job, but top quality DSLR lenses are very expensive."


# How it's done

## The right lens for the job

**Digital SLR systems offer the greatest versatility of any photographic system, and represent the best compromise between quality and portability. The best CSC systems are still some way behind, but are catching up fast.**

There are lenses and other accessories available to suit every type of photography, both amateur and professional. It's important to choose the right lens for the job, but top quality DSLR lenses are very expensive.

This photographer is using a very specialist lens to get this Manhattan skyline. The extreme nature of the distortion this lens gives you is apparent in the very visible curvature of the horizon, the bridge and the foreground jetty.

The kind of lens that can do this is called a fisheye. Whereas most lenses are trying hard to eliminate distortion, the fisheye uses it to its advantage to give you an unparalleled angle of view that can encompass 180°.

In the case of the example lens shown here, the Canon 8-15mm fisheye can actually create a fully circular 360° image at the 8mm end of the zoom range up to a 180° corner to corner image when zoomed to 15mm. Just be prepared to shell out well over £800 for the privilege. ■

Taken with a 15mm fisheye lens, a night shot of the Manhattan skyline is ideal material to show off the distortion effect that these lenses give you.

# Tripods

## The best way to eliminate camera shake

**If you want to take better photographs, the single most useful accessory you can buy is a good quality tripod. By using a tripod you can completely eliminate camera shake, the number-one cause of unsatisfactory photos. A tripod is also essential when using long exposures, powerful telephoto lenses or when shooting in low light conditions.**

There are many different makes and types of tripod, from cheap budget models costing under £15 up to professional-grade tripods made of carbon fibre and magnesium alloy which cost hundreds of pounds. They come in all sizes too, from pocket-sized mini-tripods suitable for small compact cameras, to heavy studio tripods mounted on castors. The type that you should buy depends on how much you want to spend and what sort of photography you're going to use it for.

Key factors when choosing a tripod are rigidity and carrying weight. The tripod you choose has to be able to support the weight of your camera and hold it perfectly still. Some cheaper tripods with plastic heads and thin aluminium legs are too 'bouncy' to be used with anything heavier than a compact or light superzoom. Set the tripod up and press down on the top of it. If it flexes by more than a few millimetres it's not going to be stiff enough to support a heavy camera. ■

> "Key factors when choosing a tripod are rigidity and carrying weight. The tripod you choose has to be able to support the weight of your camera and hold it perfectly still."

## MONOPODS


➤ If carrying a tripod around is inconvenient, a good alternative is a monopod, essentially a single telescopic support leg with a camera mounting on the top. Obviously they don't provide the stand-alone support of a tripod, but they can be a big help in reducing camera shake. They are also handy for shooting in confined positions where a tripod won't fit, such as in a crowd.

## TYPES OF TRIPOD

### POCKET TRIPODS

These are miniature tripods designed for small compact cameras, and are ideal for table-top use, or for positioning your camera for a self-timer group shot. They're small enough to slip into a jacket pocket or into your camera pouch. There are several different types, including ones with telescopic legs, ball or pan-tilt heads, and even flexible legs. One unique and extremely versatile design is the Joby Gorillapod, which can grip onto almost any object or work as a tripod.

### BUDGET TRIPODS

There are many cheap tripods on the market, many costing less than £20. There are some very good ones, such as this Velbon DF-41, but many lack the rigidity to support heavier cameras and lenses.

### TRAVEL TRIPODS

Travel tripods are designed for general use where low weight and portability is an important factor. They are made of lightweight materials, usually aluminium or carbon fibre, and are suitable for most types of camera from compacts up to mid-range DSLRs, although not with large telephoto lenses.

### PROFESSIONAL-GRADE TRIPODS

Top quality tripods are made from high-tech materials like carbon or basalt fibre, with magnesium alloy fittings and superior workmanship. They offer the best rigidity and support for even the heaviest cameras and lenses, but they are very expensive. The Gitzo Mountaineer Series 1 seen here costs over £800.

GETTING STARTED

# Memory cards

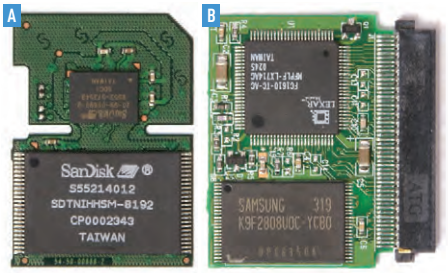
## The 'digital film' that stores your pictures

**One side-effect of the ever-increasing resolution of digital cameras is the growing size of the image files that they produce and need to store. Raw files from a high-spec DSLR such as the Canon EOS 5D Mk II are nearly 20MB each, and even JPEG files produced by a normal compact camera are frequently over 3MB each. Clearly storing more than a handful of pictures needs a substantial amount of storage capacity.**

The solution used by virtually all digital cameras (and many other modern digital media devices) is the removable memory card. Although there are several different types of card in common use, they all work in much the same way. They contain chips of a type of computer memory called Flash memory, which can store data for very long periods without being connected to a power supply, potentially for as long as 10 years without degradation (compare this with the durability of exposed film, which is often no more than a year or so). This means that a memory card can be removed from the camera when full and quickly replaced with an empty one.

The other big advantage of Flash memory is that it is reusable. Once you've copied the image files from your memory card onto a computer or other permanent storage device, the contents can be deleted and the card can be used again.

As if that weren't enough, Flash memory cards are also incredibly durable. There are many stories of cameras and other devices being damaged or destroyed, but the data stored on the memory card surviving unharmed. I have personally accidentally run an SD card full of photographs through a full cycle in a washing machine (it was in a trouser pocket) with no ill effects.




## Premium cards versus budget cards

The popularity of SD cards has led to a large number of budget brands springing up, and many supermarkets and chain stores sell their own-brand cards at often very low prices. However the best advice is to stick to the premium brands such as SanDisk, Lexar, Pretec, PNY or Kingston, or to camera brands such as Fujifilm or Panasonic. Although they may be more expensive their higher standards of quality control mean that premium cards are usually much more reliable. If you've got a high-performance camera it's also worth spending a bit extra for faster data transfer rates to get the best out of it. ■

**IMAGE A:** The inside of an SD card.
**IMAGE B:** A CompactFlash card. Memory cards are used in all types of portable devices, including cameras. They contain a chip of Flash memory, which can store data for years without degrading.


## SD CARD SPEED RATINGS

➤ Premium cards have higher data transfer speeds, which means they can store and retrieve data more quickly, an important factor when shooting video or a rapid sequence of still images. The speed of the memory card can have an effect on the overall performance of the camera, especially on high-end models. Unfortunately many manufacturers have their own ways of describing the speed of their cards, which can be very confusing for the consumer. Some use the 'x' rating, comparing the read/write speed to that of a CD-ROM, approximately 150 kilobytes per second (150 KB/s), so a memory card rated at '40x' speed has a transfer rate of 6 megabytes per second (6MB/s). The more widely accepted speed rating is the Class system, usually denoted by a number inside a letter C. Most budget cards are Class 2, with a minimum read/write speed of 2MB/s. Most mid-range high-capacity cards are Class 6, with a read/write speed of 6MB/s. The fastest class currently available are Class 10 cards, which have a read/write speed of at least 10MB/s. The newer ultra high speed UHS-I cards are rated at speeds of up to 45MB/s 90MB/s and the UDMA 7 Compact Flash cards can each 120MB/s.


> "Flash memory cards are incredibly durable. There are many stories of cameras being damaged, but the data on the memory card surviving unharmed."

## SO HOW MANY PICTURES CAN I TAKE?

➤ The total number of pictures that can be stored on a memory card is a difficult thing to quantify for a couple of reasons. Digital cameras usually store images using the JPEG file format, which compresses image data to save storage space. Most cameras have a menu setting for image quality which varies the rate of compression, with high quality images taking up more space. The compressed size of the image can also vary depending on the subject being shot, since more detailed images contain more data. For a typical modern 16-megapixel digital camera the file size can vary between about 4.5MB for a good quality jpeg and 30MB for an uncompressed Raw file, which means an 8GB card will be enough for approximately 1400 jpegs or 260 Raw files.


## TYPES OF MEMORY CARD

### COMPACTFLASH


**Launched: 1994**

➤ CompactFlash cards used to be a very common storage format for digital cameras, but are now considered too large for modern compact cameras. CF cards are still used in some high-end cameras such as full-frame DSLRs.

### SMARTMEDIA

**Launched: 1995 now discontinued**

➤ SmartMedia cards were a very popular format for digital compact cameras and a number of other devices, but reliability problems and the fact that the internal design limited capacity to 128MB led to them being replaced by SD cards.

### MEMORY STICK


**Launched: 1998**

➤ Sony's proprietary memory card format, and only used in that company's products. Original card format was limited to 128MB, but improved and smaller versions such as Memory Stick PRO, Memory Stick PRO Duo and Memory Stick PRO-HG Duo have increased this to a current 32GB.

### SECURE DIGITAL (SD)


**Launched: 1999**

➤ The SD card is by far the most popular format currently used in digital cameras, and is found in everything from the cheapest compacts to top-end DSLRs. It is small, durable and cheap, and the latest variants such as SDHC (High Capacity) and SDXC (Extended Capacity) have vastly increased data transfer speeds and maximum storage capacity. 32GB cards are widely available, and some manufacturers have talked about future SDXC cards with capacities of over a terabyte – that's 1,000 gigabytes!

### XD-PICTURE


**Launched: 2002, now discontinued**

➤ The xD-Picture card format was introduced by Fujifilm and Olympus as an alternative to SD cards, and at the time it had several advantages. However other manufacturers weren't interested, and the format was not widely used, which made the cards expensive and hard to find. Olympus and Fujifilm used them for a few years, but have now both switched to the SD format.

### MICROSD


**Launched: 2005**

➤ Most commonly used in mobile phones and MP3 players, MicroSD cards are only used in a few cameras, mainly from Samsung. Some older Olympus cameras can also use them with a supplied xD-Picture card adapter.

# Computer questions

## Will I need a powerful computer for digital photos?

You don't need a powerful computer for digital photography; most modern laptops are quite capable of running Adobe Photoshop.

**You don't actually need a computer when you have a digital camera, but it certainly helps. There are external image viewers with built-in backup storage, and you can always store your images on memory cards and view them using a digital frame, but a home computer lets you store, view, edit and share your photos much more easily.**

Handling digital photographs doesn't require a particularly powerful computer. Even the latest version of Adobe Photoshop only requires a Pentium 4 processor, 1GB of RAM and 1GB of free hard drive space to run, well within the specification of virtually any recent laptop. If you're a professional photographer who regularly uses uncompressed image files from a top-end DSLR then you may need something a bit more powerful, particularly with a lot more memory, but off-the-shelf desktop PCs with 8GB of RAM are fairly common.

> "Whatever computer you choose, what you will need is plenty of storage space. It's amazing how quickly a digital camera can fill up a hard drive."

While laptops are good for photos, the smaller "netbooks" and tablets aren't as useful. They're great for viewing images, since they have a much larger screen than your camera monitor, but they don't usually have much storage capacity. There are exceptions, for example Archos makes an Android tablet with a built-in 250GB hard drive, but this is the exception.

Whatever computer you choose, what you will need is plenty of storage space. It's amazing how quickly a digital camera can fill up a hard drive, especially if you shoot a lot of video, so a good option is to buy a very large external drive to store your images. An even better option is to buy two of them, and use one for backup. It's possible to buy a good quality 1 terabyte (that's 1,000 gigabytes) external USB 3 hard drive for around £60; at that sort of price it's by far the cheapest solution for bulk storage of images and video.

Another useful purchase is a good quality monitor. Large LCD flat-panel monitors are getting cheaper all the time, and it's now possible to find a good quality 22" LCD monitor for under £100. If you're going to spend a long time viewing and editing your photos it's worth getting a good monitor, it's better for your eyes and a lot more comfortable to use.

If you do a lot of image editing, you may want to consider getting a pen-controlled drawing tablet. The biggest name in the business is Wacom, which makes a wide range of pen tablets for both consumers and professionals. The larger ones are very expensive, but they offer extremely precise control and a wide range of drawing effects. ■

## PC OR MAC?

➤This particular debate has been raging on for some time. Both PC and Mac systems offer a great computing experience that has become more similar than dissimilar. Macs are generally more secure and more intuitive to use, but they tend to be more expensive than the equivalent PC. Additionally, there is a wider variety of software for PCs.

PCs are generally more prone to viruses and malware, since more people use them, but their modular design makes it much easier to repair or upgrade individual components. Macs are favoured more by the creative industries and tend to be a more stable platform. Both systems have pros and cons. It's just up to you to decide what suits you best.

## TABLET POWER!

➤ It is also worth noting that as technology has moved forward, more mobile computing options are becoming available for your digital processing needs. The current explosion in popularity of tablet computers has yielded portable and increasingly powerful solutions. From iPad, Surface and larger format tablets like the Galaxy Pro 12.2, when teamed with a good app like PhotoMate or RawDroid, the power is literally in the palm of your hand.


A good home photo printer can produce beautiful borderless prints in minutes, ideal for framing or putting in an album.

# Printers

## Prints are still the best way to share your photos

**The sad truth is that photo printing seems to be a dying art. It's so easy these days to share your pictures by email, Twitter or instant messaging, or via online galleries and photo albums such as Facebook, Picasa or Flickr, that hardly anyone ever prints out their photos anymore. This is a pity, because printing your photos has several advantages. A nice big framed print hung on the wall or displayed on a shelf will brighten up the room and is a great way to show off your best photos. Framed prints or photo albums make great presents or keepsakes, especially for the more important events in life. You wouldn't expect to look through your wedding photos on a laptop, and showing embarrassing baby photos to the prospective son or daughter-in-law is a tradition that just wouldn't be the same if done with a portable viewing screen.**

There are three main types of photo printer; laser, inkjet and dye-sublimation. Laser printers are used for commercial printing where high volume and low running cost is more important than print quality. Of the two types intended for home use, by far the most common are inkjet printers. They are so called because they have a moving print head that


Modern all-in-one printers such as this Epson SX620FW are designed to blend in to the home environment and feature wireless connection, avoiding unsightly cables.

sprays very fine droplets of liquid ink onto the paper to form an image. The main brands are Canon, Epson, Lexmark and HP. There are a number of different types on the market, including stand-alone printers that connect to your PC via Wi-Fi, all-in-one devices that combine the functions of printer, scanner, photocopier, fax machine and memory card reader, and cheap single-function budget printers costing less than £25.

The majority of domestic inkjet photo printers can handle paper up to A4 in size, as well as smaller sizes such as the popular 10x15cm (6x4in) snapshot size. For larger prints, A3 size printers such as the Canon Pixma Pro 9500 MkII or the Epson Stylus R3000 are available, although they cost over £500 and are considerably more expensive to run than an A4 model. For larger prints still there are large-format inkjet printers that can produce prints on A2 paper, usually fed from a roll, but these cost thousands of pounds.

These days even relatively low cost photo printers are capable of producing very good quality results, but there are a few features that are worth looking out for. Some printers can print on multiple surfaces, including specially prepared CDs, great for labelling your album backup disks. Many modern printers use multiple ink cartridges, sometimes as many as eight individual pigments. Although buying a lot of cartridges can seem expensive, they're less wasteful than multi-ink cartridges because you don't have to throw away a half-full one just because one colour has run out.

In terms of specification, manufacturers are constantly making improvements, so different aspects of performance and quality become emphasised. Print resolution should be a good indicator, but different manufacturers measure it in different ways, making it hard to compare like with like. At the moment ink droplet size seems to be the accepted quality yardstick, with anything around 1.0-1.5 picolitres being very good. Printing speed is another factor to consider; the ability to produce a 10x15cm (6x4in) photo print in under 15 seconds is a pretty good performance indicator.

Dye sublimation, dye-sub printers are less common, and are not usually used as PC printers. Most of the ones that are available are stand-alone units designed to print directly from the camera or memory card. Apart from some very expensive commercial models current dye-sub printers are limited to 10x16cm (6x4in) snapshot-size prints. Dye sublimation printing works in a completely different way to inkjet printing. Instead of a moving head squirting ink onto paper, the image is formed from three layers of pigment carried on a special film roller. Rather than replacing ink cartridges, a new pigment pack is inserted. Dye-sub printers can be very expensive to run, but they do produce very good quality results. ■

> "Showing embarrassing baby photos to the prospective son or daughter-in-law is a tradition that just wouldn't be the same if done with a portable viewing screen."


# Software

## Turn your computer into a digital darkroom

**Simultaneously the biggest advantage and one of the biggest problems with digital photography is how easily digital images can be altered using computer software. On the positive side, it means that minor exposure or colour balance problems can be easily corrected, unwanted blemishes such as overhead power lines or the problem of flash 'red-eye' can be removed, and additional information such as text captions or GPS location data can be added. On the negative side it means that you can no longer trust that a photo is an accurate depiction of reality. Fashion models can be given faces and bodies that defy nature, news photographs can be doctored to support a political agenda, and the potential for the abuse of criminal evidence is terrifying. Some cameras used for forensic photography use special encryption to ensure that photos to be used as evidence cannot be tampered with, but even this isn't foolproof.**

There is, not surprisingly, a wide range of image editing software available at an equally wide range of prices, and as with most things you tend to get what you pay for. The Rolls-Royce of image editing programs is of course Adobe Photoshop, first launched in 1990. Adobe has recently moved to an online subscription-based model called Photoshop CC, which costs £8.00 a month or £104.00 a year. In trained hands it can produce amazing results, but it is really too powerful, too complicated and too expensive to be considered for home use. The kind of simple photo editing that most digital camera owners need would barely scratch the surface of Photoshop's capabilities.

For this reason, in 2001 Adobe launched a cheaper, streamlined version of Photoshop aimed at consumers, called Photoshop Elements. Initially Elements was a low-cost program with only basic photo editing features, but over the years this too has grown in power and complexity and consequently its price has also increased, with the latest version, Elements 13, currently selling for around £50. As a simpler alternative to Elements, Adobe has launched Photoshop Express, an online browser-based image editing program available for all types of computer as well as some mobile devices. It offers a wide range of easy-to-use editing tools and a simplified interface. It does have some limits on file and image size, but pictures from most compact cameras should be fine. Photoshop Express is currently available for free trial at photoshop.com.

> "Colour balance problems can be easily corrected, unwanted blemishes such as overhead power lines or the problem of flash 'red-eye' can be removed."

There are a number of other popular image editing programs that rival Photoshop Elements for home use. Perhaps the best known is Corel PaintShop Pro, first launched in 1992. It is another very powerful program that has many of the features of Photoshop, but which is better suited for hobbyists and enthusiasts, not least because it is a lot cheaper. The current version, PaintShop Pro X7, retails for around £40. Corel also makes a more sophisticated version with 64-bit processing called PaintShop Pro X6 Ultimate, which sells for around £60, and is aimed at hobbyist and enthusiast photographers.

There are some alternatives that are even cheaper. One of the best is the unfortunately-named GIMP, or GNU Image Manipulation Program, a free image editing program released under an open-source licence. GIMP is extremely powerful, rivalling the capabilities of Adobe Photoshop, but it is just as complicated to use and like many


**Despite an early lead in the 1990s, today's Mac users have fewer choices of image editing software, but those programs that are available are very good.**

open-source programs the documentation isn't all it might be. If you're already familiar with Photoshop you should have no problem with GIMP, but it's definitely not recommended for beginners. A better free alternative for novices is Google Picasa, which is available for free download at picasa.google.com. Picasa has basic image editing features for adjusting contrast and colour, resizing, cropping or rotating images, customisable printing and removing flash red-eye. Other alternatives include Pixlr which is actually a browser-based editor that is free to use. There are plenty of image adjustment features as well as a range of filters and layers support. There is also Paint.NET which behaves, and looks, like a slightly more feature-rich version of the default paint tool that ships with Windows. It is not exactly a flagship application, but it does cover the basics very well.

For Macintosh users there aren't as many image editing programs to choose from, but there are some very good ones. Adobe Photoshop CC, Photoshop Elements 13 and the professional image management tool Adobe Lightroom are all available for Mac OSX, as is a version of GIMP, but the most popular choice is Apple's own program Aperture. The latest version has a new interface designed to be more accessible for novice users, but it lacks the versatility and sophistication of Photoshop, Paint Shop Pro or GIMP. You could also consider Pixelmator, a powerful layers-based editor, available through the App Store for £23, or the new Affinity Photo app, built for creative professionals, currently in beta but will retail for around £40. ■





# USING YOUR CAMERA

## Learn how to get the most out of your camera

**Modern digital cameras are marvels of miniaturised technology, with many automatic functions to help you take good photos in a wide range of different situations. However by learning more about how your camera works and how to use its many features you can expand the scope of your photography and get good results every time, even in difficult conditions. For owners of more advanced cameras there are options such as aperture and shutter speed control, sensitivity and white balance, as well as creative light metering modes and manual focusing, all of which can be used creatively to make your photos really stand out.**

Photography is a rewarding and potentially profitable hobby, and the more you learn about it the more you'll get out of it. In the next section we'll look at common camera features and how to use them, as well as methods for storing and sharing your pictures, and how to look after your camera. Read on and find out how that expensive gadget you bought actually works! ■

"By learning more about how your camera works and how to use its many features you can expand the scope of your photography and get good results every time."


File compression uses complex mathematical algorithms to squeeze big image files into small spaces, but quality can suffer.

# File types and image compression

## How is it possible to store so many images on such a tiny memory card?

**If you've had a computer or a digital camera for more than a couple of days, you'll have come across JPEG images, usually denoted by the file extension '.jpg', and you may be wondering exactly what it means. The letters themselves stand for the Joint Photographic Expert Group, a body of scientists, programmers and engineers from the imaging industry who got together several years ago to come up with a new standard for file storage that would allow images from different computer programs to be interchangeable, so that a picture from one computer could be viewed on another without having to use file conversion programs.**

The JPEG standard also happens to be an ideal format for storing pictures on a digital camera, because it uses something called file compression. This is a technique that allows a large number of images to be stored in a relatively small amount of memory by squashing the files so they take up less room. For this reason JPEG has become the standard image file format for all digital cameras.

A full technical explanation of file compression would fill a decent-sized textbook. It uses complex mathematical techniques that you simply don't need to know unless you're a software engineer working on a new digital camera. As consumers, all we need to know is that it reduces the size of the picture file by reducing the amount of information stored in it. JPEG compression reduces file size by reducing picture quality, and for this reason it is


> "For maximum image quality there are other types of image file which are uncompressed and lose no quality, the most common being TIFF."

called 'lossy' storage. For most purposes this quality reduction is imperceptible and fine for day-to-day use, but for maximum image quality there are other types of image file which are uncompressed and lose no quality, the most common one being TIFF, which stands for 'Tagged Image File Format'.

Basically, the way JPEG compression works is like this. An average digital photograph contains varying levels of detail. For example, take an average holiday snap of a family on a beach. While the main subject, the people in the foreground, contains a lot of detail, there will also be large areas such as the sky, the sand and the sea, which contain relatively little detail. In order to reduce the size of the file, some data from the lower detail areas can safely be lost without affecting the quality of the picture too much. The way this is done is usually by reducing the number of tonal variations between areas of similar colour, so you may notice artefacts that look like squares or stripes in highly compressed images.

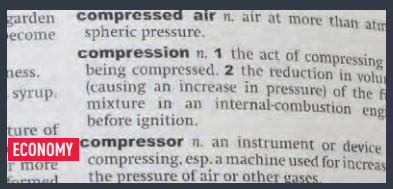
Whatever make or model of digital camera you have, it will almost certainly have an option in the menu that allows you to select image quality. What this option is doing is setting the level of file compression. If you

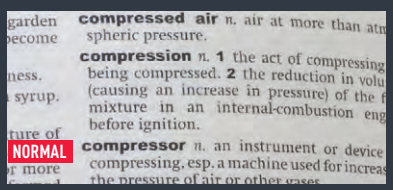
Large areas of low detail, such as the sky, can be easily compressed, while detailed areas such as the plants and leaves contain more information.

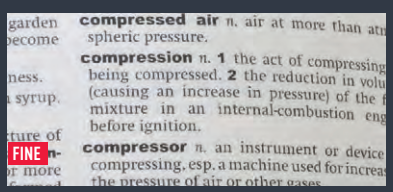
select the lowest quality, you will probably find that you can fit about four times as many images onto your memory card as you can at the highest setting, because the higher JPEG compression setting makes the files one quarter as big, but reduces the quality of the picture to compensate. Most people will use the highest setting most of the time, but unless you intend to print all your pictures at the largest size possible, you really can get away with using a lower quality setting and still have pictures to be proud of, plus you'll be able to take twice as many. ■

## COMPRESSION SETTINGS

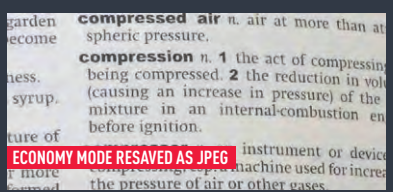
Even shooting at your camera's lowest quality setting will still produce acceptable results under most circumstances. These three photos were taken using a relatively cheap digital compact camera (a Casio Exilim EX-S12) using the Economy, Normal and Fine quality settings. As you can see the differences are very hard to spot.



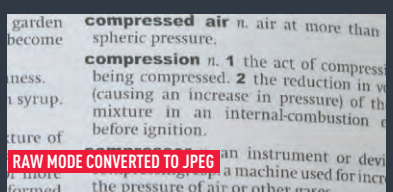




The next picture is the same Economy mode shot as above, but resaved as a JPEG using Adobe Photoshop using the highest compression setting. While the quality is certainly lower the image is far from useless.




For comparison, this next shot was taken using a 10-megapixel Digital SLR in raw mode, then converted to a low-compression JPEG using Adobe Photoshop. The quality is certainly better, but it's not *that* much better.



# Shooting modes

## Choosing the setting for the correct shooting conditions

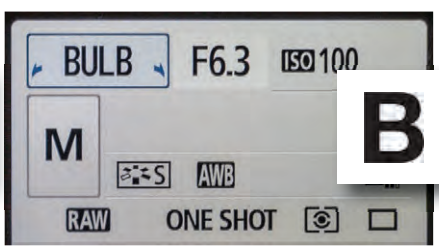

**All but the most basic budget compact cameras have a selection of shooting modes, usually chosen by a dial on the top or back of the camera. Easy-to-use, mainly automatic cameras in the range will only have a few shooting modes, while the more sophisticated cameras such as the DSLR may have as many as a dozen, including manual exposure options and user-programmable special settings.**

As newer models appear in the range or older models are updated, the shooting modes available will be revised and possibly expanded. Shown on this spread are some of the most often used modes selected from the mode dial on the top of the camera and in some cases, from the menu screen on the back of the camera. ■

**Auto DOF Mode:** As you focus on your subject, the camera will use the other focus points to measure the distance of the other objects in the viewfinder. It will determine what the appropriate aperture setting should be to render everything in focus.

**Bulb Mode:** Lets you control both shutter speed and lens aperture independently. Many cameras offer a Bulb shutter, allowing long exposures for as long as you hold the shutter button down. In some cameras, Bulb mode is an extension of Manual Mode where exposures longer than 30s are switched to the Bulb Mode option.

**Manual Exposure:** This mode provides the same range of exposure control as the other shooting modes, but lets you control both shutter speed and lens aperture independently for more creative control.


**Aperture-Priority AE:** This allows you to set the lens aperture, while the camera is left to select the most appropriate shutter speed. You have control over all the other exposure variables, including the control of exposure compensation.


**Full Automatic Mode:** Full Automatic is indicated on the Mode dial by a green rectangular outline. In this mode, the camera makes all exposure decisions with the exception of image quality. Autofocus mode is set to AI Focus.

**Close-up Mode (Macro Mode):** Turning the Mode dial to the macro flower symbol sets the camera for capturing smaller subjects such as flowers, jewellery, and other small details. The autofocus mode is automatically adjusted to One Shot,

**Shutter-Priority AE:** You can manually set the shutter speed you want to work with, while the camera chooses the best corresponding aperture setting. You have control over all other exposure variables, including exposure compensation.

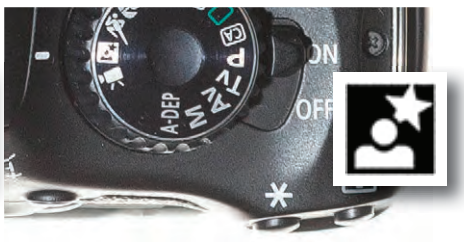

**Flash Off Mode:** Flash Off mode disables both the internal flash head and any external flash unit connected. Focus is set to AI Focus mode, the AF assist lamp disabled. ISO and white balance are set automatically as well.

**Sports Mode:** This mode uses a faster shutter speed to capture fast-moving subjects. The autofocus mode is automatically set to AI Servo to predictively track your subject and keep it in focus as it moves.

**Creative Auto Mode:** When set to CA mode, the camera allows the user to adjust picture style, motor drive, and exposure compensation, as well as to use the program shift function.


**Portrait Mode:** This mode uses a large aperture setting to decrease the depth of field, which blurs the background to emphasize the subject. ISO and white balance are set to Auto,

**Night Portrait Mode:** This mode is for taking pictures of people at sunset or at night, letting the flash illuminate the subject, while the longer exposure provides a brighter view of the surroundings.



**Program AE:** Similar to the Full Automatic mode, but allows more control over the exposure variables. Aperture and shutter speed are automatically selected by the camera, but you can alter exposure to different apertures by turning the Main dial.


**Landscape Mode:** Landscape mode combines slower shutter speeds with smaller aperture settings to increase the depth of field when shooting broad panoramas and sweeping landscapes.

**Movie Mode:** When Movie mode is selected, the camera's mirror and shutter open, as in Live View mode, but the Live View / Movie button on the camera's back functions as the start/stop button for movie recording.

Some digital SLRs can use older manual focus lenses. Obviously they won't auto-focus, but the camera's AF system will tell you when the picture is in focus.

# Focusing

## Getting the best out of your autofocus system

**With only one or two exceptions, all current digital cameras have automatic focusing. The first autofocus systems were developed by Leica in the 1970s. The first autofocus compact camera, the Konica C35 AF, was introduced in 1977, and the first autofocus 35mm SLR, the Pentax ME-F, was launched in 1981. Since that time autofocus technology has improved immensely, and these days even the most basic modern AF systems are generally fast, accurate and reliable**.

Although we now rely on autofocus for the vast majority of photographs, anyone who has tried taking a photo in low light, with fast-moving subjects or using very long telephoto lenses will have noticed that sometimes even the best AF system can run into problems. We've all stood there with the lens whirring in and out of focus, trying to get a lock on our subject, and eventually missed the shot. It's very frustrating when this happens, but with a few simple tips you can help your camera to focus quickly and accurately even in difficult situations.

There are two main types of autofocus system in common use today. All compact cameras and most CSCs use something called contrast-detection AF, which samples the image from


Different lenses have different minimum focusing distances, but many modern zoom telephoto lenses also have macro-focusing capabilities for close-ups.

Similarly you can use it in reverse to focus on objects that aren't in the centre of the frame.

> "Autofocus technology has improved immensely, and these days even the most basic modern AF systems are generally fast, accurate and reliable."

the main picture-taking sensor and detects sharp high-contrast edges in the details of the scene. Meanwhile all digital SLRs and Sony's new SLT cameras use something called phase-detection AF, which uses an array of separate dedicated sensors usually mounted below and in front of the main imaging sensor. Phase detection is a more complex system, but it is usually much faster, more accurate and works better in low light. However both systems require some detail in the scene to 'lock on' to. Try it for yourself: point your camera at a plain wall or a sheet of white paper and see if it will focus on it. Even if you own a top-of-the-range DSLR it won't be able to focus on a featureless surface.

There are a couple of ways to help your camera to focus quickly on a scene. Most digital cameras have the option to select either single or continuous autofocus. Your camera will normally start to focus on the scene as soon as you half-press the shutter button. In continuous focus mode it will continue to update the focus if you then move the camera, but in single AF mode it will hold the same focus setting as long as you hold down the button, until you actually take the shot. You can use this to focus the camera on low-detail targets by finding an object in the scene that's the same distance away as your chosen subject, focusing on that, and then holding the focus and re-framing the shot.


By carefully focusing on just one part of the scene, and using limited depth of field, you can draw attention to it.

## Moving targets

Compact camera AF systems are usually somewhat slower than those in DSLRs, which means they can have a real problem focusing on moving subjects. The way around this is either to use continuous AF or, if your camera has this option, to use manual focus. If you can tell where your subject is going to be, such as a car going round a tight corner on a race track or a child on a swing, you can pre-focus the camera on this point and wait to take the picture at the right moment. This method takes some practice and good reflexes, but it can produce excellent results.

## Close-ups

All cameras and lenses have a minimum focusing distance, a closest point beyond which they cannot focus. For many compact cameras this distance can be very small, in some cases as little as 2cm (1in), but for standard DSLR lenses the distances tend to be longer. Most compact cameras have a 'macro' setting, usually denoted by the symbol of a flower. To get closer focusing with a DSLR or CSC, special close-focus macro lenses have to be used.

Depth of field is greatly reduced at very close focusing distances, and you may find that your AF system doesn't focus on the right part of the subject, for example if you are trying to photograph the centre of a flower, but the AF focuses on the petals, because they're closer. The best option is to use a tripod, and manually set the focus to the closest distance. Move the tripod until the front of the subject comes into focus, then carefully manually adjust the focus point to get the right part of the flower to look sharp. ■

# Shutter speed and camera shake

## The shutter of your camera is simply a mechanical barrier

> "The wider the range of available shutter speeds, the greater the creative versatility of the camera."

**The shutter of your camera is simply a mechanical barrier that prevents light from entering the camera until it is needed, controlling when and for how long light is allowed in to expose the sensor. The latest digital cameras have high-speed electro-mechanical shutters capable of timing exposures with an accuracy measured in fractions of a millisecond.**

Along with the aperture setting and the sensitivity control, shutter speed is one of the three ways that photographic exposure is adjusted. When a picture is taken, the shutter is opened for a precisely measured amount of time allowing light to pass through. The duration of the exposure is set either automatically by the camera's light meter or manually by the photographer. The wider the range of available shutter speeds, the greater the creative versatility of the camera.

Modern digital SLR cameras have a very wide range of shutter speeds available, usually ranging from 30 seconds to as high as 1/8,000th of a second, and most also have a 'B' setting, in which the shutter stays open for as long as the shutter release is held down. The 'B' is from bulb; very old cameras commonly used an air-bulb attachment as a remote shutter release.

Shutter speed can be manually adjusted in either full manual exposure mode or in shutter priority mode, the latter usually denoted by an 'S' or 'Tv' on the exposure mode dial. Shutter priority is a semi-automatic exposure mode in which the photographer sets the desired shutter speed, and the camera's exposure system adjusts the aperture accordingly to produce the correct exposure.

In automatic and program exposure modes the camera will set both the shutter speed and aperture automatically. Under normal daylight conditions, the shutter speed will usually be set to between 1/125th and 1/1000th of a second, since this is fast enough to freeze most movement and to reduce the effects of camera shake. However in low light conditions the camera may set a slower shutter speed, and with this comes an increased risk of movement blur caused by camera shake. Most cameras will display some sort of warning if this occurs. ■

## AVOIDING CAMERA SHAKE

When shooting hand-held and wishing to avoid camera shake, as a rule of thumb you can safely use a shutter speed roughly equivalent to the reciprocal of the focal length you are using. For example if you're using a 100mm focal length then you can take a sharp hand-held shot at a shutter speed of 1/100th of a second or faster. If you're using a 35mm focal length then 1/35th of a second is safe, and so on.


**Here's an example shot taken hand-held at a focal length of 50mm and a shutter speed of 1/50th of a second. As you can see it's sharp and shake free.**

**Here's the same hand-held shot but this time with a shutter speed of 1/10th of a second. At this speed it's virtually impossible to hold the camera steady enough for a shake-free shot. As you can see, the result is badly blurred.**

Many modern cameras include technology which can reduce the effects of camera shake at low shutter speeds. Many compact cameras use electronic processing to counteract movement, which does work but produces relatively poor image quality. Among digital SLR and CSC manufacturers there are two types of image stabilisation in common use. Canon, Nikon and Panasonic favour optical stabilisation, where elements within the camera lens are moved to counteract camera shake. Others brands including Pentax and Sony employ a system which moves the camera's sensor to achieve the same effect.

There is no clear advantage between moving-lens and moving-sensor systems. Modern image stabilisation systems of both types can provide around three or four stops of additional stability, however the sensor-shift method has an advantage for SLR users because the non-stabilised lenses are usually considerably lighter and are often also cheaper to buy, since the complex anti-shake system is built into the camera body. It also means that photographers using older pre-digital lenses can still have the advantage of image stabilisation.

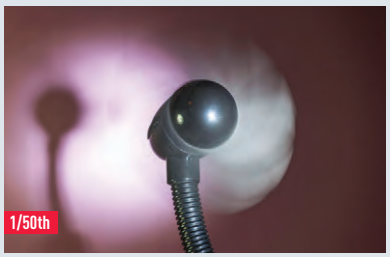
**This example shot was taken with a focal length of 50mm at 1/10th of a second as before, but this time the image stabilisation (in this case a sensor-shift system) is switched on. It has detected the vibration and corrected it by moving the sensor to compensate, resulting in a much sharper shot.**

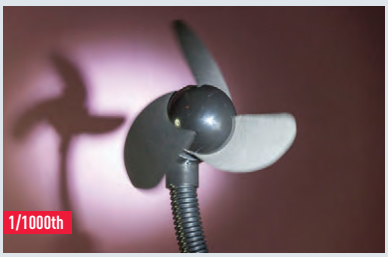
## MOTION BLUR

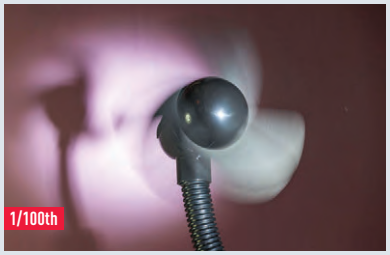
➤ Any movement in the frame during the exposure will be captured in the picture, resulting in motion blur. Anti-shake systems can do nothing to correct this; the only solution is to use a shutter speed fast enough to effectively freeze the action. With a fast enough shutter speed you can freeze even very fast-moving objects, as this next sequence of photos will show. They were taken at shutter speeds ranging from 1/50th to 1/8000th of a second.

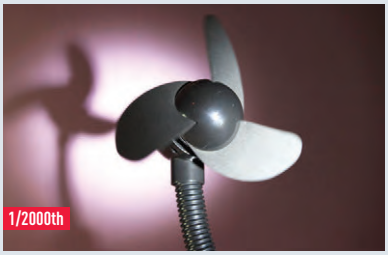
As you can see, at 1/8000th of a second the spinning blades of a desk fan can be frozen in place.

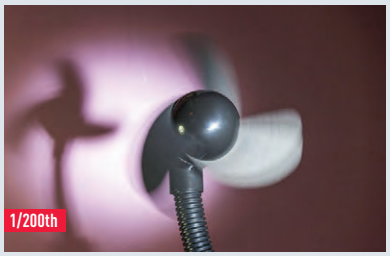
> **"The solution for motion blur is to use a shutter speed fast enough to freeze the action."**

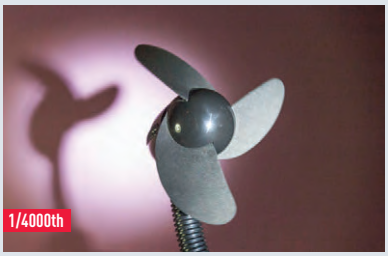


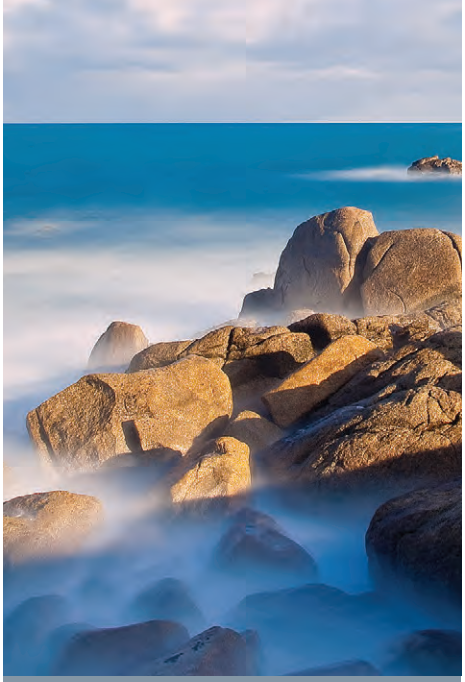





## THE MISTY WATER EFFECT

One of the most effective uses of long shutter speed is photographing flowing water. It's a beautiful if slightly over-used effect, but it is very easy to achieve. Any moving body of water, flowing stream or waterfall will do, as long as it has white splashing water. This scene is the northern end of Tresco, Isles of Scilly.

**➤ If you just point the camera and shoot on automatic, you'll end up with something like this (below). It looks nice enough, but it's a bit dull. This example was shot on at a shutter speed of 1/400th of a second and an aperture of f5.6.**

**➤ Fixing the camera on a tripod eliminates camera shake. You now need to get the slowest shutter speed you can. The image at the top of the page was taken from the same position as the previous shot, but with the addition of a 10stop ND filter to give a shutter speed of 45 sec and an aperture of f16.**

# CAPTURING MOVEMENT

Freezing the action with a fast shutter speed produces a nice sharp image, but sometimes you might want to allow a controlled amount of movement blur to show that the subject was in motion. There are a number of ways to accomplish this.

➤ In this first example, the camera was fixed on a tripod, with a shutter speed of 1/250th of a second, while the subjects cycled past in front of the lens. The tripod ensures that the background is sharp and the fast shutter speed has frozen the movement. The result is sharp but looks slightly unnatural, as though they were somehow balancing there without moving.

➤ With the camera still mounted on the tripod, the shutter speed was set to 1/10th of a second, and another subject came past. This time the background is still sharp, but the slow shutter speed has resulted in lots of movement blur, making the subject almost unrecognisable.

➤ In order to capture the feeling of movement (top image), the best technique is to use a slow shutter speed, but to pan the camera (move it side-to-side) to follow the moving subject as you press the shutter. It is a technique that requires practice, since you need to be able to keep the camera moving smoothly as the exposure is taken, and avoid up-and-down movement as you press the shutter. It may take several tries to get it right, but when it works the results are very effective, with the subject stationary against a movement-blurred background. This shot was taken hand-held at a shutter speed of 1/10th of a second. Some recent cameras have a setting on the image stabilisation system to correct vertical movement but not horizontal, which helps with this kind of shot.

## CAR LIGHTS AT NIGHT

➤ Another interesting effect achieved using long shutter speeds is streaking car lights at night. This example was taken from a footbridge overlooking a busy junction on the A30, a major road between Exeter and Plymouth. The camera was set up on a tripod, using manual focus and full manual exposure, with a cable shutter release. With the aperture set to f3.5 several shots were taken at different shutter speeds, starting at 4 seconds and increasing by 2 seconds per shot. Bracketing exposures like this is the best way to ensure a good result. This shot proved to be the best of the lot, taken at a shutter speed of 10 seconds.

When shooting near heavy traffic at night it's obviously important to stay safe. Wear something bright and reflective, and don't get too close to the road. Also, never use a flash when taking photos of traffic. You could dazzle a driver and cause an accident.

## FIREWORKS

➤ One way to take good fireworks photos is to set your camera on a tripod some distance from the display, with the zoom set to a very wide angle. Set a shutter speed of 2 seconds and as wide an aperture as you can manage. Getting the framing exactly right is simply a matter of luck, timing, and then cropping the photo later.

# How it's done

## Flowing water looks great with a longer exposure time

**The capture of moving water with a longer shutter duration is very popular and looks great when it's done right. It looks challenging, but in fact it's very easy to set up. All you need is a tripod and any camera with manual shutter speed control. The hardest part is finding a stream, river or beach that has great photogenic qualities. Use your common sense and always exercise caution around fast-moving water; it may be deeper than it looks, with strong currents.**

It's best to take this sort of photo on a day that's bright, but not too sunny, because it's easy to burn out highlights on a longer exposure. A calm day is best, because you don't want any trees or plants waving about in the wind if they are in shot. Set up your camera using a good solid tripod on solid ground, and set the shutter speed to one second. Trigger the shutter using a cable release, a remote control or the two-second timer, so as to avoid any camera shake. You may need to experiment with different shutter speeds, depending on how fast the water is moving, but somewhere between half a second and two seconds should produce the effect you're looking for. For longer exposures you may have to invest in a neutral-density filter to avoid over-exposure. ■

"It's best to take this sort of photo on a day that's bright, but not too sunny, because it's easy to burn out highlights on a longer exposure."

Careful control of shutter speed can produce some beautiful effects. This picturesque beach in Ireland takes on an almost mystical quality when photographed at a shutter speed of several seconds. Be sure to use a tripod though!

# Focal length and zoom

## Understanding how focal length works in composing shots

> "Selecting the right focal length for the scene allows the photographer to control perspective, angle of view and magnification."

Nearly all modern compact cameras have zoom lenses, and most users of digital SLRs or CSCs will also have at least a couple of zooms in their kit. Focal length is one of your primary tools for adjusting composition. Selecting the right focal length for the scene allows the photographer to control perspective, angle of view and magnification, and can radically alter the mood and style of the photo. Some focal lengths are more suited to particular types of photo, and the properties of wide-angle and telephoto lenses can be used to produce particular effects. Understanding how focal length works and how it affects your photos is a vital photographic skill.

# LENSES AND FOCAL LENGTH

➤ There are basically two types of lens; those with fixed focal lengths, also known as prime lenses, and those with variable focal length, or zoom lenses. They both have their own advantages and disadvantages. Prime lenses are usually smaller and lighter than zooms, and also generally have much faster maximum apertures than a zoom lens at equivalent focal length. The optical quality of prime lenses is also usually a little higher than the equivalent zoom lens. Zoom lenses however are much more convenient, allowing the photographer to cover a wide range of focal lengths with just one or two lenses, rather than carrying around a bulky collection of prime lenses. There are some fast zoom lenses, but they tend to be extremely expensive.

The focal length of a lens is an expression of its magnifying power, and is usually stated in millimetres. If you look on the front of your camera, usually inscribed around the front of the lens you'll find the focal length, or a range of values for zoom lenses. For a typical DSLR kit lens this will usually be around 18-55mm. For digital cameras it is fairly usual to see two figures quoted, both the actual focal length and the 'equivalent' length. The reason for quoting both is simply that more people are more familiar with the sizes of 35mm lenses, so they know that 28mm is wide angle and suitable for panoramic shots, or that 200mm is a telephoto, suitable for long-range subjects.

Real and equivalent focal lengths are different because most digital camera sensors are a lot smaller than a frame of 35mm film, and are fitted much closer to the lens than the film would be. Most consumer DSLRs use the APS-C sensor format. Exact sizes vary from one manufacturer to the next, but are typically around 22.5 x 15 mm. A frame of 35mm film measures 36 x 24mm, which means that the edges are 1.6x longer, so the focal length of the lens would need to be 1.6x greater to produce the same image size and magnification. This is usually referred to as the 'conversion factor' or 'crop factor'. It means that a typical 18-55mm DSLR zoom lens is roughly equivalent to the popular 28-80mm zoom lens often used on 35mm systems.

Compact camera sensors are even smaller still. Because there are several different sizes of sensor in common use it is more usual for compact camera zoom lenses to be rated in terms of their magnification power, such as 3x, 4x, 10x etc. This relates to the difference between the minimum and maximum focal lengths. A lens with a range of focal length from 5.8mm to 17.4mm is called a 3x zoom, because 17.4 = 3 x 5.8.

While in older prime lenses a 200mm lens would literally be 20cm long, modern optical systems use multiple lens elements working in combination, which means that the light path can be shortened while still maintaining the same effective magnificatiion. As a result quite powerful telephoto and zoom lenses can be relatively compact.

Wide-angle and telephoto are relative terms. On a 35mm film SLR a 50mm lens produces approximately the same perspective and magnification as the human eye, and has traditionally been the standard lens for this type of camera. Anything longer than 50mm is considered a telephoto, while anything shorter is considered wide angle. Digital SLRs tend to follow this rule too, although considering the crop factor the mid-point is approximately 35mm.

NIKON 300MM F/2.8 FAST TELEPHOTO


PENTAX 50-200MM F/4.0-5.6 WEATHER RESISTANT


SONY 18-55 F/3.5-5.6 STANDARD ZOOM


CANON 14MM F/2.8 FISH-EYE

# MAGNIFICATION

➤ The most obvious effect of altering focal length is the change in magnification. Anyone who has ever used a zoom lens will be familiar with this effect. If you want to take a photo of something a long way away, you zoom in and the subject appears closer.

This series of photos shows the effect of a wide-angle zoom equivalent to 25mm, medium zoom of 80mm and a telephoto of 400mm, all taken from the same position.

What is happening here is not the subject being brought closer, but the angle of view being reduced so that a smaller proportion of the scene fills the frame of the sensor. If we look at a cropped-down section of the centre of the wide-angle 25mm view we can see that it looks very similar to the 400mm view, although rather less sharp, because this cropped-down section of the frame obviously has far fewer pixels than the full-frame zoomed-in image. This is the way that digital zoom works on a compact camera, and is why digital zoom should never be used as a substitute for optical zoom.

> "A cropped-down section of the frame has far fewer pixels than the full-frame zoomed-in image."





As you can see, cropping the wide-angle image produces the same effect as zooming in, but greatly reduces quality.



# ANGLE OF VIEW

➤ Changing the angle of view can be used to produce some interesting effects. If we move closer to the subject while shortening the focal length we can see that although the subject fills roughly the same area of the final image, in a wide angle shot a lot more of the background is included.

Take a look at this series of five pictures, each one taken at approximately half the focal length of the previous one. As the focal length is reduced more of the background comes into view behind the subject, while objects in the foreground appear much closer to the camera, increasing the appearance of extreme perspective.



## PORTRAITS


➤ Changing the angle of view is important to remember when shooting portraits. If you use a short focal length to take a facial portrait at close range the parts that are closest to the camera will appear disproportionately larger, distorting the facial features. The result is an enormous nose, bulbous forehead and tiny ears, not a particularly flattering look (below).

Most portrait photographers prefer to step back a little and zoom in. The most popular choice is a focal length of about 80-100mm, since this gives a flattering, natural-looking perspective (above).




## DEPTH OF FIELD

➤ The perspective-flattening of long lenses can also be used in other circumstances, such as drastically reducing depth of field. You can use this to isolate a subject by blurring out the background, as in the shot above (left). Compare this with the same shot on the right, but taken with a wide angle lens from a much closer range. The relative size of the statue is the same in both shots, but due to the increased depth of field in the wide angle shot, the background, although apparently more distant, looks much sharper.



## TELEPHOTO LENS

➤ Careful focusing with a long telephoto lens can pick out individual subjects despite busy surroundings, such as focusing on your subject down at the beach with lots of visual distractions. The same scene shot from the same position using a wide angle lens presents the subject, and how they relate to their environment, in a completely different way.

**➤ The examples we've used here are extremes intended to emphasise the effects we're demonstrating, but in fact a lot of people only ever use their zoom lenses at either maximum or minimum settings. Don't do this out of habit; instead use the full range of the lens to explore all the different possibilities it offers. Focal length is one of your primary creative tools, so make good use of it.**

# Aperture and depth of field

## With aperture you can control how much of your picture is in focus

Using a very wide aperture and precise focusing, emphasis can be given to one subject to effectively isolate it from its surroundings.

**Of the three main controls common to nearly all cameras – shutter speed, focus and aperture – it is aperture adjustment that is the least well understood. This is because it not only helps to control exposure, but also affects something called Depth of Field. Understanding the effects of aperture size is a vital skill for any keen photographer.**

At least there's nothing mysterious about the name. The aperture is literally a hole through which light passes after it enters the lens. The diameter of this hole can be altered, allowing a greater or smaller amount of light to pass through on its way to the sensor. In the early days of photography, aperture was adjusted by slotting cards with different sized holes cut in them into the body of the camera behind the lens. These cards were known as 'stops', and this is still part of photographic terminology today. On modern cameras the aperture is controlled by an arrangement of curved shutters inside the body of the lens, which move to produce a continuously variable aperture, however the aperture settings are usually still referred to as 'F-stops'.

Aperture adjustment is used in combination with the shutter speed and ISO sensitivity


WIDE APERTURE


NARROW APERTURE

"Understanding the effects of aperture size is a vital skill for any keen photographer."

to control photographic exposure. However it is also the primary means of controlling something called depth of field, a concept that may need a bit of explanation.

If you take a photo of a subject at a distance of about 3 metres with standard zoom lens, in good light with the focal length set to about 30mm, as long as the lens is focused correctly the subject should appear nice and sharp in the image. However you'll usually find that objects about 1.5m in front of the subject, and for about 4 or 5 metres behind the subject, also appear sharp. This distance, from the closest point of acceptable sharpness to the most distant, is known as the depth of field.

By altering the size of the aperture it is possible to control the extent of this depth of field, either reducing it so that only the main subject is in sharp focus, or expanding it so that an entire landscape can appear to be just as sharp.

If you have an older camera to hand, take a look at the lens. It will have a ring for controlling the aperture setting, labelled with numbers usually from about F2 to about F22. The focus control ring will have distances usually calibrated in feet and metres, and alongside it you'll usually find lines marked with the same numbers as the aperture ring, arranged in pairs either side of the focal distance mark with the larger numbers toward the outside. The purpose of this aperture scale is to help estimate the depth of field at a particular distance for any given aperture setting; with the focus set to a particular distance, anything between the two lines for the selected aperture setting should be acceptably sharp. Some older zoom lenses have a series of curved lines etched into the lens barrel for the same purpose. For some reason this scale is missing from most modern auto-focus, auto-aperture lenses, which is a shame because it makes the whole concept of depth of field much easier to understand.

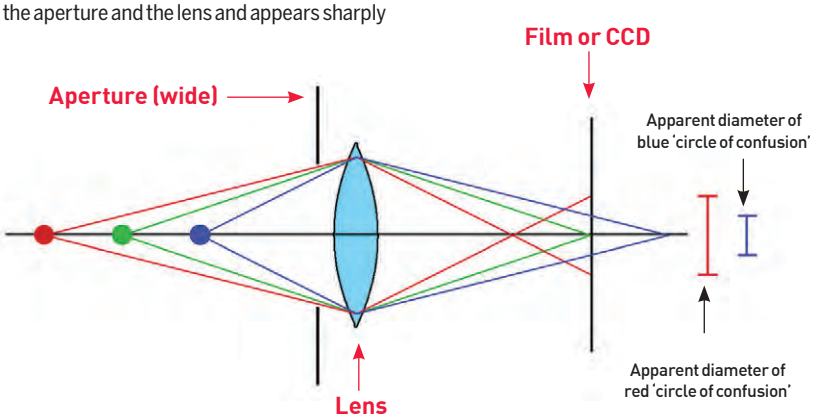
APERTURE RING

## How aperture works

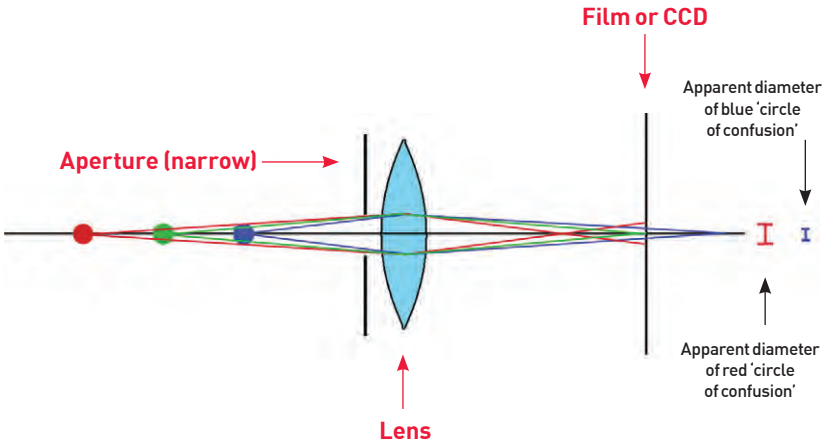
➤ Explaining exactly why altering the size of the lens aperture alters the depth of field is a little complicated, but a few simple diagrams should help to shed some light on the matter. For a start, let's clear up some popular misconceptions about the difference between focus and sharpness.

This is a highly simplified diagram of the arrangement of lens, aperture and sensor inside a modern digital camera. In this first diagram, three subjects at different distances from the camera lens are represented by the red, green and blue dots. The lens is focused on the green spot, so light from it passes through the aperture and the lens and appears sharply focused on the sensor. Light from the red and blue spots also passes through the aperture and lens, but light from the red spot focuses a short distance in front of the charged coupled device (CCD), while light from the blue spot focuses a short distance behind it. The light from these other spots still hits the CCD, but due to light scattering it is unfocused and spread over a wide area.

What this means is that the red and blue spots will appear as large blurred spots on the final image, while the green spot will be sharp and in focus. The size of the blurred area of the red and blue spots is called the 'circle of confusion.'




➤ The diagram below shows the same arrangement of camera and subjects, and the coloured spots are the same distance from the lens, but this time the aperture has been reduced to just a small hole. Again the lens is focused on the green spot, and the red and blue spots are out of focus. However the narrow aperture restricts the light scattering and the relative angles of the light paths, and as a result the 'circles of confusion' are much smaller. This makes the red and blue spots in the final image appear much sharper. They are still out of focus, but the effect is not so noticeable. To make circles of confusion as large as in the first image, the red and blue spots would have to be much further away from the green one.



# FOCAL LENGTH AND DEPTH OF FIELD

➤ The focal length of your lens, in other words how much you zoom in on your subject, also has a large effect on depth of field. Short focal lengths have much greater depth of field than longer focal lengths. This is one reason why, when taking a portrait shot, it's a good idea to step back a bit and zoom in rather than using a wide angle lens up close.

In optics, particularly as it relates to film and photography, depth of field (DOF) is the distance between the nearest and farthest objects in a scene that appear acceptably sharp in an image. Although a lens can precisely focus at only one distance at a time, the decrease in sharpness is gradual on each side of the focused distance, so that within the DOF, the unsharpness is imperceptible under normal viewing conditions.

In some cases, it may be desirable to have the entire image sharp, and a large DOF is appropriate. In other cases, a small DOF may be more effective, emphasizing the subject while de-emphasizing the foreground and background. In cinematography, a large DOF is often called deep focus, and a small DOF is often called shallow focus.

In the examples shown here, at f4, the rusted pump casing nearest the camera on the left is the only object in sharpest focus and the boat in the distance is totally blurred.

At f8 the area of acceptable focus has increased so that some of the foreground pipework and the post behind it are coming into focus and the boat is becoming slightly more defined.

Stopping the camera down to its narrowest aperture of f22 has all the foreground items in focus and the distant boat is now very well defined. In fact, if the lens used was an f/32, it would be completely sharp.

> "...it's a good idea to step back a bit and zoom in rather than using a wide angle lens up close."



## Practical uses for depth of field

➤ There are several situations where controlling depth of field is important. The most common is portrait photography. Portraits shot on an automatic camera using a medium aperture usually have a lot of sharp foreground and background detail, which can distract attention away from the main subject.

As you can see in this shot, which was taken using an aperture of f/16, the model is in focus, but so is the background, which draws the viewer's attention away from the subject.

By increasing the aperture to f/4, and moving the subject further from the background, only the subject is now in sharp focus. A blurred background is much less distracting, and concentrates your attention on the subject, making them really stand out from the background.

## LANDSCAPE PHOTOGRAPHY

➤ Another situation in which depth of field is an important issue is landscape photography. Here it is often important to maximise depth of field, so it is usual to use the smallest possible aperture. This shot was taken using an aperture of f/16, to ensure that both the foreground and distant background are in focus. It also uses something called Hyperfocal Distance, but that's a subject we'll cover in a future tutorial.

# How it's done

## Isolate your subject using narrow depth of field

**Careful control of depth of field by adjusting aperture and focal length is one of the most striking creative techniques available to the photographer, and you don't need any special equipment to do it, just your camera and a zoom lens.**

For this outdoor wildlife shot, the photographer has used a long, fast, telephoto lens with a focal length of around 600mm, shooting at f4. This has resulted in a narrow depth of field but by carefully focusing on the deer's head the effect of this narrow plane of focus is to isolate the animal against what would otherwise be a busy and distracting grassland background.

One consideration to bear in mind is that as the focal length increases, so does the chance of camera shake. Large focal length lenses will demand higher shutter speeds and a good tripod to eliminate those shot-spoiling effects. ■

> "Large focal length lenses will demand higher shutter speeds and a good tripod."

The Canon EF 600mm f/4 L series prime lens. The sport and wildlife photographer's dream.

If the background of your outdoor photo is distracting, you can blur it out by using a wider aperture to create a narrow depth of field.


# Exposure and metering

## Accurate exposure is the key to good photography

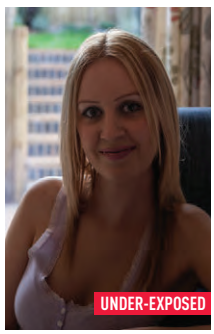
**Understanding exposure and how it affects your photographs is probably the single most important technical skill you can learn in photography. It's certainly the one that most people get wrong, and apart from camera shake bad exposure probably ruins more photos than any other single cause. The main problem is over-reliance on automatic metering.**

Most modern cameras, even relatively cheap compacts, have sophisticated built-in TTL multi-zone evaluative exposure meters that measure light levels at dozens – in some cases hundreds – of points within the frame, instantly comparing the results with a built-in library of exposure situations and automatically adjusting the shutter speed and aperture to deal with problems such as back-lighting, close-ups or moving subjects.

In most cases these automatic exposure systems are very good, and can reliably cope with most common circumstances. However even the best automatic meter can be fooled, resulting in poorly exposed photos. By overriding the camera's automatic settings and adjusting exposure manually we can avoid these problems and take much better photos.

Let's take a look at a couple of examples. In this first scene we have a fairly ordinary portrait of a brightly-lit light-skinned model shot against a very dark background. This was taken using a typical compact camera set on automatic exposure. As you can see the camera has badly over-exposed the model's face, losing details in the highlight areas.

In this second example the same camera has been used to photograph the same model, but this time standing in front of a brightly-lit window. In this case the camera's automatic exposure system has seriously under-exposed the shot, leaving the model's face in deep shadow with little detail visible.


The same usually reliable exposure meter took both of these shots, so what went wrong?

FIG 1. ORIGINAL SCENE

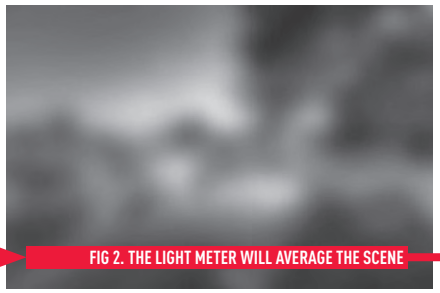


FIG 2. THE LIGHT METER WILL AVERAGE THE SCENE

FIG 3. THE AVERAGE RESULT WILL BE MID-TONE GREY

SMALL APERTURE

LARGE APERTURE

> "Apart from camera shake bad exposure probably ruins more photos than any other single cause. The main problem is over-reliance on automatic metering."

In order to understand what happened and accurately correct it, it is necessary to know how light meters operate, and the rules by which exposure is calculated.

## Fade to grey

➤ Take a look at the main picture above. What you see there is a nice scene of a river in the evening, with a good tonal range, plenty of colour and some nice crisp sunlight. What your camera's light meter sees is very different as our example above shows. Try it out for yourself. Find any nice, average snapshot scene, properly lit and with good contrast like our example **FIG 1**. Start up your image editing software and open your picture. Light meters only see in black and white, so reduce the saturation of the shot to zero. Your light meter doesn't see detail, so set your Gaussian blur filter **FIG 2** to maximum diameter and apply it a couple of times. Use the eyedropper tool to measure the RGB colour value of the resulting tone. You should find that it averages out to a mid-tone grey **FIG 3** with an RGB value of around 127,127,127.

It's an interesting and curious fact that any average scene reflects 18% of the light falling on it. Look out of your window, and unless you live in Antarctica the scene you see is reflecting exactly the same amount of light as the scene out of my window. That 18% reflection is exactly the same as a mid-tone grey, mid-way between black and white.

Light meters are calibrated with this fact in mind. When your camera takes a light reading, the meter averages the scene and adjusts the exposure to produce that mid-tone grey (or 12% luminance, but that's another discussion altogether). If you point the camera at a black stage curtain, it will try to make the black into a mid-tone grey, so it will over-expose. If you point it at snow it will try to make the white into grey, so it will under-expose.

## Adjusting exposure

➤ Let's take a moment to explain how exposure is controlled, and what is meant by some of the terminology. If you already know the basics, feel free to skip to the next page.

On all cameras, exposure is adjusted by altering two settings; aperture and shutter speed. Between them they control the amount of light that hits the sensor when the shot is taken.

Shutter speed is self-explanatory, it is simply the amount of time that the sensor is exposed to light. This is usually controlled by an electrically operated mechanical shutter in front of the sensor that opens and closes very quickly for a precisely measured period of time, usually in the order of a few hundredths of a second. Obviously a shutter speed twice as long lets in twice as much light, one half as long lets in half as much.

The aperture is literally just a hole through which light passes on its way to the sensor. The diameter of that hole can be adjusted to precisely calibrated sizes. A smaller hole lets in

less light, and a larger hole lets in more.

These calibrated aperture sizes, for largely historical reasons, are called stops, or f-stops. An aperture setting one stop larger lets in twice as much light. For reasons that are both historical and mathematical, the standard full-stop aperture settings that you are most likely to encounter go f/1, f/1.4, f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16 and f/22. The smaller numbers refer to larger apertures, and the larger numbers to smaller ones. Many cameras can set apertures in increments of 1/3rd of a stop, but the whole-stop numbers are the ones to remember.

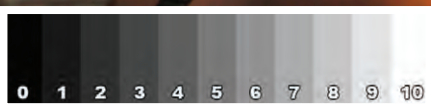
Let's consider an example. With your camera set to automatic exposure point it at a scene and take a light reading. For the sake of argument, say the light meter sets an aperture of f/8 and 1/200th of a second. You can produce the same exposure by increasing the aperture by one stop to f/5.6 and halving the shutter speed to 1/400th of a second, because this lets the same amount of light through to the sensor. Similarly, reducing the aperture to f/11 and setting the shutter speed to 1/100th of a second will also produce the same exposure.

However by altering one setting without altering the other you will change the exposure. In our example, changing the aperture to f/5.6 but leaving the shutter speed at 1/200th of a second will increase the exposure by one stop, or one exposure value (EV), making the picture brighter. Decreasing the aperture to f/11 will reduce the exposure by one EV, making the picture darker.

Similarly, changing the shutter speed while leaving the aperture alone will also change the exposure. Double the shutter speed to 1/400th at f/8 and you reduce the exposure by one stop, halve the speed to 1/100th and you increase the exposure by one stop.

## The Zone System

In 1939-40 the pioneering photographers Ansel Adams and Fred Archer developed an exposure system based on this fact, a system that is still used today. It is called the Zone System, and is quite possibly the most useful piece of photographic knowledge you'll ever learn. There are several variations on the original system, but I'll go with the one that is easiest to understand.




Starting with 18% grey as the mid-point, the system divides all the tones between black and white into 11 zones, numbered 0-10. Zone 0 is featureless black with no details visible, which in your image editor would have an RGB value of 0,0,0. Zone 10 is pure white with no details visible, and an RBG value of 255,255,255. The mid-tone 18% grey is zone 5, and should have an RGB value of about 127,127,127.

The zones represent exposure values, or EV. The difference between one zone and the next is equivalent to the difference between one exposure setting and another one exactly one stop higher or lower.

"The zones represent exposure values, or EV. The difference between one zone and the next is equivalent to the difference between one exposure setting and another one exactly one stop higher or lower."

# PUTTING IT ALL TOGETHER

➤ If we relate the tone scale of the Zone System scale to real world objects we can use it to help produce accurately exposed photos. The zones are roughly equivalent to the following scene elements (adapted from Adams' descriptions):

| | |
|---|---|
| Zone 0 | Pure black, no details or texture visible. |
| Zone 1 | Black tone but no texture. This is normally as black as you want to get in a picture. |
| Zone 2 | First hint of texture and detail, very deep shadow. |
| Zone 3 | Dark materials, details visible. |
| Zone 4 | Dark foliage. Dark stone. Landscape shadow. Shadow on portraits in sunlight. |
| Zone 5 | Clear north sky. Dark skin. Grey stone. Weathered wood. 18% mid grey. |
| Zone 6 | Average Caucasian skin value. Light stone. Shadows in sunlit snow. |
| Zone 7 | Very light skin. Light grey objects. Snow with side lighting. |
| Zone 8 | White with texture. Snow in shade. Highlights on Caucasian skin. |
| Zone 9 | Glaring white surfaces. Snow in flat sunlight. White without texture. |
| Zone 10 | Light sources, reflections of sunlight on metal. Pure white. |

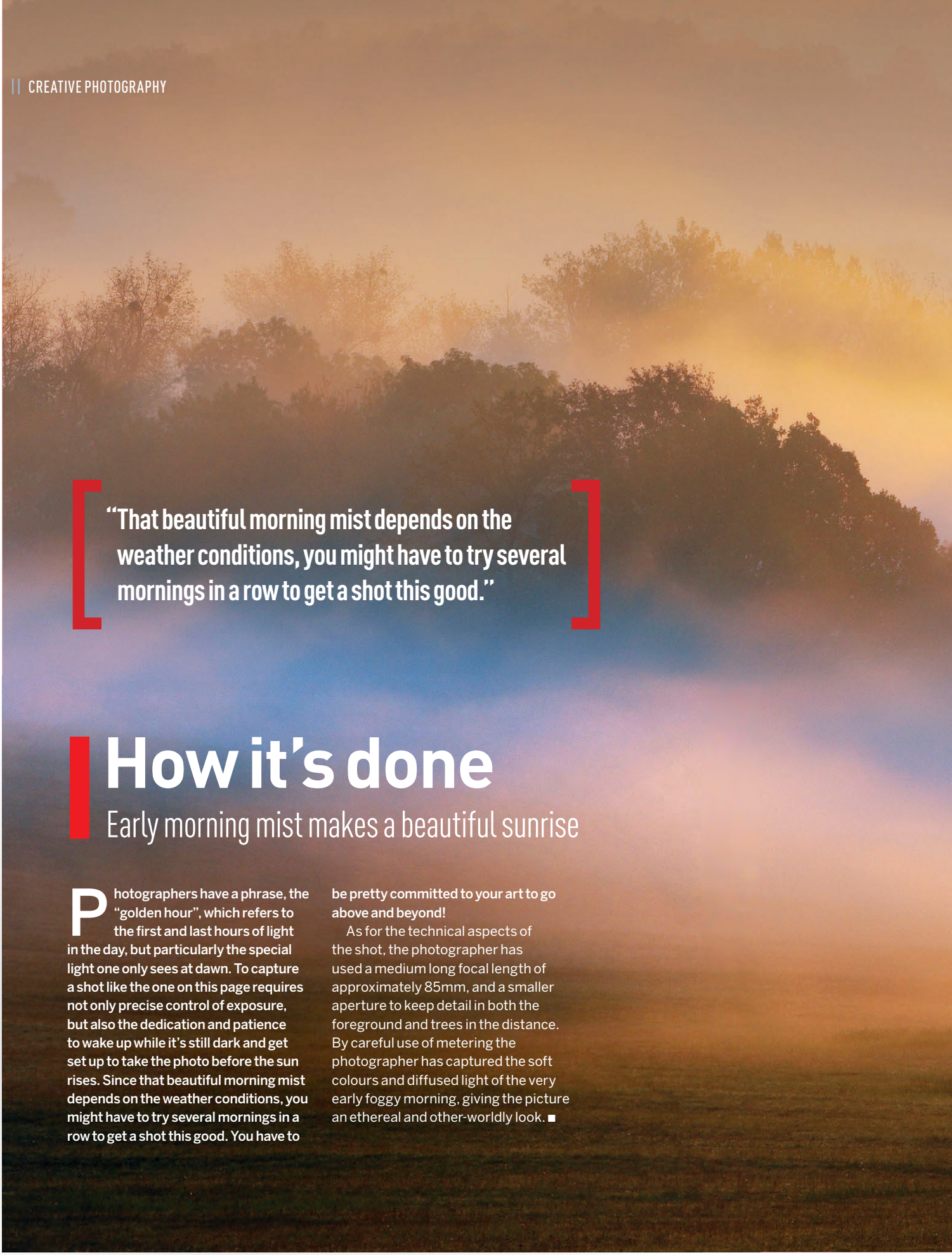
➤ Let's go back to the two troublesome portraits from the first page. If we use the spot meter to take a reading from the subject's face, we know that the light meter will give a reading that would make the face mid-tone grey, which is zone 5. However from the zone chart we know that average Caucasian skin should be zone 6, so we need to increase the spot metered exposure by one stop, in this case from 1/30th at f/5.6 to 1/30th at f/4. In the resulting shot the background details are all burned out, but the subject is correctly exposed.

For the over-exposed portrait against the dark background, we can use a similar approach. Spot metering the background gives an exposure setting of 1/3rd sec at f/5.6 to render it as zone 5 mid-grey. By reducing that exposure by four stops to 1/3rd at f/22 we can make the background come out as what it should be, zone 1 black, leaving the model's face also correctly exposed.

The zone exposure system can help with difficult exposures, but it is helpful in another way. Learning to think of images in terms of tone and dynamic range will encourage you to approach these concepts in a creative way, and to use them to produce better pictures. Controling exposure is the primary creative tool of the photographer, and learning how to use it will make the difference between mere snapshots and artistic photographs.

This system has been used by professional photographers for over 70 years. Used properly, it can help to improve your photography immensely, probably more than any other single technique.

"The zone system can help with difficult exposures. Learning to think of images in terms of tone and dynamic range will encourage you to approach these concepts creatively."



> "That beautiful morning mist depends on the weather conditions, you might have to try several mornings in a row to get a shot this good."

# How it's done

## Early morning mist makes a beautiful sunrise

**Photographers have a phrase, the "golden hour", which refers to the first and last hours of light in the day, but particularly the special light one only sees at dawn. To capture a shot like the one on this page requires not only precise control of exposure, but also the dedication and patience to wake up while it's still dark and get set up to take the photo before the sun rises. Since that beautiful morning mist depends on the weather conditions, you might have to try several mornings in a row to get a shot this good. You have to be pretty committed to your art to go above and beyond!**

As for the technical aspects of the shot, the photographer has used a medium long focal length of approximately 85mm, and a smaller aperture to keep detail in both the foreground and trees in the distance. By careful use of metering the photographer has captured the soft colours and diffused light of the very early foggy morning, giving the picture an ethereal and other-worldly look. ■

Mastering exposure metering allows you to cope with almost any lighting conditions, and opens up a whole world of creative possibilities. A beautiful shot like this is only possible with very precise metering and exposure.

# White balance

## White may not be as white as you think

**When you look at, for example, a sheet of white paper, your brain adjusts what you see so that it matches what you are expecting to see. However your digital camera doesn't have any expectations, and the colour that it "sees" is the actual colour present in the scene.**

'White' light visible to humans can actually vary in colour from reddish orange to greenish-blue. This variation is usually described as a temperature range, with warm being the red end and cold at the blue end, and is usually measured in degrees Kelvin using a colour meter. Confusingly, the higher the colour temperature, the cooler the tone and vice-versa.

We perceive various shades of white light illuminating a scene as neutral, a clever trick performed by our brains to maintain a sense of normality. Digital cameras can perform the same trick using a feature called automatic white balance. The camera evaluates the scene through the lens, analysing areas it guesses should be white (highlights) and black (shadows). More expensive cameras have a more reliable ambient white balance sensor that measures the temperature of general, focused light. However these automatic systems can be fooled, so most cameras give you the option of setting the white balance manually, either from pre-sets that cover most normal lighting conditions or by making an accurate measurement of the prevailing lighting conditions.

In the example pictures on this page you'll see a scene lit by ordinary incandescent light bulbs, also called tungsten lighting. As you can see, when the camera is set to the warm artificial light white balance setting that suits this lighting, the light areas of the


INCANDESCENT, WITH DAYLIGHT WHITE BALANCE


INCANDESCENT LIGHT, INCANDESCENT WHITE BALANCE


DAYLIGHT, WITH DAYLIGHT WHITE BALANCE


DAYLIGHT, INCANDESCENT WHITE BALANCE

scene are neutral. The same scene looks very different when the camera's white balance is set to normal daylight colour temperature. Now there is a distinct reddish-orange cast. Light bulbs can shine with various colour temperatures. Cheap traditional, low wattage light bulbs tend to be the warmest in colour, while low voltage halogen bulbs are cooler in tone.

strip lights of different tone have been fitted side by side. So-called daylight tone fluorescent lights are not equivalent to real daylight. Better digital cameras will have a number of pre-sets for fluorescent light to help you match the white balance in these conditions more accurately. In our example here, the fluorescent light is a greenish yellow in tone.

> "We perceive various shades of white light illuminating a scene as neutral, a trick performed by our brains to maintain a sense of normality."

Another example is a typical noon day outdoor scene where the ambient white light temperature is cool. When the camera's white balance setting matches the cool tone of the brightness of the sun, everything looks quite normal. On the other hand, if the camera has been set for tungsten artificial light, the scene appears to have a very blue cast. Sunlight, like artificial light, can vary quite considerably in colour temperature. Early morning and late afternoon daylight is warmer as cooler components of the light are filtered out because it has to shine through more atmosphere and its pollutants as the sun is nearer the horizon. Meanwhile, cloudy and overcast conditions deliver a cooler light because warmer components are filtered out by the cloud.

Our third example is lit with fluorescent lighting, and presents an even harder challenge for your digital camera. The visible spectrum of fluorescent light is not a nice smooth line, it's full of peaks and troughs. Some fluorescent lights have a green cast and others a pink cast. These differences are visibly evident where

## Know your camera

➤ Nearly all digital cameras offer white balance adjustments accessible either from a settings menu or, typically on higher-end cameras, via an external button in conjunction with an LCD display.

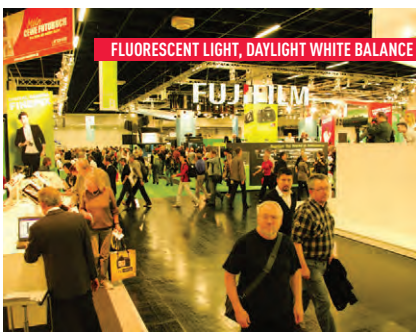
## Manual white balance

➤ Some cameras can let you calibrate the white balance setting manually. You simply hold a white card in front of the camera lens and press a white balance calibration button. The camera adjusts its white balance setting until the card is reproduced neutrally. Beware of this setting remaining on as when you return to normal shooting conditions it may spoil your pictures!

## Pre-set white balance

➤ All digital cameras offer choice of white balance pre-sets, and some cameras let you choose the setting via colour temperature values. Some really advanced cameras let you bracket white balance settings, or take a series of shots with settings above and below your standard setting. ■


FLUORESCENT LIGHT, FLUORESCENT WHITE BALANCE


FLUORESCENT LIGHT, DAYLIGHT WHITE BALANCE

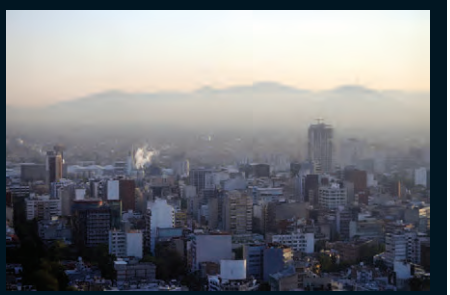
## TYPICAL WHITE BALANCE VALUES

### TUNGSTEN/ARTIFICIAL
2500-3000K
➤ Indoor lighting using traditional non-fluorescent light bulbs.

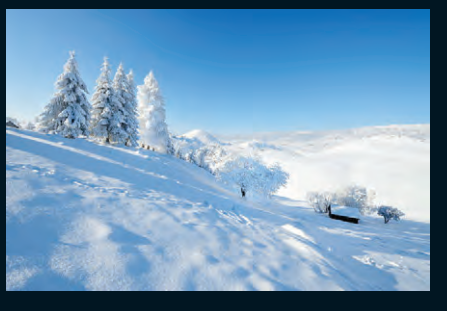
### FLUORESCENT
3500-5500K
➤ Include strip lighting and modern compact fluorescent lamps

### NORMAL DAYLIGHT
5500-6000K
➤ Typical mid-morning to mid-afternoon conditions at sea level.

### CLOUDY/OVERCAST
6000-8000K
➤ Hazy or overcast conditions.



### CLEAR BLUE SKY
10,000-15,000K
➤ Exceptionally clear mid-summer or high altitude conditions, especially snow scenes.



# How it's done

## Even casual shots can sell

Selling pictures to photo libraries is a good way to make some money from your hobby. If you've got some decent quality camera gear, the technical know-how to use it properly, and you have a good eye for a picture, you can make yourself some useful extra cash by selling your photos to one of the many online picture libraries, such as Alamy, iStockphoto or Shutterstock.

If you're sufficiently dedicated you could even make a decent living from it. Almost any type of picture can sell, it just depends on what picture editors are looking for that week.

Even casual shots, like this moorland image, can find a sale in a book about the local area this was taken, which means a sale for the library and a payment for the photographer.

> "If you've got some decent quality camera gear, technical know-how, and you have a good eye for a picture, you can make yourself some extra cash."

Photography is a rewarding hobby that can last a lifetime. Whether you just like taking snapshots, or if you're a serious shutterbug with a huge collection of complex equipment, there's always something new to try, or some clever technique to learn.

# CREATIVE PHOTOGRAPHY

## Learn the creative techniques the professionals use

**Now you're familiar with how your camera works and how to use its many features, you're ready to start learning the creative techniques that professional photographers use to achieve great results time after time. By learning and using a few simple techniques you can turn your photographs from well-taken snapshots into works of art of which you can be proud.**

Professional photographers use some very simple tricks and rules-of-thumb that have been developed over many years, including rules of composition that are inspired by classical art. Combined with technical skill and a thorough understanding of the principles of photography that we laid out in the previous section, these artistic methods produce well-balanced, attractive photographs that will really stand out. However the true artistic inspiration that differentiates a talented photographer from merely a skilled technician must come from within, and can't be taught by any guide book. To use an analogy, we can help you buy a car and teach you how to drive it, and even show you how to handle a car in a skid, but you have to decide where you want to drive to for yourself.

There are of course many more secrets and tricks in the field of creative photography than we have room to cover in this general guide to photography, but hopefully we can show you some basic principles that will form the foundation of your hobby and inspire you to learn more. If we succeed in that aim, then our job here is done! ■

"Professional photographers use some very simple tricks and rules-of-thumb that have been developed over many years, including rules of composition that are inspired by classical art."

The placement of elements in a scene can make a big difference. The position of the hat on the sand in the bottom left of this shot is crucial to the composition. Try covering it up with your thumb and see how the scene looks without it.

# Basic composition

## The simple rules that make a good picture great

**The main difference between a well-taken snapshot and a truly artistic photograph is simply a matter of composition. By changing the focal length, the angle and the position of the camera, the photographer can change the relative positions and sizes of objects in the frame to produce a more visually pleasing effect. Learning to do this is mostly a matter of practice and experimentation, but there are a number of simple tips and rules-of-thumb that can help you to take better pictures.**

The first and most important thing to remember is to take your time. Look at the scene in the viewfinder or on your monitor and try to see it not as simply a view but instead to imagine it as a finished print. Ask yourself if there's any way that it can be improved by maybe zooming in a little, or by moving the camera. A tripod is a very useful tool for this, since it lets you view a completely static image without having to hold the camera steady.

"Look at the scene in the viewfinder or on your monitor and try to see it not as simply a view but instead to imagine it as a finished print."

## The Rule of Thirds

➤ The most commonly used compositional technique is called the Rule of Thirds, and it's really very simple. Take a look at this picture: It's a nice enough shot, correctly exposed, in

focus and nicely lit, but now look at this one: Doesn't that look better? It's obviously the

same scene, and taken from roughly the same position, but this composition is much more appealing. The reason it works is because the lighthouse is now positioned off-centre in the frame, in fact it is one third of the distance from the right to the left. This type of composition is known as the Rule of Thirds.

The best way to apply the Rule of Thirds is to imagine the frame divided up into thirds both vertically and horizontally, rather like a Noughts and Crosses (Tic Tac Toe for those in the USA) grid. If you position the main elements of the image on these imaginary lines, or better yet on the intersections where the lines meet, you'll find that your image will look a lot more pleasing to the eye.

The Rule of Thirds works just as well in vertical-format shots, and is useful in landscape photography, since features on the horizon makes a natural dividing line.

Portraits can also benefit from Rule of Thirds composition. By positioning your subject's nearest eye on an intersection you will give your portrait much greater impact and really help to draw the viewer's attention into the picture.

Most digital cameras feature an option to superimpose the Rule of Thirds grid on the monitor screen to make this type of composition easier. You may have seen this and wondered what it was for; now you know the answer. ■

# Tabletop photography

## You don't need huge studios and expensive equipment to get good results

With the pro photographer's studio space packed with equipment worth many tens of thousands it must seem like us mere mortals could never enjoy a studio of our own. The thing is, even the greatest professional had to start somewhere. In this guide, we can show you that even your own dining table can become a studio, albeit in a much more modest way.

However, all the principles involved in a large studio shoot are just as valid for a humble tabletop setup too. All you need for this setup is your camera and tripod, a prop to photograph, two cheap desktop lamps and some white paper, oh, and your table of course.


"Simply put, an infinity curve is a surface that has no corners that show up when photographed."


## Getting set up

Our studio needs a basic floor. Some white paper laid flat on the table is a good start, but if you can set your table against a wall you can create an infinity curve. Simply put, an infinity curve is a surface that has no corners that show up when photographed. All you do is tack the top edge of your sheet to the wall and curve the paper down to the table. The radius of your curve is down to your personal preference or indeed how much space you have to play with.

One thing to note, an infinity curve is usually just one surface, unlike an infinity cove, which takes the idea of a single curved sheet and expands it into a whole room with no edges.

## Let there be lights

You can set your camera and tripod at table level just in front of your curve and now we can add some light. In the spirit of keeping it as simple and cheap as possible, all we have used are two basic, tiny, desk lamps from a hardware store. They are ideal as they have flexible necks which mean we can bend them to face any direction. The lamps can be set either side of our table. Now you can grab yourself a prop to shoot. Here, we've used a perfume bottle and some jewellery arranged on the white surface.

At this point you can focus your camera on the prop and get your framing and composition just how you want it. Keep your focusing set to manual so it doesn't try to refocus during the shoot. We can dial in our exposure settings once we have our lights set. If you had no lights at all to use, you could set your table near a window and shoot with natural light, this can work great but you are tied to a single light source and you can't change its direction. So, for our purposes, we are going to return to our studio setup with our lamps as our only light source.

Above is the most basic setup of our tabletop studio. A simple sheet of white paper that curves up from the table surface and tacked to the wall behind with enough slack in it to create a curve to keep any hard edges at bay in the final shot. The two lamps are extremely cheap and, although not very bright, are perfect for the scale we are working at here.

## Out of the shadows

Assuming the camera is set at the 6 o'clock position and your prop is centre of the dial, your lights can be at the 8 o'clock and 4 o'clock positions, just above your prop and pointed directly at them. This is a basic, but tried and tested setup for lighting. Setting lights is a matter of personal creative taste, but it is usually a good idea to set one light at a time rather than just turning them both on and seeing what happens. Not only that, if you work with one





light at a time, you get to see how each light source interacts with your prop and also what effect the lights have on each other when they are eventually both turned on. If you turn on the left light first, you'll probably notice straight away that the shadows are probably quite sharply defined and dark **[1]**. This is to be expected as the source of the light is a very small point-light and there is no other light to fill in the shadows. The same will be true of your right hand light too **[2]**. With both lights on at the same time, the effect is going to change. You may notice now that you have two sets of shadows, of course, and they are still quite sharp, but the additive effect of one light on another means that not only is our scene brighter, but the shadows are filled in and not quite so dark **[3]**. So we take the shots now? Well, there are a couple of simple tricks we can use to enhance the lighting further.

## Bigger is better

➤ As mentioned earlier, the shadows are quite sharply defined because the light source is small. Flash photographers encounter this problem all the time. Often, what they will do to soften their shadows, is to bounce their flash off another larger surface like a wall or ceiling, that surface is now their light source, and because it is much larger than the flash head, the light is more diffused and therefore softer shadows are the result. Our humble desk lamps don't have the power to bounce off a wall or celling, but we can introduce a sheet of paper into our setup and bounce the lamp light off that onto our prop. Because of the scale we're working at, the difference may not be huge, but every little helps. Repeat that on the other side as well and the improvement is visible **[4]**. Roughly speaking, our lamp's 20mm light has become a 100mm light source. Its power will have been diminished by having to travel further, but we can account for that in our exposure when we finally take the shots, which is now, right?

## And another thing

➤ There is more we can do. The more diffuse light we can get into our scene, the better it will be. How about putting a sheet of white paper across the top of our setup? It will act as another reflective surface and bounce some more light back into the scene **[5]**. Finally, just when you think it's all over, adding two more reflectors at the front of the setup with a gap between them just large enough to shoot through **[6]**, we are ready. We have softened the original harsh lighting and as a bonus, the metallic surfaces on our props are reflecting the white surfaces and have changed from flat black reflections to more interesting white highlights.

Finally, we can shoot. We're all set up, the camera is set to shoot Raw and we are in Aperture Priority Mode, so we just need to dial in the exposure. Our first test shot, with settings of aperture f/11, shutter speed 1/15th second and ISO 200 yielded an underexposed image. This is because the scene is predominantly white and the camera's metering system is set to try to produce an image that conforms to a mid-grey image. This results in whites that are too dark. We can compensate for this by dialling in some exposure compensation, where we deliberately make the camera overexpose the image **[7]** to make our whites the correct brightness. In this case +1EV (1 stop) is enough to get us our final shot **[8]**. The extra stop made the exposure time 1/6th second, essentially doubling the length of time the camera was letting light fall on the sensor.

## Coloured lights

➤ You could pack up and be happy with what you've learned, but you could always add yet another light source to pep the image up a bit. We didn't have another desk lamp, but we did have a powerful led torch, and as luck would have it, some coloured gels. You can get coloured cellophane from art shops but there are those resourceful types out there who have been known to use the coloured wrappers from sweets to create their coloured lights. We used purple to cover our torch and simply shone the light onto the curve behind the prop to add an extra bit of zing to the image **[9]**.

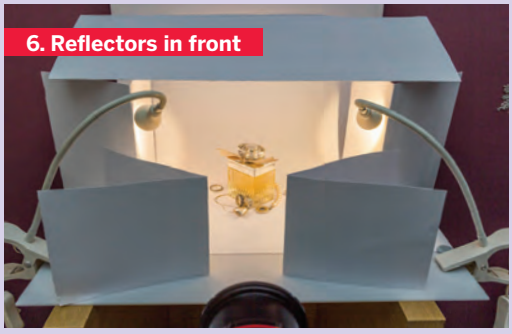
## Processing the shots

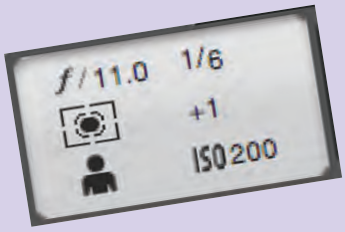
➤ All that remains is to get your shots into your favourite Raw processing application and review the results. This is a good time to check your colour balance as it is likely your little desk lamps use tungsten bulbs that throw an orange colour cast over your scene. However, because you have shot in Raw mode, you can easily dial out the colour cast by altering the colour temperature of your shots, or using the White Balance tool to select an area of your shot you know is white (which, lets face it, is quite a lot of it) to automatically correct the colour cast **[10]**.

## You're done!

➤ In our own, cheap to assemble, modest way, we have just gone through a shooting process that is used by all photographers regardless of whether they are using a vast state-of-the-art facility to shoot the latest Ferrari, or a tabletop enthusiast wanting to shoot an item to show on a certain popular internet auction site! ■

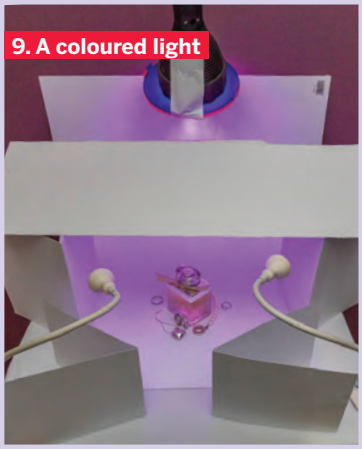

5. Reflector above


6. Reflectors in front



7. Exposure compensation


8. The final exposure


9. A coloured light

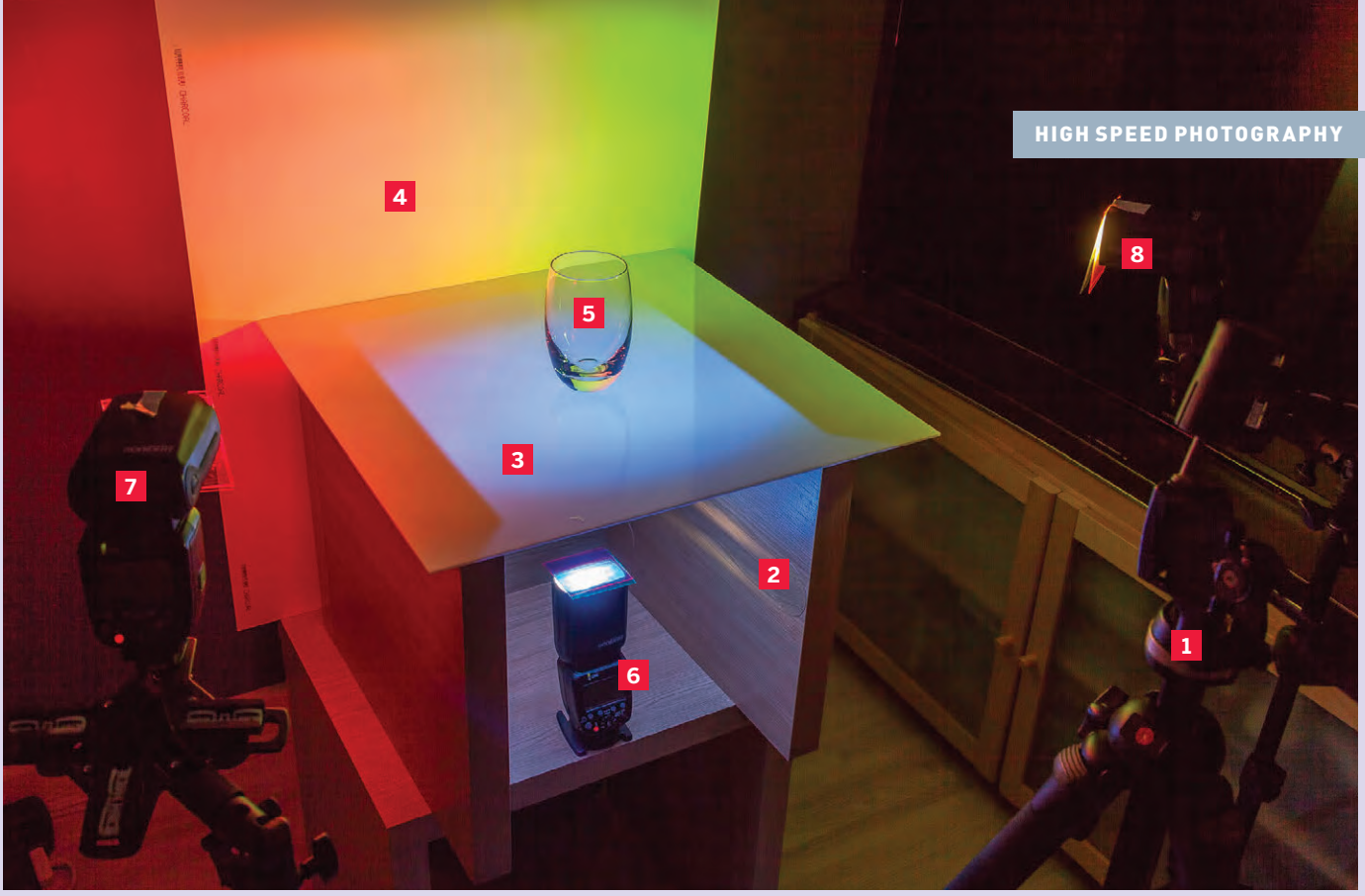

10. The chosen shot

# High speed photography

## A great tabletop project for the artistically adventurous

The water doplet. Probably one of the most recognisable high speed images and a very popular one to try and capture. To catch one though you would need some clever equipment or a very accurate shutter button finger! This image does prove that it can be done, with a little luck and a lot of trial and error.

Just to clarify, when we say high speed, we don't mean that we are doing it very fast! In point of fact high speed, in this context, refers to being able to catch rapid movement in such a way that you effectively 'freeze' the action. There are two basic ways we can do this. First is to have enough light pouring on to your scene to give you the required shutter speeds (in excess of 1/2000th of a second) to have a hope of stopping an event dead in its tracks. The second method relies on the stopping power of flashguns and not the settings used on your camera. The camera, depending on how many flashes you are brining to bear on the scene, is normally set to ISO 100 or 200, the aperture somewhere around f/7.1 and the shutter is set at the max sync speed of your camera, in this case 1/160th of a second on my 5DMk2. It can sometimes be hard to wrap your head around the idea that the shutter speed is not really a factor when using this method. You only need to make sure that if you press the camera button without the flashes turned on, the shot should look totally black. The light will be provided by the flashes of course, but in a very short 'pulse' that stops the action. Here's how this is achieved:




## The technical bit

Flashes (strobes or speedlights as they are also known) have an interesting operating characteristic. Their output brightness is not governed by the unit's power. The effective brightness of the flash is always the same. It is only the duration of the flash that changes, so less power means shorter flash duration. For instance, a Canon 580EX flash at full power has a duration of 1/1,000th of a second. Dial the flash down to 1/8th power and the flash duration becomes 1/9,000th of a second. Set it at 1/64th power as I have done here for my shoot, and you can achieve a flash duration of a mind-boggling 1/30,000th of a second!

Now imagine if this incredibly fast pulse of light was your only light source in a dark room. If you take a shot with your camera with the flash set as described, even though your shutter speed is 1/160th of a second as we mentioned above, your subject will only be lit for 1/30,000th of a second during the time your shutter is open. The trade-off with this method is that your flash is at a very low power setting and has to be very close to your subject. As this is a tabletop project, it's not an issue because you are going to be shooting at very close quarters anyway.

## The setup

Our shot is going to be a very simple water droplet splashing down into the surface of a small body of water. It is quite a popular photo to capture, and is easy enough to set up. The camera is set on a tripod **[1]** in front of a makeshift mini-studio. A table **[2]** is turned on its side and a piece of opaque perspex **[3]** is set on top. A sheet of white card is placed at the rear of our 'set' **[4]** to create the background. Our water receptacle, a simple glass **[5]**, is placed on the perspex, in the middle, and filled to the brim with water.

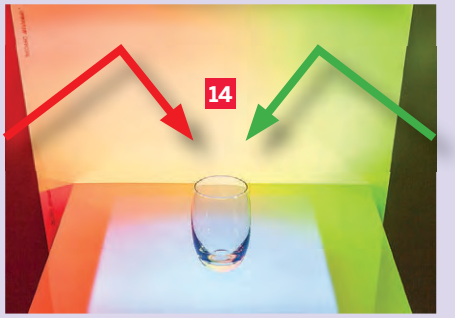
This example has three flashes **[6] [7] [8]** that were originally set up, although after a few tests, it was only two that were finally used. Just for the sake of creativity, one was set underneath the perspex, firing upwards, to create a nice pool of light at the base of the glass. Again, just to be a little creative, the flash underneath the perspex and the flash to camera left had coloured gels **[9]** put over them. After some trial and error **[10] [11] [12]** it was decided to use blue underneath and red on the left **[13]**.

## On reflection

One aspect to consider is that when photographing clear liquids, it can be more effective if you cast your light on a surface that the liquid can reflect **[14]**, rather than firing directly at the liquid itself. The flash on the left was aimed at the white card at the rear of this setup so that when it fires, it illuminates the white card and colours it red. Our water will reflect this colour as well as the blue light coming from below and this combination will hopefully create a nice dramatic effect.





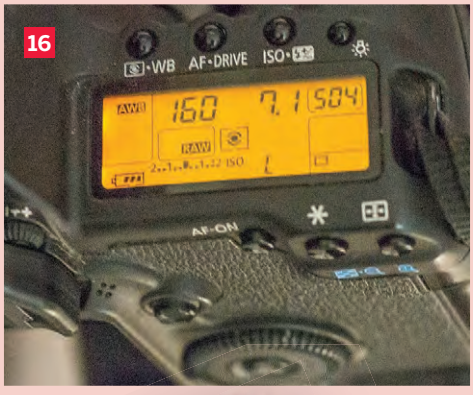
## The shoot

➤ The flashes are controlled by a wireless transmitter **[15]**, but you can also use a camera mounted flash, bounced off coloured card on to your scene if needs be. You could also get your flash off-camera by using a hot-shoe cord. After a few test shots to get framing and flash power dialled in, the settings worked out as follows: the camera was set at ISO 50, aperture f/7.1, shutter 1/160th **[16]** and was shooting Raw. The lens is a 24-105mm f/4 zoom lens **[17]**. The flash firing up from below was set at 1/16 power **[18]** and the flash on the left was set at 1/32 power **[19]**.

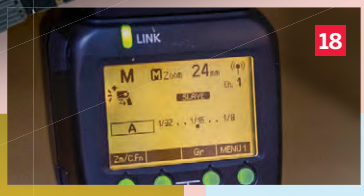
The area of focus was the point where we were attempting to get the water droplet to land. We could generate a reasonably consistent flow of drips by using a syringe filled with water **[20]** and slowly depressing the plunger and aiming our drops at the centre of the water surface. Trying to capture a single drop hitting the surface without the aid of specialist timing equipment could have you trying all day long with no success. This way at least, you can create a steady series of drops that will increase your chances of capturing the decisive moment of splashdown.

## Drip, drip, drip

➤ The process was to gently drip water into the glass and shoot at the same time. It can be a bit random, but as mentioned before, without special equipment that can time the camera's firing down to milliseconds, you just have to persevere. The sample shots you see here were all done by one person with syringe in one hand and the other hand pressing the shutter release button. So, many frames later, a fairly decent number








The shot of a droplet of milk dripping down into a small pool of the same liquid can create the ever popular and quite iconic image of the droplet splash. Even though the milk is white, it is reflecting the light cast by the flash with the blue gel on it.

> "The water drop images are very cool and do make for good abstract images..."

with usable droplet captures, it was time to go for the big one! The water drop images are very cool and do make for good abstract images, but it was time to end on a big splash. With the glass full to the brim, an ice cube was dropped in from a decent height to create a big splash. It took a couple of goes, but some great captures were in the bag. Finally, a quick experiment to see if another liquid could be used. The perspex was cleaned and a pool of milk was dripped into place by the syringe. Then more milk was dripped from above and captured in the same way as the water. Different coloured gels were tried on the flashes and another set of interesting images were captured.

## To finish

➤ The preferred shots were processed in a Raw editing package and then edited, rotated and cropped in Photoshop. Some colour values were altered even more to give an interesting surreal look to the pictures. So, with some initial trial and error, the end results could easily end up as a large format canvas print and be adorning the wall of some happy art lover! ■

# Food photography

## Get arty with some everyday food items

Back in the day, it was always something of a cliche to shoot or paint a bowl of fruit as an indoor still life project. It doesn't have to be that way, especially in the world of digital photography. Using fruit as your still life subject can be given a little twist with this easy to setup tabletop project. Rather than having a bunch of fruit in a bowl, how about something a little more creative?

Sliced fruit pieces are a lovely, translucent material, in a range of great colours. All well and good, but what if you shine a strong light through them? Now things get interesting. Suddenly the fruit glows and internal shapes and structure are seen. This is not how you normally see fruit and it sounds like a great image to capture.

These two comparison shots demonstrate the key visual difference that can elevate your food images away from the mundane. The image on the left is lit in a conventional way where the surface of the fruit reflects light as you would expect. The shot on the right is lit from below so now the light is transmitted through the flesh of the fruit and your food is given a great new look.

## Box clever

› To achieve this, you would need a light source of some sort that you can arrange your sliced fruit on. An old-style light box for viewing slides and negatives sounds ideal but they aren't necessarily just lying around your house waiting to be used. As an alternative, you can use a plastic storage box lined inside with some thin white paper that you can shine a powerful torch or lamp through to give you your light box. For our example, we are going to use a 500mm square sheet of white translucent perspex purchased online quite cheaply.

## Setting up

› The perspex is set on the legs of a small overturned table and one flashgun is set underneath to fire upwards into it. A two-flash setup is used above to create some fill light by bouncing off a piece of white card onto the perspex surface and cast some illumination on the slices of fruit. Our camera and a 24-205mm zoom lens is set up in front and above to capture the image. All flashes are controlled wirelessly but you can easily replace flashes with lamps or powerful led torches.

## Slice and dice

› Now we need fruit. The citrus and pulpy type fruits are perfect for this kind of shoot. They have great texture and colour. This example employs apples, oranges, lemons, limes, kiwi and water melon. The trick is

to slice them nice and thin. Too thick and the light will have trouble passing through them. Slice up as much as you need (or have room for on your home-made light box) and arrange the slices to suit your needs. Our example is just a random assortment laid out on the perspex sheet.

## Dialling it in

› Now we need to do a few test shots. After some test firings we have our settings dialled in. Bear in mind, if you are using lamps or torches, your exposure times will differ. Just make sure the most powerful light is the one underneath, shining through the fruit. The flash underneath firing up into the fruit was set on 1/16 power, whilst the two flashes above were each set at 1/64 power. The camera was dialled in manually at ISO 50, aperture f/5.6 and shutter speed 1/160 which is the max sync speed of the camera. This made sure the bottom light is getting through all the fruit slices without over-exposing any of them.

## Variety

› Now it's just a case of shooting away to your heart's content. Rearrange your fruit as you see fit. Try different angles and zoom levels. In our example, it was quickly realised that having the camera on the tripod was too restricting so we went hand-held with it instead. As the camera settings had given us a shutter speed of 1/160 and the flash duration itself was effectively freezing any movement, we could shoot without worrying about camera shake of motion blur. For a spot of variety, the 24-105mm zoom lens was swapped out for a 100mm f/2.8 macro lens for some close-up detail work. Shooting

with the lens at its widest aperture of f/2.8 meant the power of the flashes had to be adjusted. The flash firing upwards was adjusted to 1/32 power and both top flashes were set to 1/128 power.

## Pick your fruit

› Once the shots were in the bag, they were reviewed and the favourite images processed through a raw editing program, in this case Adobe Camera Raw. There were some interesting compositions that would not look out of place as large format canvas prints. Creative dropping also heightens the abstract feel. In fact, the only problem that remained, was what to do with all the fruit that was left over. Fruit salad anyone? ■

# Custom bokeh

## Have some fun shaping light

If you have ever shot a subject with a lens that has a very wide maximum aperture, you have no doubt noticed how the out-of-focus background has a particular quality to it. Bright highlights are transformed into 'orbs' of light by this blurring effect. This blurred out quality is referred to as Bokeh, usually pronounced "boh-ka". The bright, soft, orbs of light (also sometimes called 'circles of confusion') are a by-product of the out-of-focus light being shaped by the aperture blades within your lens. If your lens has an 8 blade aperture configuration, then your bokeh shapes will be octagonal as well, although the shape will become less well defined as the aperture opens up to its maximum. It has been known for some photographers to choose a lens specifically for the shape the aperture blades make at different aperture settings.


The aperture blades within your camera lens are responsible for creating the shapes of the bokeh you normally see in your shots. We can however, have our own say on what shape they will be.

## Getting started


That's all well and good, but there is a very simple way to shape the bokeh to suit your creative requirements. You aren't limited to the the shape defined by your lens. In this guide, we will show you how you can quite literally customise the shape of the bokeh recorded by your camera's sensor. It's nothing more complicated than a piece of card with a hole cut in it!

### Things you will need

1. Your camera.

2. A prime lens with a wide maximum aperture. F/2.8 or wider is recommended to give the best results.

3. An old UV filter to fit your lens. This helps keep the surface of your prime lens clear from dirt or fingerprints.

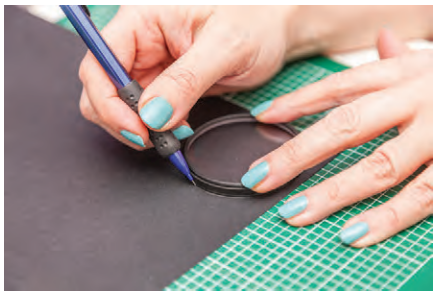
4. Some black card.

5. A pencil, ruler and a maths compass for describing a circle.

6. A craft knife.

7. Some fairy lights if you are going to be shooting indoors.

8. If you are shooting outdoors, you'll need to find somewhere at dusk that has lots of external lights, or maybe car headlights passing by on the road, even an amusement arcade or fairground.



1. Firstly you need to describe a circle on your black card to match the diameter of your UV filter/lens. It needs to be the same width as the inner edge of your UV filter/lens, so it will cover it and not have any gaps. Because I am using an old UV filter on my lens, the card can be cut to fit this.

2. I can simply trace around the circumference of the filter with a pencil onto the card. Alternatively you can measure the width of your lens and use a compass to describe a circle which you can then cut out with scissors or a craft knife.

3. Now, in the centre of the circle, draw a shape that you want your bokeh to resemble. Strong simple shapes are best to start with. Make the shape about 1/3 to 1/4 the width of the circle. Here, we have used a love-heart.

4. Carefully cut out your shape from the circle with a sharp craft knife. Then you can cut out the main body of the circle.

5. You should be left with a card circle with your custom shape cut out from the centre. Test fit the card circle in your UV filter or lens. Trim if necessary but try to avoid any large gaps that might let light through.

6. Using small pieces of masking tape or tacky putty, secure your card circle in place on the filter. If securing directly to your lens, take care not to get the front element dirty.

7. Your new custom bokeh filter is in place. Just fit it to your lens and camera and you are ready to start shooting with your very own custom bokeh.

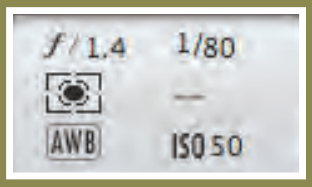
The Canon 50mm f/1.4 USM prime lens may not have the build quality of its L series counterpart but it has great image quality and a fast f/1.4 max aperture for a relatively small price tag.


## Shooting your custom bokeh

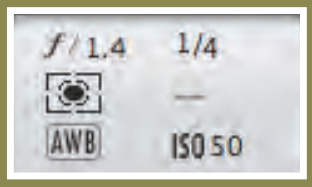
Some fairy lights covered with coloured gels and taped to white sheet will be our bokeh source.

This is how the bokeh created by the fairy lights will look without any customisation.

Once you add the filter, the shape of the hole cut in the card will shape the bokeh to match.




Settings required before the custom bokeh filter is added.




Settings required after the filter is fitted.

The setup can be as simple as you like. You will need a foreground subject and your lights that will act as your out-of-focus background. Bear in mind that you and your subject need to be a good distance in front of your lights so that when you focus on your subject, using an aperture as wide as your lens will allow (f/1.4 on my 50mm prime lens as used in the example) the lights will just be blurry orbs of light.

It is best to start without your bokeh filter on your lens. Compose your shot and take a test image to confirm that the background is as out-of-focus as it needs to be. A tripod may be a good idea if your shutter speeds are slow. Additional illumination on your subject with a flash is fine as long as it doesn't overpower your background lights.

In our example here, the test shot without the bokeh filter on gave us settings of Aperture f/1.4 - Shutter Speed 1/80 - ISO 50. I was at the lens's closest focusing distance to my subject (about 0.5m) and the lights were stuck to the lounge wall about 2.5m away. A quick look at the results showed the lights were nicely blurred.

Now it's time to attach your custom bokeh filter. Once it is on, re-compose your shot as before. You will probably notice a couple of things. First, your exposure settings will have changed and you may notice some dark vignetting around the perimeter of your shot. Both are by-products of adding what is essentially a second aperture to your camera. It is shaping the light certainly, but it will also reduce the amount of light getting to your camera's sensor, requiring a longer exposure time or an increase in ISO sensitivity to compensate. The vignetting, depending on how strong it is, will be something you can correct at the processing stage or just simply crop it out. You will also see that your circular orbs of light have now become hearts, or whatever shape you chose.

Now, our settings are Aperture f/1.4 - Shutter Speed 1/4 - ISO 50. As I am shooting what is basically a still life and I am using a tripod, I'm not too concerned about those settings. I take the new shot and voila! The bokeh has been re-shaped and is now yours to control. ■

# Up in smoke!

## Smoke patterns make for fascinating subjects

Wispy, ethereal and endlessly changing, smoke is a fascinating subject that for many, is an art form in its own right. Whichever way you view them, smoke patterns are wonderful organic creations. Thankfully, they are also quite easy to photograph. With a few quick steps, you too can have some smoky art adorning your wall or desktop wallpaper.

# The basic setup

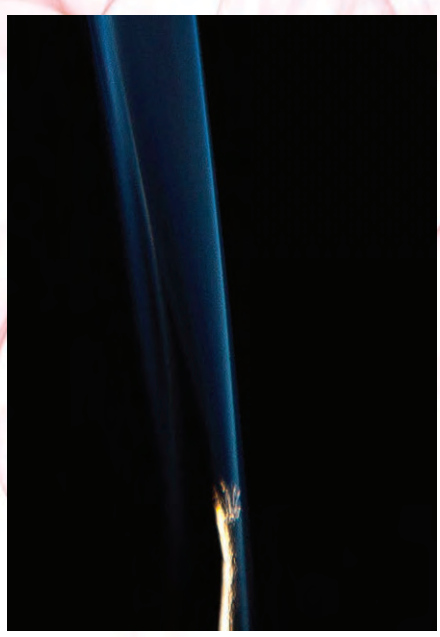

1. Rouge Flashbender
2. 600EX-RT speedlite
3. Incense stick
4. 24-105mm f/4 zoom
5. EOS 1DS Mk3
6. ST-E3-RT
7. Manfrotto tripod
8. Work surface

If you don't have speedlites or any light modifiers, such as the Flashbender shown left, don't worry. A bright desk lamp or one of the new generation of powerful LED torches will do the job with no problem.

The most basic setup requires the source of your smoke of course, and generally incense sticks are the most preferable smoke generator. You can use them individually or bundle a few together for a greater outpouring of smoke. You'll need to set up your camera with a medium zoom lens. For this example I am using my trusty Canon EF 24-105 f/4 L series lens. Setting your camera on a tripod is handy as it frees up a hand in order to waft the smoke around and the other to press the shutter button when appropriate and once you have your focus locked in, it won't change. Then you need a light source. A wireless flash would be ideal but of course you can use an off-shoe camera cord to get the light into the correct position. Failing that, a bright desk lamp or even a powerful torch will do the job admirably.

The setup is simple. A darkened room is required as you want your shot to be totally black apart from your lit smoke pattern. Shooting at night, of course, gives you the darkness you need if your room conditions are too bright. Now before you turn out the lights, place your incense stick upright on a surface and set your camera and tripod in front of it. Compose your shot so the tip of the incense stick is at the bottom of the frame and in focus. Make sure you are using manual focus as you don't want the camera attempting to continually refocus your shots. Our example is shooting in portrait orientation to catch more smoke

Set your camera's focus on the tip of the incense stick. You can't reliably predict which way the smoke will move, so this is the best point of focus.



A shutter speed of 160th and aperture f/6.3 at ISO 100 were enough to render the room black.


Check your test shots to see if your lights are illuminating the smoke enough.

At close range, the power output of the speedlite could be set at 1/8. The flash duration would be very short and freeze thesmoke in place.

For convenience, the speedlite was controlled wirelessly by the ST-E3-RT transmitter.

as it rises. Make sure you are as far away from any walls or surfaces that might catch any of the light. If you have a matte black surface to shoot against, then all the better.

As in our example, the light needs to be on the left or right of the incense stick at a right angle to your camera. Assume that your incense stick is at the 12 o'clock position and your camera is at the 6 o'clock position. The light source needs to be at either 9 o'clock or 3 o'clock facing directly at the incense stick. Camera settings will be dictated by the light source you are using to illuminate your smoke. Whatever light source you intend to use, make sure that no spill light falls directly onto the lens; this will cause unwanted lens flare and spoil the shot. A piece of black card to block any spill from the light source to your lens is ideal.

For my smoke shots I've used a rather handy device called a Flashbender. It is essentially a foldable mini softbox that is secured to your flash by Velcro. Inside the unit is a silver reflective lining that bounces the flash out through the diffuser panel on the front of the Flashbender. You can use it in its open state as a softbox, or as it used here, you can fold it inwards and replace the standard large square diffuser panel with a tall but thin panel that transforms it into a strip light. This makes the light output very directional, which is just what we need for our purposes here.

So, you can light your incense stick, turn on your desk lamp or flash and fire some test shots to see how the lighting is looking. If you're using a lamp or torch you need to dial in settings that render your background black but your smoke lit correctly. Bear in mind the shutter speed is a key factor depending on whether you want your smoke frozen in place using a fast shutter or more soft and amorphous with a slower shutter speed. I tried a few shots using just a bright LED torch and found I could get great results using an aperture of f/5.6, shutter speed of 1/100 at ISO 500. Make sure that your camera is set to shoot in raw format. Just for the extra processing options it will give you later.

In this example, my Canon 600EX-RT speedlite with Flashbender attachment was controlled using the Canon ST-E3-RT wireless transmitter and was set at 1/8 power, I got my Canon 1DS Mk3 dialled in and was using settings of aperture f/6.3, shutter speed of 1/160 at ISO 100. The composition and focus were ready, so, it was lights out and time to shoot. If you are in a very still room with no windows open, the smoke will rise very evenly. The fun part is adding a little turbulence to make the smoke 'dance' and create those gorgeous loops, swirls and veils. I've found that using a very thin stick (in this case, another incense stick) is perfect to swipe through the rising smoke column to create circular eddy patterns. A gentle puff of breath will tear the smoke column apart but as it settles down again, wonderful shapes will appear. There is nothing to do but click away and have fun. One word to the wise. Throughout the shoot, our incense stick is doing its job very well and your living room will soon be full of the odour of cinnamon, vanilla or whatever scent your sticks are. It is recommended that you take regular breaks and ventilate the room or it will smell like a new-age gift shop!

You can now take your shots and process them using your favourite software. All you want to ensure is that your smoke is as bright and detailed as possible and your background is dark as possible. This gives you the maximum contrast between your smoke patterns and background. ■

# Off-camera flash

## Set your flash and your creative vision free

If you have a flash in your camera setup, you have no doubt been enjoying the benefits of having an available light source when conditions demand it. You may discover there are times when you want a little more creative control over the end result. At the moment, your flash sits atop your camera providing one light source, perhaps with the option of bouncing it off a nearby wall or ceiling if you happen to be indoors so you can modify the light to soften the shadows. Anything is better than the direct flash rabbit-in-the-headlights look right? This is great, bounce flash can create some lovely images. If you were outdoors though, trying to do a portrait, where would you bounce the flash? Options become limited, and you may have to resort to direct flash which can kill the mood of the shot. You want to be able to control the direction of light and create some highlights and shadows to add modelling and depth to the scene. This is the point where you would want to get your flash/strobe/speedlite (whatever you want to call it) off your camera. But how do you do that?


> "Although there are a bewildering variety of options out there, the truth of the matter is, you do have plenty of choice."


**Detaching the flash from your camera and still being able to control it from a distance is not as daunting a prospect as it might seem to the fledgling strobist. The basic methods are:**

## Sync cords

➤ A wired system of cables and adapters. Basically, this is an extension cable that connects one end to the hot-shoe of your camera and the other to your flash. You can use multiple flashes if needs be, but it will require additional cabling, adapters and splitters. Also, with the correct cable, all the flash's original functions and things like eTTL metering and High Speed Sync will be preserved. The distance you can get between you and your remote flash is determined by the length of cables available. A standard off camera cord is usually about 1m. I have seen videos on YouTube where people buy several cables and hack them together. It can be no surprise that the big manufacturers might possibly limit cable length because they most likely want you to go for a more expensive wireless system.

## Optical triggers

➤ These are very cheap to buy, simple to operate and readily available. In fact eBay is overflowing with cheap non name-brand camera accessories such as this. Simply put, it is a wireless system that uses optical triggering i.e. a trigger that attaches to your flash unit and will activate it remotely when it senses another flash (usually the one connected to your camera) firing. This does, of course require a second unit on your camera (or maybe attached to a sync cord) to 'pop' and fire the optical unit attached to your remote flash. When outdoors, the optical trigger may become erratic or, at worst, even useless depending on the power of your trigger flash and the prevailing lighting conditions.

## Remote infra-red

➤ A wireless system that makes use of infra-red signals from a sender unit to trigger a flash with a built-in IR receiver. IR is good for indoor use, but does need line-of-sight for the sender and all receiving flash units. IR setups are also infamous for erratic behaviour in bright, warm, sunlit conditions outdoors. The big name brands have their own native IR-based wireless systems but it does mean you are tied in to a specific manufacturer to match your camera system meaning that this type of setup can be quite expensive, particularly if you have to buy a sender unit to control the flashes. You may be lucky, however, as the newer batch of cameras on the market have wireless control built-in. Multiple flashes can readily be triggered with this system.

## Wireless transceiver systems

➤ A wireless system that uses 2.4GHz radio frequency from a transmitter to any number of receivers attached to flashes to trigger them. The latest crop of wireless systems are based on what are called transceiver units. This means each trigger can be set to either send or receive a flash fire signal just by setting an appropriate option in a menu or by a flick of a switch on the unit. Once again, eBay has you covered for any number of cheap alternatives like Cactus V2's. You can pick up a Yongnuo RF 603 twin pack for about £30. If you are feeling a little more flush, then £300 will get you a pair of Pocket Wizard Plus III transceivers. I have to put my hand up and admit to getting a native brand wireless system for my Canon setup. It is an ST-E3 wireless transmitter and multiple Speedlite 600EX RT's.

All these systems, cheap or eye-wateringly expensive all benefit from not needing line-of-sight. You can have a flash in the next room and it will still get the signal to fire ok. They also have a good range and work equally well indoors or out. Bear in mind though that the cheaper units are cheap for a reason. Any flash connected to them will have to be controlled manually and individually. TTL metering is not available in cheaper units as well as High Speed Sync. Greater control of your flashes, such as eTTL metering and even High Speed Sync (even something called HyperSync in top of the range models), along with advanced control of multiple groups of flashes, comes at a price.

Although there are a bewildering variety of options out there, the truth of the matter is, you do have plenty of choice and within a wide price range. You just need to assess how you want your equipment choices to work in your standard shooting environment. If you shoot lots of close-up portrait or macro work, then you don't necessarily need a high-cost wireless system that supports multiple flashes that can be operated from a large distance.

A wired, sync-cord approach, is a great way to start out. Besides, it is a useful accessory to have in your kit bag anyway. As with everything photographic, you always have the option to upgrade to other systems later if needs be. With the cord approach in particular, if you find yourself running out of hands to hold and operate flash and camera, consider a cheap light stand to perch your flash on while you are concentrating on shooting. ■


Yongnuo transceivers may not be the most feature-rich wireless system you'll ever come across, but they are cheap and an excellent choice for a first foray into creating a wireless light setup.


Pocket Wizards are a very popular choice for pro photographers. There are a number of systems to choose from and can run to very high prices, but you do get what you pay for.


The Canon 600EX-RT, a powerful flash that can be controlled by the ST-E3-RT. A wireless controller that can work with multiple groups of flashes up to 16 units at once.

# BAILEY THE DOG GETS HIS CLOSE-UP

**I wanted to show a basic before and after setup using a sync cord and one flash connected to my camera to show the beginning of possibilities that off-camera flash can give you.**

## No flash

➤ Camera settings f/3.5 1/1000 ISO 50

In the first shot, Bailey is sitting on a wall down by the beach. It is a bright day with some great cloud formations going on behind him. I metered the shot to try to balance out the shadows and highlights.

The end result has Bailey correctly exposed but the sky looks a little washed out. You can probably do a bit to recover the sky using post-processing, but overall the shot lacks any punch or drama. Note the shadow from the sun.

**The shots of Bailey the dog were taken using a sync cord and flash. It is probably the simplest way of getting your flash off the camera hot-shoe and is a cheap way to begin exploring these new lighting possibilities.**

## With flash

➤ Flash at 3/4 power. Camera settings f/10 1/200 ISO 50

For the next shot, knowing I was going to light my subject using the flash off to the left side, I set my camera at its maximum sync speed (1/200) and adjusted the camera settings to underexpose the scene by about 2 stops.

The flash was on manual and set at about 3/4 power several feet away from Bailey. Now, the sun has been turned into a fill light rather than the main light source. The shadow cast by the dog in the previous shot is gone to be replaced by the shadow cast by the flash.

At this close range, the flash has become the main light. The shot has more drama now, not least because the sky is much stronger now that it is underexposed. Now that the flash is off to the left hand side, there are strong highlights and shadows to a give more 'pop' to the image, rather than a direct flash which can create the white-faced rabbit-in-the-headlights look.

Off-camera lighting is a creative and endlessly variable world that can take you from a 'sunlight only, shooter' to a full-on 'strobist'. Hope we have been able to light the way a little. ■

> "...your camera, no matter how new and expensive, cannot see all the subtle tones and variations in light and dark that the human eye can."

# The 'magic cloth' technique

## With some practice you may find there is no need for a camera bag full of ND grad filters

If you have ever shot landscapes to any great degree, you have no doubt encountered the particular exposure challenges that go with them. Scenes with your beautiful foreground interest and far off mountains and dramatic skies are perfect landscape subjects. When you take your shots, however, you realise that certain factors come into play. The main one being that your camera, no matter how new and expensive, cannot see all the subtle tones and variations in light and dark that the human eye can. A typical daytime landscape of foreground and bright sky has such a large dynamic range from the brightest

AFTER

BEFORE

This coastal scene is a great example of how the magic cloth can recover a picture. A standard exposure results in the sky being blown out to white with no detail visible in the highlights. But by just adding a screw-on ND filter and using a piece of card to cover the sky area, we can underexpose the sky and bring detail back into the clouds. Read on to find out how.

**highlights to the deepest shadows and is far beyond the scope of your camera. You can expose your shot for the sky and have your foreground very underexposed or the reverse where your foreground is correctly exposed but the sky blows out to white and all detail is lost. Given that in pretty much every daytime landscape your sky is always much brighter than the rest of the scene, this issue is ever present.**

At this point you might be considering reaching for a graduated neutral density filter. They are darker at the top and fade to transparent at the bottom blocking more light at the top of the shot where your sky is and leaving the remainder of the scene unaffected, giving you a much better overall exposure that retains highlight detail.

The choice of filters is pretty vast though. Do you use a hard grad, soft grad? What density of filter do you get? A two stop grad filter? A four stop grad filter? Where do you stop? Let's also consider the fact that, as is the way in photography, these items will not be cheap.

A good range of quality filters and filter holders could possibly set you back almost as much as you paid for your DSLR camera in the first place. That could be a serious restriction for the budding landscape photographer who wants to get as much of his image right 'in-camera' as possible.

It was this issue that prompted landscape photographer Tony Brackley-Prower to pioneer the technique that is widely known as 'the magic cloth technique'. Whilst there is not necessarily any cloth or magic involved, the technique only requires that you use an object that can completely block light entering the lens of your camera. Anything from a beer mat to the sleeve of your jumper can be employed. If you're staring at these words wondering just what on earth that means then read on. ➤

# How it's done

## Simulating a graduated filter with the 'magic cloth' technique

First and foremost, this technique has to be employed with longer exposures of 2 seconds or more. Put simply, you are using an opaque object (let's say a piece of card) to cover the camera lens blocking out the light. Then using your camera's timer or a cable release you open the shutter and whilst the exposure is happening you raise the card up, uncovering the lens from the bottom upwards. A fast shutter speed would make it impossible to use this technique, so be aware of this particular issue.

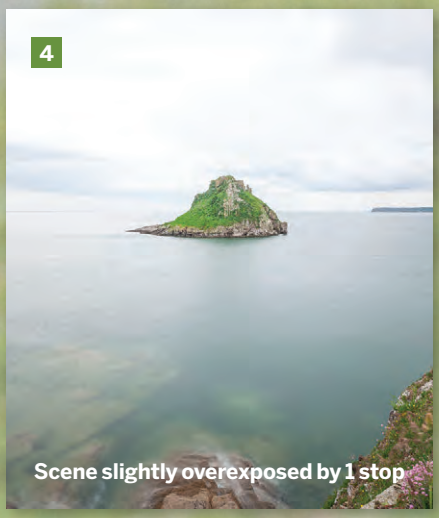
As an example: a 10 second exposure would give you plenty of time to slowly raise the covering up. At the end of the exposure the foreground has been exposed longer to the light in the scene than the sky, resulting in an underexposed sky. That is a bit of an oversimplification as the amount of time you block the sensor will result in a lighter or darker image. The covering must be kept moving at all times. Reduced movement of the card will result in a hard grad effect and increased movement will give you a similar effect to a soft grad.

Originally, this technique was developed for low light situations where the longer exposures were welcomed, giving you more time to move your lens covering. However, with the addition of one cheap screw-on ND filter, preferably an 8 stop filter or more, you can take this technique out into the daylight.

The procedure is pretty simple. Set up your camera on a tripod and compose your shot **[1]**, making sure you have your autofocus set to manual and pick your point of focus in the scene. You can also take this opportunity to figure out if you'll need to cover all or only some of the scene to balance the exposure. At this point you can estimate roughly where your card needs to be in its start position **[2]**. Using live view gives a good idea of where to place your card at the start of the exposure. Once the composition and focus are set, screw on your ND filter **[3]**. The camera will attempt to meter the scene, but I would recommend switching to manual mode and trying a few test exposures.

With your test exposures you are looking to get your foreground as well exposed as possible. In fact, slight overexposure by 1 stop is recommended as a starting point **[4]**. After a couple of test shots, my exposure for



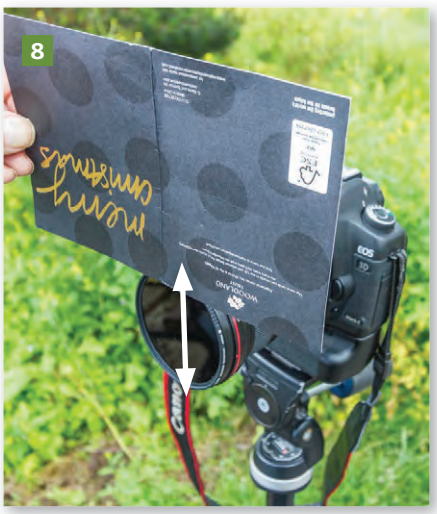
Keep settings on manual


5

> "I was surprised how quickly it becomes quite natural and intuitive."


6


7


8

the scene was aperture f/5.6, shutter speed 10 seconds at ISO 50. I could have reduced the aperture still further to f/16 or more for even longer exposure times, but felt that 10 seconds was a good starting point **[5]**.

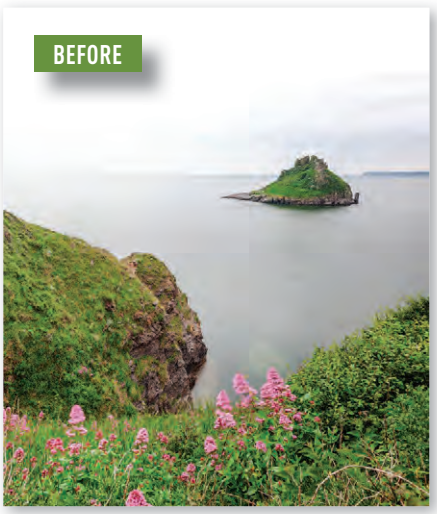
Next, you have to cover the lens with your 'cloth'; in this case it is a piece of card **[6]**. Press the shutter button and the exposure begins. As it starts, slowly raise the card **[7]**, revealing more of the lens, move the card to the top of the lens and then out of shot **[8]**. You need to try and time the raising of the cloth to coincide with the duration of the exposure. Keep the card covering the lens for too long or still having it in shot when the exposure has finished will result in some very bad underexposure **[9]**.

A key factor is that you always keep the card moving. Never hold it still and always make sure it is as close to the lens as possible otherwise light may leak in around the sides altering the exposure. Once the shot is taken, you can review it and see if you need to modify the length of time the card is blocking the lens. You may find that the card has to spend more time covering the top half of the shot to block more light for longer and therefore reducing the exposure in the sky.

Unlike using a filter system, the magic cloth technique does require some trial and error. In my experience though, never having done it before, I was surprised how quickly it becomes quite natural and intuitive. Yes, the technique has to alter for every shooting situation, but generally for most landscape shooting situations it does beat having to carry around a plethora of filters and holders. One screw-on ND filter that you can get for about £40 on eBay for your favourite landscape lens and a piece of card and you are set. Not only that, it is a great way to visualise the effect you are having on your exposures, and a certain satisfaction can be gleaned from knowing you did it all in-camera. ■


9

Card left too long at the top of the lens



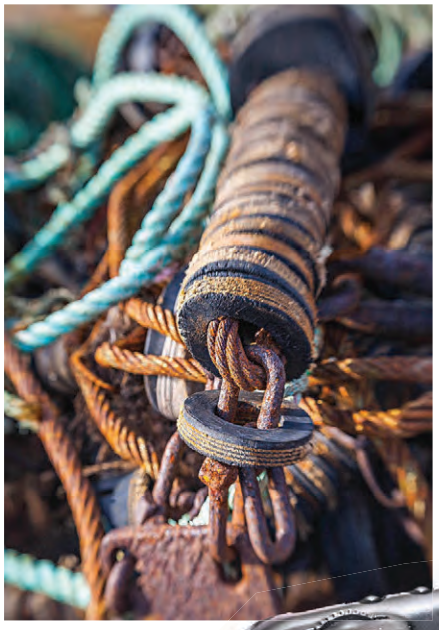

# Selective focus

## Where blur is beautiful

Selective focus is the term used to describe the method by which you render one part of your shot in sharp focus and the area beyond and/or in front increasingly out of focus. Any shot that has a small area of sharp focus whilst everything else is blurred, draws the eye to that focused area. Typically it is achieved using lenses with very large apertures of f/2.8 to f/1.2 or even wider. NASA once developed a lens that had a maximum aperture of f/0.7 that was used by the famous filmmaker Stanley Kubrick for one of his early films.

This picture was taken with a 100mm f/2.8 macro lens but it was used on a crop-sensor camera to give a magnification factor of 1.6. At its closest focusing distance, the subject fills the frame and the very shallow depth of field removes any unwanted background distractions.

Below are some Lensbaby image examples. The Lensbaby optics are set at f/5.6 with a 50mm field of view. You will need to adjust your shutter speed and ISO accordingly to correctly expose your images. It is up to you to manually operate the 'bellows' to pick your point of focus and move it around the frame.



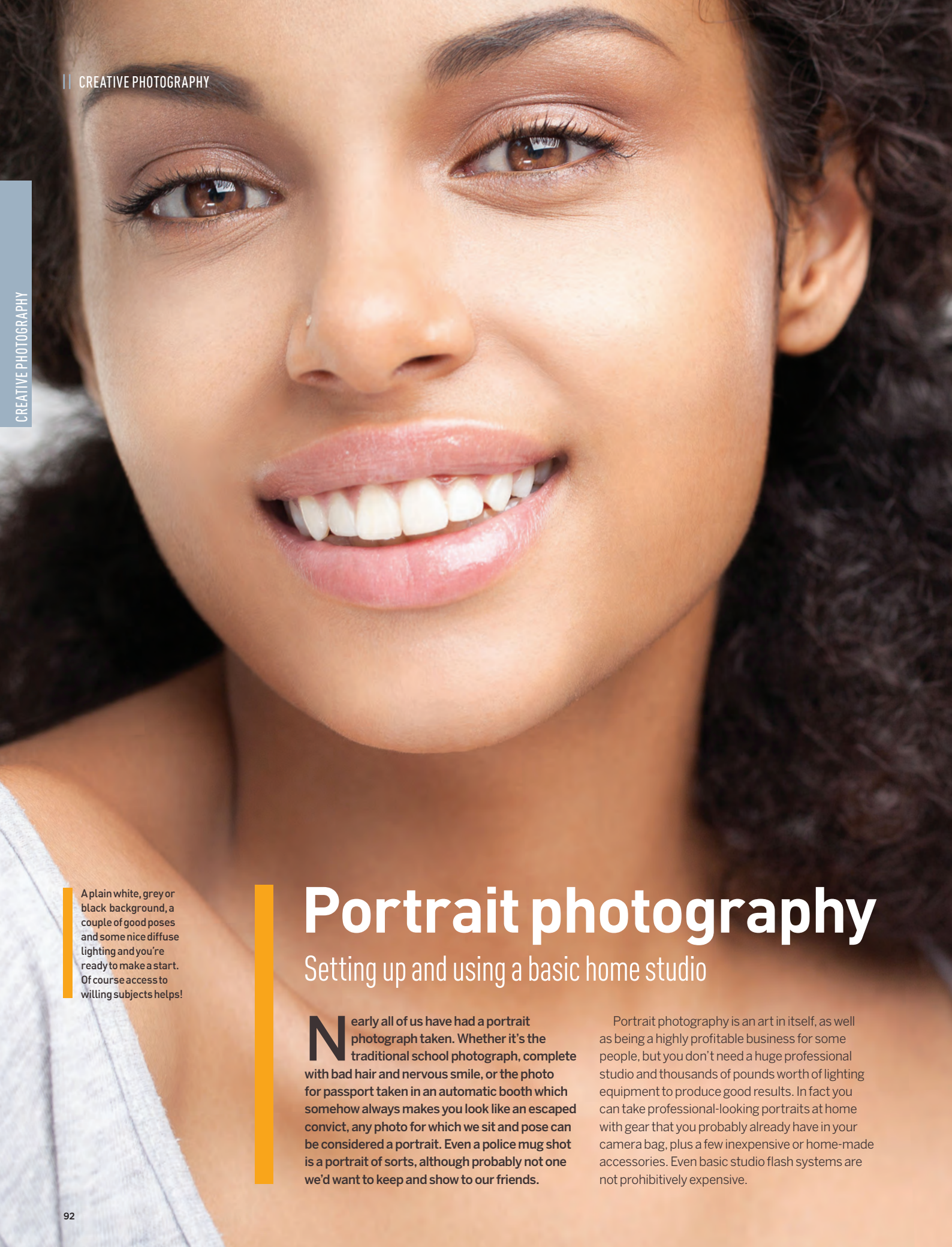
As is the way in photography, any lens that incorporates 'fast glass' usually comes at a price. Prices can range from £75 for a basic 50mm f/1.8 prime lens up to £1700 for an 85mm f/1.2 prime and a poverty-inducing £8000 for a 400mm f/2.8 super-telephoto lens. Another specialist lens that allows you to tinker with focus in interesting ways is the tilt-shift lens. It is made up of a special mechanism that can let the lens tilt up and down by about 7° and also shift left and right (or up and down if the lens is rotated) by about 12mm in each direction. A typical tilt-shift lens will set you back £1800. The so-called tilt-shift effect creates images that look like miniatures and has become very popular.

The Canon TS-E 17mm. A great tilt-shift lens with an even greater price tag to match.


There are a series of lenses made by the company Lensbaby who manufacture effects lenses. One such lens is the Lensbaby Spark that behaves a little bit like a tilt-shift lens. It is cheap, made of plastic and is operated manually by hand. The front element is mounted on a plastic bellows that you have to squeeze in and out to focus and then bend up and down, left and right, to move that focus point around the frame. At £50 it is perhaps sitting at the far opposite end of the scale from a proper tilt-shift lens and it does take some getting used to. It's cheapness does make it accessible and it can be good fun once you've mastered the slightly odd focus system.


Although not a true tilt-shift lens and with image quality that can't match up to a good prime lens, the Lensbaby Spark is a fun effects lens that gives a great hands-on experience when exploring the world of shallow depth of field and selective focus photography.

In terms of the image quality, if you set your expectations low enough, it will yield some decent results. The effect it produces I would describe as 'lo-fi meets tilt-shift'. You could argue that the effect could be produced in Photoshop, and you would be right, but it is a very hands-on way of experiencing how selective focus works. ■



A plain white, grey or black background, a couple of good poses and some nice diffuse lighting and you're ready to make a start. Of course access to willing subjects helps!

# Portrait photography

## Setting up and using a basic home studio

**Nearly all of us have had a portrait photograph taken. Whether it's the traditional school photograph, complete with bad hair and nervous smile, or the photo for passport taken in an automatic booth which somehow always makes you look like an escaped convict, any photo for which we sit and pose can be considered a portrait. Even a police mug shot is a portrait of sorts, although probably not one we'd want to keep and show to our friends.**

Portrait photography is an art in itself, as well as being a highly profitable business for some people, but you don't need a huge professional studio and thousands of pounds worth of lighting equipment to produce good results. In fact you can take professional-looking portraits at home with gear that you probably already have in your camera bag, plus a few inexpensive or home-made accessories. Even basic studio flash systems are not prohibitively expensive.

"You can take professional-looking portraits at home with gear that you probably already have in your camera bag."

## Have you got the room?

If you're thinking about setting up a home studio, the first thing you have to consider is the space you'll need. For portrait photos it's best to use a longer focal length to avoid distortion, and this means that for full-length shots of a standing subject you have to be around 5m away from them, which obviously means your studio area needs to be pretty large, about the size of a generous double bedroom. What you want to find is a large spare room with little or no furniture in it, with a floor area at least 5 x 4 metres with a nice high ceiling and a couple of mains electricity outlets. A loft conversion or decent-sized garage or lock-up is ideal. If you simply don't have that kind of space to spare at home, enquire at your local arts centre. You may find that they have studio space available for hire at reasonable rates.

Apart from floor area, the most important consideration for a studio is the control of light. When you're trying to set up the perfect portrait shot you need to have complete control over the lighting, so you don't want stray light from doors and windows creeping in and spoiling the shot. There are two ways to do this; either cover the windows with heavy curtains or blinds, or only shoot at night, assuming you're not worried what your neighbour will think when they see camera flashes coming from your bedroom window! If your studio space is going to be permanent you should also cover the walls, floor and ceiling in dark colours, preferably black. The less stray light you have bouncing around the room, the tighter your control over the light in your pictures.

## CAMERAS AND LENSES

➤ If you're thinking about portrait photography then the chances are that you already own a pretty good camera, so you've already got the most vital ingredient. The best choice is, as always, a digital SLR, although there are a few other types of cameras that can be used in a studio. The vital feature you're looking for is a flash hot shoe, found on some high-end compacts and super-zoom models.

Almost any DSLR will do the job, but obviously some are better than others. A useful feature is an X-sync socket, which is used to connect the camera to a studio flash system. These are mostly found on expensive high-end cameras, but some mid-range models do have them. If yours doesn't you can always buy an adapter that clips onto the camera's hot shoe. Another useful option is a flash sync or 'X' setting, again usually only found on more expensive models.

When it comes to lenses the choice is more a matter of personal taste, but it's usually a good idea to stay away from wide angle lenses unless you're aiming for a deliberately distorted effect. The most flattering focal length for portraits is a short telephoto, traditionally around 80-100mm (on an APS-C camera around 50-70mm, on Four Thirds cameras 40-50mm), so you're better off using the wider end of a telephoto zoom than the standard 18-55mm wide-zoom that comes as a kit with most current DSLRs.

Many photographers prefer to use prime (non-zoom) lenses for studio photography, usually of around 80mm focal length. There are several reasons for this. Most prime lenses have wider maximum apertures than the equivalent zoom lenses, giving much more precise control over depth of field, and in many cases their optical quality is better too. Another reason is that if you're shooting a set of photographs of the same model, using the same focal length for every shot creates an sense of consistency from one shot to the next.

> "When it comes to lenses the choice is more a matter of personal taste."

## Backgrounds

➤ There are several different types of background you can use for your home studio. A plain painted wall will do, but really you want something that can create a smooth curved corner or "cove" between wall and floor, to give the illusion of an infinitely distant background. The most professional option is a purpose-built paper roll background system, which consists of two upright stands, a crossbar and a wide roll of coloured heavy-duty paper, which can be rolled down to provide a background and floor covering. They are very easy to use, and a wide range of different colours are available, but they can get expensive. A typical support system costs around £140, and an 11m x 2.72m roll of background paper costs around £50. The trailing end covering the floor will get scuffed and dirty, so it will need to be cut off and discarded periodically. An 11m roll is usually only enough for half a dozen sessions.

A cheaper alternative is a fabric background. Your local fabric shop may have some good sized end-of-roll cutoffs available cheap, so go and ask. Ideally you want something at least 3m wide and about 4-5m long, so that you've got enough to cover the background and part of the floor. There are many purpose-built fabric backgrounds such as the self-supporting ones manufactured by Lastolite. They are harder wearing than paper, and can be washed if they get too dirty.

As for background colours, start off with two, one white and one black. The former is good for high-key portraits, while the latter is better for total light control and low-key portraits. Coloured backgrounds are tricky because you have to consider what your subject will be wearing, and the tone of the finished photo. If you want to use coloured backgrounds it's best to stick to pale pastel colours, particularly a light sky blue which goes well with most things. Patterned backgrounds are also problematic, for the same reasons. The most popular patterns are either a grey marble effect or white-on-blue clouds, both of which are unobtrusive enough for most portraits.

"Coloured backgrounds are tricky because you have to consider what your subject will be wearing, and the tone of the finished photo... start off with one white and one black."

## Lighting

Studio photography is all about controlling light, and for that you're going to need some sort of lighting system, and again there are a number of choices. The first decision is between continuous and flash lighting. Continuous lighting used to mean powerful 500W incandescent bulbs, which use a lot of electricity and generate a huge amount of heat, making them impractical for home use. However recently high-output low-energy fluorescent lamps have provided a more practical alternative, and there are several systems available based on this technology. They are great for close range still-life and product shots, but cheaper models lack the power output and versatility for serious portrait photography.

The most popular choice for the home studio is flash lighting, and there are a number of manufacturers that sell starter kits designed for home use, starting at under £200, although it's worth spending extra to get decent quality. Brand names to look out for include Bowens, Elinchrom and Interfit. Although you can shoot portraits with just one flash head and a reflector, its a better idea to start off with a two-head kit. A pair of 200Ws heads is adequate for home use, but a couple of 400Ws lamps gives you enough power to shoot in larger spaces. If you buy a third head you should also get a boom-arm stand, so you can use it as a hair light.

Flash systems offer a wide array of accessories, most with specialised uses, but you can start off with just the basics. Two medium reflectors with brolly mounts, two brolly reflectors or one brolly and a 1m softbox, and either a snoot or honeycomb for more directional lighting should be enough to get you started. You can always add more gadgets later. Barn doors are also useful for blocking out unwanted light.

As well as the lighting system a couple of reflectors are always useful. The best brand name for these is Lastolite, which makes a range of collapsible reflectors in different sizes, shapes and colours. Start off with a 1m silver/gold round reflector and see how you get on with it.

# Outdoor portraiture

## Swap the studio for the great outdoors

**Portraits are infinitely variable in their content, style, composition and location. Trying to pin down a simple set of ground rules on how to take a good portrait is tricky in the sense that everyone eventually develops their own style and way of doing things. After all, a golden rule I've heard mentioned time and again is: 'take the shots that YOU like'. It is quite easy to get started and use available light for your portraits but I've always held the opinion that if an experienced photographer and an enthusiast were taking shots side by side of the same subject with the same camera and lens on a sunny day, the shots are likely to be more similar than different.**

One of the things that can set your portraits apart from the herd is how you control light. More specifically, it's how you use and augment additional lights to create portraits that, as you develop as a photographer, become your signature. Sticking a flash on your camera and shooting away is the very tip of the lighting iceberg. On-camera flash is not ideal, unless you can bounce the light off a wall or ceiling, the results have a tendency to look like the good old 'rabbit in the headlights'.

If you are shooting outdoors in the open though, you can't just bounce your flash off the stratosphere or off a passing aircraft and direct flash doesn't give you much creative scope. What to do? Off-camera lighting is the way to take your shots to the next level. Just one light, and a diffuser such as a white shoot-through brolly, opens up creative possibilities. Add a second light to the mix and things get interesting. Getting your lights off the camera and working remotely is relatively easy to do and can be done on a budget at first, working up to more complex, and more expensive, wireless systems.


The Canon 600EX-RT, a powerful flash that can be controlled by the ST-E3-RT. A wireless controller that can work with multiple groups of flashes, up to 16 units at once.


The AlienBees AB1600. A cost-effective lighting solution where more power is needed than a standard speedlite. Controlled wirelessly by the Cybersync transmitter/receiver combo.

I've shot a wireless 2 flash setup using my Canon 600EX-RT speedlites mounted on light stands with shoot through brollies and my ST-E3-RT wireless controller a number of times. If time is short I have dispensed with putting the flashes on stands and simply asked for the help of a V.A.L. or two (voice-activated light stand) or, as they are better known, a handy person who is not in the shot! They can hold the flash up and move around at your command. They are much easier to move around than a light stand.

For our example here, it was actually a commission by a local Torquay rock band called Gravity Storm who wanted to update their group photography. We had arranged a couple of venues which had some interesting shapes and textures and some tunnels with graffiti. Knowing we were working late afternoon going into dusk and with the possibility of needing to be fairly mobile, I took my trusty Canon Speedlites, powered by rechargeable

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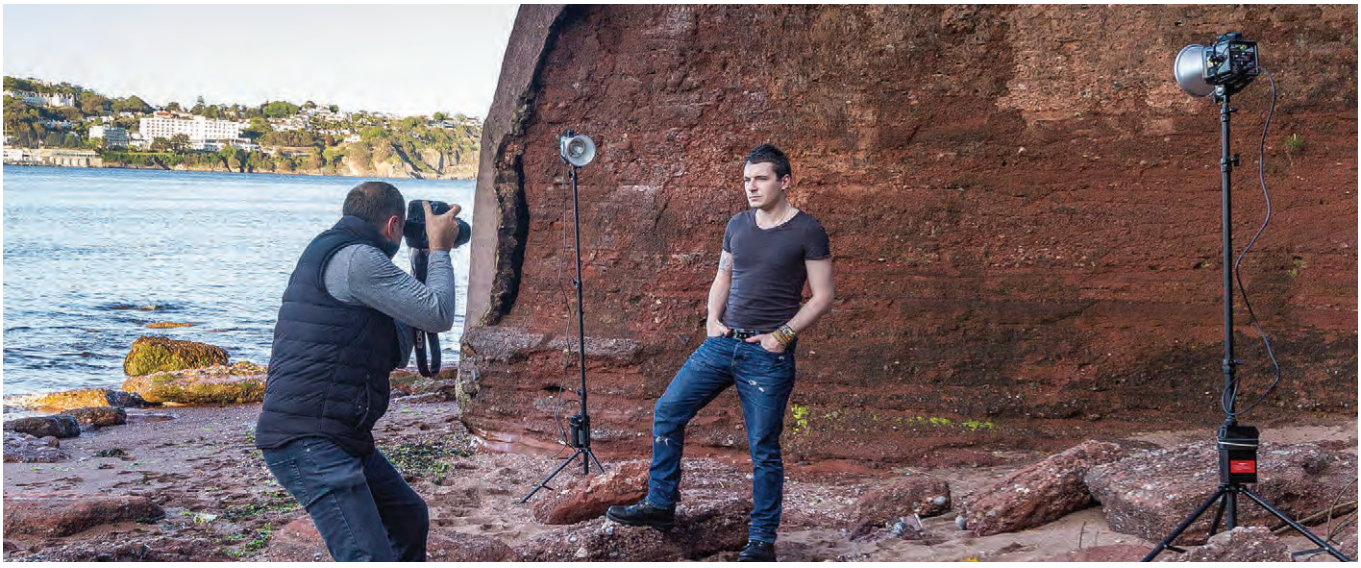
www.gravitystormband.co.uk

Underexposing your background and then lighting your subjects correctly in the foreground produces a dramatic effect. Certainly in the case of the boys from the band Gravity Storm, this was a look that suited them.



batteries and triggered wirelessly using a Canon ST-E3-RT trasnmitter. My flashguns could be controlled easily and at a fair distance if needed. If we required more lighting firepower (as in a previous shoot pictured above), then my more powerful AlienBee monoblocs would be preferable. The principles involved in the setup and shooting, however, are exactly the same.

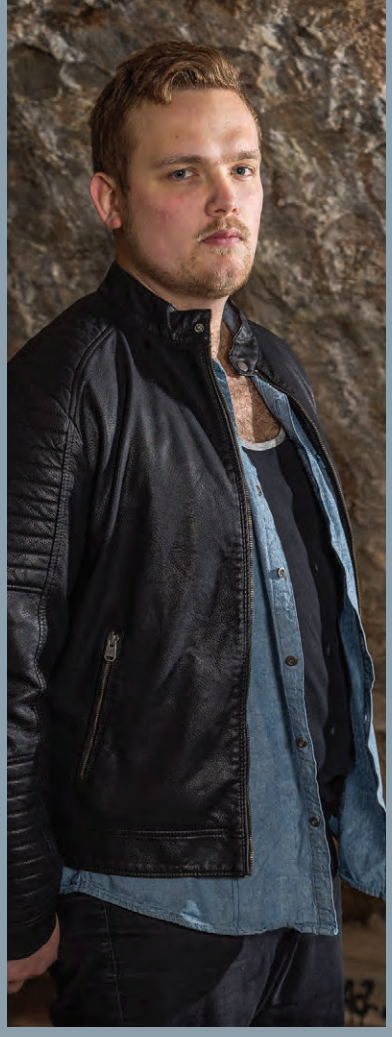
For each of the setups involving the Gravity Storm boys, the first thing I did was meter the scene to get an idea of the light levels. For one setup, we were in a tunnel and the readings came out at about Aperture f/6.3 with a shutter speed of about 1/15th at ISO 100. The shutter speed was not fast enough and camera shake or motion blur could have been a factor. However, because I wanted their surroundings darker anyway for the flash output to be more apparent, I could make some adjustments. In manual mode, I adjusted the shutter speed to a more usable 1/100th of a second. The boys were sitting in the first shots so this

CREATIVE PHOTOGRAPHY


was fine. The background was darker but obviously so were my subjects. The next step then was to add light to the subjects themselves.

Given that the boys were in a rock band, soft dreamy lighting was not exactly the look they needed. So we created a very simple cross-light scheme (see diagram above). Assuming your subject is standing at the 12 o'clock position and the camera is at the 6 o'clock position, one light was set to shoot through a brolly at 1/2 power from camera right at about 4 o'clock proving the main key light on the right side of their faces and the other was shooting at 1/4 power at the 11 o'clock position to provide some fill light and lessen deep shadows on their left side. As the lights were on stands, they were easy to move around to get the right mix of highlight and shadow. So the shoot went on in this fashion.


When shooting portraits, your choice of lens is very important. It is generally held that a lens with a focal length of about 50mm to 135mm is regarded as the optimum for portrait work. When working on a portrait shoot, I always default to my favourite mid-range wide angle zoom lens, the Canon EF 24-105mm F/4 L IS. It covers most of the preferred portrait focal lengths with the option to zoom out wide if you should need it. It has great quality optics too. When working with groups and individuals in one shoot, this is a useful lens to have. It is often sold with Canon full-frame cameras as the main kit lens.



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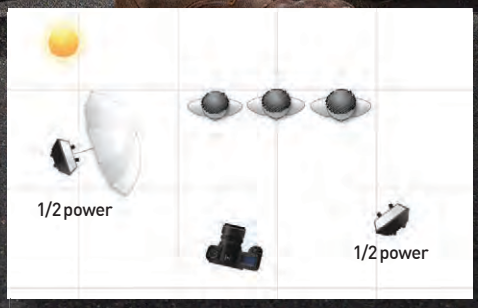



Stepping back to show how the lights are set for this group shot. The light on the right provides the key light whilst the light shooting through the brolly on the left is providing fill. As an added bonus, the sunset behind them contributed to give us a great orange rim light as well.

We moved to another spot on a bridge with an industrial area as a background for more group shots. The scene was underexposed as in the previous example by about 1.5 stops. The lighting was set up similarly to the previous location now with the three guys in a row with the unmodified key light to camera right, set just above head height, angled directly at their faces at 1/2 power. The brolly on the left was at 1/2 power just to make sure the shadows were eliminated from the boys' faces on the left side. We were shooting at sunset, and by this point the sun was out and provided an extra light source for us with a great orange rim light. This combination of underexposing the background and artificially lighting your subjects creates a dramatic and some would say surreal look to the shots. More group shots taken under a railway bridge with a grungey stone backdrop were used in this setup again but at slightly closer range with both lights at 1/8 power at the same distance both camera left and camera right for even lighting.

As you move from one lighting setup to another, you need to keep an eye on exposure settings. In the final shots it was getting fairly dark, so we had to up the camera ISO to 200, drop the aperture to f/4 and halve the distance

of both flashes to the subject. It is always a balancing act between camera settings and flash power but the more you do it, the easier and more intuitive it becomes. Keep checking your shot previews on your camera's LCD and look at your histograms.

Don't shoot away without checking the results of any changes you make to your settings. The beauty of digital is that you can keep shooting and keep experimenting until your shots are in the bag.

# In-car long exposure

## A different take on traffic trail long exposure images

On a personal level, this is something I always wanted to try. We have all seen long exposure images of night skies and the infamous traffic trails. This just takes that basic idea and changes the point of view to favour a driver in his car with the world going by outside at hyper speed. It goes without saying of course that the speed is achieved with a long shutter duration rather than breaking either the speed limits or the laws of physics! In our example we will show you the basic setup to achieve the end result you see here.

Because it was shot at night, the shutter speeds we are working with are right in the so-called 'butter zone' to get a good 'hyperspace' look to the streetlights and car tail lights zooming by as you drive at a nice and legal limit. In our case that was a leisurely 30mph. You could shoot an equivalent daytime version but it would mean being able to get a shutter speed somewhere in the order of 2-4 seconds. This can be done if you have a neutral density filter capable of cutting out enough ambient light to give you the exposure time you'd need.

A night time drive becomes a surreal journey into hyperspace with a little twist on the familiar traffic trail long exposure shots. Turn the page and read on to discover more about how this shot was created. ➤


The Gorillapod can secure smaller cameras with its strong but flexible and multi-jointed leg arrangement.

Back to our night time version.
The checklist for this effect is fairly straightforward. You will need your camera that is either able to shoot up to 30 second exposures or, in the case of exposures longer than 30 seconds, is capable of bulb exposures. A bulb exposure, usually shown as a B on your camera's settings, is a setting that allows the camera to keep the shutter open for an indefinite amount of time. This period of time can be controlled either by the photographer with their finger depressing the shutter release button for the desired amount of time, via a shutter release cable attached to the camera or using a device called an intervalometer which can automate the process without your input. You just set an exposure time, how many shots you want taken and the interval between each shot. Our example has us working around the 2-4 second area, so in this case the camera can be set accordingly just using manual settings.


This cable release makes the process of shooting long exposures much easier and also doubles as an intervalomter.

Lens choice comes down to personal preference. Our example was shot using a 15mm fisheye lens so you can see a lot of the car's cabin and the front windscreen and side windows. A 10-22mm crop sensor lens (16-35mm equivalent) will also do well. It may be that you have to set the camera further back in the car to get a wider view if that is what you want.

The camera will need to be kept immobile for the period of the exposure. A tripod will be essential. That said, if you are tight for space in the vehicle and the tripod doesn't really fit, you can always bungee the camera to the passenger seat headrest or secure it on the rear parcel shelf. If you are working with a smaller, light camera, the Gorillapod by Joby is a good option for securing a camera. The Gorillapod is small, light and very flexible.

So, you have your camera, lens and means of securing it inside your vehicle. You can set yourself up in the back with the camera and get your driver of the vehicle to start driving around the night-time roads. This option is great of course as it means you can do test shots to get the look you are after. It is worth noting that the previously mentioned 'butter zone' for this long exposure effect is based partly on personal taste. My experience of this type of shot leads me to recommend exposures somewhere between 2-4 seconds. I say this as I think a longer exposure time has greater streaking of lights but less detail and a shorter exposure time just looks too normal. We are after a good hyperspace effect but with enough detail left to see that you are driving on a road.

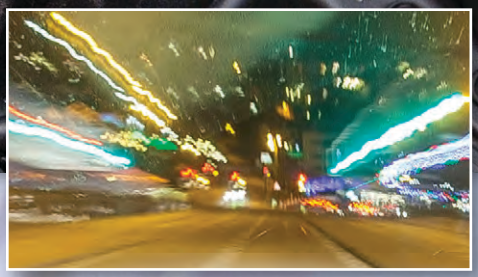

The Canon EF 15mm f/2.8 fisheye lens. Great for ultra wide angle capture if you are in cramped conditions.

Sitting in the back with the camera and doing testing shots on the move is not an option for me as I get terribly motion-sick if I'm not looking where I'm going. So in this case I found somewhere where the lighting would be similar to what I'd encounter on the road, set up my camera and lens on a tripod and positioned it above the passenger-side headrest looking out through the windscreen. I set the focus manually on the windscreen as this offered a good degree of sharpness in the shot both inside and out. Because of the wide angle there was a lot of the cabin on view. A few test exposures had settings of 2 seconds at f/6.3 with ISO 200 to get the best exposure of the cabin and the world outside. Now my problem was how to drive my own car and be able to take shots whilst on the move.


For those using crop-sensor camera as a 10-22mm (16-35mm equivalent) is a great wide angle zoom lens for wide FOV.

The cable release mentioned earlier would have been a good option as it meant I could

Wirelessly triggering your camera is a piece of cake with a device such as the Giga T Pro II. Affordable and reliable, it is worth the relatively small outlay.



The camera settings below were just right to create the light streaks you see above without destroying too much detail in the outside world.


After a bit of trial and error, I was able to secure my camera just behind the passenger seat with the tripod wedged between the rear seat and footwell. The 15mm fisheye could capture a wide field of view inside the car and with the wireless transmitter in my lap I could easily active the camera via the receiver attached to the camera hot shoe.

activate the shutter release with one push of a button and keep my attention on the road. There is also the option to wirelessly activate your camera. For a modest £60 you can get a device such as the Giga T Pro II. It is a 2.4GHz wireless remote control and intervalometer. It comes with a transmitter and a receiver which you attach to your camera's hot shoe and plug into the cable release port with the supplied cable. It doesn't require line-of-sight and can actually be used through walls to set off your camera.

I was good to go and set off with the Giga T Pro II transmitter on my knee. All I had to was press the button and the camera would fire using the manual settings. The trick was to shoot on a straight stretch of well-lit road and keep both myself and the steering wheel as immobile as possible because any movement during the exposure would result in too much motion blur. The only blur we want is the world outside streaking by. I traversed this stretch of road a couple of times and then pulled over to review the result. This is where I found a 4 second exposure was slightly too long and anything under 1 second was too static. 2 seconds seemed to be the ideal result for the road conditions I was driving in. If you were driving on a fast motorway doing 70mph then the amount of light streaking would be greatly increased for that exposure. It is just a case of personal preference.

All I had to do then was get home and review and process the favourites. The result is what you see here. There are those that take this idea one step further and attach the camera to the outside of their car or motorcycle. If you have a suitably robust method of securing your equipment, then this can make for some supremely dynamic images. ■

If you are feeling brave, you can attach your camera to the outside of your vehicle, or at the very least, have it lashed to the door pillar looking out an open window. Although it is definitely worth having someone on hand to grab it if it comes loose.

With a low angle and use of a very wide lens, this surfer, riding a barrel wave makes for a dramatic image. It goes without saying that special waterproof housings are required to protect your camera

Golfers don't like to be distracted when taking their shot. Using a long telephoto lens will keep you a safe distance from your subject who may be taking a very tricky shot.

# Action and sports

## How to capture movement and excitement

**Photographing sports and action scenes is a challenging but rewarding part of the hobby. At almost any sporting event, from the company five-a-side team on a Saturday fixture, to international events like the Olympics or the World Cup, you'll find photographers on the sidelines capturing the action. Professional sports photographers make a good living from it, and use specialised equipment such as advanced high-speed cameras and ultra-fast telephoto lenses costing thousands of pounds, but even the average hobby photographer with basic equipment can capture good sports and action shots with a bit of patience and effort.**

There are no hard-and-fast rules for sports photography, mainly because there are so many different types of sporting event. A technique that might work well for horse racing would be completely inappropriate for beach volleyball, for example. You have to learn to tailor your technique and the way you use your gear to the event you're trying to photograph. Many professional sports photographers will specialise in one particular type of event, becoming experts in one or two techniques that work well and can guarantee them the reliably good results they need.

With fast action motor sports, it is often prudent to position yourself in a spot where the vehicles are moving relatively slowly to enable you to capture the action.

> "Many professional sports photographers will specialise in one particular type of event, becoming experts in one or two techniques that work well."

Although there are as many techniques for sports photography as there are types of sport, there are some general tips that work well in most situations.

## Get close to the action

➤ There's a reason why ringside or front-row seats are more expensive. If you want to see the excitement and passion of a close-fought contest, it's a lot harder to do that from 200 yards away over the heads of a crowd. Get as close as you can without putting yourself in danger or interfering with the event you're trying to photograph. For events where you can't get physically close, use a telephoto lens to zoom in.

## Capture the moment

➤ Although most people seem to think that a fast continuous shooting speed is the key to action photography, in fact the professionals will tell you that good timing and fast reactions are much more important. It also helps enormously if you have an understanding of the sport you're photographing so that you can anticipate when the best moments are going to come along. A camera with a good fast autofocus system and quick shutter response is much better for action photography than one that can shoot at 10 frames a second. Being in the right place is also important. You're going to get more drama at the finish line of a race than halfway down the track.

## Control shutter speed

➤ One of the keys to good action photography is appropriate use of shutter speed. Although the traditional approach to sports and action photography is to use the fastest shutter speed available, and the sports mode on your camera will try to do this automatically, it's not always the best approach. Using a very fast shutter speed freezes the action, which can rob the picture of any sense of movement. To capture fast-moving subjects, try using a slightly slower shutter speed and panning to follow the action. If you do it right you'll have your subject nice and sharp against a movement-blurred background. If you are using a normal telephoto or zoom lens, i.e. not one that cost £3,000, then the restricted aperture at longer focal lengths will limit your choice of shutter speeds; don't forget you can get faster speeds at higher ISO settings, although beware of image noise above about 1600 ISO.

## Compose your shot

➤ Just because you're documenting a sporting event, it doesn't mean your shots can't be well-composed. Try to find a viewpoint that provides an interesting angle, or at least an appealing backdrop to your shot. If you can compose your shot so that it both looks good and provides an accurate impression of the event, so much the better.

One of the most useful compositional tips for action photography is the concept of implied movement; always try to have your subject moving into the frame rather than out of it. ■

# Landscapes

## There's more to landscape photography than just pretty pictures

**Landscape photography is like playing a musical instrument. It takes an afternoon to learn the rudiments, but it can take the rest of your life to really master it. It is a vast and rewarding field, as well as a lifelong hobby.**

Landscape art is not restricted to photography. People have been drawing and painting the world around them since prehistoric times. A walk around any art gallery or a quick search on Google will demonstrate that the landscape has always been a major source of inspiration to the world's greatest artists, and even a brief study of their work will show that there are as many different approaches to landscape art as there are artists. Studying how different painters have chosen to represent the landscape will also teach you valuable lessons about theme, composition and lighting that will improve your photography.

Photography is a relatively new art by comparison, but there are many photographers from the past century whose work is worthy of study. Among landscape photographers, few names are better known than that of Ansel Adams (1902-84). His large-format photographs of Yosemite National Park and other American landscapes from the 1920s and 1930s are world famous and his work remains popular to this day. Contemporary master landscape photographers such as Steve Mulligan, George Schaub, and the late Peter Jarver are also inspirational.

### The lessons of history

➤ The invention of photography allowed for the first time a truly accurate record of the changing world. Looking back now at landscape photography from the 19th and early 20th centuries can show all too clearly

"Studying how different painters have chosen to represent the landscape will teach you valuable lessons about theme, composition and lighting."

the dramatic and often devastating effect that mankind has on the environment. Today many of the best landscape photographers work in developing nations, recording a world that is vanishing all too quickly. Landscapes, especially urban landscapes, can have a social relevance that elevates them above the realm of mere poster art. A photograph that you take today could be a historical document in the future, the only surviving record of a vanished world.

That's not to say that all your photographs have to be taken in South American rain forests or the post-industrial decay of Eastern Europe. The landscape in first-world countries can change just as quickly. That pretty wooded valley that you photographed last year could be under a new industrial park or bypass next year. Your photograph then becomes a social document, all that remains of something that has been lost. Bear this in mind the next time you head out to take some photos. You have an obligation to future generations to show them the world as it looks today.

## Pretty as a picture

➤ Of course not all photographs have to have historical significance. Landscapes can be beautiful, dramatic, restful, or just plain pretty. Photography is your hobby, and it's there for you to enjoy. Landscape photography is usually a solitary occupation, so take pictures to please yourself. It doesn't have to be great art, but taking a photograph that you really like and hanging it on your wall makes any hardship you had to endure to get it seem worthwhile.

## Location, location, location

➤ Landscape is all about place. You are photographing a place, and you are also photographing from a place. Just as important as choosing what you are going to photograph is choosing the vantage point from which you are going to take your picture. If you are photographing a popular location, such as Dartmeet on Dartmoor or Swaledale in Yorkshire, take the time to familiarise yourself with the area, and also take a look at some of the guidebooks and see how other people have photographed it. Look at the lighting, the background detail, try to judge what focal length lens has been used, and most importantly try to determine from where the photo was taken. You don't have to copy someone else's work, but knowing what others have already done may give you some ideas. You may be able to get a better shot from a slightly different location, or by using a different lens, or simply by waiting until a different time of day.

## Patience is a virtue

➤ One thing that sets landscape photography apart from all the other branches of the art

> "Ask any landscape photographer about their favourite time of day for taking photos, and ninety percent of them will tell you that it's the very early morning ."

## FILTERS AND ACCESSORIES

➤ Whatever camera you buy, there are several accessories that you will find very useful. First, get a lens hood. Sometimes the sun is going to be in your shot or just out of frame, and a lens hood will help to reduce lens flare. If you have several lenses you may need a hood for each.

Also useful are a few filters. The most popular are a polariser for reducing glare, a neutral and a sepia gradient for enhancing clouds, and a skylight UV filter to prevent fogging at high altitudes and to protect the front element of your lens.

Finally, since most digital cameras don't have particularly wide-angle lenses, a wide-angle adaptor is a sensible purchase.

Sparse winter trees captured on a misty day have an ethereal and almost fairytale quality to them. You can almost picture Red Riding Hood on her way to Grandma's house.

is lighting. In a studio you can change the lighting by moving flash units around or by opening the curtains, but as a landscape photographer you have Mother Nature as your lighting technician, and she's not always on your side. You have no control over the weather, and you can't pick up the Lake District and turn it a few degrees to the left to get a better lighting angle. The only thing you can do is wait.

With practice you'll be able to tell in a few seconds what a particular scene will look like under different weather conditions and at different times of the day. Get a good large scale map of your chosen location, a compass and if necessary a set of tide tables and keep them in your camera bag. You'll be amazed how often you use them. Another increasingly useful tool is Google Earth, available to download for free. It features highly detailed 3D models of the Earth's surface, and the ability to model the position of the sun at any time of day, any day of the year. It's a great way to judge where the sunrise or sunset will appear on a specific date, and can give you some idea of how the shadows will look on the landscape.

## The early bird gets the shot

➤ Ask any landscape photographer about their favourite time of day for taking photos, and ninety percent of them will tell you that it's the very early morning, while the rest will tell you it's late in the evening. There's something magical about the light an hour either side of dawn and sunset that brings out the colours of a landscape like they'd just been freshly painted. Also, the strongly directional nature of low-angled light helps to delineate shapes and emphasise textures, adding a three-dimensional quality to a scene that can be lost in the bright overhead light of midday.

The early hours of the morning also have the advantage that there are usually far fewer people around to get in the way or distract you.

The best urban landscape photography also serves as a social document, reflecting the ways that people live around the world.

## Not just a pretty face

There's a lot more to landscape photography than just chocolate-box views of mountains, trees and rivers. The field of urban landscape photography is as wide and varied as anything the natural world has to offer. The same rules apply: lighting, location and composition are just as important in Yokohama docks as Yosemite park. Even scenes of appalling urban degradation can make a good photograph, but be aware that what is a photograph to you is home to somebody else. Treat the local inhabitants with respect, don't invade their privacy without permission, and leave when you're told to. If you are taking your camera gear into some of the world's less hospitable urban environments it's a good idea to hire yourself a native guide both for information and protection. Places such as sub-Saharan Africa, the former Soviet republics and many American and European inner cities can be very dangerous places for a naïve visitor, and there are people there who'd be all too happy to carry that heavy camera bag for you.

## Whatever the weather

Just because it's not bright and sunny outside, that's no reason to put your camera away. With a good wide-angle lens a dramatic stormy sky can be just as much a part of your landscape photo as the rocks and the trees. A lightly cloudy day, especially if the clouds are high in the sky and it has been raining earlier, will produce the most spectacular sunsets.

Rain itself can add to a landscape. A light haze of mist and water dripping from leaves typifies much of Britain's landscape, and if captured properly it can be very beautiful. Try using a circular polariser filter to cut down glare and saturate colours.

To help get the best out of the sky, try using a neutral density graduated filter. This will make sky darker and more dramatic.

> "The field of urban landscape photography is as varied as anything the natural world has to offer... the same rules apply: lighting, location and composition."

You can replicate this effect in Photoshop, but using a real filter when the shot is taken will also help to reduce the contrast between the sky and the foreground, avoiding burned-out highlights and featureless shadows that even Photoshop can't fix.

## Light and colour

Try to develop an eye for colour. With practice you can really learn to see the subtle ways that colours interact with each other, and with the ambient light. The colour of daylight changes depending on the hour of the day and the time of year, as well as the weather. Some scenes look better in the early dawn, others look better at sunset. It may take a process of trial and error, but sooner or later you'll realise that you can tell the difference.

Also, don't be afraid to do away with colour altogether. Ansel Adams shot in monochrome for a reason, and you can do the same. It's up to you whether you use the black & white setting on your camera to shoot the original picture in monochrome, or if you shoot in colour and then convert to monochrome later in Photoshop, although there are image editing techniques that can produce excellent monochrome images from colour originals.

## Equipment

You can take good landscape photos with nothing more than a pocket snapshot camera, but to ensure the best results it's advisable to use the right equipment. First you are going to need a good high-resolution camera. It can be a compact or an SLR, but it's best to go for plenty of raw megapixel power, preferably at least 12MP. You'll probably want to make large prints of your best work, and a low resolution camera won't produce enough fine detail. If you're going for a compact, try to get one with a lens that has a good wide-angle zoom setting, equivalent to at least 28mm.

After your camera, the second most useful item in your kit list is a tripod. Get one that's light enough to carry long distances but which is strong enough to support your camera, rigid enough not to sway about in the wind, tall enough to see over rocks and bushes, and durable enough not to break the first time you take it outdoors. Many landscape photographs are taken using very narrow apertures, which means slow shutter speeds and the risk of camera shake, which will ruin your shot instantly. A good tripod is the only solution.

A good weatherproof camera bag or rucksack is absolutely essential. The chances are that you'll have to haul your camera gear many miles from the nearest road, so get something light and comfortable to carry. You can guarantee that the point at which you're furthest from shelter is the exact moment that it will start pouring with rain, so get a bag that can protect your expensive gear from the worst the climate can throw at it.

Other useful equipment for the landscape photographer includes a good pair of walking boots. Waterproof breathable fabric ones are the best, but they can be expensive. Buy a compass and a map of the area you wish to visit, and learn how to use them. A good satellite navigation device or a smartphone GPS is also very useful, but bear in mind that batteries may only last a few hours. Make sure you pack a map and compass as well. A good set of waterproof outer garments are an essential. They'll keep you warm and dry when the weather inevitably turns against you, and they could save your life. All this might seem like a lot of fuss just to get a few photos, but even the British landscape can be surprisingly treacherous, and the weather can turn from bright and sunny to cold and wet with surprising speed. If you're prepared this won't be a problem, but if not you could get into a lot of trouble. ■

## COMPOSITION

**There are several simple guidelines for better-looking pictures that artists have learned over the years. They work for photographs too.**

### THE RULE OF THIRDS

Imaging the scene in your viewfinder is divided up into thirds by straight lines both horizontally and vertically, like a noughts-and-crosses game. Try to compose the shot so that major elements fall on the points where the lines cross, and large dividing objects such as tall trees or the horizon fall along one of the lines.

### FOREGROUND DETAIL

Try to include some element of the foreground in your shot, as this leads the viewer's eye into the picture and serves to balance out the distant view of the horizon. Things such as driftwood, small bushes, or small items of debris or even litter will work. At least one well-known photojournalist keeps a child's old shoe in his camera bag for just this purpose.

### LEADING LINES

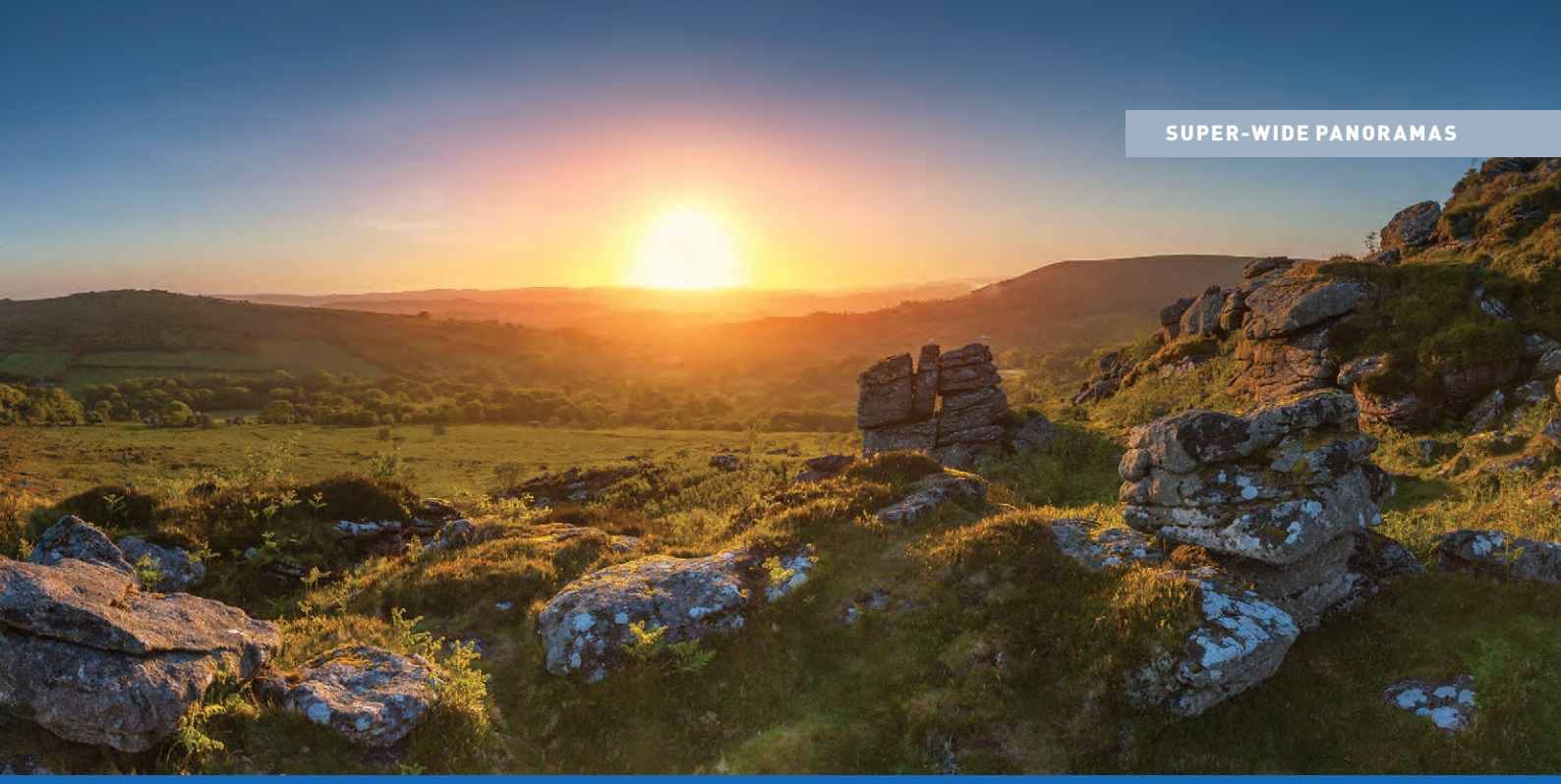
Lines such as railway tracks, roads, rivers or even the contrails of high-flying jets can also lead the eye into the shot. Notice where the lines lead and try to incorporate this point into your composition.

# Super-wide Panoramas

## 180º and 360º panoramic landscapes Packing more of the world into your shots

**"The process is pretty straightforward and just requires a little bit of thought regarding the approach to the sequence."**

Both images you see here were shot with a Canon 16-35mm wide angle lens in portrait orientation. Each pan is composed of 8 images stitched together in Photoshop. They cover almost a 180° field of view.



**There will come a time when your widest lens just won't be wide enough to capture the scale and grandeur of a particular landscape. This is where the ability to capture a panoramic sequence of shots and combine them into a much wider or higher resolution image comes in very handy.**

**The process is pretty straightforward and just requires a little bit of thought regarding the approach to the sequence you are about to capture.**

Essentially you are going to take a number of stills, rotating the camera a few degrees left to right with each shot taken, while allowing enough overlap from image to image so that they can be stitched together. This can be achieved with programs like Photoshop, PT GUI or Hugin, that rely on features in each shot being matched together to create accurate stitching points.

As a general rule, shoot with a wide angle lens and always try to overlap your images by 25% or more. For example, look for features that are right-most in your current shot like a car or building (something that isn't moving). For the next shot you rotate yourself on the spot so that those features are now left-most in the frame. These matching features will help your software to stitch the shots together more accurately and avoid odd tearing and mismatches that can spoil the image.

Another consideration is to try and avoid a scene where a lot of objects are very close to the camera. Unless you are using

Lenses like this Canon EF 8-15mm fisheye can shoot a 180° image in one go, but it is a hugely expensive lens and will produce a circular image when shot at 8mm.


**DID YOU KNOW?**

Parallax shift describes how objects close to you seem to move a greater distance relative those that are further away when you move your head or camera.

specialist panoramic photographic equipment and lenses, you will find that even slight unwanted movement and rotation of the camera (which is unavoidable if you shoot hand-held) will result in big parallax shift errors in very near objects that even the best software will not be able to put right.

To capture a basic panorama from left to right you can set up your camera in the following way. Firstly set your camera to focus manually. Select a point of focus roughly a third of the way into your scene. This is an utterly basic rule of thumb to quickly set yourself up to record as much sharp focus in your scene as possible. Working out the exact point into the scene that gives the best overall focus based on your aperture, referred to as the Hyperfocal Distance, is not to be approached lightly. For our purposes the most basic approach will do for now.

Your camera settings need to be set such as to give as little noise as possible but keep a fast enough shutter speed to avoid camera shake or motion blur. Camera shake is a main concern if you are going to choose to shoot hand-held. For shot-to-shot consistency, it is always a good idea to shoot in manual mode and use a pre-set White Balance setting rather than Auto White Balance. With trial and error you can arrive at settings that yield enough detail on the ground and the sky without either losing detail in shadows or blown out highlights.

It goes without saying (but we'll say it anyway) a tripod is the first requirement for good results. Images will be shake-free and the camera will rotate around a fixed point that won't move. It also gives you the option to have your camera set to shoot in landscape or portrait orientation. As long as your tripod and camera is as level as

The sequence of images above show the amount of overlap you need to have when shooting a multi-image panorama. Shots with lots of detail and plenty of overlap will result in more accurate stitching later.


The spirit level cube. Fits on your hot shoe mount and will keep you on the straight and level.

Right is the hi-tech method for shooting accurate panoramas. This device is called a Nodal Ninja. It is made from metal and is very robust with the optional levelling plate to provide a very quick way of getting things on an even keel.

Below is the low-tech method of shooting a panorama on, or near, the nodal point of your lens. The monopod I'm resting the lens on is the centre of rotation and the front of the lens sits on this rotation point.

possible the results will be good. Most good tripods come with a spirit level built in to check. You can even buy a little spirit level cube that sits in your camera's hot shoe to help with levelling. Some newer cameras now come with a digital leveller built in.

For even greater stitching accuracy, you can attempt to rotate the camera around its Nodal Point. The nodal point is the point around which the lens must rotate in order to completely eliminate parallax shift. Without specialist equipment it can be very difficult to achieve. On wide angle lenses this nodal point is generally at or near the front lens group. There is a very low tech way you can do it yourself, whereby you rest the camera lens barrel on a pole or stick (even a sawn-off broom handle) so the front lens is as near the pole's centre of rotation as possible. It will be up to you to keep the camera as level as possible but it does help avoid those nasty parallax shifts. Oh, and people will wonder why you are rotating around a pole stuck in the ground!

Once you have your sequence, you can process the shots, taking care to make sure they are as level as possible. If you have a strong horizon line, this makes the process easier. Or if you have any strong verticals like the side of a building, it all helps.

With a little practice, super-wide panoramas are yours for the shooting. ■

**IMAGE DATA** Aperture: 2.8 :: Shutter: 60 seconds :: ISO: 200 :: 15 image exposure stack

# Night photography

## Some top tips for quality night shots

**Whether it's the lure of bright city lights, barren moorland bathed in moonlight or a tumbledown barn in the country under a starry sky, night-time photography is a big draw for many photographers. It can be challenging, it can be very frustrating and time-consuming, but once you get the bug for it and get those first few 'wow!' images under your belt, it's a hard habit to break. Personally, I find it quite relaxing.**

As you are normally dealing with much longer exposures than usual and having to carefully compose and focus your shots, it forces you to slow it all down and take a much more considered approach. After all, if you set up a ten-minute exposure and the end result is disappointing, you could angrily pack up your gear, set off home, and miss out on a very rewarding aspect of photography.

To make sure you get the most out of your photos, here are a few tips that should see you well on your way to capturing amazing night shots.

### Use a tripod

➤ This may sound a bit obvious, but if you want to take photographs where exposure times can sometimes be in the tens of

A good quality, stable tripod, is essential for long exposure photography.

"At night, it's a different world out there. Your exposure settings are a world apart from those used in the light of day."

**IMAGE DATA** Aperture: 5.6 :: Shutter: 2 seconds :: ISO: 400

minutes, you're going to need something sturdy to put your camera on. You can of course set your camera to its highest ISO setting, open the aperture as wide as it will go and shoot handheld, but to really do the image justice you're going to need a solid tripod. One thing is worth mentioning; pay particular attention to the surface on which you're setting your tripod. The shot of the pier you see above is a good example. The tripod was pushed firmly into the sand and I set the three-minute exposure going. All was well until I noticed the waves getting close to my gear. One larger-than-usual wave and the feet of the tripod were swamped. Not a big deal, but the water soaked into the sand, the sand became soft, and my tripod started to list over to one side ruining my shot. The next attempt was carried out higher up the shoreline away from the waves.

## Keep the ISO low

Because you have your tripod keeping things steady for the camera, you can use the lowest ISO setting your camera will allow. This is a big advantage from the point of view of image quality. High ISO settings create a lot of image noise, and can affect the sharpness of the shot, detracting from the overall quality of the image. Many modern cameras can produce fairly clean shots at high ISO, and it may well be that you can work in the 800-1000 ISO range if the situation demands it, but generally the lower the ISO setting, the better the result will be.

A lot of cameras also offer Long Exposure Noise Reduction (LENR). This works by taking a second exposure of just the sensor noise which is then used to subtract the noise from your original shot. What this means is that if you take a five-minute exposure, it will then take another five-minute LENR exposure. For any exposure longer than a couple of minutes, the sensor may start to heat up and this introduces noise artefacts.

**IMAGE DATA**
Aperture: 3.5 :: Shutter: 60 seconds :: ISO: 400


A good quality lens, whether prime or zoom, is expensive, but it is expensive for a reason.

This is what LENR is trying to remove. It's just a personal preference but I don't use LENR. Like a lot of recent DSLRs my camera uses a CMOS sensor which isn't as prone to overheating, and I've taken ten-minute exposures without any noise issues. If you want to try very long night-time images like star trails, consider taking multiple exposures of 30 seconds each and stacking them in Photoshop. For example, 30 exposures of 30 seconds each is equivalent to one 15 minute exposure.

## Shoot raw

➤ Shooting in raw mode just allows you to extract the absolute last pixel of quality

**IMAGE DATA**

Aperture: 6.3 :: Shutter: 10 minutes :: ISO: 50

from your image and process it any number of creative ways non-destructively. You can happily alter white balance settings, cross-process, split raw and any number of effects without losing your original image. Like using low ISO, it's another way of keeping the image quality as high as possible.

## Lenses: zoom or prime?

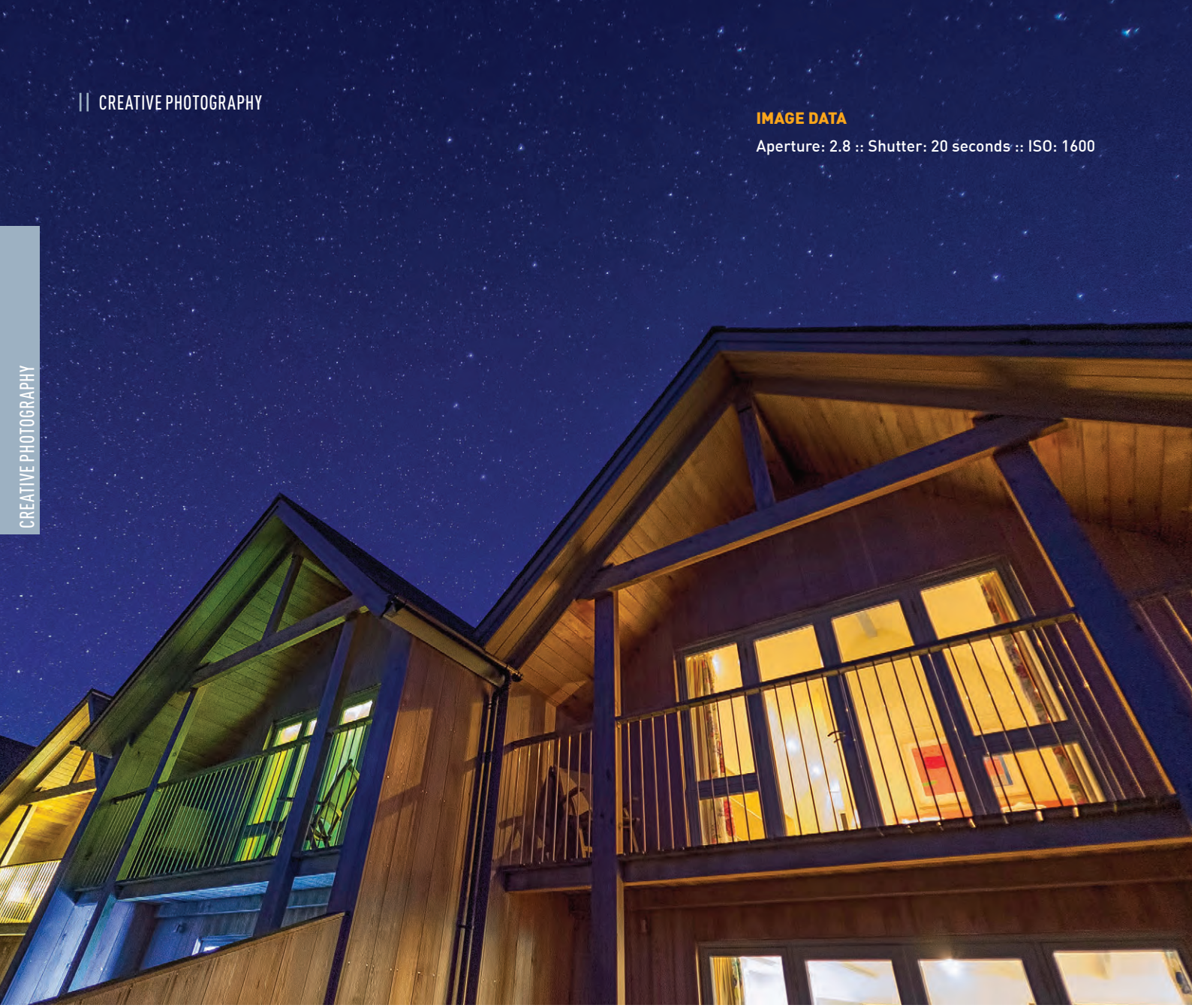
➤ When you're shooting at night there are any number of light sources, such as street lights, headlights, the moon, bright windows, neon signs, all of which are capable of introducing unwanted lens-flare that can ruin an otherwise excellent shot. Lens flare is caused by unwanted light scattered by the optical elements inside your lens. Zoom lenses particularly suffer from flare as they contain many more optical elements. Your best chance of reducing lens flare is to use a prime lens. A prime is a lens that only has one set focal distance and therefore uses fewer internal optical elements. Whether you use a zoom or a prime, a lens hood is recommended for both. Also, wherever possible, use a lens with as wide a maximum aperture as possible, such as f/2.8. You may well be shooting at smaller apertures than this but the image in the viewfinder will be brighter with a faster lens, helping you to see and set up your composition.

## Bulb mode

➤ With most current DSLRs the longest shutter speed you can use in normal operation is 30 seconds. However if you switch to Bulb mode ("B") on your camera, you can keep the shutter open for much longer periods. "Bulb" in this case is a reference to the old squeeze-bulb, pneumatically activated shutter release systems from the earliest days of photography. What you don't want to be doing though is standing there with your finger on the shutter release button for five minutes. Your finger is going to ache and you are going to move the camera and spoil the shot. Attaching a cable release instead

**IMAGE DATA**

Aperture: 2.8 :: Shutter: 20 seconds :: ISO: 1600




The cable release makes the process of shooting long exposures much easier.


Expositor is a great app for helping you calculate those tricky exposure times.

means you can activate the shutter and lock it open for as long as you need. These vary from the simplest 'press to activate' types to fully programmable interval timers that can take multiple shots with durations and intervals between shots set by the user.

## Take test shots at high ISO

Since most modern cameras offer very high ISO settings, it makes sense, before committing to a long exposure or a sequence of long exposures, to ramp up the ISO to the max, take a shot and have a look at the composition, framing and exposure. However if you've just done your test shot at 2000 ISO and it looks great, how does that translate to shooting the same scene but at a lower ISO setting to get the quality? There is some maths involved but not complicated, especially if you have your mobile phone with you.

**IMAGE DATA**
Aperture: 4.5 :: Shutter: 4 minutes :: ISO: 400

## The mathematical bit

At 2000 ISO your camera meter tells you that for the aperture you have set, a shutter speed of five seconds gives you a good exposure. Now you need to know how that exposure will change when you dial your ISO down to 100. Divide your high ISO number by the target low ISO number (2000/100 = 20) take your answer (20) and multiply it by the high ISO exposure value (five seconds) this gives you a final answer of 100 seconds (1.6 minutes). Still with us? If you prefer, there are apps for iOS and Android that can do the heavy lifting for you. My personal favourite, Expositor, has a nice user-interface that can quickly calculate any combination of EV, ISO, F-stop and exposure time you care to dial in. It's great for someone like me who is hard of thinking when it comes to arithmetic!

## Earth, sky and water

Use this to your advantage. It may have been done to death, but a coastline shot taken with a long exposure reduces the sea to that wonderful misty blanket. If there are patches of clouds in the shot, they appear to streak across the sky when your exposures get up beyond 30 seconds or more. Of course, who can forget traffic trails? They are the staple of long exposure photography. The key word here is experimentation.

## Light painting

Seen in the photograph at the top of this page, this refers to the technique of illuminating parts of your scene with additional light sources other than those in the shot. Light painting has become very popular and ranges from simply using a flashlight to illuminate a dark foreground subject, to using all manner of light sources, such as strobes, sparklers, coloured LED lights and even steel wool set alight to create huge showers of sparks, all of which create bizarre and abstract "light art". It's worth looking into if you're thinking of taking night photography to a whole new place.

It's dark out there. Go take some photographs. What are you waiting for? ■

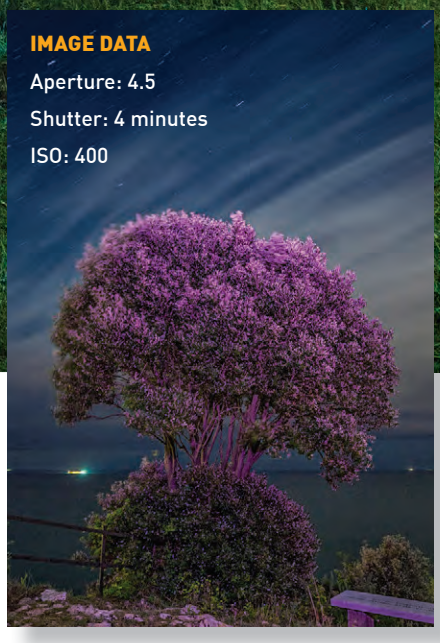


**IMAGE DATA**
Aperture: 4.5
Shutter: 4 minutes
ISO: 400

# Pet photography

## Time to get our furry friends ready for their close-up

**We love our pets. In fact for most people they are more than mere pets and become more like family members, the recipients of love, affection and lavish attention. It is likely then that their owners, at some point, are going to want photographs of their furry friends (or scaly, feathery or otherwise). I have a dog, and the number of photos that include him specifically outnumber those of all my other family members put together. However, pet photography presents its own special problems. Animals, as we all know, can be unpredictable, lazy, aggressive, hyperactive and downright cute. If you're thinking of trying pet photography, here are a few pointers to get you started.**

### Pet personality profile

➤ You don't need to sit the pet in question on a psychiatrist's couch and ask it to tell you about its mother, but before you start snapping away, find out about your subject's personality and habits. Where does it snooze if the sun is out? What is its favourite toy? Is it lazy, sleepy, or does it like to perch on a garden fence or hide in the grass? Take time to chat with the owner and observe your subject to gain some insight. It's also worth spending a little time getting to know the animal yourself. Cats, dogs, horses, they all have personality, and you need to ensure they are comfortable being around you, and you around them. Scaring a pet right at the outset is not going to make for a particularly happy or productive photo shoot.

### Close quarters

➤ Think about getting in close to your subject. If the pet is comfortable with you, and if it isn't too skittish, fill the frame with the pet's face. Get the eyes nice and sharp. Just like humans, this is a natural point of focus, although focusing on the snout of a dog or cat can also make for an interesting image in its own right. A good portrait focuses on the subject and not the background. Yes, there are times when shooting wide can create a great environmental portrait, but make sure you get a good selection of close-ups. A macro lens is perfect for capturing details of the pet, and shooting with a wide aperture keeps any background distractions out of focus.

> "Capturing behaviour is what can turn a good photo into a great one."

With puppies and smaller dogs it is a good idea to capture them at their own level. Rather than looking down upon them from human height, get down to eye level and you can see the world from their point of view.


Capture funny 'moments'.


Keep the eyes nice and sharp.


Get in close.


Try to keep background distractions to a minimum.


Keep an eye out for interactions or displays of behaviour.

Obviously if the animal is not content to keep still for more than a second, this can be a challenge. Keep snapping away; try using your camera's continuous autofocus to track the animal as it moves. If it's proving too difficult, let the animal play a while, and try again. Pets have very short attention spans, so keep it fun, break it up a bit if you have to and always reward and fuss them when they do well.

## On the level

➤ Your average dog is a couple of feet tall, cats even smaller. The average adult human is about 5' 7". If you photograph a pet while you're standing up, all you're going to see is the top of their head and their backs, not what you want for a portrait. Get down to their eye level, and see the world from their perspective. If you are able, get lower still. Try pre-focusing your camera and just holding it at ground level so you can look up at the pet. It's worth a try just for a new angle on things.

## Lighting

➤ When I meet a new animal, I'll always bring a flash and, with the owner's permission, while greeting or playing with the pet, fire a couple of test flashes away from them to see their reaction. In daylight particularly, they never seem to mind the flash at all. If they do mind, then stick with natural light and use a white or silver reflector if you need to fill in any shadow areas. Indoors, a bright continuous light may be preferable. I have a photoflood light that, rather than using old tungsten bulbs, uses three daylight-balanced energy saving bulbs. They are housed in a 22" reflector that I can cover with a diffuser to soften the light if need be. You can also try placing your subject near a window to use the natural light. If I am using flash with a willing subject then I invariably use cross-lighting, avoiding shooting a flash directly at them.

## Be patient and carry on!

➤ As they say, "memory is cheap, but memories are priceless". Pets are challenging subjects so you're just going to have to stay sharp and keep shooting. The more you shoot, the greater your chances of hitting that perfect shot! ■

It is normally an assumption that your shots be in colour. If the subject matter allows it, consider a mono conversion. Sometimes, converting to mono, gives an image a whole new feel that you don't get with colour.

# Macro photography

## Welcome to the fascinating world of macro photography


**Macro Photography, sometimes referred to as Photomacrography, is a form of extreme close-up photography. It is typically associated with the capture of very small objects.**

With the advances made in digital camera and sensor technology in recent years, many entry-level cameras can rival the macro capabilities of much more expensive DSLRs fitted with extremely specialist equipment such as magnifying filters, extension tubes or bellows between the lens and the sensor, or actually using two lenses that are joined together using a macro coupler to allow the shooting of your subject at higher reproduction ratios.

For most of us however there is a much simpler solution; a dedicated macro lens.

All the major DSLR manufacturers produce various macro lenses to suit your pocket. They range from 40mm up to 200mm versions with the closest focusing distance ranging from 5"-6" out to about 16". The measure of a 'true' macro lens is its ability to resolve an image on the sensor of your camera that is at least life-size, or a reproduction ratio of 1:1. There is a formula that lets you calculate the reproduction ratio of a macro lens called the '35mm Equivalent Reproduction Ratio', but let's dispense with the maths, the good

> "Macro Photography, sometimes referred to as Photomacrography, is a form of extreme close-up photography."

The tripod. One of the essential items for good quality macro photography.

rule of thumb is that if you photograph an object that is 35mm wide or 24mm high (the proportions of an old 35mm film negative) and it just fits, or is too big for your viewfinder, then you are taking a macro photograph.

Prices will vary of course. Lenses such as the 40mm Nikon AF-S DX f/2.8G retails at about £180 and the 200mm AF Nikkor f/4D IF-ED at a less wallet-friendly £1,000. Canon's 50mm offering the EF f/2.5 runs at about £220 while their 100mm image stabilised f/2.8 macro lens will set you back £700. Sigma and Tamron also manufacture lenses that range from 50mm to 105mm costing from £180 upwards of £600. The major difference between a 50mm macro and a 200mm (apart from the price) is a greater subject-to-lens distance on the longer focal length lenses. So, your expensive 200mm macro lens lets you keep further away from that pesky butterfly you're trying to photograph without spooking it.


It's fair to say that if you are starting out, one of the cheaper 50mm-60mm options is as good a place as any. There are still a few high-street camera stores that will allow you to demo a lens, a try-before-you-buy approach that is sadly becoming rarer in this online age. If you have such a store nearby, it is definitely worth a visit.

So, you have your camera and a macro lens. One other piece of equipment is essential to get you started; a tripod. There are many brands to choose from. The tiny Gorillapod, good for smaller DSLRs, costs about £30, while a good midrange tripod like the Velbon Sherpa 550R will set you back around £115. A sturdy high-end tripod from Manfrotto, with a good quality tripod head, will see you spending something in the order of £200 or more. You see, when shooting macro, if you are taking shots at the widest aperture with the tiniest sliver of your shot in sharp focus, the slightest movement of your camera or your subject will result in the composition's point of focus being very hard to achieve. If, on the other hand, you are shooting with the smallest aperture to wring as much depth of field from the shot as possible, then depending on how much light you have at your disposal, your shutter speeds may well be very slow, certainly slow enough to record the slightest camera shake. Hence, a tripod becomes invaluable in helping you secure those amazing macro shots.


No matter what aspect of photography you are into, there is always a bewildering array of lenses for you to choose from. If possible, try to go with the best bit of glass your bank balance will allow.

Many have found that once you start, macro photography can be quite addictive. The idea of exploring what is referred to as "near space" can be very rewarding. If your interest has been piqued, then read on, as we have some real world examples coming up on the next page. ■

# How it's done

## Who needs outer space when you can photograph near space?

It comes down to personal preference of course, but I would always recommend beginning your macro photography experience indoors. This type of photography does not require a lot of space. As long as you have your camera, lens, tripod, a tabletop and a light source, you are ready to begin. You're in comfortable surroundings and you aren't subject to the vagaries of the weather. You can concentrate on learning the craft and a cup of coffee isn't far away either!

The depth of field is shallow enough to render the far end of this guitar's headstock out of focus.

## Choosing your subject

➤ To be honest, anything and everything is fair game for macro photography. A lot of macro work can be seen on picture sharing sites like Flickr. The insect world is a popular subject for macro photography, as is plant life, but there is no restriction on what can be shot in the macro world. Browsing through these images may give you inspiration. In the examples seen on these pages, I have defaulted to the obvious, but readily available, flowers. I did once read somewhere about a piece of advice given to budding macro photographers: "If you're struggling to find a subject, go look in the fridge". The chances are there will be some fruit or vegetable in there that will happily pose for your shots; something colourful with interesting textures or maybe something more minimalist and abstract. It's up to you. ■






## Setting up

➤ In the case of our example, I set up my camera with my trusty old 100mm macro lens **[1]** on my tripod next to a small coffee table. I had a white reflector which I placed behind it and set up two speedlites controlled by an IR transmitter **[2]**, one directed at my subject and set manually to 1/64 power **[3]**, the other pointed at the reflector to bounce some light from behind. This one was set at 1/8 power. If you don't have off-camera flashes you could just as easily work on your kitchen table with a desk lamp or by a bright window.

My camera was set on manual mode at 1/250th of a second with an aperture of f/3.5 and an ISO setting of 50 **[4]**. The macro lens is set to manual focus. The combination of shutter speed and low power flash meant that I could eliminate any possible camera shake or movement in the subject. A shutter-release cable is also a wise addition as it means you don't have to touch the camera and risk it moving. At these magnifications, the slightest movement will be noticable.

For these particular shots I wanted to have very shallow depth of field. I wanted to pick out a very small area of focus and just concentrate on that. You could go the other way, of course, and set your aperture at f/16 or greater to resolve a larger area of focus. So after a bit of fiddling around with the light positions, subject-to-lens distance and composition of the flower, I could make a start on my macro project.

## Focus

➤ Just to reiterate; make sure your lens is set to manual focus. If left in auto-focus mode it may struggle to lock on to your subject or may actually decide to focus on to another area. Looking through the viewfinder, it is now a case of finding the point of focus, the point of greatest interest. Since we are dealing with very shallow depth of field, it is quite important to spend some time getting this right. To help me, I use a very bright torch to illuminate my subject so I can see it very clearly and manually fine-tune the focus. It is always good practice to check your focus after every shot because something might have moved, albeit a tiny amount. At this kind of magnification and at such a shallow depth of field, that could ruin the shot.

Since you're at home, you can download the shots you've done so far and review them. I did the same with the first set of shots I had taken. They were OK, but not great. Something was missing, some little detail to lift the shots. Staring out the window, I noticed it was raining. Rain! There was a lightbulb moment and I raided the cupboard under the sink for an ancient, empty bottle of detergent with a spray nozzle. I cleaned it out and filled it with fresh water, set up another flower and sprayed it liberally with water. As I sprayed, the liquid started to 'bead up' forming globules that clung to the petals and leaves of the flowers **[5]**. Some dripped to the edges of the petals and hung there. This is where it really took off. Suddenly the flowers were looking much more visually appealing. So I sprayed and clicked away quite happily. At the end of the shoot, I had a great collection of macro shots and a very wet floor! ■

"The insect world is a popular subject for macro photography, as is plant life."

The leaf of a Gerbera flower with a water drop just falling off into space! Caught by a 100mm macro lens and a flashgun duration short enough to freeze the action. A lucky shot that I was fortunate enough to capture.

> "Black and white photography can be seen as your interpretation of what is real..."

# Black and white images

## See the world in black and white as we introduce you to this timeless medium


**At the dawn of photography as we know it, when everything was fresh and new, your only choice back then was to shoot in black and white. Exposing images onto glass or metal plates gave way to the film and chemical process. It wasn't until 1936 that Kodak gave the world colour photography. However, black and white didn't die off like the black and white TV, in fact it flourished.**

Which ever way you look at it, colour distracts you from the heart of what should make a great photo. Things like texture, composition, form, lighting and good old storytelling can be swamped and made inconsequential by colour. It's not to say colour is an invalid medium. Black and white photography can be seen as your interpretation of what is real, whereas colour can feel more like a record of reality That may all sound a bit mystical, but in essence, many photographers would argue that black and white is probably the purest form of photography.

We could fill an entire book on its own with the intricacies of the black and white art, but there are some simple tips that can help you on your way to discovering why black and white photography is such a prized, creative, medium.

You would imagine that the starting point would be to grab your camera, set its functions to black and white mode and start shooting. Many photographers always shoot in colour, just so you maintain as much tonal variation in your Raw image as possible. It just gives you more data to play with when it comes to the conversion process. A key word in the last sentence was 'Raw'. Always shoot in Raw format. You want to record as much scene data as you can without your camera trying to process the image for you.

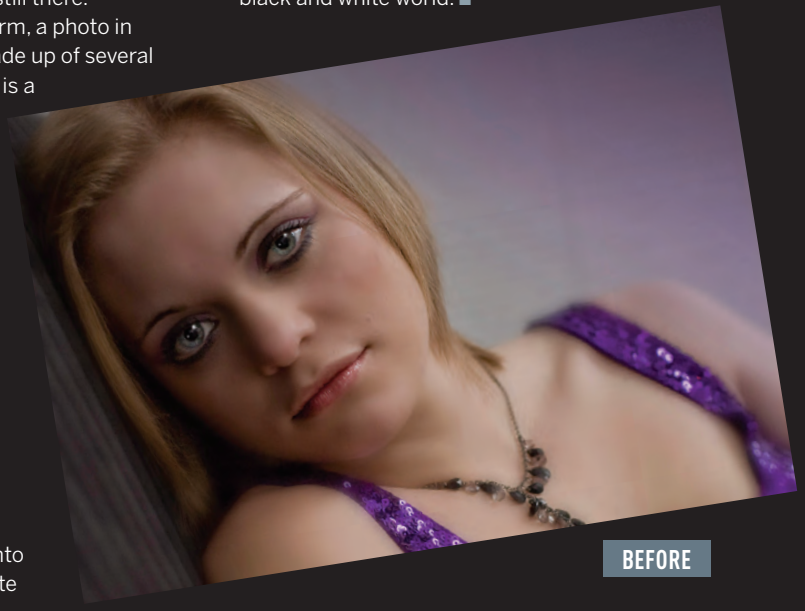
Although it might sound odd, you need to develop the ability to 'see' in black and white. A great visual aid is to shoot Raw, as we've said, but also set your camera's picture style to black and white. It displays a black and image on your LCD screen, but all the colour data is still there.

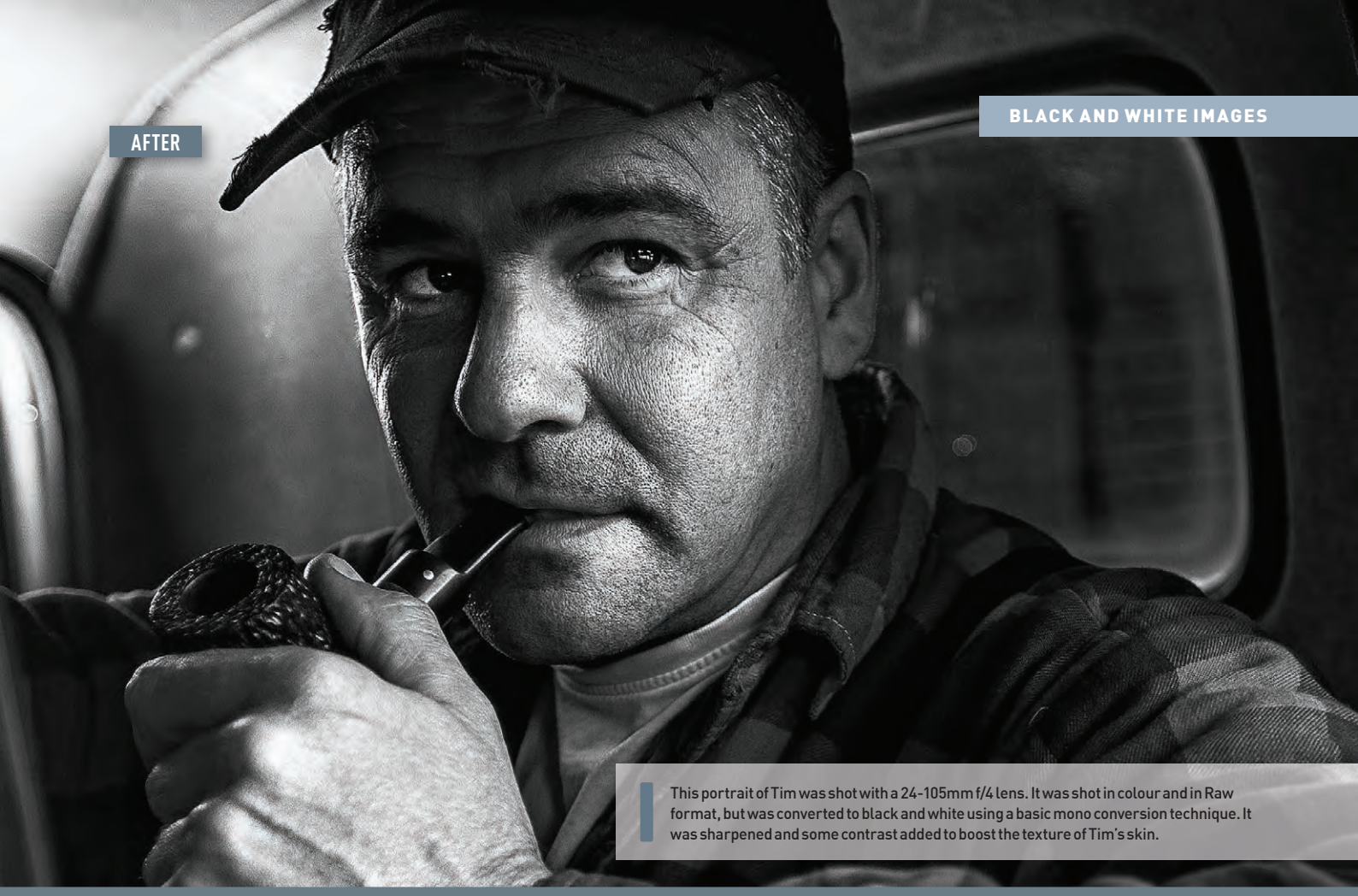
In its most basic form, a photo in black and white is made up of several components. Texture is a key ingredient, black and white loves texture. Harsh midday sun knocks everything flat, but the light glancing across a scene at sunrise or sunset makes texture 'pop' out of the image.

Tonal contrast is another important consideration. A flat image with very little contrast will not necessarily convert into a great black and white shot without some serious post-processing, although in some cases, low contrast images can be very visually appealing if done well.

Shape defines how an object looks in its simplest form, as an outline or silhouette only. Images based on shape alone can be graphically intense. Form in a shot, shows how something has depth and dimension. How an object is lit and casts shadows within its environment is the key to showing its form.

As mentioned before, we could go on, but hopefully, this is a useful introduction to the black and white world. ■






This portrait of Tim was shot with a 24-105mm f/4 lens. It was shot in colour and in Raw format, but was converted to black and white using a basic mono conversion technique. It was sharpened and some contrast added to boost the texture of Tim's skin.

This image of Michelle was shot with a 50mm f/1.8 lens with a wide aperture to make sure the background wasn't a distraction. This low key black and white conversion was done with heavy contrast. No sharpening was applied to keep the skin soft and grain added for a 60's retro feel.

**TOP TIP!**
Never underestimate the power of cropping your portraits. A mediocre shot can be transformed if you crop in tight to make the image more personal and intimate. Also, converting to black and white and increasing the contrast adds drama.

AFTER

> "For anyone interested in photography as a hobby the best choice is a mid-range editing program... and they don't come much better than Adobe Photoshop Elements."

# IMAGE EDITING

## Altering and improving your photographs using Adobe Photoshop Elements

**One of the great things about digital photographs is that it's very easy to improve or alter them using the right computer software. There are dozens of image editing packages available, ranging from simple, easy-to-use programs costing under £20, all the way up to the professional-standard Adobe Photoshop, which costs over £600.**

For anyone interested in photography as a hobby the best choice is a mid-range editing program designed for home use, and they don't come much better than Adobe Photoshop Elements. It incorporates the same advanced image editing technology as the full version of Photoshop, and shares many of the same features, but at around a tenth of the price.

On the following pages you'll find a selection of tips and techniques for improving and altering your images in Elements. Of course we've barely scratched the surface when it comes to creative image editing, but hopefully you can combine and adapt these techniques to produce the results you're looking for. ■

A church in mid afternoon sunshine. Taken in east Devon.

> "There are times when you may want to crop a digital photograph... you need to make it smaller to send via email or publish on a website... doing this is very quick and simple in Elements 11."

# Cropping and resizing

## Changing the size of a digital photograph

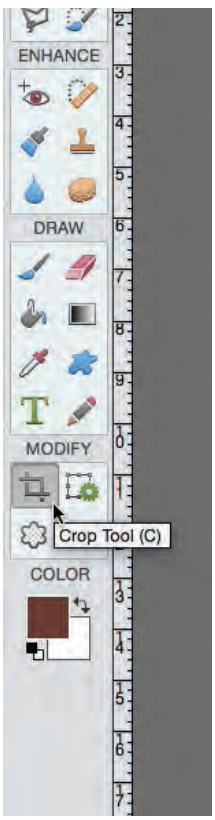
**Sometimes a digital photograph can be the wrong size. Maybe you've got too much of the surroundings in the picture, when you wanted to concentrate on just the main subject, or maybe the whole image is too big, and you need to make it smaller to send via email or publish on a website. Doing both of these things is very quick and simple in Elements 11.**

As a starting image we'll use this picture of a church. What we want to do first is crop it down so just the main part of the building fills the picture.

The best tool for the job is, not surprisingly, the Crop tool. You'll find it in the Modify palette, about halfway down. It looks a bit like two set-squares.

The Crop tool is very easy to use. Simply click near one corner and then drag a box around the area you want to crop. Don't worry if you don't get the size exactly right first time, because you can adjust the size of the box by using the drag-handles on each side and corner [1]. Press Enter to perform the crop.

Next we'll resize the image. You'll find this option in the Image menu under Resize.



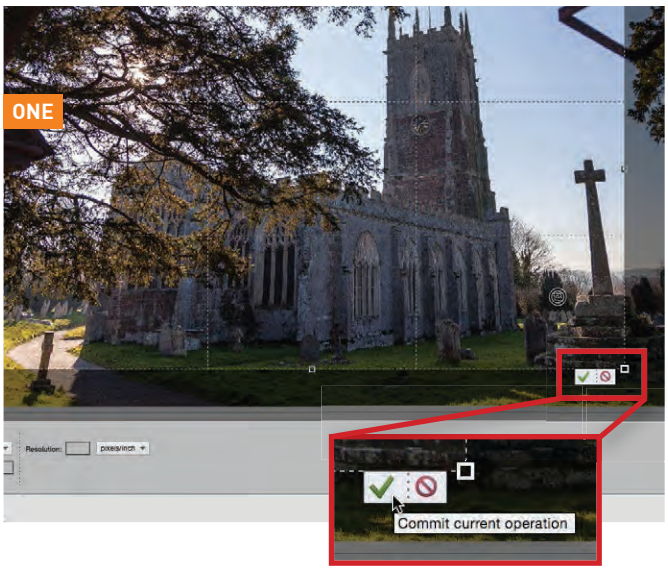

Select Image Size [2]. In the Image Size dialogue box, check the box marked Resample Image, and open the drop-down option panel below it. We're reducing the size of this picture, so select Bicubic Sharper [3].

In the Pixel Dimensions panel, enter the width that you want your image to appear. If we were preparing this picture for a website, a width of 800 pixels would be ideal [4]. The height will change automatically to keep the aspect ratio the same. Press OK to resize the picture.

Next, go back to the Image menu and Resize, but this time choose Canvas Size [5].

You'll see the current size in pixels at the top of the panel, with the width as 800 pixels. In the lower window put in a height of 480 pixels. If your main subject is not in the centre of the frame you can alter the anchor point by clicking on the arrows surrounding the box below [6]. Click OK to perform the resize. You'll get a warning that you're about to chop off part of the image, but just ignore it.

Now we've resized the image to 800 x 480, a common size for display on many mobile devices, and ideal for uploading to a website or sending via email. ■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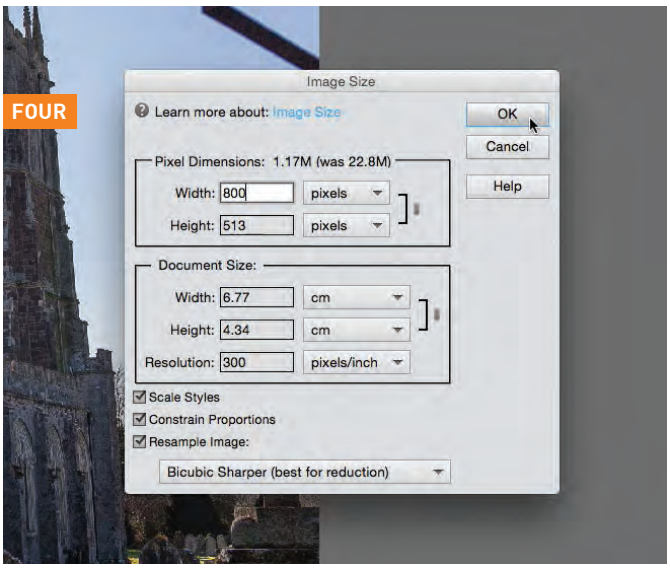
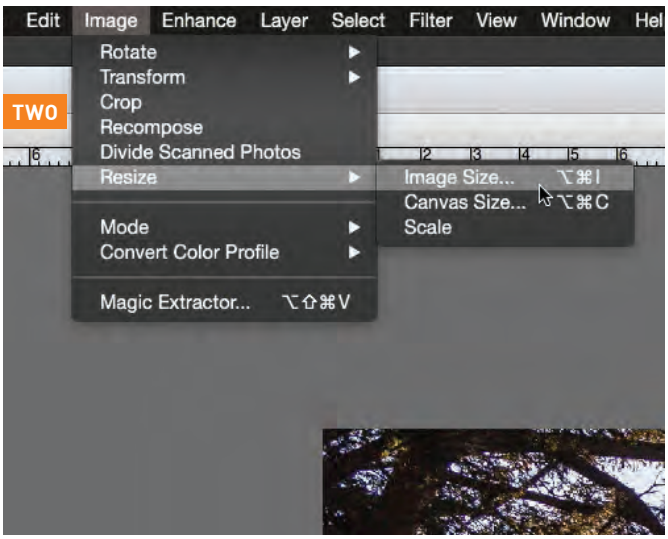
Commit current operation


FOUR
Image Size
Learn more about: Image Size
OK
Cancel
Help
Pixel Dimensions: 1.17M (was 22.8M)
Width: 800 pixels
Height: 513 pixels
Document Size:
Width: 6.77 cm
Height: 4.34 cm
Resolution: 300 pixels/inch
Scale Styles
Constrain Proportions
Resample Image:
Bicubic Sharper (best for reduction)


TWO
Edit
Image
Enhance
Layer
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Filter
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Rotate
Transform
Crop
Recompose
Divide Scanned Photos
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Canvas Size... ⌥⌘C
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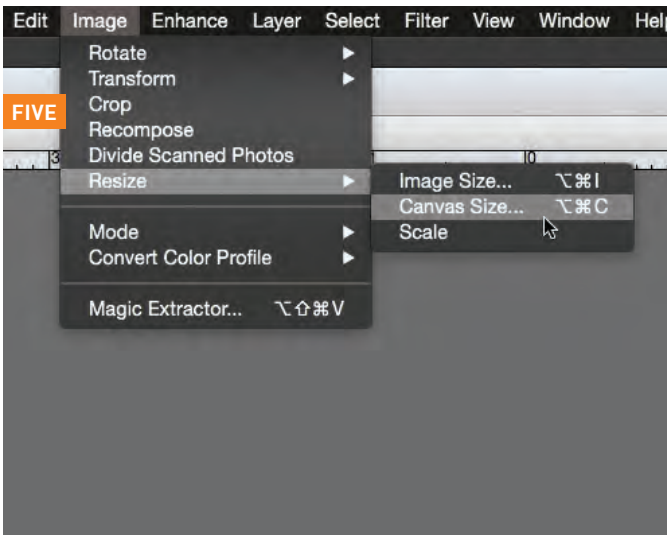
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Layer
Select
Filter
View
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Rotate
Transform
Crop
Recompose
Divide Scanned Photos
Resize
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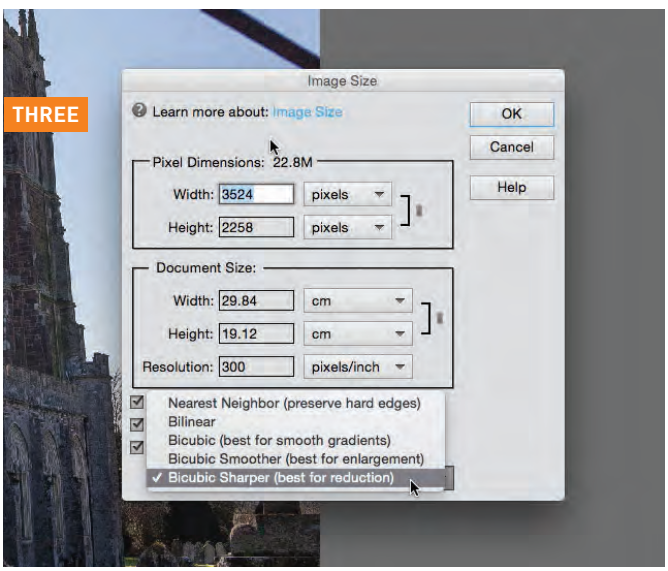
THREE
Image Size
Learn more about: Image Size
OK
Cancel
Help
Pixel Dimensions: 22.8M
Width: 3524 pixels
Height: 2258 pixels
Document Size:
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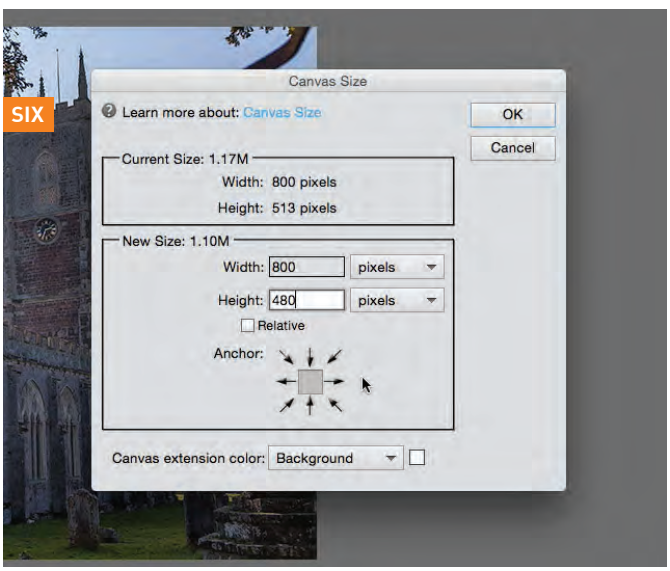
Bicubic Sharper (best for reduction)


SIX
Canvas Size
Learn more about: Canvas Size
OK
Cancel
Current Size: 1.17M
Width: 800 pixels
Height: 513 pixels
New Size: 1.10M
Width: 800 pixels
Height: 480 pixels
Relative
Anchor:
Canvas extension color: Background

# Straightening and rotating

## Make sure your horizons are level and your towers aren't leaning

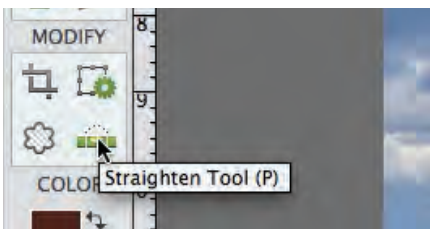
**If you're shooting landscapes or architecture, or even if you're just taking snapshots of your family on holiday, if you don't keep your camera level you're going to end up with a sloping horizon or buildings that look like they're leaning over. Unless you're holidaying in Pisa this is something you want to avoid, but accidents will happen. Fortunately it's possible to correct tilted shots using Photoshop Elements by rotating and cropping the image.**

There are several different techniques available for rotating images, so let's take a look at them in order of simplicity.

### The Straighten Tool

It's very easy to rotate an image in Photoshop Elements, to bring the horizon back to the straight and level, and to stop buildings looking like they're about to topple over. In fact it's such a common operation that the program provides several different ways to perform it. Which method you choose depends on the particular photo you want to straighten. Photoshop Elements 11 includes a Straighten tool specifically designed for correcting horizontal and vertical lines, so we'll take a look at that first. You'll find it about halfway down in the Modify tool palette; its icon looks like a little spirit level. The keyboard shortcut for this tool is P.

Select the Straighten tool from the tool palette, and your cursor will turn into a small

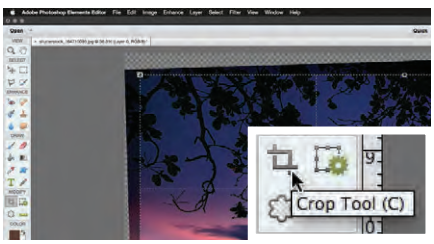



cross-hairs. Position it at one end of the horizon, click and drag a line along the horizon.

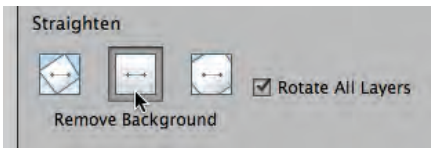
Although the horizon is now level, you'll see that there are now triangular white areas around the image which will need to be

removed. The usual way to do this is to crop the image so that they are no longer visible. Unfortunately this means losing some of the image around the edges, but that's the price you have to pay for not getting your shot straight in the first place.

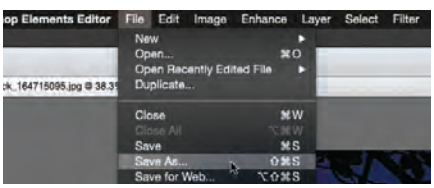
To crop the image, you'll be astonished to learn that we'll use the Crop tool. You'll find this in the Modify palette, the same as the Straighten tool. The Crop tool is very simple. Starting near any corner, click and drag a box towards the opposite corner. You can use the grab-handles in the middle of each side to resize the box, and zoom in to get it as close as possible to the edges of the image, so that you're wasting as few pixels as possible. When you're happy with the position of the box, hit Enter to perform the crop.



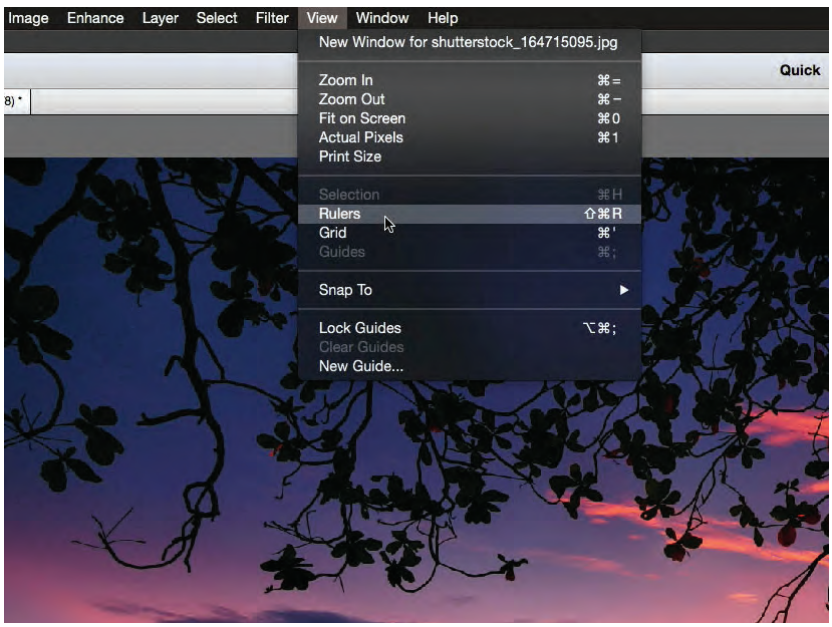

Optionally you can have Elements do this step automatically, by selecting Crop to Remove Background from the menu in the tool options in the bottom left of the workspace.




Once you've done this, save the corrected version of your picture under a new name or number using the Save As... option so that you still have the original file.



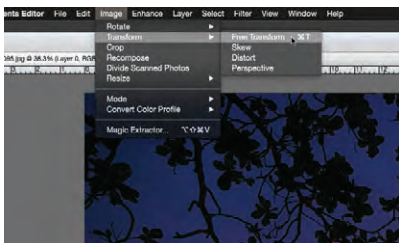

## FREE TRANSFORM




Another way to rotate an image is by using the Transform function. This is useful if you want to rotate an image freely by hand, or if you want to rotate just one layer in a multi-layer composition. To help with this, first you need to have Rulers visible. These are gradations around the edge of the image marked in pixels or centimetres. You'll find this option in the View menu.

Next, click on the horizontal ruler and drag downward. This will place a guide line on your picture. Position this line so it is close to the horizon. Don't worry, it won't show up on the finished image.

> "If you don't keep your camera level you're going to end up with a sloping horizon or buildings that look like they're leaning over."



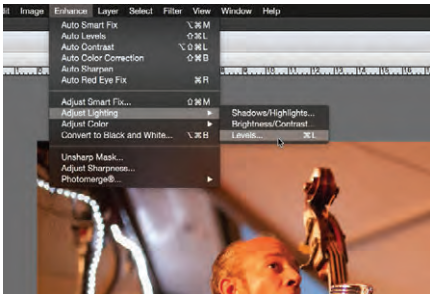

You'll find the Free Transform option in the Image menu, under Transform.

You'll see a line appear round your image, with grab handles at the corners, while at the top of the screen are three input boxes, two for width and height, and the third for rotation, marked in degrees. You can input an angle of rotation directly in this box, or you can click and drag near one of the corner handles to rotate the image manually. Drag it until the horizon lines up with your horizontal guide, then press Enter to confirm the transformation. Crop off the white edges and save the image under a new name as per the previous section. ■

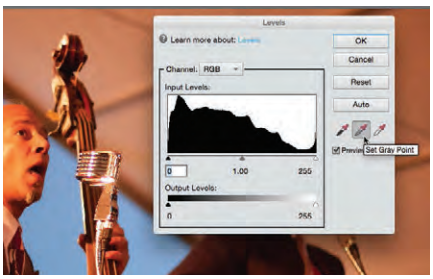
# Colour correction

## Correcting colour casts and white balance problems

Almost all digital cameras have some sort of white balance selection, but it's a feature that most people seem to ignore. In most cases this isn't a problem, because the default automatic white balance feature handles most everyday lighting situations perfectly well. However sometimes, usually when shooting without the flash in artificial light, your pictures may show a strong colour tint, caused by incorrect white balance setting. Using the pre-set white balance options in your cameras menu will normally prevent this problem, but it is also possible to correct colour tints later using photo editing software. There are several ways to do this.



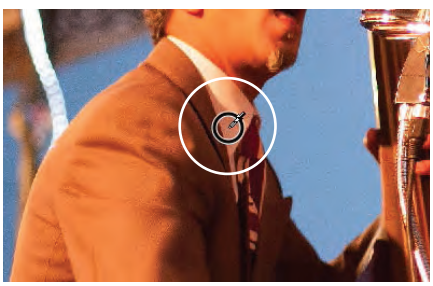

This photograph is illuminated by a combination of coloured led lighting, sodium, fluorescent light and tungsten lighting, using automatic white balance, and as you can see the camera has got a bit confused, resulting in a heavy colour cast.



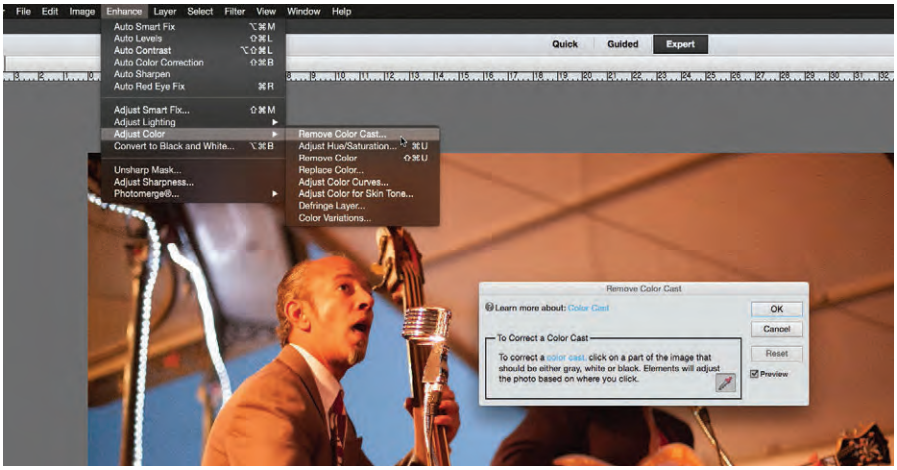

However by adjusting the colour balance in Photoshop I have been able to largely correct this fault, resulting in a much better picture.

There are several ways to correct a colour balance problem using Photoshop Elements 11. One of the quickest and most effective is to use the Levels function. You'll find this in the Enhance menu under Adjust Lighting.

Levels is used to adjust the relative brightness and output levels of the various tones in the image, and can also be used to set particular points on the histogram. The one we're interested in is the grey point, the middle one of three buttons on the right of the dialog panel.



Click on the grey point button, and move the cursor off the dialog panel. You'll see that the cursor has changed into an eye-dropper tool. Click this on any part of the image that should be either white or a mid-tone grey, in this case the shirt collar or cuffs on the bass player on the left are a good choice. The colour balance of the image will immediately change to make this point the new grey, which will help correct the colour cast.

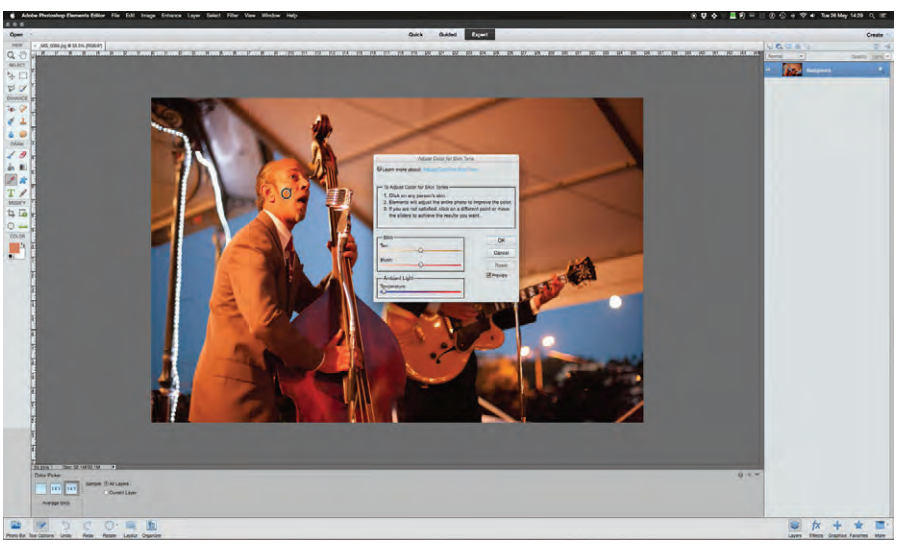




Another way of correcting the image is exclusive to Photoshop Elements 11, a Remove Colour Cast function. You'll find this feature in the Enhance menu under Adjust Colour. This tool works in the same way as the tone point tools in the Levels function, and yet another way to correct a colour cast is to use Adjust Colour for Skin Tone. This is another feature unique to Elements. You'll find it in the Enhance menu under Adjust Colour.

Again the colour is corrected by clicking on a sample colour in the picture, but this time select a skin tone, such as the face or hand of the bass player. Note that this feature may not produce good results with very dark skin tones in some lighting conditions. ■

**"When shooting without the flash in artificial light, your pictures may show a strong colour tint."**




# Adjusting exposure

## How to correct your exposure mistakes

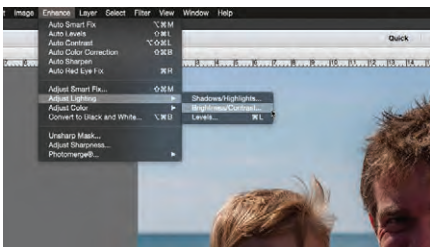
**Even with the sophisticated technology in the light metering systems of modern digital cameras, they are not infallible. Some lighting conditions can confuse them, resulting in pictures that are over or under-exposed.**

Severe over-exposure where large areas are burned-out white, or under-exposure resulting in areas of featureless black, are generally impossible to correct, but between those two extremes is it often possible to rescue a badly exposed photo. Over-exposure tends to be more of a problem, since burned-out highlights contain no detail, but digital cameras are surprisingly good at capturing detail in areas that might initially look like featureless black. As a result it's usually possible to rescue shots that are quite badly under-exposed.

Take a look at this shot. It was taken using centre-weighted metering against quite strong backlighting, and as a result the subjects are in dark shadow and very under-exposed. It would have been a better idea to use spot metering, but we can still rescue this photo using an image editing program.

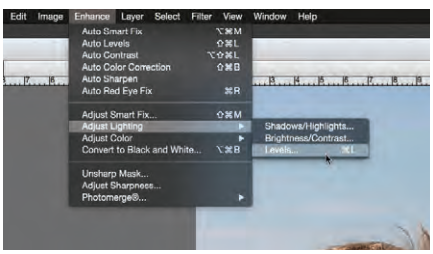
## Brightness/Contrast

The quickest and easiest way to brighten the photo is to simply turn up the brightness. This will work in any editing program, but as we will see it isn't always the best option. You'll find it in the Enhance menu under Adjust Lighting.



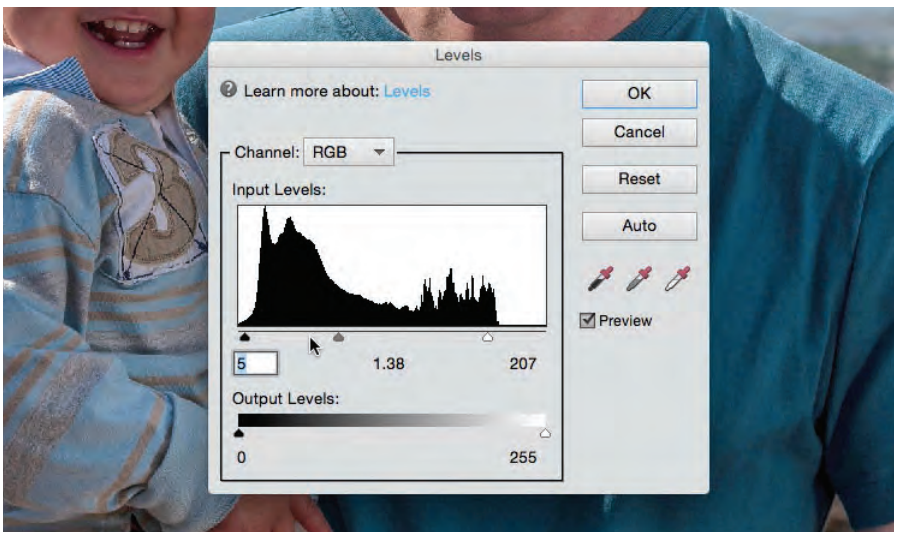

By moving the Brightness slider to the right, the overall brightness of the entire photo is increased, which makes the shadows far too light, so we have to adjust the contrast slider to the right as well. This produces an approximation of the correct exposure, but the lighter areas of the shot have been brightened to the point where they are burned out, losing all detail in the background, as well as the highlights on the subject's hair and shoulders.


Most of the better image editing programs, including Photoshop Elements 11, include another way of altering brightness and contrast, but this time with more subtlety and control, by adjusting the levels histogram. You'll usually find this in the same sub-menu as Brightness/Contrast.



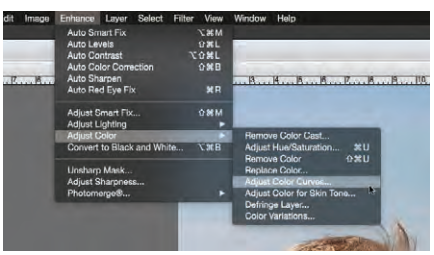

The levels histogram is basically a graph showing the proportion of pixels in the image at each colour intensity. The far left-hand end of the graph represents black, and the right-hand end is white, with every tone in between represented by a spike on the graph. On the bottom axis of the graph are three points, the left representing the black cut-off point, the right the white cut-off point, and the one in the middle representing the mid-tone point.

> "Some lighting conditions can confuse digital cameras, resulting in pictures that are over or under-exposed."




As you can see from the graph our image is all shadow and some highlights, with a flat spot in the mid tone range, so we need to brighten some of those shadows into mid-tones. The way we do this is by moving the mid-tone point left towards the shadows. This has the effect of bringing out a lot of the detail from the shadow areas without burning out any more highlights. It also leaves the deeper shadow areas intact. It is a far better way of adjusting the exposure of a photograph than simply altering the Brightness/Contrast, however it isn't quite the best way. Adjusting the Levels mid-point is still strictly linear in its adjustment.

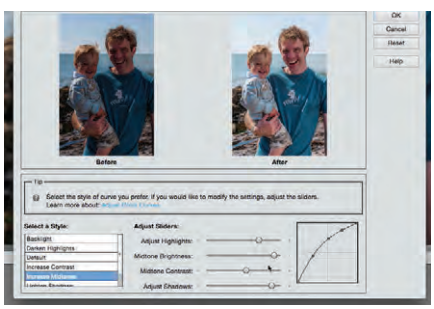
The Curves adjustment option, again found in all the better image editing programs, is a method of changing the relative brightness of specific tones and ranges of tones within an image, giving precise control over exposure.




Learning to use it properly is a core skill in image editing, and will enable you to make precise and subtle changes to brightness and relative contrast not just of the image as a whole, but also of individual colour channels.

You'll find Curves in the Enhance menu under Adjust Colour. In Elements 11 the Curves adjustment is made very simple, perhaps a little too simple for accurate control. Although the Curves graph is shown, it is adjusted by means of four sliders. For our image here, moving the Adjust Shadows slider all the way to the right, as well as increasing the Mid-tone Brightness and Mid-tone Contrast slightly produces the most pleasing result, although to be honest the picture is still too dark.

In fact the best results we were able to obtain for this image were by using the Levels function. The finished result is displayed on the opposite page. ■



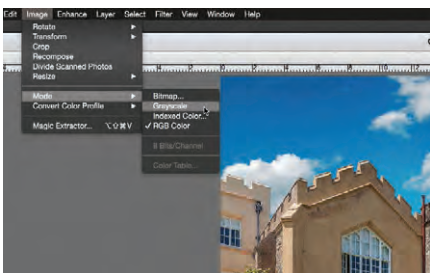
# Monochrome from colour

## Converting colour pictures to black and white isn't as easy as it looks

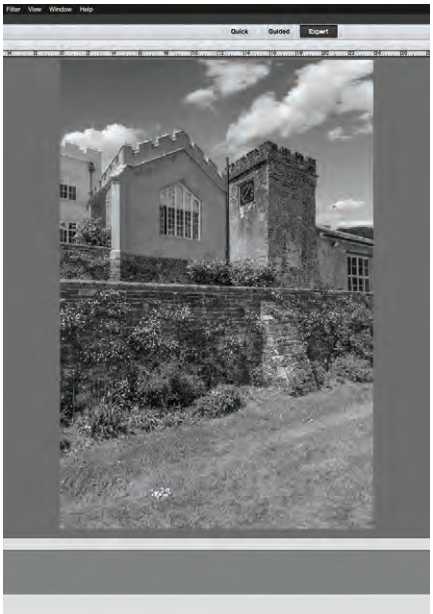
**Sometimes you may want to convert a colour picture into black and white, usually for artistic effect. Black and white photography has always been popular, and for some subjects, such as interesting textures, retro portraits and historical scenes many people prefer it to colour.**

Converting a colour image to black and white isn't as easy as it looks however. To see why, lets take a look at three different ways of doing so.

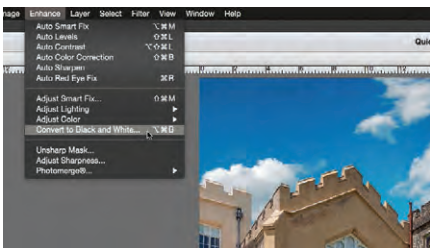
The quickest way to turn a colour image into a monochrome one is to simply convert it from a full-colour 8-bit image into a greyscale image.




This discards all colour data from the image, leaving only varying levels of brightness. While this is certainly a monochrome image, the result looks rather flat and lifeless, lacking all sense of tone.



When shooting with black and white film, photographers will add colour filters over the lens to produce certain effects in the finished photograph. Adding a yellow filter causes the blue sky to appear darker in the monochrome image, while adding a green filter causes grass and foliage to appear much lighter. Photoshop Elements 11 attempts to recreate some of these effects in its Convert to Black and White function, found in the Enhance menu.

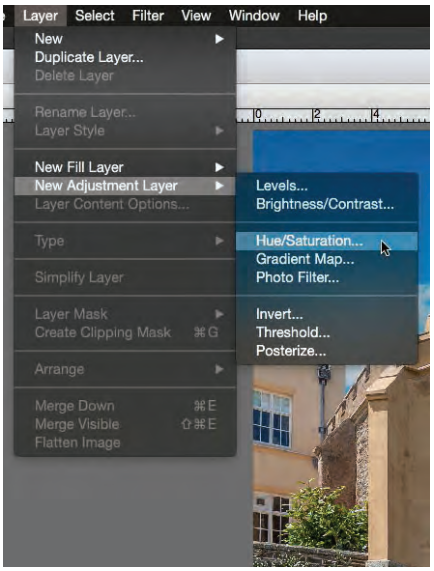



The Convert to Black and White dialog offers several different options for adding tone to your monochrome image. Try them out for yourself and find out which one works best for your picture.

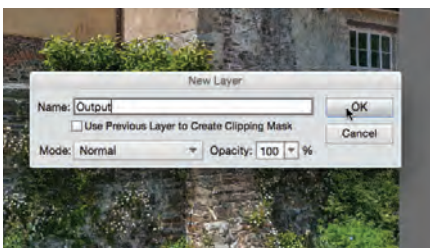
There is a much better way to convert colour into black and white, offering full control over tonal balance using the same colour filter technique that film photographers use, but it is a bit complicated so pay attention.

> "Black and white photography has always been popular... many people prefer it to colour."

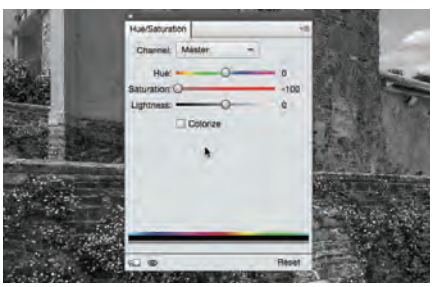
In the Layer menu you'll find New Adjustment Layer. Mouse over this and select Hue/Saturation... from the fly-out menu.



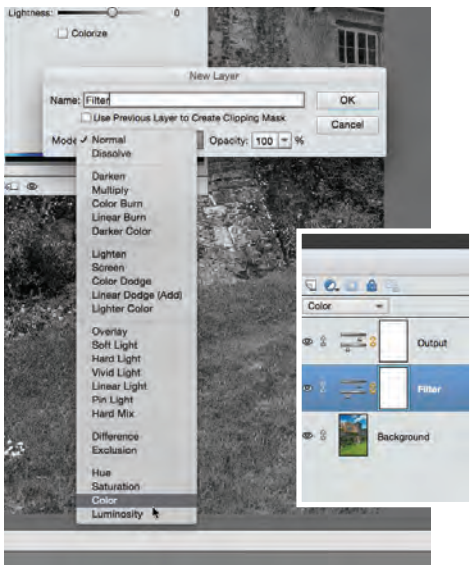

You'll be offered the option to give this adjustment layer a name. Call it 'Output'. Leave the blend mode as Normal.



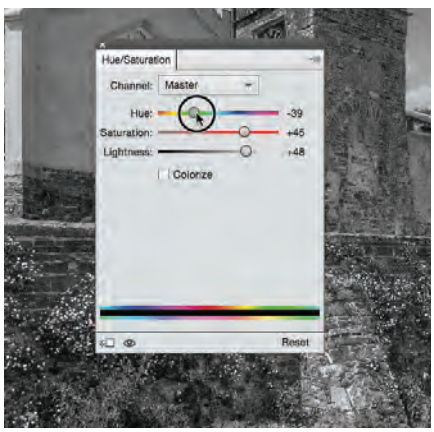

Set the saturation of this new layer to zero. You'll see that all the colour is removed from the picture, just like converting to greyscale.




Next, create a second Hue/Saturation adjustment layer, but name this one 'Filter'. In the Mode drop-down menu, select Colour. Make sure that the Filter layer is under the Output layer in the layer stack.




This second layer works like the colour filter on the photographer's camera. If you now adjust the Hue slider in the adjustment palette you should see the various grey tones in the image change their relative brightness. You can use this in the same way that photographers do, making clouds stand out against the sky, or trees and grass to appear lighter. Have a play with it, and see what works best for you. ■



# Colour replacement

## Swapping one colour for another

Colour replacement can be used for all sorts of things, such as changing the weather in a postcard shot or giving a car a new coat of paint.

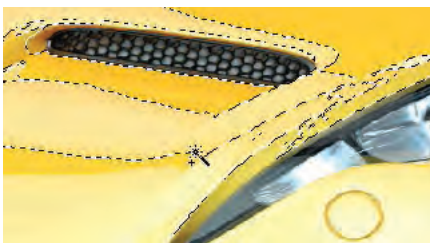
**Here's a picture of a supercar. Unfortunately, I'm not a fan of yellow. It would be great to see it in another colour. But what colour to paint it? Fortunately using a photo editing program it's possible to preview the results without the expense of a spray booth.**

Hmm, how about green, purple or red? Well, now the choice is yours.

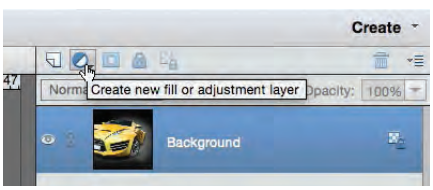
Selecting large areas of the same colour is one of those few occasions where the Magic Wand tool is actually useful, so we'll use it as a starting point here. With a tolerance setting of 30 it should be able to pick out the car bodywork without too much trouble.

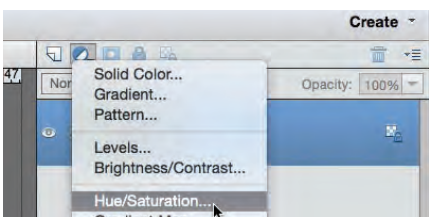
With the Magic Wand, it's best to add a bit at a time. Click on an area that's a mid-tone for the total area you want to select, and you'll find

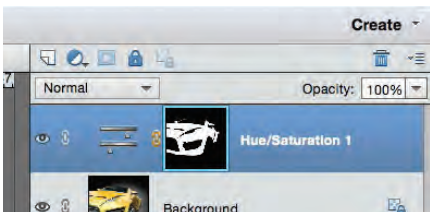
that the wand tool will select an area around it. The size of the selection will depend on the tolerance setting. By holding down the Shift key and carefully clicking on areas around your starting selection, you can add more areas. If the wand selects part of the background, use Ctrl-Z to undo that step, and try again more carefully, possibly adjusting the tolerance downwards if it keeps happening. At this point don't worry if the selection isn't super accurate. We can adjust this in due course.

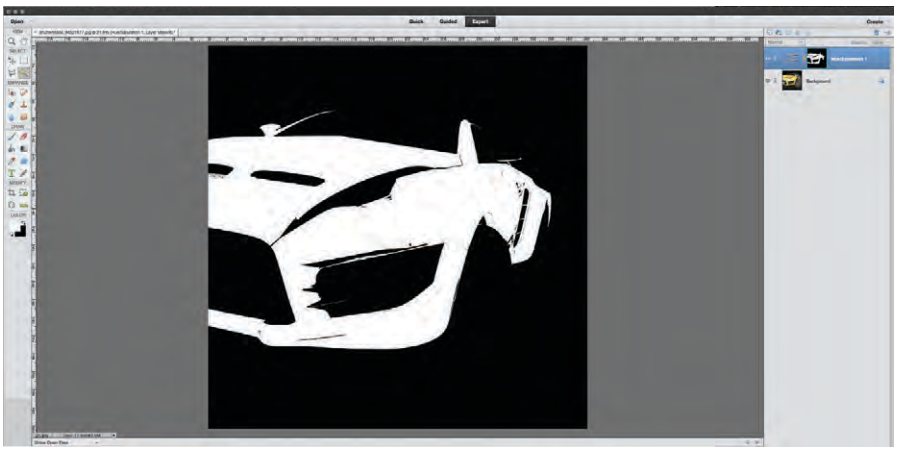


When you have as much of the bodywork selected as is possible, go to the layers palette and double-click your image thumbnail to make sure it is a layer, not a background image. With your selection still active, go to the New Adjustment button and select Hue /Saturation. A Hue/Saturation layer will be created above your car layer plus a mask which is based on the selection you made. It is designed to only let the Hue/Saturation effect show through areas of the mask that are white. This is useful as it allows you to work non-destructively. Your original picture remains untouched.



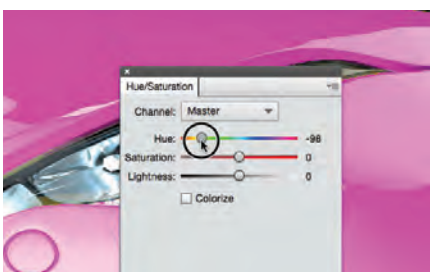



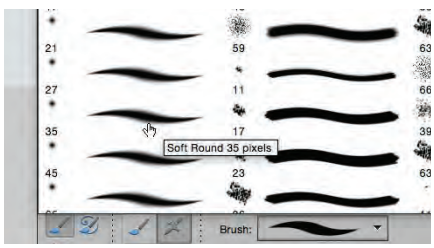
> "A Hue/Saturation layer will be created, plus a mask which is based on the selection you made. The effect will only show through areas that are white."

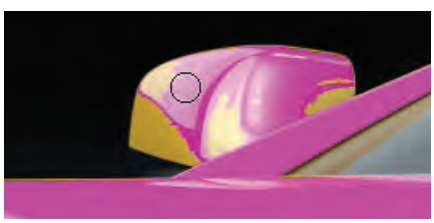
To begin with, alter the Hue/Saturation slider to change the colour of your car. Changing it to something very different will allow you to see if there are still areas of the original bodywork colour showing.




These little areas can easily be removed. Take a soft round brush of about 35 pixels, click on the black and white mask thumbnail to activate it and paint white on the mask anywhere the original colour can be seen.

Alternating between painting black or white with various brush sizes means you can fine tune the black and white mask to only reveal the colour change where you need it.



When you are happy the mask is complete, you can go back to the Hue/Saturation slider and alter the colour of your car as you wish. Not just the Hue and Saturation, but also the lightness. When you're happy with the result you can then save the file. If you save the final image as a .PSD file it will be compatible with both Elements and Photoshop itself.

You know, I reckon it would have looked pretty good in yellow after all... ■

# The Clone Stamp tool

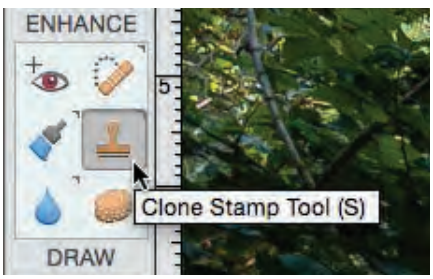
## Remove unwanted elements from your photos

**The Clone Stamp tool (also known as the Clone Brush in some programs) is one of the most useful items in your image editing tool kit. Despite recent developments such as Photoshop's Spot Healing tool and Content-aware fill, it is still the most precise and reliable way to retouch photographs, allowing you to remove unwanted elements such as dust spots, skin blemishes, lens flare and other intrusive objects from your pictures. Because the process is entirely manual it can be very time-consuming, but the results are often superior to the output of the more modern automatic tools.**

The Clone Stamp works by copying ('cloning') pixels from a selected target area and placing them over the unwanted objects. Using the Clone Stamp it is relatively straightforward to remove even quite large unwanted objects from a photo. Take this photo for example:

This otherwise pleasant churchyard shot is spoiled by the obtrusive wires snaking across the left of the shot. With twenty minutes using the Clone Stamp the wires have been completely removed, leaving a much nicer picture (main image above).

Select the Clone Brush tool from the tool palette. The icon used in Photoshop Elements for the Clone Stamp, a rubber stamp, is the same in most other popular image editing programs.

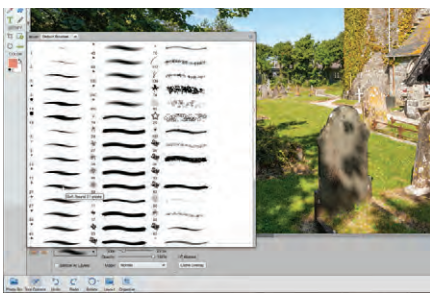



There are several options available when using the Clone Stamp. In the bottom left of the screen you'll find the Tool Options bar, and on top of that you'll see the pre-set brush menu, allowing you to select brushes of various sizes, shapes and hardness. For most Clone Stamp work on photographs a default round, soft-edged brush is the best choice. You can adjust

the size using the drop-down slider next to this menu to suit your needs.

For the other controls, for retouching photos use a Normal blending mode, and make sure the Aligned check-box is ticked. This is very useful; it determines whether the sampling point will follow the movements of your brush, or remain in the same location. For most photo retouching operations you'll want to have the sample point aligned with the brush.

The brush size that you'll need will depend on the size of the photo you're working with, but for the 18-megapixel example we're using here a 48-pixel diameter is a good place to start. You can quickly vary the size of the brush using the keyboard shortcuts, the open and close square brackets keys '[' and ']'.



The Clone Stamp brush works by sampling pixels from one position and copying them over the pixels at the brush location. With the Alignment box on the Options bar checked the sampling point will follow the movements of the brush. In order to set the sample position, hold down the Alt key, and you'll see the cursor change to a cross-hair. Click this cross-hair on the image, release the Alt key, then move the cursor a short distance away. In Photoshop CS6 you'll see a preview of the sampled pixels superimposed on the brush position. To paint these pixels onto the image click again. You'll see that a portion of the image from the sample position is copied at the cursor location.

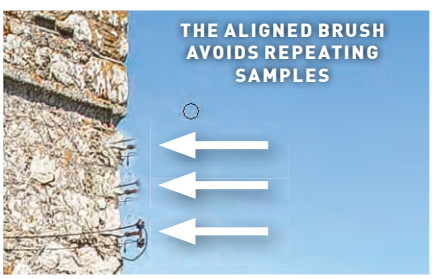
By carefully positioning the sample target relative to the area you want to change, you can usually match up the background to seamlessly cover it with copied pixels. It may take a few tries to get the position exactly right, so use the Ctrl-Z shortcut to undo any mistakes.

In our example image, the wires across the top left are against a simple plain blue sky background, making them relatively easy to cover up. However where the lines cross detail, such as the leaves near the top of the church tower or the white drainpipe near the corner of the tower, a more creative approach is going to be needed.

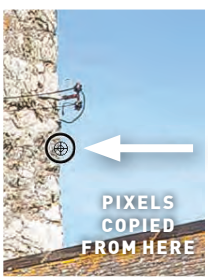
> **"It may be fake, but unless the person viewing the image has seen the original they won't know the difference."**

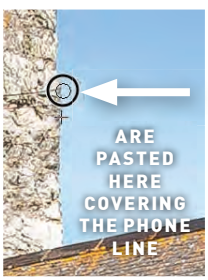
By renewing the sample position whenever necessary, you can match up different areas of the background to cover up the rest of the parts you wish to hide. It's a good idea to change the sample position regularly when cloning out large areas, because otherwise a repetitive pattern builds up which is very easy to spot in the finished picture, even in comparatively uniform areas such as the sky. The human eye is very good at spotting repeating patterns. This is especially important to remember when making fake news pictures of war-torn middle-eastern cities, as a Reuters photographer discovered a couple of years ago.

It's also a good idea to change the size of your brush to work around fine details, or to cover larger areas more quickly. Also, zooming in to 200 percent will make it easier to work on fine details. The default keyboard shortcuts for zooming in and out are CTRL + - and CTRL + =




In some areas, it is necessary to construct details by copying areas of the image that resemble the detail that you are attempting to replace. In the case of the phone line fixture, by positioning the sample target over one of the clear stone tower details, and then painting it in over the part of the tower where the fixture appears . It may be fake, but unless the person viewing the image has seen the original they'll never know the difference.




Likewise, where the wire crosses the leaves and stonework, by copying parts of the leaves or stones we can create a new edge to cover up the wire. Because of the fractal nature of the shape of the leaves, one part of the edge looks much like any other, so again the illusion will be convincing for anyone viewing the image for the first time.

Where the wires cross the drainpipe, we can just use the method outlined earlier where you copy a clean area of the pipe and paste it over the point where the wire crosses it.

Again it is important to change the position of the sample target regularly to avoid building up easily recognised repeating patterns.


It's a good idea to zoom out to a full-screen view from time to time to get an overall impression of how the whole picture looks. Remember that the person viewing the finished image has probably not seen the original, so as long as it looks convincing it doesn't need to be totally perfect. It's all too easy to get bogged down trying to fill in tiny details, when it's far quicker and easier to cheat a little and simply replace them with plain background. Try to balance the amount of time it takes to doctor the image with the quality of the results.

With a little tidying up to hide any remaining blemishes or duplicated details, that's pretty much it, and the result is a very presentable landscape shot minus the intruding wires. You can use this technique for many things, from hiding embarrassing zits, losing that tree that looks like it's growing out of the top of someone's head, or eliminating political opponents who have fallen out of favour with your military junta. The possibilities are endless! ■

# Retouching a portrait

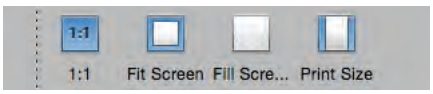
## Make your portrait subjects look happier, healthier and more attractive

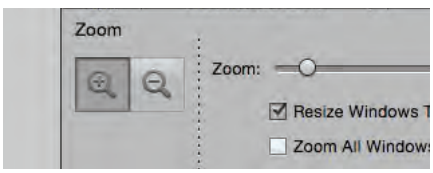
**You may have seen an advert on TV a few years ago for Dove's "Real Beauty" campaign, showing the alterations done to a photograph of a model used in a billboard advertisement. While there's a lot to be said for this campaign and the unrealistic images of beauty we're all (men as well as women) expected to live up to, the fact is that portraits have always been idealised representations. Oil paintings of historical figures never show zits and coffee-stained teeth, and professional portrait photographs have always been retouched. All of the most famous portrait photographers have employed the talents of retouch artists to work on prints and negatives with a brush or airbrush to correct minor blemishes.**

Thankfully digital imaging makes this process much easier, and even relatively cheap home photo editing programs contain powerful tools that we can use to get the best out of our photographs. In this image editing tutorial we're going to look at several techniques for improving portrait shots. Everyone likes to look their best, and with these tools you can present your friends and family with portraits they'll be proud of.

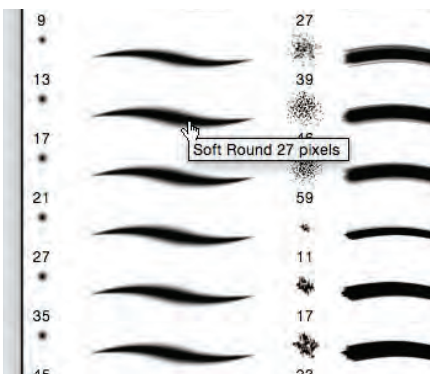
## Removing spots and wrinkles

We have a typical casual portrait shot of a very attractive girl, the sort of shot someone might take of their girlfriend. It's a nice enough picture, but the girl wasn't happy with it, because the camera, as cameras often do, has shown up a number of small skin imperfections. We can get rid of those quite easily though by using the Clone Stamp tool just as if this was a scene where we wanted to remove unwanted elements like telephone lines in a landscape photograph. We can copy a small part of the image from a specified area and paste it over another area, following the movement of the brush cursor.




Select the Zoom tool from the tool palette, or by using the keyboard shortcut 'Z', and click on the subject's face until it is zoomed as required. Alternatively you can use the zoom slider in the tool option bar bottom left of your screen. Since we're going to start off by working on the face, lets zoom in on this area. First, switch to Fill Screen by clicking on the Fill Screen icon below the image.




Select the Clone Stamp tool from the tool palette. When you select it, you'll see that at the bottom of the screen is a box with a drop-down arrow, labelled Brush Presets. Click on this, and select a soft round brush 27 pixels in diameter. This should be ideal for our portrait shot, however if your pictures are of a different size you may need a smaller or larger brush.

> "Even relatively cheap home photo editing programs contain powerful tools that we can use to get the best out of our photographs."

Pick an area adjacent to the skin blemish that you wish to remove. It needs to be a good match for the skin tone around the blemish, because we're going to use a sample of this area to cover up the blemish.

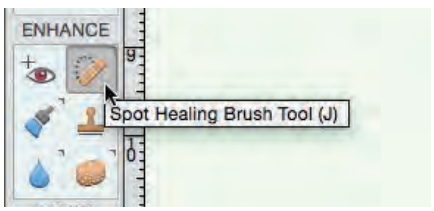
Hold down the 'Alt' key on your keyboard and you'll see the cursor change to a round cross-hair. Click this cross-hair on the point you want to start sampling.

In some image editing programs, including Paint Shop Pro, you right-click to select the sample point.

Using short, smooth strokes with your mouse or graphics pen, paint over the blemish you want to hide. You'll see that there is a cross that follows the path of the brush cursor, indicating the place from which the sample is being taken. Keep an eye on this, because if it passes over any other marks, these will be copied too. You may need to use several sample points to cover up a larger blemish, but with practice you can achieve apparent miracles with this technique.

Remember that you can drag the image around on the screen at any time by holding down the space bar and left-clicking the mouse.

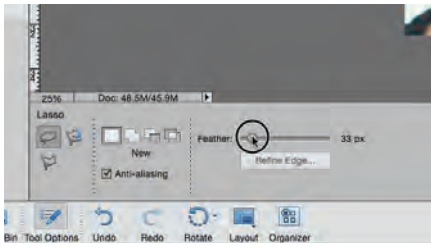
Photoshop Elements has another tool for removing skin blemishes, which while not as precise as the Clone Stamp, is certainly quicker and easier to use. It's called the Healing Brush, and you'll find it on Photoshop 7, CS1 onwards, as well as Elements from version 3.0 onwards. Paint Shop Pro X and XI have tools called the Scratch Remover and Makeover Tool, which operate in much the same way.




The Healing Brush is best for small blemishes such as spots or small scars. To use it, Alt-click anywhere on the image that has skin texture, and then simply click over the blemish you wish to remove. We'll use the same 21-pixel soft brush as before. Go over each blemish in turn. If you're not satisfied with the result, remember that you can undo each step by using Ctrl-Z. Photoshop Elements 5.0 supports multiple undoes, as do Paint Shop Pro and most other recent editing programs.

## Evening out skin tone

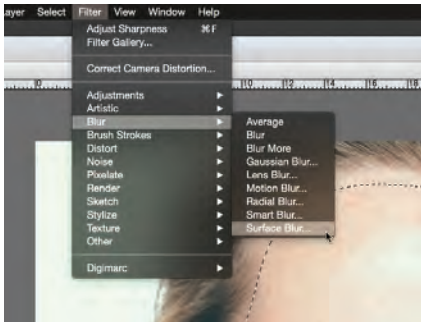
➤ Once you've removed all the blemishes, there are several other things you can do to improve the appearance of a portrait. Our model here has very good skin, but if skin texture is a problem then you can use selective blurring to smooth it out.




Select the Lasso tool from the tool palette. You can use this to select areas of an image for adjustment. You can soften the edges of the selection by using a setting called Feather. You'll find this at the top of the screen. Set a Feather value of 50 pixels for a very soft edge.

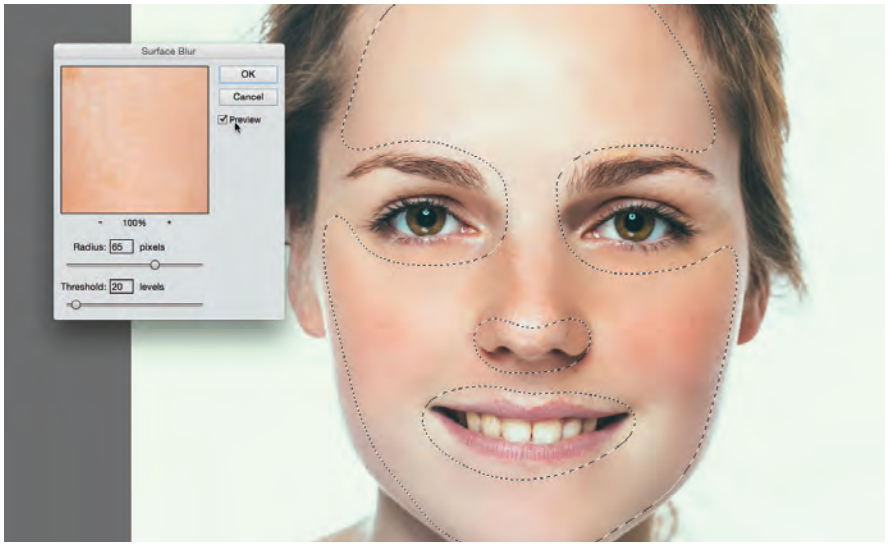
Using the Lasso tool, carefully draw around all areas of open skin texture, avoiding any edges or details such as the nose and eyes. You can do this a bit at a time, adding to your initial selection by holding down the Shift key while drawing the next bit. You can de-select areas by holding down the Alt key and drawing round them.

When you're happy with your selection, go to the Filter menu at the top of the screen, roll down to Blur, and select Surface Blur.



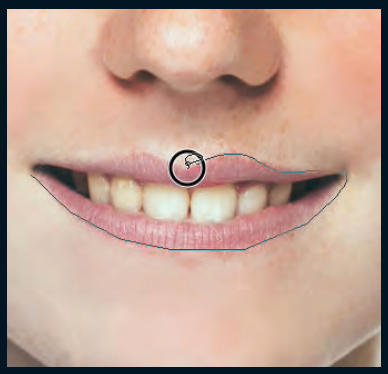

You'll see a window like this. You will need to adjust both your Radius values and the Threshold value until you achieve the level of blur you are after. Bear in mind that the larger radius values will remove all detail and your subject may end up looking like a wax dummy. Subtlety is the key here. When you've finished, press Ctrl+D to cancel the area selection.

> "If skin texture is a problem then you can use selective blurring to smooth it out... subtlety is the key."

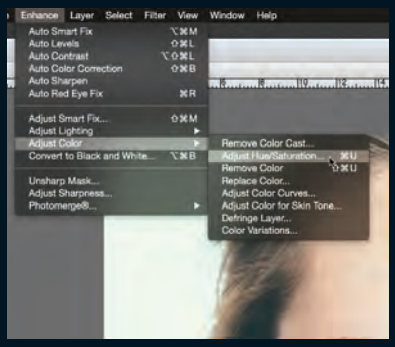



## Increase lip saturation

➤ We can make our model look even more attractive by increasing the saturation of the colour of her lips. Again using the Lasso tool, but this time with a Feather of 5 pixels, carefully select the lips, using the Alt key to de-select the teeth.



You'll find the Saturation adjustment in the Enhance menu under Adjust Colour (or "Color", since it's an American program...). Select it and a control panel with three sliders will appear.

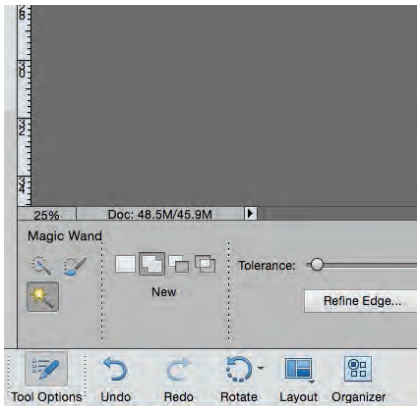



Move the hue, saturation and lightness sliders to alter the shade of colour, density and brightness of the lips until you are happy with the result.

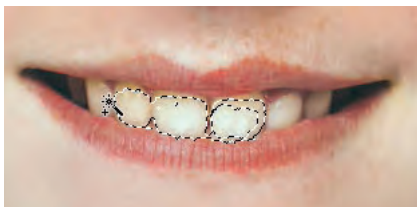
When you've finished, press Ctrl+D to cancel the area selection.

# BRIGHTEN TEETH AND EYES

Although our model here doesn't really need it, one good way of improving a portrait is to lighten the subject's teeth and the whites of the eyes, and it's very easy to do.

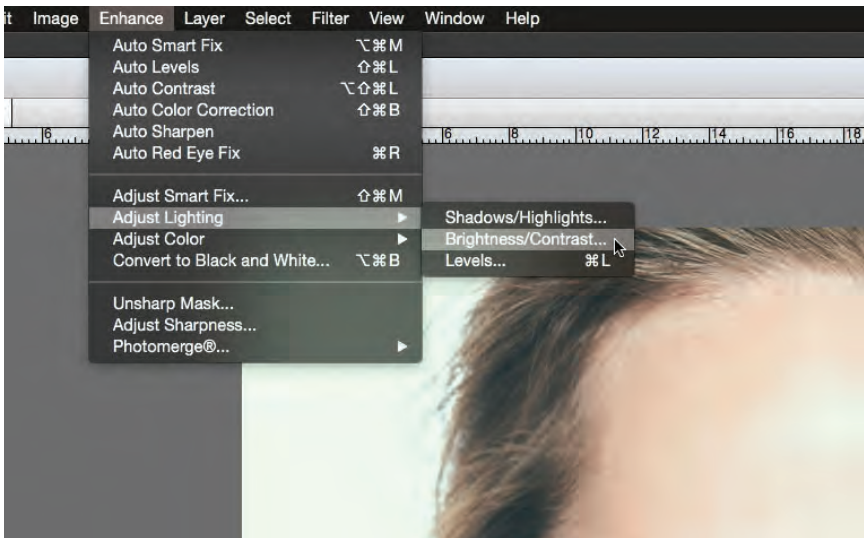



First, select the magic wand tool from the palette. This tool is used to select zones of similar colour and tone over an area. It's quicker and easier than trying to select them manually. You can adjust the degree of similarity that is selected by altering the Tolerance. For this picture we'll use a value of 50.



Click the Magic Wand tool on the teeth, and you'll see that an area is selected. You can add more areas by holding down the Shift key and clicking on unselected areas. Continue until all of the teeth but none of the surrounding area is selected. If you go too far use the Ctrl-Z key to go back a step.

When you're happy with your selection, go to the Enhance menu, roll down to Adjust Lighting, and select Brightness/Contrast. You'll see a control panel with two sliders.



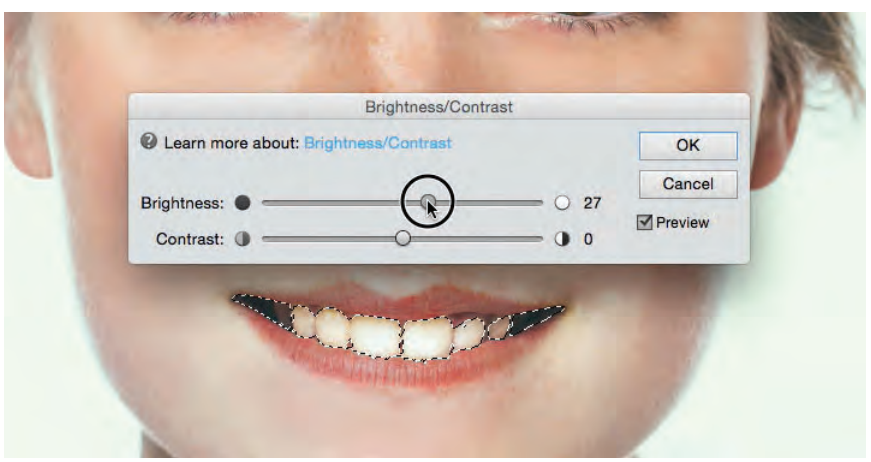

> "A very good way of improving a portrait is to lighten the subject's teeth and the whites of the eyes, and it's very easy to do."

You won't usually need to add much brightness to achieve a dramatic improvement. An increase of less than +30 will usually be sufficient.

When you've finished, press Ctrl+D to cancel the area selection.

And after cloning out a couple of stray hairs, there we have it. Each effect on its own is very subtle, but the cumulative effect is a dramatic improvement. Next time someone complains that they never look good in photographs, maybe you can surprise them.

You can also use the techniques we've used here to adjust other images, altering colour and brightness, and removing unwanted elements. While it may be true that the camera never lies, image editing is a completely different story. ■



The incredibly rugged Scafell Pike in the Lake District, Cumbria on a moody day. This is England's highest mountain.



# Panorama stitching

## Get the whole of the landscape into one ultra-wide picture

**Many digital cameras have a feature known as "Panorama Stitching" mode. It is designed to help with a particular type of photograph, or rather series of photographs, in which successive shots are taken as the camera is panned across a scene. After you take the first shot, the camera shows the edge of that shot superimposed on the monitor so you can match up the position of features in successive shots, producing a long continuous photo showing an entire panoramic scene. When it's done well the results can be breathtaking. Unfortunately getting a satisfactory result is a lot harder than it looks. Here's how to do it properly.**

The most obvious tip for panoramic photography is to use a tripod, preferably one with a "pan and tilt" type head. The best results are obtained when the successive photos line up perfectly, so find a good vantage spot with a wide and unobstructed view and set your tripod up nice and level. Check that when you pan the head from one side to another the camera is turning level with the horizon, and isn't tilted.

When shooting panoramic landscape shots it's normal to use the shortest focal length (widest zoom setting) that you have available. However the large field of view of a wide angle lens has another effect; it also alters the perspective. In single shots this looks fairly normal to our eyes, but if you compare two wide-angle shots taken from the same position but in slightly different directions you'll see that the perspective changes and that the relative proportions of objects are very different from one shot to the next, making it almost impossible for the editing program to line up the successive shots. The shape of features at the edges of the frame will be so different that the image-recognition system that helps the program match up the photos will be unable to recognise details from one shot to the next.

> "The best results are obtained when the successive photos line up perfectly. Find a good vantage spot with an unobstructed view and set your tripod up nice and level."

The solution is to shoot at a slightly longer focal length. The ideal focal length for stitched panorama shots is the equivalent of a 50mm standard lens, because this magnification most closely matches that of the unaided human eye. With most digital compacts that have a stepped zoom and a wide angle end equivalent to around 35mm, if you zoom out to the widest setting and then tap the zoom-in control twice, that should put you at around 50mm. It doesn't need to be exact anyway, just as long as it's enough to cure the perspective distortion.

Another problem with stitched panoramas is exposure. In outdoor shots where the only source of light is the sun, the brightness of the scene will change depending on your angle to the sun, so as you turn the camera the exposure values will change. When you come to stitch your panorama shots together you'll find that the brightness changes between shots, most noticeably in the sky, resulting in dark bands in the finished shot.

The best solution is to set the exposure manually. If your camera has full manual exposure, take an exposure reading from a mid-point position on your panorama, and then manually set the exposure to this value. With automatic compacts it is a bit harder. Most cameras will at least tell you the exposure information, displaying the shutter speed and aperture settings on the monitor when you half-press the shutter button. In order to match up the exposures between shots, take an exposure reading at about the mid-point of your proposed panorama and make a note of the exposure values. Next, position the camera for the first shot of the series, and again half-press the shutter and make a note of the readings. Most compacts only have a limited range of aperture settings, so you'll probably find that the aperture will be the same as your first reading, but that

the shutter speed will be different.

You can change the exposure settings on even the most basic compact camera by using the exposure compensation feature. Exposure values are usually incremented in 1/3EV steps, so you may find, for example, that your first reading is 1/400th of a second at f/8, but that the second reading is 1/320th of a second at f/8, which is an increase in exposure value of 1/3rd of a stop, or 1/3EV. Likewise a change in shutter speed from 1/400th to 1/640th of a second is a reduction in exposure of 2/3EV. Exposure compensation is also incremented in 1/3EV steps, so in the first case setting it to -0.3 will change the exposure to the same value as the first reading, while in the second case a setting of +0.6 will do the same.

Having made these preparations, you're ready to take your shots. Many cameras with panorama stitching functions also allow you to pick the direction in which you wish to pan, although the default is usually left-to-right, so pick your starting position and start shooting. After you've taken the first shot you'll see the right-hand edge of it super-imposed as a semi-transparent overlay on the left-hand side of the monitor. Simply rotate your camera on the tripod until the details on the left of the scene match up as closely as possible with the overlay. If you're using an automatic compact, check and adjust the exposure value, and then take your second shot.

The more shots you take, the longer it will take your editing program to stitch them all together, however, the more image overlap you have, the less likely it is you'll have a mis-stitch. Although it is possible to stitch together dozens of shots, unless you have a very powerful PC with a lot of memory it's a good idea to limit yourself to a maximum of five to ten shots depending on image size. At a focal length equivalent to 50mm your camera has a horizontal angle of view of approximately 47 degrees, so even allowing for the overlap between shots, six frames should be more than enough to cover 180 degrees.

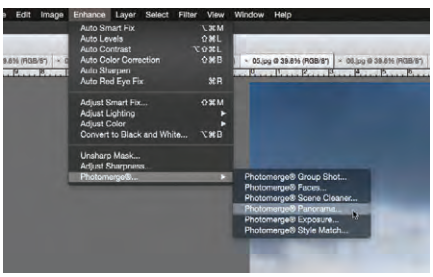
> "The more shots you take, the longer it will take your editing program to stitch them all together, however, more image overlap will help avoid a mis-stitch."

For the purposes of this tutorial we'll use these shots of Scafell Pike in Cumbria, which is England's highest mountain.

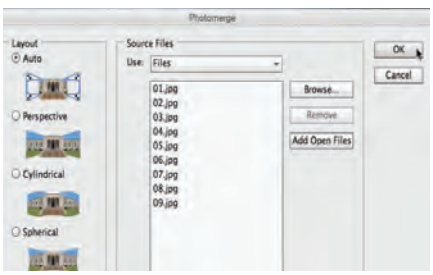
Having taken our panorama shots we'll load them into Photoshop Elements 11 to stitch

them together into a panorama. Most popular photo-editing programs have a similar feature that works in much the same way. It's normally a fully automated process, so just refer to your program's instruction manual or help files.

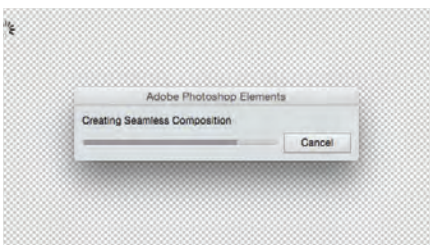
In Elements 11 you'll find Photomerge Panorama in the menu under "Enhance", along with several other automatic processes. In other programs it may be in the Edit menu.



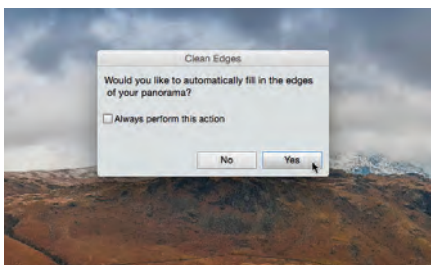

If you click on this you'll see a simple dialog window with an option to browse to the location of the folder containing your panorama shots. Go there, highlight all the shots you want to include in your merged panorama and click OK. Note that if you have the shots already open in your editor then they can be selected automatically, but since having photos open in the editing program uses up memory, the merging process will go faster if you leave them closed and use the dialog browser instead.




Once you click OK the merging process starts, and it is completely automatic. It will take a while to complete, possibly quite a long while if you have a slow computer and/or very large image files.




The Photomerge Panorama function in Elements 11 includes the option to automatically fill in any edges in your panorama using Adobe's amazing content-aware fill technology. Click Yes on this option to see just how good it can be.




The result should look something like this. You can use the crop tool to make any final compositional adjustments. ■

# Glossary

### AMOLED
Stands for active-matrix organic light-emitting diode. A new type of display technology used in mobile devices and televisions, and in the monitors of some digital cameras. Has several advantages over LCD, including using less power.

### Aperture
Behind the lens of your camera is a movable circular iris which opens and closes to control the amount of light falling on the sensor. This is usually controlled by the light meter, although some cameras have a manual aperture control. Altering the aperture also changes the depth of field.

### Aperture priority
This is one of the semi-manual exposure options found on some cameras. The user sets the aperture according to the depth of field they require, and the metering system sets the shutter speed to obtain the correct exposure.

### Artefacts
When an image is stored in your camera's memory it has to be compressed to fit, usually into a JPEG file, and in the process some information is inevitably lost. When the image is uncompressed for viewing, noise creeps in and appears as angular blocks in the image, which are known as artefacts.

### Autofocus
Almost all digital cameras have automatic focusing. There are essentially two types; contrast detection, used in compact cameras and most CSCs, uses the camera's main sensor and works by detecting the borders between high-contrast areas and trying to make them as sharp as possible. Phase detection AF is used in digital SLRs and some CSCs, and uses a separate sensor. It is usually faster and works better in low light.

### AE lock
Stands for Auto-Exposure Lock, a function found on most advanced digital cameras. This enables you to take a light meter reading from a particular part of the image and then hold that setting while you compose the image. Useful for dealing with backlighting and other difficult lighting situations.

### Backlighting
Backlighting occurs when your subject is brightly lit from behind, such as somebody standing in front of a sunlit window. Unless you adjust the exposure to compensate for this, your subject will appear as a dark silhouette against the bright background.

### Back-side illumination
Not to be confused with backlighting, this refers to a new method of sensor design. In conventional sensors the wires connecting the photocells of the sensor run over the front surface of the chip, reducing the light-collecting area. Back-side chips are made the other way up, so that the wires are on the back. Offers potentially better low-light performance.

### Barrel distortion
Barrel distortion occurs when a lens, usually wide-angle, distorts an image so that it appears slightly spherical. If you take a seascape with a wide-angle setting and notice that the horizon seems to curve, this is barrel distortion. It's most noticeable when there are straight lines near the edge of the frame. In digital images barrel distortion can be corrected in image-editing software.

### Bracketing
Bracketing shots is where a photographer takes the same shot three times or more, each at different exposures. This increases the chance of getting an ideally exposed image. Also, it's possible to combine the shots in software to increase the light and shade within the image, which is how HDR works.

### Burst mode
Many cameras offer a burst mode, which means they can take several images in rapid succession, just as you'd get with a motor-wind on a traditional film camera. The number of shots that can be taken is limited by the speed of the camera's image capture and processing systems, as well as the size of the internal memory buffer. You'll typically get about three frames per second from a standard digital camera in burst mode.

### Centre-weighted metering
This is when the camera takes an average light reading from the whole frame, but pays more attention to the centre of the image where the subject normally is. This has been largely superseded by multi-pattern metering, which is better able to cope with unusual situations.

### CCD
Stands for Charge Coupled Device. This is the light sensor behind the lens of your camera that records the image when you take a photograph. It consists of a grid of millions of tiny light sensors, one for each pixel of the image. The size of a CCD is measured in megapixels, and the higher the megapixel rating, the better the image quality.

### Chromatic aberration
Coloured fringes that appear around objects, often toward the edges of the frame. Caused by light rays of different wavelengths coming to focus at different distances from the lens. Better quality lenses seek to minimise this by the use of special coatings and lens designs. Can be corrected by software after the picture is taken.

### CMOS
Stands for Complimentary Metal-Oxide Semiconductor. A chip-manufacturing technology used to produce the sensors in an increasingly large proportion of digital cameras. Cheaper but with better tolerance than other methods.

### Depth of field
When you focus your camera on a subject, some detail behind and in front of the chosen subject will also be in focus. The distance between the nearest and furthest in-focus objects is known as the depth of field. It is changed by altering the size of the aperture – the smaller the aperture, the larger the depth of field.

### Digital zoom
Some cameras give you the option of zooming in on the centre part of an image by expanding it in the camera. Although the zoomed area looks bigger, it still contains the same number of pixels as it did originally, so it will appear blocky and will lack resolution. Not to be confused with optical zoom, which is far superior.

### Dynamic range
The difference between the lightest and darkest areas of an image. If a camera can simultaneously capture shadow and highlight detail then it has good dynamic range. Few cameras can do both.

### DPI
Stands for Dots Per Inch. The sharpness of an image produced by a printer is defined by how many dots of ink per inch of printed paper its print head can produce. A figure of 1,200dpi or higher is usually required for photographic-quality results, although most modern printers are capable of this.

### Effective pixels
Although your digital camera may claim to have 13.6 million pixels on its CCD, some of that number will not be used for taking the picture. Usually, some pixels around the edge of the sensor are painted black to provide a colour balance, while others fall outside the range of the lens.

### Electronic viewfinder
Some cameras have a viewfinder containing a miniature LCD monitor showing you what the camera sees. This usually uses less battery power than the LCD screen on the back of the camera, but can be a strain on the eye and difficult to focus.

### Exposure
When you take a picture, the light meter in the camera determines how long the shutter should be open for and how wide the aperture should be, thus obtaining the correct exposure. If a picture is too dark, it is underexposed, whereas if it goes the other way and is too light, it is overexposed.

### External flash
This means that the camera has a connection, usually a hot shoe, that enables you to use a flashgun other than the one built into the camera. This allows a lot more creative freedom and control over lighting, because the flash can be positioned further away from the camera. This feature is only usually available on more expensive or professional-quality cameras.

### EXIF
The Exchangeable Image File (EXIF) format is used by nearly all digital cameras that output pictures as JPEGs. It enables information, such as the GPS co-ordinates, date and time the shot was taken, plus exposure and other camera information, to be stored in the image file alongside the normal picture information.

### Fixed focus
Cheaper cameras have fixed-focus lenses, which means they cannot be adjusted. Instead they rely on a very narrow aperture to make everything appear in focus, from a few feet in front of the camera out to infinity. They are fine for snapshots at average distance in good light, but are not so good for creative photographs where focus can be used to produce unusual effects.

### Focal length
In brief, this term describes the magnifying power of the camera's lens. The longer the focal length, the greater the magnification. Conversely, the smaller the focal length, the more wide-angle the lens. Most digital camera zoom lenses can vary between short and long focal lengths.

### f-number
This is the number which describes the ratio of the aperture of a camera's lens to its focal length. Generally, a higher quality lens will have a smaller f-number, which bizarrely means a wider maximum aperture, and thus more light entering the lens. See also 'Depth of field' for more information about focusing.

### HDR
A rather over-used technique whereby several shots at different exposures are combined to produce one image capturing a very wide range of contrast, or dynamic range. Useful for high-contrast lighting and night-time shots, but can be over-used by art students who've just discovered it.

### Histogram
A histogram is a graph of brightness. It ranges from black through grey to white along the horizontal axis, while values in the vertical axis represent the number of pixels at the appropriate brightness. It provides a means of checking the exposure of an image. If too many pixels are present at the left-hand side of the histogram, the image is underexposed, while if it's weighted to the right, then it's likely to be overexposed.

### Interpolation
Some cameras and image-editing software can increase the size of a digital image by adding extra pixels in between the original ones. They take an average of the pixels around the new one and attempt to match the colour and brightness to create a

seamless image. Some systems give better results than others.

### ISO
Stands for International Standards Organisation. In conventional photography, the ISO number is a measure of the light sensitivity of photographic film, and this has been carried over into digital photography as a way of expressing the light sensitivity of the CCD.

### Jaggies
'Jaggies' refers to jagged diagonal lines that appear in a low-resolution picture. Pixels are square, so if large pixels are being used to represent a diagonal, you'll be able to see the corners of each, creating a saw-like edge. Anti-aliasing is used to soften jaggies, whereby the software will attempt to calculate 'in-between' shades to blur the line a little and make it look a lot smoother.

### JPEG
This file type stands for Joint Photographic Expert Group, and is the most commonly used system of image compression. Using a sliding scale between file size and picture quality, it enables digital cameras and computers to squash a large picture into a small amount of memory. Be careful when compressing files, though, because too much compression will reduce the quality of your image.

### Landscape mode
A program exposure option found on many mid-priced cameras, this function automatically selects the best exposure settings for taking landscape photographs, usually a longer shutter speed and the narrowest possible aperture to maximise depth of field. It can also refer to holding the camera horizontally, which is usually preferred for landscape shots.

### LCD
Stands for Liquid Crystal Diode, a display technology first developed in the 1970s, and in widespread use today. Most cameras have an LCD monitor screen mounted on the back for viewing photographs. Some also have an LCD electronic viewfinder, and some DSLRs also have a separate LCD data display panel.

### L-ion
Stands for Lithium Ion. This is the latest kind of rechargeable battery, superior even to Ni-MH. It can hold more power, and does not suffer from 'memory effect', where a partially charged battery, when recharged, will only register the additional charge rather than its full capacity. However, L-Ion batteries are quite expensive.

### Macro mode
Refers to a lens that can focus closer than its designated focal length, but these days it is used to describe any facility for taking extreme close-ups.

### Manual mode
Found on higher-end cameras, this is for experienced photographers only. It gives you full control over both aperture and shutter speed, enabling you to experiment with exposure and depth of field. Essential for creative photography.

### Megapixel
Megapixels are a measure of the size and resolution of the pictures that a digital camera can produce. Mega means one million, and in this case a million pixels, or more accurately a million individual light sensors on the camera's CCD. The more megapixels, the better.

### Memory card
Most digital cameras store your pictures on removable cards full of computer memory. They come in a variety of sizes and there are several different types, including CompactFlash, SD and MicroSD cards as well as Sony's own MemoryStick format.

### Metering system
This is how the camera measures the amount of light being reflected by whatever you are trying to photograph, to determine the correct exposure for that particular scene. There are many different types, including spot metering, multi-pattern metering and centre-weighted metering.

### Multi-pattern metering
This is a sophisticated means of determining the correct exposure of a photograph. The camera takes light readings from several different areas of the frame and compares them to its pre-programmed data to determine the right exposure. The idea behind this is that bright light sources, such as the sun or brightly lit windows, won't cause the rest of the image to be underexposed.

### Night-time mode
A program exposure mode that compensates for low light by setting the aperture to maximum. This lets the most available light into the camera and gives the fastest possible shutter speed under the circumstances.

### Ni-MH
Stands for Nickel-Metal Hydride, a type of rechargeable battery rapidly replacing older Nickel Cadmium (NiCad) batteries. Ni-MH batteries do not suffer from the 'memory effect' which was a problem with older rechargeables, and they can also store a lot more power. This makes them ideal for use in battery-guzzling digital cameras.

### Optical zoom
With recent advances in lens manufacturing technology, many digital cameras now have small but powerful optical zoom lenses. This means they can be adjusted to magnify the image (zoom in) or to capture a wide-angle shot (zoom out). Because the image uses the full capabilities of the CCD this is preferable to digital zoom.

### Pixel
Short for Picture Element. If you enlarge a picture on your computer, you will see that it is made up of tiny squares of a particular colour and brightness called pixels. A pixel is the basic building block of a digital photograph, and there can be several million of them in an image. The higher the pixel count, the better the quality of the photograph.

### Portrait mode
This is a program exposure mode that optimises the camera for taking classical portrait shots, widening the aperture to minimise the depth of field. This ensures that only the subject is in focus, while the shutter speed is increased to minimise camera shake.

### Processor
All digital cameras have an image processor, which takes the data from the sensor and turns it into the finished JPEG image that you see on the screen. A faster processor means larger resolution images can be processed more quickly, improving the camera's performance.

### Program exposure
Found on most digital cameras, program exposure is an automatic setting where the camera's metering system selects an appropriate aperture setting and shutter speed in an attempt to get the best exposure and performance out of the lens.

### Raw
Raw mode is found on most high-end digital cameras. It is an option which stores the uncompressed raw data from the sensor, which can then be processed on a computer using software such as Adobe Camera Raw, Bibble etc. Raw files contain more information than JPEGs, and take up more memory. Raw is actually not an acronym and so shouldn't be all capitals; it should really be written simply as "raw".

### Resolution
The more pixels there are in an image, the sharper that image will be. This is the resolution of the picture, and is usually expressed as two numbers representing the height and width of the image in pixels, such as 3,872 x 2,592. Multiplying these two figures gives you the effective megapixels, in this case 10.03MP.

### Shutter
The shutter is a device behind the lens of the camera which is normally closed, but opens for an instant when a picture is taken to allow light into the camera and onto the CCD. The length of time the shutter is open for is determined by the metering system, and is known as the shutter speed.

### Shutter lag
This is a problem found on many digital cameras. Because of the way they work, there will often be a slight delay between pressing the button and the camera actually taking the photograph. The latest camera designs have reduced this problem a great deal, so check this when buying a new camera.

### Shutter priority
This is a semi-manual mode that enables the photographer to specify a shutter speed while the camera's metering system sets the aperture for the correct exposure.

### SLR
Stands for Single-Lens Reflex. A mirror or prism reflects the light coming in through the lens to the viewfinder, so when you look through it you see exactly what the camera can see.

### Spot metering
Found on the more expensive cameras, this metering mode enables the photographer to take a light reading from a small area in the middle of the frame, usually marked in the viewfinder. This is the best way of dealing with difficult lighting conditions such as backlighting, and is normally used in conjunction with auto-exposure lock.

### Time lapse
We've all seen films of flowers opening at incredible speed, or the sun and clouds racing across the sky. This super-fast motion technique is called time-lapse photography, whereby a stationary camera takes several successive shots at time intervals of a few seconds, minutes or even hours. The images are then played back rapidly, giving the impression of continuous motion.

### VGA
Stands for Video Graphics Array, and refers to an image size of 640 x 480 pixels. This was once the standard size of a computer monitor output, but these days even mobile phones have larger displays. VGA is still sometimes found as an image size mode, particularly in the video recording modes of some cheaper cameras.

### White balance
Most modern digital cameras automatically adjust the colour balance of the picture to compensate for any tints in the ambient light, such as sunlight, fluorescent strip lights or normal light bulbs. This is called a white balance, and means you can take a picture indoors without that orange tint you get with a film camera.

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