NEW

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OUTDOOR PHOTOGRAPHY

FOR BEGINNERS

How to get started

Using your camera outside

Tips for better photos

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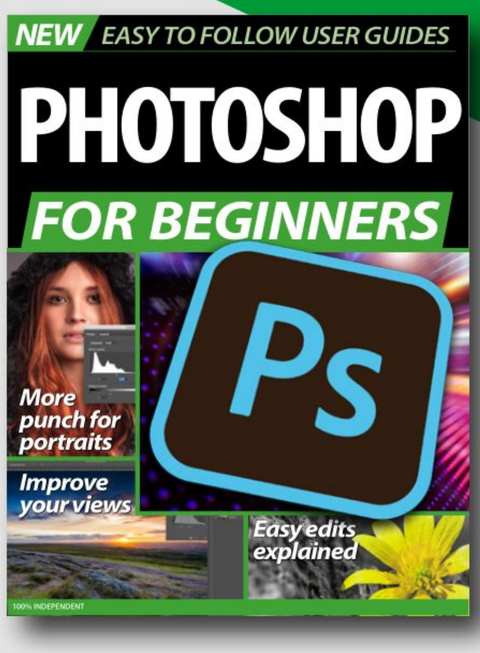

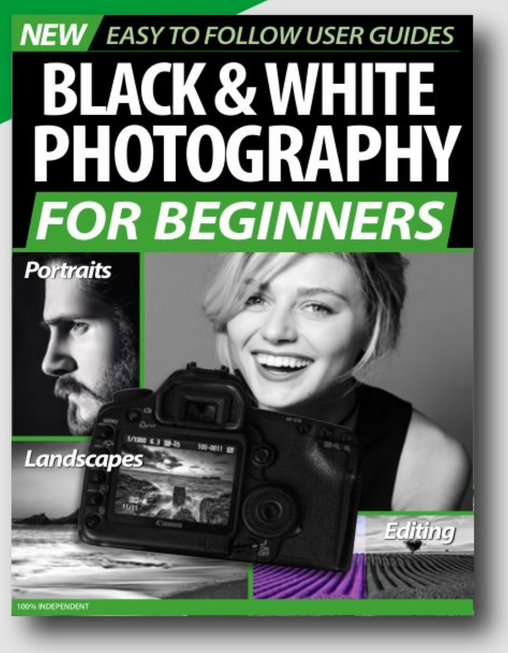

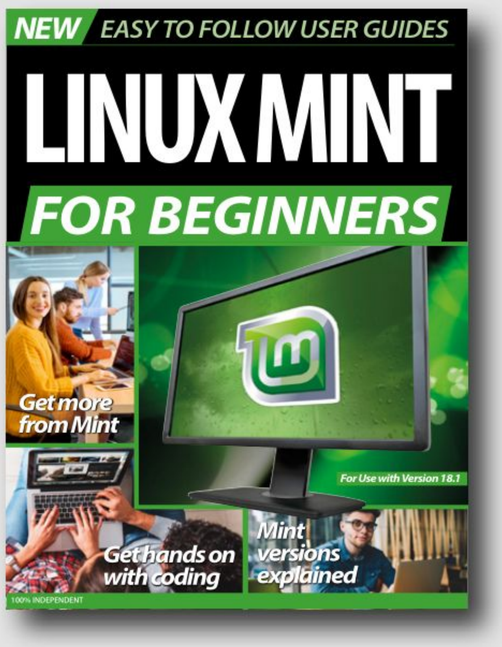

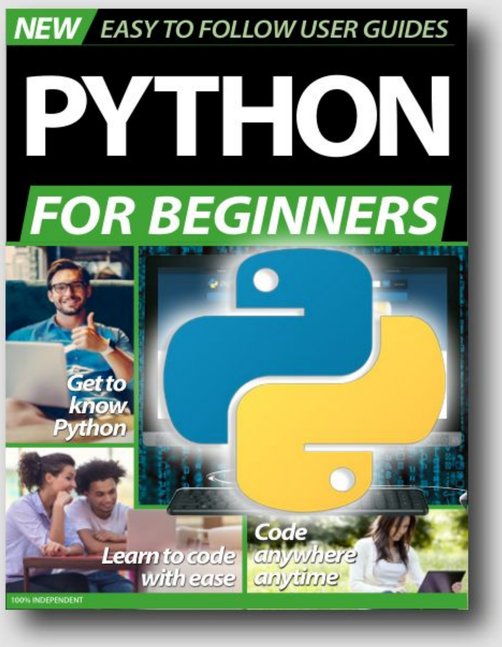

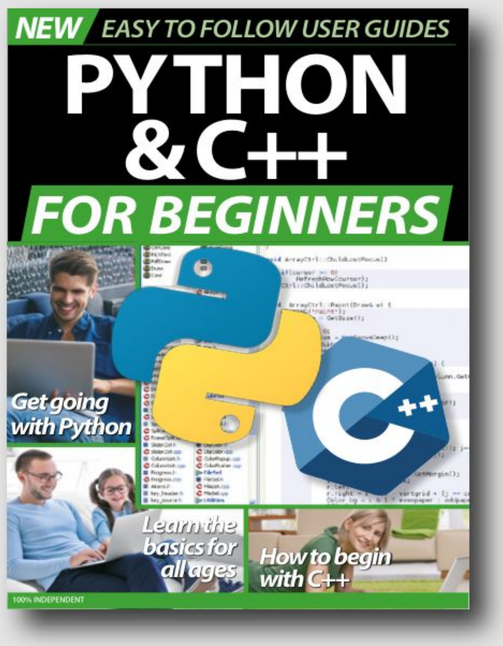

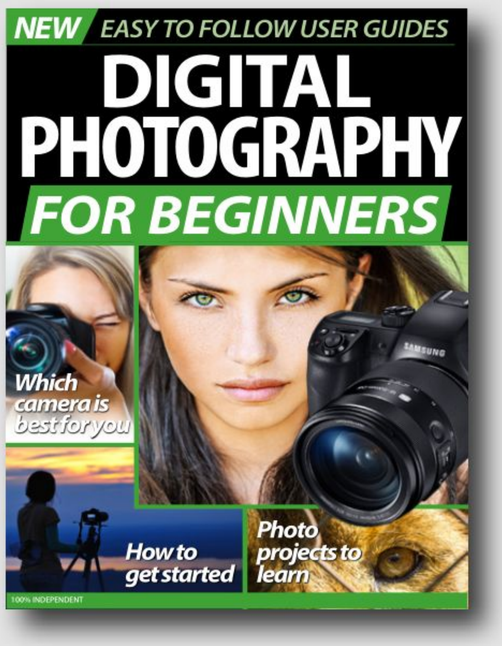

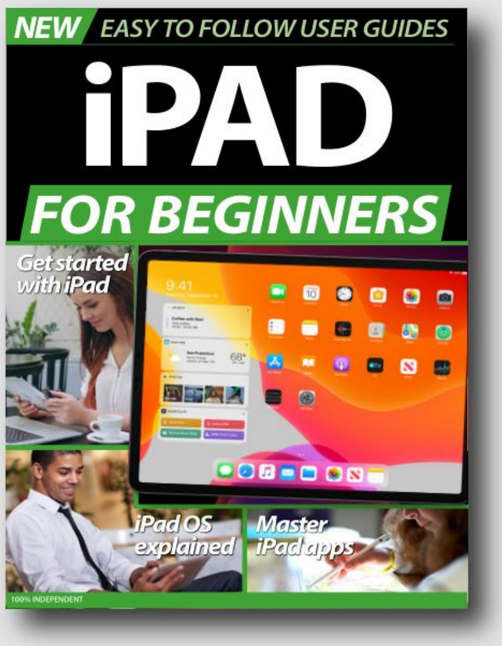

OUTDOOR PHOTOGRAPHY

FOR BEGINNERS

Starting something new can be daunting. Learning a skill or mastering a new piece of hardware is tough. Even tougher if you have no-one at hand to help. Conversely as the complexity of our consumer technology increases, the size of the requisite instruction manual decreases or in some cases it simply disappears. At numerous times in our lives we have all been "beginners", there is no shame in that fact and rightly so. How many times have you asked aloud, "What does this button do?". "Why doesn't that work?". "What do you mean it doesn't do that?". "HELP!". At the start of any new journey or adventure we are all beginners but fortunately for you we are here to stand beside you at every stage.

Over this extensive series of titles we will be looking in great depth at the latest consumer electronics, software, hobbies and trends out of the box! We will guide you step-by-step through using all aspects of the technology that you may have been previously apprehensive at attempting. Let our expert guide help you build your technology understanding and skills, taking you from a novice to a confident and experienced user.

Over the page our journey begins. We would wish you luck but we're sure with our support you won't need it.

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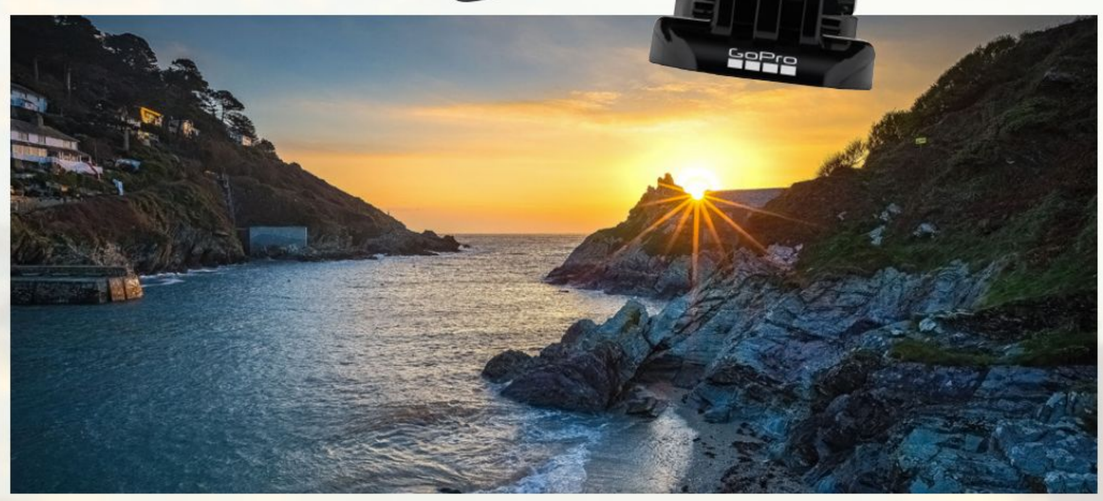

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"...there is so much to do and capture when you venture outside with the desire to create some fun and interesting images..."

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"So you have a new camera, or you are itching to get one and get out there and start snapping away, filling memory card after memory card, right?"

OUTDOOR PHOTOGRAPHY HINTS & TIPS

Some handy quick reference tips to start you off

For many people, new to the world of photography, one of the easiest and most accessible areas first explored with a new camera is the great outdoors, and why not? You don't need a studio or masses of expensive equipment. There is plenty of available light, unless you're feeling adventurous and want to try night photography, and beautiful seaside or countryside scenes are usually not too far away by car or a brisk walk.

Photographing outdoors is an amazing and rewarding experience for the novice and seasoned professional. Whether it's just a record of a day trip you've made to a new location with the family or a more serious professional endeavour in an exotic landscape, your shots, when taken well, are able to instil all sorts of emotions in the viewer of the final shot. Even if it is that most mundane of emotions summed up in the simplest way: 'wish you were here'.

So you have a new camera or you are itching to get one and get out there and start snapping away, filling memory card after memory card, right? Before you do, why not take a quick look at our essential hints and tips. Then, over the following pages we have assembled a useful quick reference guide to outdoor photography that can take your photographs to the next level. Go from 'snap' to 'masterpiece'. The rest of this publication will also cover some of the tips in greater detail, so turn to the next page and start reading. ■

1

Choose the right camera

When you're looking to buy a new camera for outdoor photography, make a list of your requirements and set yourself a budget. Don't forget to allow for accessories such as lenses, a tripod and cleaning kit if you need them. Don't fall in to the trap of thinking that a more expensive camera will make you a better photographer. You're much more likely to improve your technique by overcoming the limitations of cheaper kit than by spending more money than you need to.

2

Choose the right lens

If you're buying a compact system camera or DSLR, it will probably come with a standard telephoto lens that is ideal for general photography and snapshots but there is a wide variety of special lenses available for other types of photography. If you like to shoot landscapes, get a good wide-zoom lens but avoid super-wide lenses as these will distort the image. If you want to shoot wildlife, you'll need a high quality fast telephoto but this will be expensive.

3

Buy a tripod

The quickest way to improve your photography is to invest in a decent tripod. For the best combination of strength, rigidity and portability, the ideal choice is carbon fibre. Carbon fibre tripods start at around £120 ($175, €165) and can cost ten times more, so if that's too expensive get a good quality aluminium one. Features to look for include a ratcheted centre column, portrait-format tilt and all-metal construction. Avoid ones with plastic heads, as they are seldom rigid enough to prevent camera shake on long exposures.

4

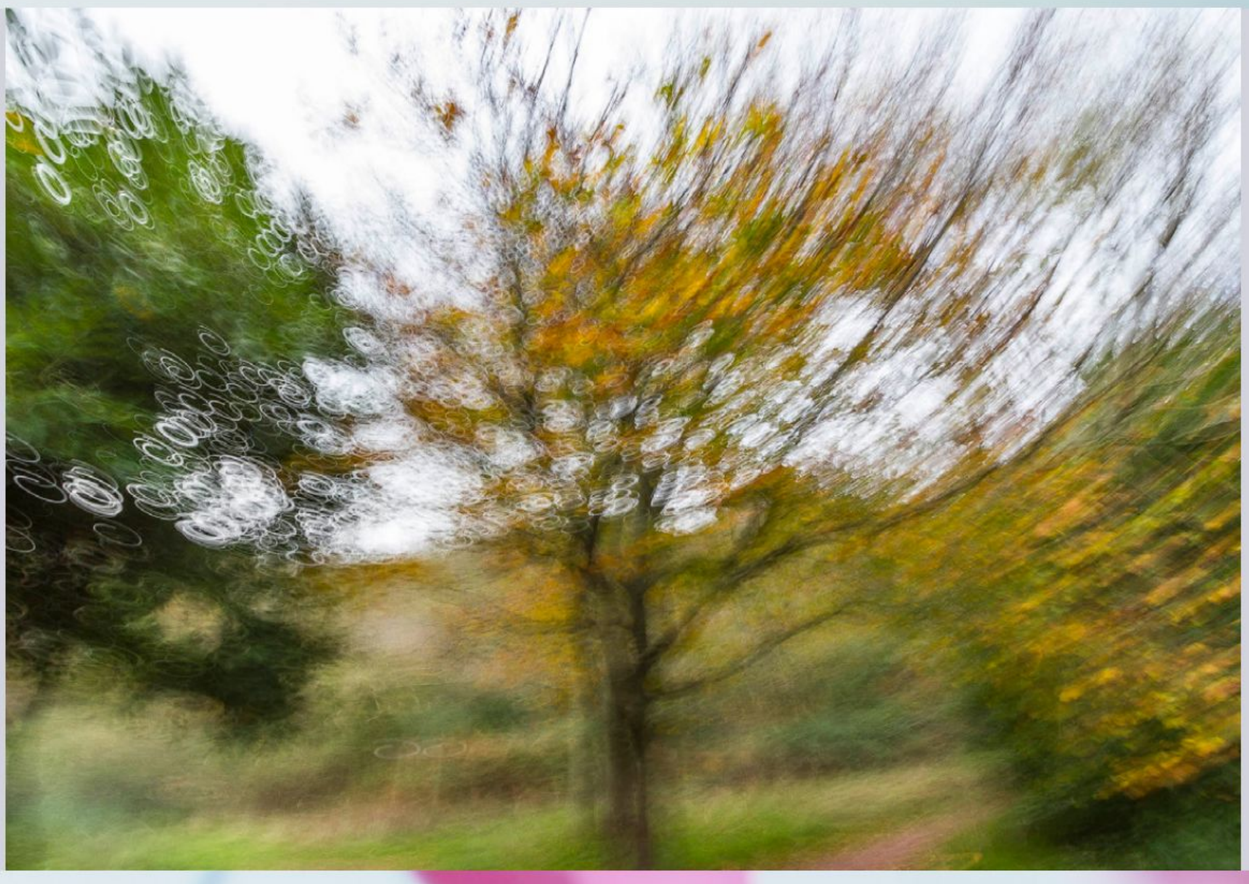
Photo editing software

To get the best out of your photos you'll need photo editing software. You can make simple edits with the Photos app that comes with Windows or with Photos on a Mac but for more accurate and detailed work you'll need something more capable. The best is Adobe Photoshop but with a monthly subscription fee, it may be too expensive for most hobby users. Fortunately there are plenty of cheaper options, including Corel PaintShop Pro X9, Corel AfterShot Pro 3 and Adobe Photoshop Elements 15.

5

Avoid camera shake

Camera shake ruins more photos than any other cause. You can avoid it by setting a faster shutter speed or higher ISO setting, or by using your camera's sport or action mode. Try bracing your camera against a solid object such as a wall or tree for additional support. You can eliminate camera shake altogether by using a tripod or by resting your camera on a solid surface and using the two-second self-timer setting or a remote shutter release.



6

Natural light portrait

Shoot portraits outdoors to take advantage of natural light. Position your subject so that their face is well-lit but don't believe the old tip about having the "sun over your shoulder". You should avoid having them face directly into the sun, because this will cause them to squint. The best option is to have them stand in bright shade, or near a white wall or other object that will reflect a flattering diffused light.

7

Fill-in flash

If you're shooting a portrait into the sun with your subject's face in shadow, use your camera's flash to help balance the sunlight and fill in those dark shadows. Most cameras these days have an automatic fill-flash setting that will work with the exposure meter to produce the correct result but if not use the flash on full power and reduce the aperture by one or two stops to avoid over-exposure.

8

Group portraits

If you're shooting a group portrait outdoors, try to find a location that lets you position your subjects at different heights. A set of broad steps, a low wall, a park bench or even the trunk of a fallen tree make ideal impromptu stages, and add interest to what would otherwise be a fairly dull photo. Position shorter people at the front of the group or get those at the front to kneel, so that everyone can be seen clearly in the shot.

9

Portrait backgrounds

When shooting a portrait outdoors, always be aware of objects in the background and how they will appear in your shot. You can avoid the classic mistake of having a tree appearing to grow out of the top of someone's head by using a wide aperture (narrow depth of field) to blur the background while keeping the subject sharp. If you want a sharp background in your shot, take care to position your subject so as to avoid obtrusive distractions.

10

Time of day

When shooting landscape shots, the time of day is all-important. You can't control the position of the sun in the sky, so you'll have to wait for it to be in the right position to provide the best lighting for your scene. Make a note of sunset and sunrise times and try to visit the same location several times at different times of day. The favourite times for perfect lighting are an hour after sunrise and an hour before sunset, known as the 'golden hour'.

11

Position

Since you can't move the landscape around to suit your composition, choosing the right position to take your shot is all-important. Study the scene you want to capture and try to picture how it would look from higher up, lower down or from a different angle. Be aware of obstructions such as power lines and pylons, and try to choose a location that minimises their impact. The perfect location may involve a bit of hiking but it will be worth it.

12

Harmony and balance

There's more to a good landscape composition than just a snapshot of some nice hills. Try to include foreground detail such as old walls, rock formations or plants. They will add depth and a sense of perspective and scale to your picture, and make for a much more interesting composition. Try to balance foreground detail with background detail to create a harmonious balance to your composition.

13

Whatever the weather

Remember that the weather is part of the landscape too. While a nice sunny day is perfect for outdoor photography, natural weather effects such as mist, clouds and even rain can be used to create an attractive photo under the right circumstances. Make the weather part of your composition. Try capturing mist in early morning light, or raindrops hitting puddles or the surface of a lake. Cloud formations can add interest to the composition of a panoramic landscape shot.

14

Night photography

You can capture amazing photos of the stars on a clear night by setting your camera on a tripod, setting the aperture to its widest position and using the 'B' exposure setting and a cable release to hold the shutter open for five or six minutes. Make sure you're well away from any light sources such as street lights or passing cars. If you point your camera towards the Pole Star (or the Southern Cross) you'll capture the apparent circular motion of the stars as the Earth rotates.

15

Low-light

When shooting in low light the most important thing to remember is that your camera's exposure meter will try to brighten everything up; this can cause problems with image noise at higher ISO settings. To capture dimly lit subjects against a dark night-time background, try reducing your exposure by a couple of stops. This will also help to reduce the blurring caused by camera shake and moving subjects during long exposures.

16

Flash

Many people will try to use their camera's flash when shooting outdoors in low light but using flash outdoors has its own special difficulties. The effective range of your flash will be greatly reduced, since it has no walls or ceiling to bounce off, so make sure your subjects are no more than three or four metres away. If they're outside this range turn the flash off and use the night-portrait mode instead.

17

Raw mode

Most high-end cameras, and even some of the better mobile phone cameras, have a feature called Raw mode. This is the equivalent of the negative in a film camera; you can take the Raw image data and process it yourself using image editing software such as Photoshop.
The advantage is that the Raw mode file contains uncompressed data with more colour information and tonal depth than the processed JPEG image that your camera usually produces, so you can do more with it.

18

Get on their level

Children, as you may have noticed, are usually considerably shorter than adults, so all too often when photographing them they're either looking awkwardly upwards into the camera or you can only see the tops of their heads. When photographing young children, try kneeling or sitting down, so that you're more or less on their level. You'll appear less intimidating and your picture will capture the world from the child's point of view.

19

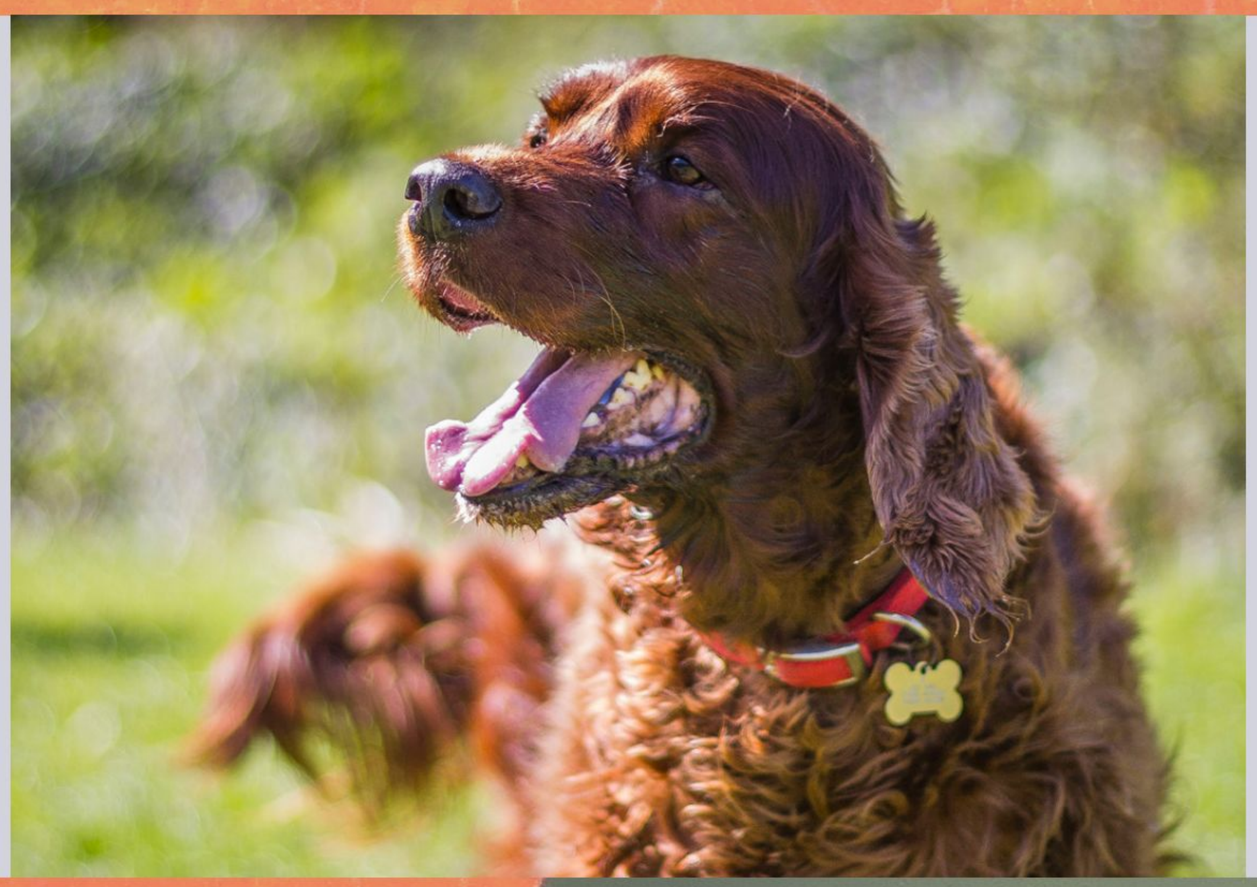
Exposure compensation

Your camera's exposure meter will usually try to make everything in the frame appear to be of average brightness, which can cause problems if there are areas of very deep shadow or bright light sources in the scene you're trying to photograph. Use exposure compensation to overcome this. To make sure that shadows remain black, reduce exposure by a couple of stops. Stop bright highlights under-exposing the scene by increasing exposure accordingly.

20

Animals

The old actors' adage "never work with children or animals" can also apply to photographers. Even domesticated animals and pets will seldom co-operate and pose for a photo; and wild animals will usually run or fly away as soon as they see you, so you have to employ some special tactics. For pet portraits try giving the pet a chew toy or a catnip treat to get them to sit still and with wild animals follow the professionals and use camouflage and a long telephoto lens to help you get closer.



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Concerts

Outdoor music festivals and concerts are a popular summer activity in many countries and often make excellent photo opportunities. If you have the equipment, shooting from a tripod at the back of the audience using a fast telephoto lens gives excellent results but for more modest cameras you'll need to get closer. When shooting concerts at night, try setting your exposure manually to 1/20th of a second at maximum aperture and use an ISO setting of 1600. If possible, focus manually too.

22

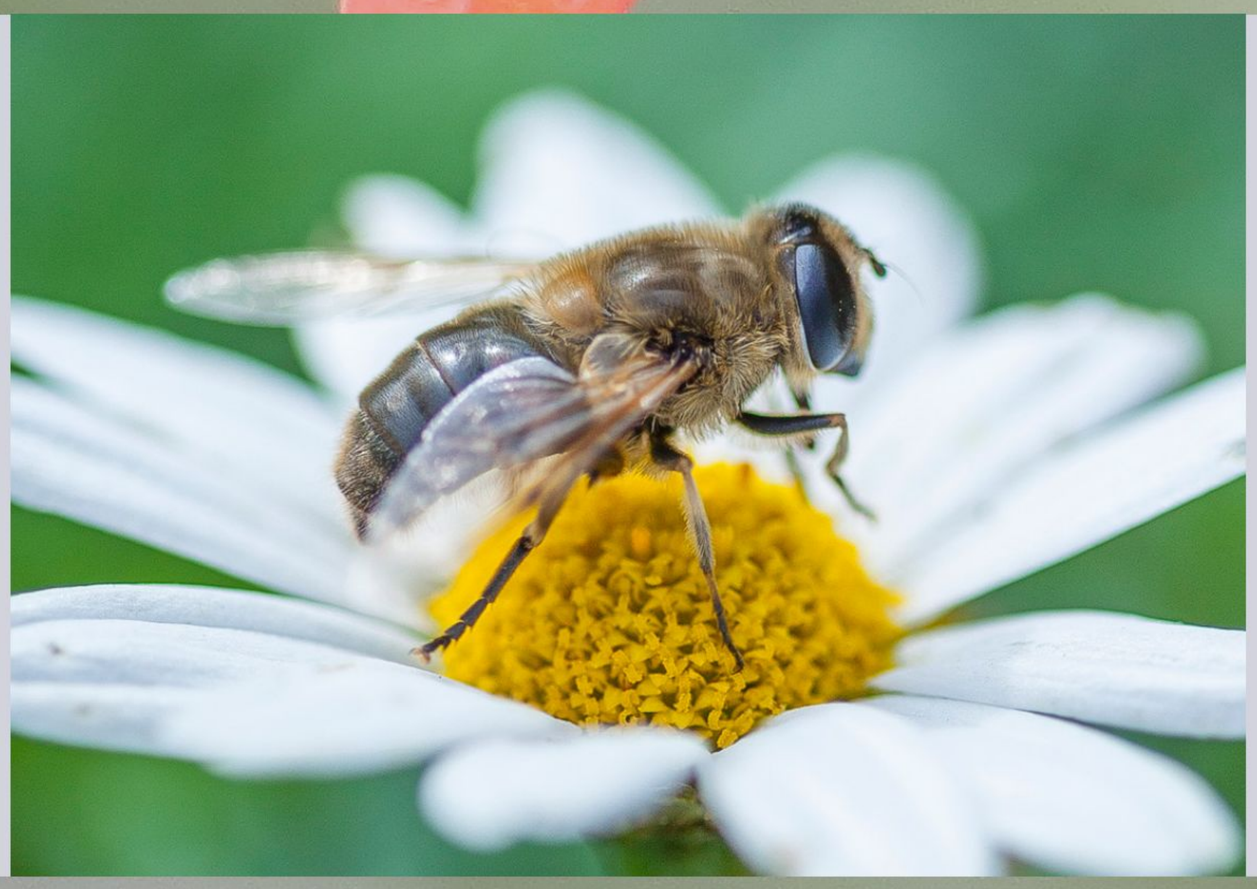
Cars

A quick browse through any popular car magazine will show you that there are a couple of standard ways to photograph cars. The most commonly used technique is to park the car somewhere interesting, like an abandoned warehouse or deserted beach, preferably just after dawn or just before sunset, use a wide-angle lens and shoot at a low angle from the front quarter of the car with the front wheel turned away from you to show off the alloy rims. It may be a cliché but it works.

23

Close-up

Good close-up photography requires either a camera with a very close minimum focusing distance or a special macro lens. The main problem with extreme macro photography is that the object you're focusing on will be in the shadow of your camera, so try to arrange lighting from the side. One handy gadget to try if you plan to do a lot of close-up work is a ring flash, which provides even illumination from all sides.



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Sports and action

The summer is a good time to photograph sports and other outdoor activities. For spectator sports you'll need a fast telephoto lens, such as Canon's excellent (but very expensive) EF 800mm f5.6 L IS USM. If that's too steep for you, try getting as close to the action as possible and then using your zoom lens at maximum length and maximum aperture. Time your shots carefully so as to minimise motion blurring. If your camera has a sports mode, use that.

25

Adventure photography

If you're keen on outdoor pursuits such as hiking, camping, skiing, kayaking and so on, you'll no doubt want to take photos to record your adventures. Most normal cameras don't take too kindly to being soaked in rain or submerged in a river, so buy yourself one of the many waterproof, shockproof cameras that are available, such as one of the GoPro range of action cameras. If you do want to take your DSLR along, invest in a fully waterproof case such as the Aquapac.

26

Focal length

Focal length, or the zoom setting of your lens, is one of your most important creative tools. Longer focal lengths let you get closer to distant subjects, whilst wide angle settings let you capture more of your surroundings. However, most people only ever seem to use the minimum and maximum settings. If you do this you're missing out on a lot of creative potential. Use focal length creatively to improve composition or to focus attention on details in a scene.

27

Depth of field

Depth of field is the distance between the nearest and most distant objects in a scene that are in focus. It is controlled by a combination of aperture and focal length and is an important creative tool for improving your photographs. Use a narrow depth of field (wide aperture) to isolate subjects against a blurred background or use a large depth of field (narrow aperture) to capture an entire scene in sharp detail.

28

Focusing

Your photo needs to be properly focused but it's important to make sure that you focus on the right point. For narrow-depth-of-field portraits, try focusing on the subject's eye that is closest to the camera. For big panoramic landscapes using narrow apertures, manually focus on a point roughly one-third of the distance between the foreground and the most distant point. This should ensure that the whole scene looks sharp. If you use autofocus, try using spot focusing, it's usually more accurate.

29

Hot weather

Hot weather can also cause some problems, with condensation and high humidity being at the top of the list. Keep a couple of bags of silica gel in your camera bag to absorb any stray moisture and wipe off any surface condensation as soon as it forms, to avoid it seeping inside your camera and messing up the electronics. Keep your lens clean too and avoid the problem of fungal blooms growing inside the lens barrel.

30

Black and white

There are many subjects that can look great in black and white, particularly portraits, rough textures like old stone, and even landscape shots. However the black and white mode on your camera may not do the scene justice. You can get much more creative control over the final appearance of the image by converting the photo to monochrome using photo editing software. This is especially true if you shoot in Raw mode, with its much greater tonal range.

31

Cleaning

Like any piece of complex equipment, your camera needs regular care and maintenance if it's going to continue to work properly. Dust and dirt can cause serious problems, so clean your camera regularly. Clean the outside with a soft cloth and use a small soft brush to get into the nooks and crannies. Clean your lens carefully, using only a proper lint-free lens cloth and lens cleaning fluid, which should be applied to the cloth and not to the lens directly.

32

Batteries

Your digital camera can't operate without power, so make sure you fully charge the battery before taking it out for the day. If you're going away for a holiday remember to take your battery charger and an adaptor for foreign mains sockets; and maybe consider investing in a spare battery or external battery pack in case you can't charge it for a while. There are also several devices available that can charge your battery using solar energy or from a hand cranked mini-generator.

33

Cold conditions

Cold conditions can cause a few problems for your digital camera, the main one being its effect on batteries. You'll find that even on a cold morning after a clear summer night, your battery will only last around half as long, so keep a spare in a warm inside pocket and swap them over when the first runs out. When you take your camera back indoors, keep it in a sealed plastic bag until it's warmed up, to avoid condensation problems.

34

Bright beach scenes

Shooting bright beach scenes can be tricky with an automatic camera. The exposure meter will try to make that expanse of pristine white sand look like a mid-tone grey, which will cause anything else in the scene to be under-exposed. Use your camera's exposure compensation, or manual exposure if your camera has it, to increase exposure by two or three stops to counteract the metered under-exposure. Alternatively, use spot metering on your subject's face to produce a more accurate result.

35

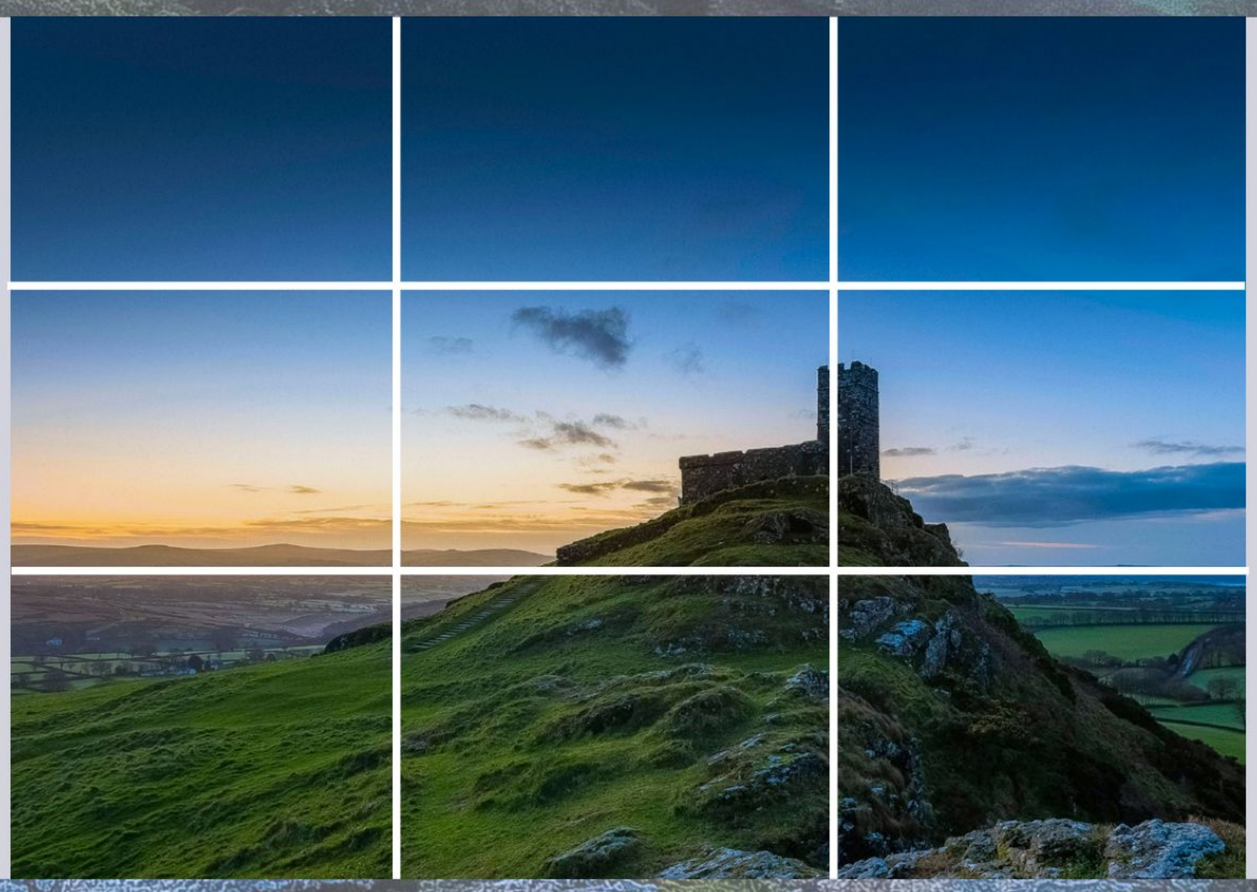
Leading lines

There are many rules and guidelines for photographic composition but one that applies most often to landscape photography is the concept of leading lines. When composing your shot, try to find lines in the scene, such as roads, rivers, railway lines or hedges. Frame your shot so that these lines will lead the viewer's eye into and through the scene. They will also help to give the scene a sense of scale and perspective and this will also help with your composition.

36

Rule of thirds

One of the most commonly quoted rules of photographic composition is the famous Rule of Thirds. When composing the scene in the viewfinder, try to position the main elements of the scene in such a way that they fall on imaginary lines a third of the way across the frame, either vertically or horizontally, or even both. This technique works for all kinds of photography, not just landscapes.



“Good advice is essential and that’s why we’re here to help.”

GETTING STARTED

Some essentials to start shooting outdoors

In this first section, we want to outline some of the essentials you'll need to consider if you are looking to purchase your first camera, or upgrade what you currently have. Shooting outdoors, particularly if you are wanting to shoot landscapes, can be done with the cheapest of compact cameras, all shot hand held. That is absolutely fine up to a point. Beyond that, to take your outdoors photography up a notch, getting informed about lens types and investing in a good tripod, are key things to bear in mind.

Over the next few pages we'll look at a few of the many different types of camera that are available. We show you a few good tripod choices, lens types, and also look at some of the accessories that are available to help you take better photos when you venture out into the world. ■

Choosing the right camera

Which one is right for you to take outdoors on your next adventure?

Cameras come in so many shapes and sizes, packed with gadgets and technology that can be confusing to the average enthusiast. Add to that the fact that there are many types of camera system too, and you would be forgiven for wondering if it's easier to take up fishing instead. Don't worry, if you just want to snap pictures of your friends on holiday or shoot with the latest medium format camera in the wilds of Borneo, we've got a list of camera types that help sort it out for you.

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1. 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.

2. 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 £700 for luxury models.

3. 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. From rock climbing to surfing, this is the kind of camera that can keep up with an active outdoor lifestyle.

4. 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 is an even more rarefied category that has appeared more recently of advanced compacts with larger sensors. The use of a larger sensor offers better image quality and great low light performance , as well as an expanded set of features. Prices vary quite a bit within this range of cameras, starting from around £500 to well over £3000.

5. 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.

6. Compact system cameras

Compact system cameras (CSC), also known as mirrorless interchangeable lens cameras (MILC), 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. 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 and prices range from less than £300 to over £1,200. As sensor technology improves, the compact system camera offers a viable alternative to outdoor photographers who need to travel light but need quality images.

7. Smartphone cameras

There is no getting away from it, the smartphone has turned the idea of a point-and-shoot camera on its head. 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, m any smartphones now have the main camera backed up with a front-facing, lower resolution, 'selfie' cam as well. Most new smartphone cameras have the ability to be able to take very wide panoramas by merging images taken as you pan the camera to create some detailed landscape images.

8. Digital SLR

Digital SLRs (DSLR) 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, offering 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. A good full frame DSLR with a couple of great lenses is still the main choice for capturing great outdoor images in a range of conditions and lighting challenges. From a misty morning to a starry night, the DSLR can shoot it all.

9. 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 new Hasselblad X1D-50c has a 50 megapixel sensor and amazing picture quality, but it doesn't come cheap. With a standard lens it will cost you around £15,000!

Your next camera?

Some interesting cameras to consider

If you are just a holiday shooter or an enthusiast landscape photographer, then your choice of camera can be fairly specific. Obviously, when looking at a new camera, budget will have a major part to play. It is always recommended that you try to get the best camera you can afford without breaking the bank. Just be aware that it is a good idea to get something that you can grow into as you develop as a photographer. You may find that if you get a basic model with limited manual controls, you will quickly outgrow it and go looking for a new camera anyway, so it is something to keep in mind.

You may not need all the fancy technology and gadgets that are on offer with certain cameras when you start out, but that may soon change as you crave more exciting ways of taking photos. So with all that in mind, here is a selection of some varied and interesting cameras from both ends of the scale; hopefully, it may pique your interest and point you in the right direction. ■

Canon EOS 5D Mark IV

Full-frame DSLR - £3320/$3499/€3827

- 30.4 megapixel Full-Frame CMOS Sensor
- New Auto Focus system
- DCI 4K Video at 30 fps

Nikon D500

APS-C DSLR - £1700/$1999/€2003

- 173-point autofocus system
- 20.9 megapixel APS-C sensor
- 10 fps max shooting speed

Panasonic Lumix LX100

Micro Four Thirds camera - £500/$580/€590

- 12.8 megapixel MOS sensor
- 4K movies
- Classic manual control

Fuji X-T2

Mirrorless APS-C camera
£1399/$1599/€1649

- 24.3 megapixel CMOS sensor
- 3.0 inch tilt-angle display
- 8 fps shooting speed

Panasonic Lumix TZ70

Travel camera - £280/$400/€322

- 12 megapixel sensor
- 24-720mm f/3.3-6.4 lens
- 30x zoom range

Pentax K-1

Full-frame DSLR - £1799/$1946/€2073

- 36 megapixel CMOS sensor
- 33 Autofocus Points
- ISO 100-204,800

Choosing the right lens

Make sure your next lens is right for the job

A camera can stand or fall depending on how a good a lens you have attached to it, and also if it is right for the job in hand. Imagine setting up by a beautiful lake that stretches off as far as the eye can see in each direction. You would need a wide angle lens with a very short focal length that is capable of capturing all that grandeur and spectacle, but all you have is a telephoto lens. That is going to limit the kind of shot you could take there. You could also find yourself in a field of bluebells, wanting to get an extreme close-up of the dew on those gorgeous flowers. All you have in your bag is a standard lens with a minimum focusing distance that puts that dew-covered bluebell so small in the frame, it just doesn't work as a photo. After choosing the right camera, lens choices are your next port of call.

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 prefer to use a mixture of prime and zoom lenses depending on the circumstances.

For creative photography and amazing landscape and outdoor images, you'll need to get lenses that are suited to the task.

TYPES OF LENSES

Pancake lens

Typical focal length:
Wide, Normal, Telephoto

Simply put, a pancake lens is a very flat prime lens. It is shorter than it is wide and it is very small and light. They are used primarily by photographers who are after a small and compact camera/lens system. They are used with DSLR and Micro Four Thirds cameras. Relative to their diminutive size, they can produce very good images.

Standard zoom

Typical focal length:
28-80mm (full-frame equivalent)

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 quality lens often costing a lot more.

Ultra-wide zoom

Typical focal length:
16-35mm (full-frame equivalent)

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.

Macro lens

Typical focal length:
50-100mm (full-frame equivalent)

A true macro lens by definition should be able to record an image at 1:1 scale on the sensor or medium it was shot on at its closest focusing distance. This magnification factor means that a macro lens is able to fill the frame and reveal amazing detail on very small objects.

Medium telephoto zoom

Typical focal length:
80-300mm (full-frame equivalent)

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 have a smaller effective aperture than standard zooms.

Specialist lenses

Typical focal length:
400-1200mm (full-frame equivalent)

Specialist lenses are used mainly by professionals and advanced enthusiasts. These include both zoom and prime ultra-fast telephoto lenses used by sports and wildlife photographers.

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 now 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, which again is roughly equivalent to the 28-80mm full-frame standard.

Tripod tips

The best way to avoid camera shake spoiling your shots

The Xshot mini travel tripod, when folded away, is small enough to fit in your pocket. It could not really support a large DSLR, but your cameraphone or compact camera would be fine.

There can be no worse feeling, for a photographer of any skill level, than finding yourself in a location where the combination of setting sun, clouds, land and water conspires to create the perfect landscape image and what you actually capture is blurry due to too slow a shutter speed and the fact you shot it hand held. In situations like this, the tripod becomes your saviour. All the best cameras and lenses in the world cannot save you from the need to shoot long exposures in low light conditions. Even the most modern DSLRs with very high ISO capability will still produce a noisy image if you bump the sensitivity too high. If you want the sharpest, highest quality images for shooting in low light situations outdoors, then you will need a tripod.

Rigidity and carrying weight are going to be the key factors when picking the best tripod for your needs. The tripod you choose has to be able to support the weight of your camera and hold it perfectly still. Any movement or flexing of the tripod, will ruin that perfect landscape shot you spent hours hiking up hill and down dale to find. 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 the weight of a heavy camera. ■

> **"Rigidity and carrying weight are going to be the key factors when picking the best tripod for your needs."**

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 Hama Star 75, 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.


77/77
6016x4000

Digital storage

Your precious holiday photos in safe hands

As camera technology develops and the megapixel count increases with every new camera that is released, the file sizes that these cameras create when shooting in Raw format can be substantial. As an example, if you were to shoot a highly detailed landscape image with lots of tree, grass, clouds and mountains, an uncompressed 12-bit Raw file from something like a Nikon D810 could be as much as 55MB. Now imagine shooting an action scene of ponies running across the moorlands in burst mode and capturing twenty shots in just one sequence, you can imagine how quickly you would start filling up any digital storage. There's more to it than just the amount of storage you have. A memory card of 64GB will let you store a lot of images, but if that card cannot write the data from the camera fast enough, that burst mode sequence of ponies that your camera should be able to shoot at 8 frames per second is going to hit a digital log jam after a couple of shots because the buffer can't get the image data written to the card and it all grinds to a halt while it finishes the task. Clearly, there is more to memory cards than meets the eye.

Premium or Budget?

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. ■

A

B

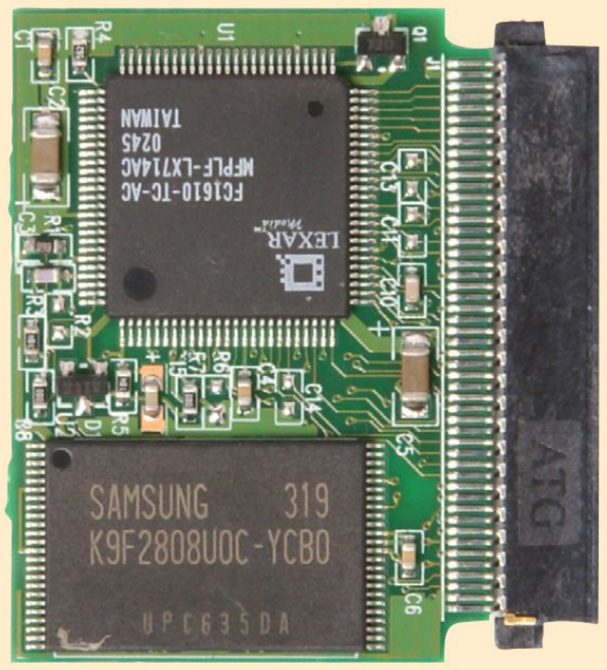


IMAGE A: The inside of an SD card.
IMAGE B: A Compact Flash card.
Memory cards are used in all types of portable devices, including cameras. They contain a chip of Flash memory, which can store data for years without degrading.

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 reach 160MB/s. Some cards offer storage capacity up to 256GB in size. All this from a card that is not much bigger than a postage stamp.

MEMORY CARD USAGE

Kingston SDHC 8 GB
Class 4
£5/$4/€6
Best for: compact camera users and holiday shooters.

SanDisk Extreme Pro
UHS-3 SDXC
64GB, 95MB/s
Class 10
£37/$35/€44
Best for: pros shooting Raw files and 4K movies.

Lexar Multi-use 16GB
Class 4
£5/$9/€6
Best for: compact users and amateur DSLR users.

SanDisk Extreme Pro
Compact Flash
64GB, 160MB/s
£75/$85/€90
Best for: high bit rate DSLR and HD video users.

Lexar Premium SDHC
32GB 200X
Class 10
£15/$12/€18
Best for: varied storage intensive DSLRs and devices.

SanDisk Extreme Pro
256GB, 160MB/s.
£275/$300/€330
Best for: extreme image and video performance.

Transcend SDXC Flash
128 GB
Class 10
£35/$44/€42
Best for: serious DSLR and video enthusiasts.

Lexar Professional
512GB, 525MB/s.
£1043/$1200/€1228
Best for: the highest possible performance.

> "The speed of the memory card can have an effect on the overall performance of the camera."

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 average 8GB card will be enough for approximately 1400 jpegs or 260 Raw files.

"Photography is a rewarding and potentially profitable hobby, and the more you learn about it the more you'll get out of it."

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. It's just a case of getting to grips with the basics of photography and your camera gear.

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. So read on and find out how that expensive gadget you bought actually works! ■

How image compression works

How you can squeeze that big panorama into such a small file

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

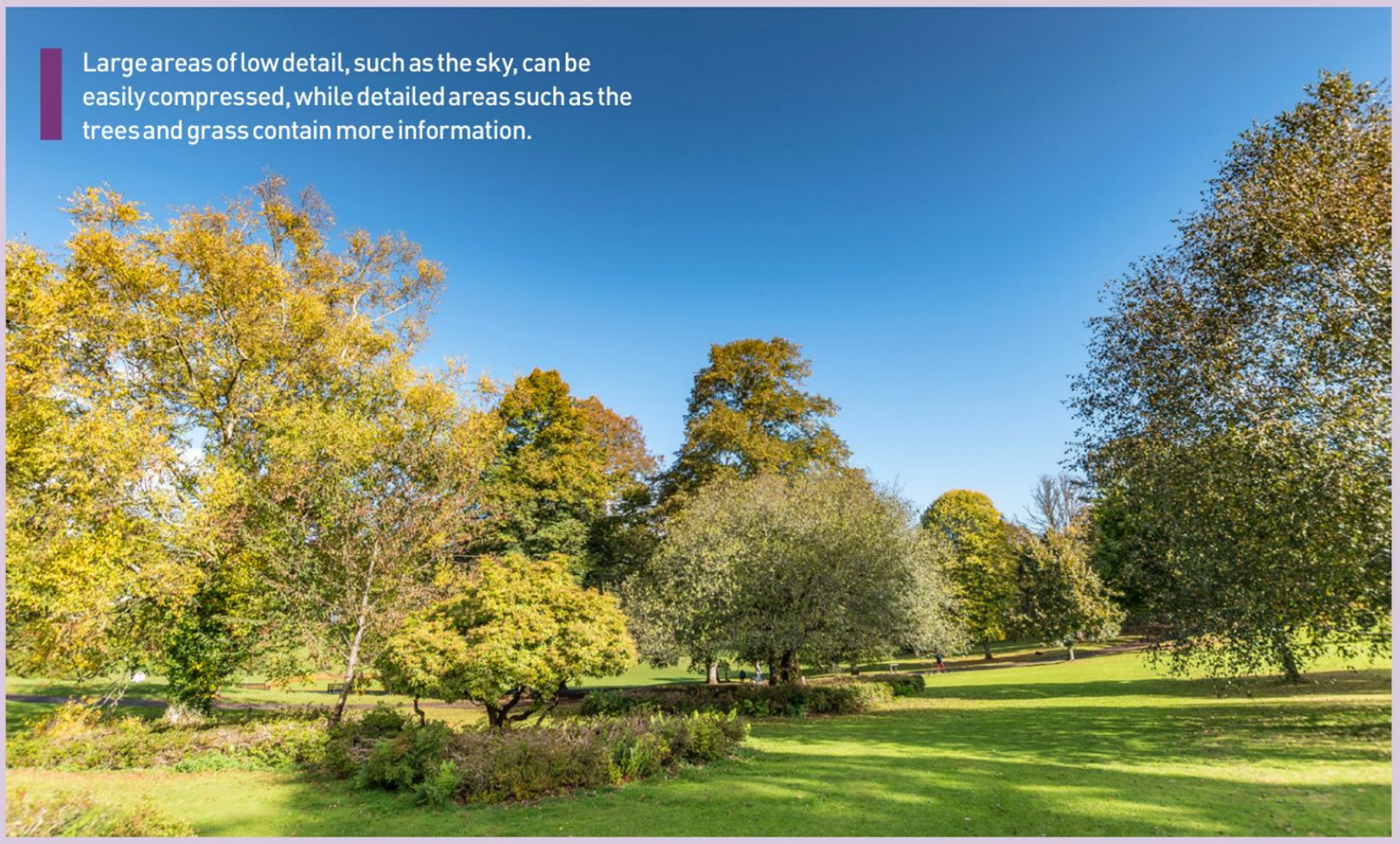
If you've ever edited a photograph on your computer using Photoshop, Gimp, or any of the main image editing programs, you may have noticed a disparity between the size of the image as displayed in your computer's file manager, and the size of the image once opened for editing. That image of the Lake District you took was about 4MB according to your file manager, but Photoshop is telling you it's actually 35MB. Well, thanks to some clever maths and algorithms, image compression is at work here. We'll start with the one you've all probably heard of which is the JPEG.

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 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

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



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

varying levels of detail. For example, take an average image shot in your local park on a sunny day. While the main subject, the leaves, trees and grass in the foreground, contains a lot of detail, there will also be large areas such as the blue sky that will 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. If you 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. 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 can get away with using a lower quality setting and still have pictures to be proud of. ■

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 Canon DSLR using the Maximum, Medium and Minimum quality settings. As you can see the differences are very hard to spot.

The next picture is the same Minimum quality shot as above, but resaved as a JPEG using Adobe Photoshop using the Medium compression setting. While the quality is a little lower, the image is far from useless.

For comparison, this next image takes the Minimum quality original and is then resaved in Photoshop using the Minimum quality compression settings. Now more compression artefacts are visible in the image.

18+

WHAT IS AVAXHOME?

AVAXHOME-

the biggest Internet portal, providing you various content: brand new books, trending movies, fresh magazines, hot games, recent software, latest music releases.

Unlimited satisfaction one low price
Cheap constant access to piping hot media
Protect your downloadings from Big brother
Safer, than torrent-trackers

18 years of seamless operation and our users' satisfaction

All languages
Brand new content
One site

AVXLIVE.ICU

AvaxHome - Your End Place

We have everything for all of your needs. Just open https://avxlive.icu

The right mode for the right conditions

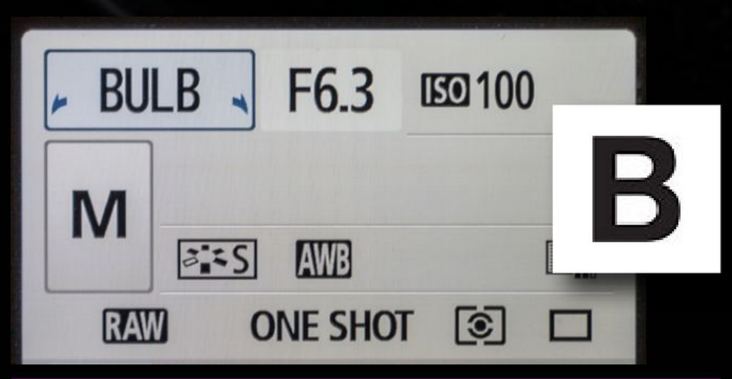
If you're trying to capture fast action on the football field or a sweeping panorama, there's a mode for that

Sometimes it's great to set your camera on a particular shot mode setting knowing it will take care of business for you in your particular shooting environment. This means that you can get on with just enjoying taking the shots you want. Most new compact cameras, mid range compact system cameras and DSLRs offer a range of modes or creative options that you can choose. There is a mode for action and sports that means your images of the important football match are shake free and the action is frozen. There is also a landscape mode that boosts saturation and contrast for vibrant green and blues, as well as using narrower apertures to give you as much depth of field image sharpness as possible.

Here 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 can be set from the command dial or through the menu screen.

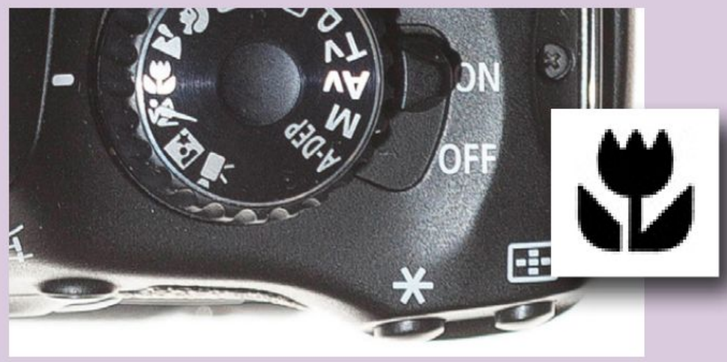


Manual Exposure: This mode provides the same range of exposure control as the other shooting modes, but lets you control both shutter speed and lens aperture independently for more creative control.

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, morning dew on grass, 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 like football players or racing cars . 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 subjects at sunset or at night, letting the flash illuminate the subject, while the longer exposure provides a brighter view of the landscape around the subject.

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, sweeping landscapes or any outdoor subject where you want as much sharpness as possible.

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.

Staying focused

Don't miss out on a good photo due to incorrect focusing

It's your child's sports day. They are taking part in the 100 yard dash and they are going to win. Standing by the finish line, you steady your camera and take a shot as they race over the line in triumph with another child in close second. When you finally review the image, you child is blurred, but the child behind them is in sharp focus. The image is useless. What happened? Well, you've just fallen victim to autofocus. Your camera decided that because of the various objects in the scene, and what it could actually lock on to, the second child was what it thought should be in focus. Autofocus is a great tool, but it does need your input now and again to keep it in line.

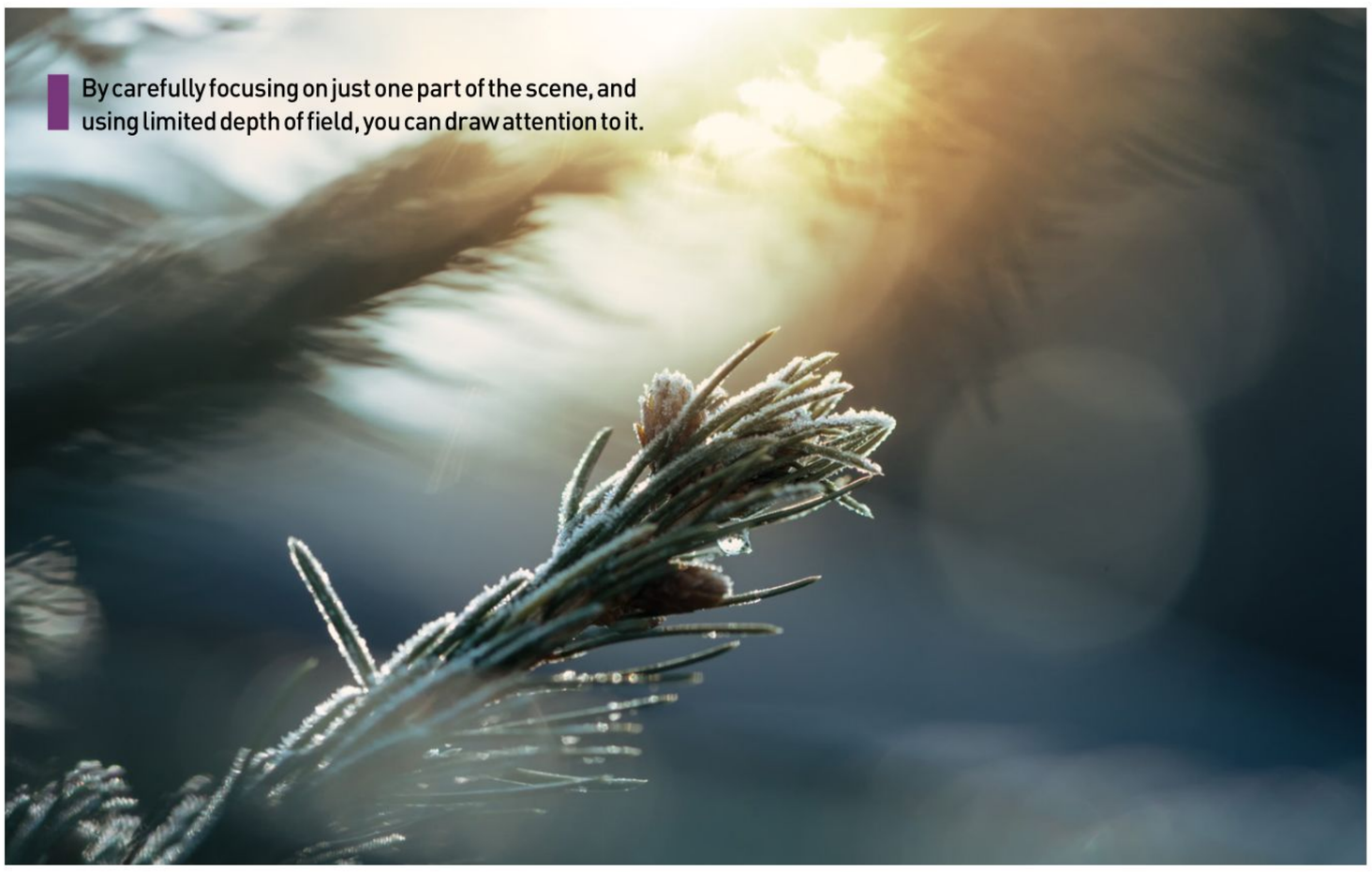
Although we now rely on autofocus for the vast majority of photographs, anyone who has tried taking a photo in low light, with fast-moving subjects or using very long telephoto lenses will have noticed that sometimes even the best AF system can run into problems. We've all stood there with the lens whirring 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,

To get this flower in focus, the camera was put on a tripod and manually set to get the exact part of the flower required in sharp focus, rather than relying on the autofocus system.

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

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



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

which samples the image from the main picture taking sensor and detects sharp high contrast edges in the details of the scene. Meanwhile all digital SLRs 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 reframing the shot. Similarly you can use it in reverse to focus on objects that aren't in the centre of the frame.

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. ■

How shutter speed affects your photos

Some simple tips that keep your photos sharp

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

From birds frozen in flight, to water looking more like fog. Those shots are created by using your camera's shutter speeds in different ways to create a range of visual effects in your photos. 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 100mm and a shutter speed of 1/100th 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 and focal length it's much more difficult to hold the camera steady. As you can see, the result is quite 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. Other 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 predigital lenses can still have the advantage of image stabilisation.

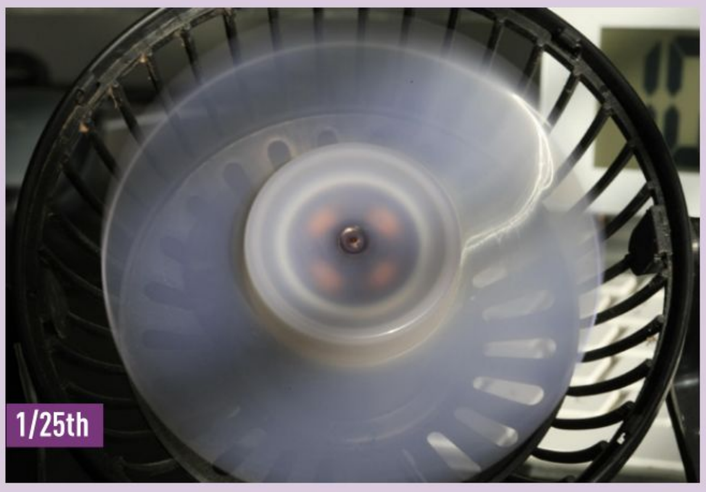
This example shot was taken with a focal length of 100mm at 1/10th of a second as before, but this time the image stabilisation is switched on. It has detected the vibration and corrected it by moving the sensor to compensate, resulting in a much sharper shot.

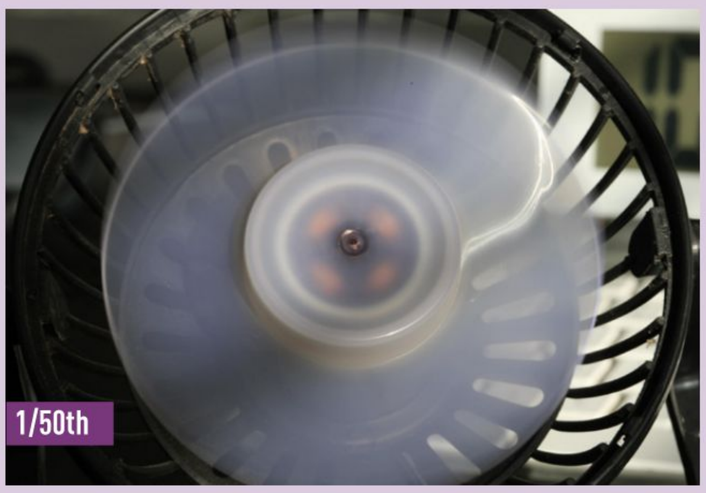
MOTION BLUR

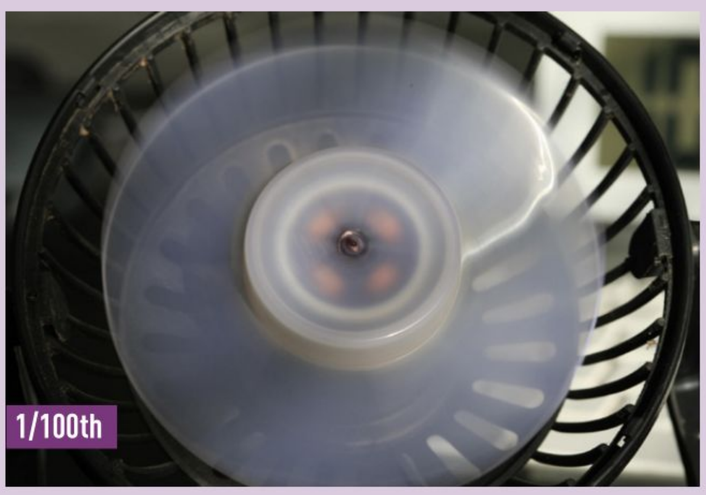
Any movement in the frame during the exposure will be captured in the picture, resulting in motion blur. Anti-shake systems can do nothing to correct this; the only solution is to use a shutter speed fast enough to effectively freeze the action and eliminate any sense of motion. With a fast enough shutter 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 a fairly slow 1/25th of a second up to 1/4000th of a second.

As you can see, at 1/4000th of a second the blades of a desk fan can almost be frozen in place.

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



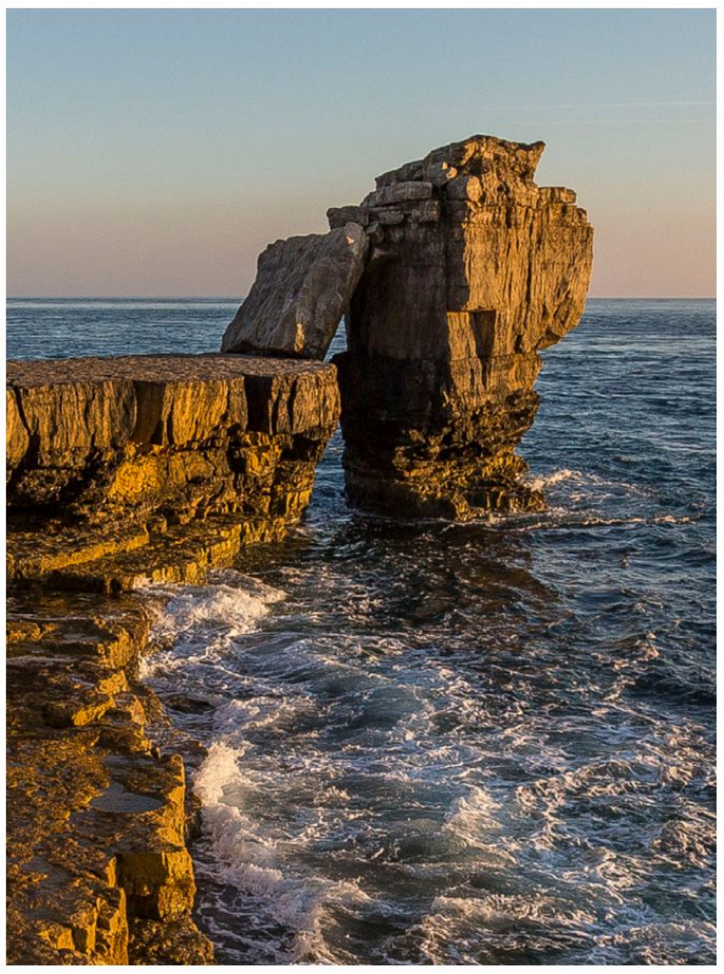




THE MISTY WATER EFFECT

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 Meadfoot beach on the Devon coast.

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 1/640th of a second and an aperture of f8.



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 a similar position as the previous shot, but with the addition of a 10stop ND filter to give a shutter speed of 30 secs and an aperture of f9.

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. The camera was set up on a tripod, using manual focus and full manual exposure, with a cable shutter release. Starting with an aperture of about f/4, you will need to dial in your settings to get a balanced exposure. If your exposure duration is still too short, stop your aperture down to f/5.6 or smaller until you get a longer exposure duration that renders car lights as long streaks. Generally, a shutter speed of around 4 seconds is a good starting point.

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.

Changing your view with focal length

Focal length is another great compositional and creative tool to use in your outdoor photography

Whether it's the smallest flower filling the frame of your viewfinder, or the sweeping vistas of the high moors and dales, these images would not be possible to capture without the aid of different focal lengths, giving you very narrow or very wide angles of view. A zoom lens allows you to choose a wide angle of view, or zoom in and use a narrower angle of view, magnifying the image. 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

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

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 most 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 lens, 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 magnification. 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.

300MM TELEPHOTO

50-200MM ZOOM

18-55MM KIT LENS

14MM WIDE-ANGLE

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 a similar effect as zooming in, but greatly reduces quality.

ANGLE OF VIEW

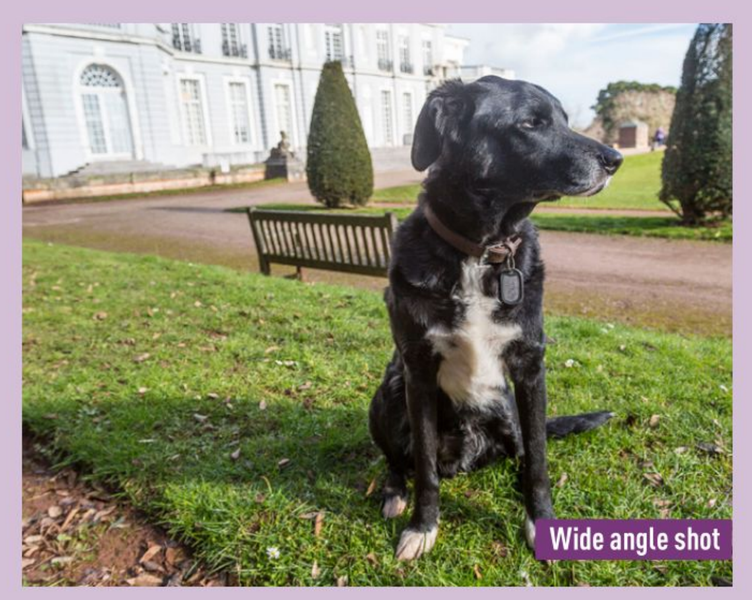
Changing the angle of view can be used to produce some interesting effects. If we move closer to the subject while shortening the focal length we can see that although the subject fills roughly the same area of the final image, in a wide angle shot a lot more of the background is able to be seen.

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.

DISTORTION

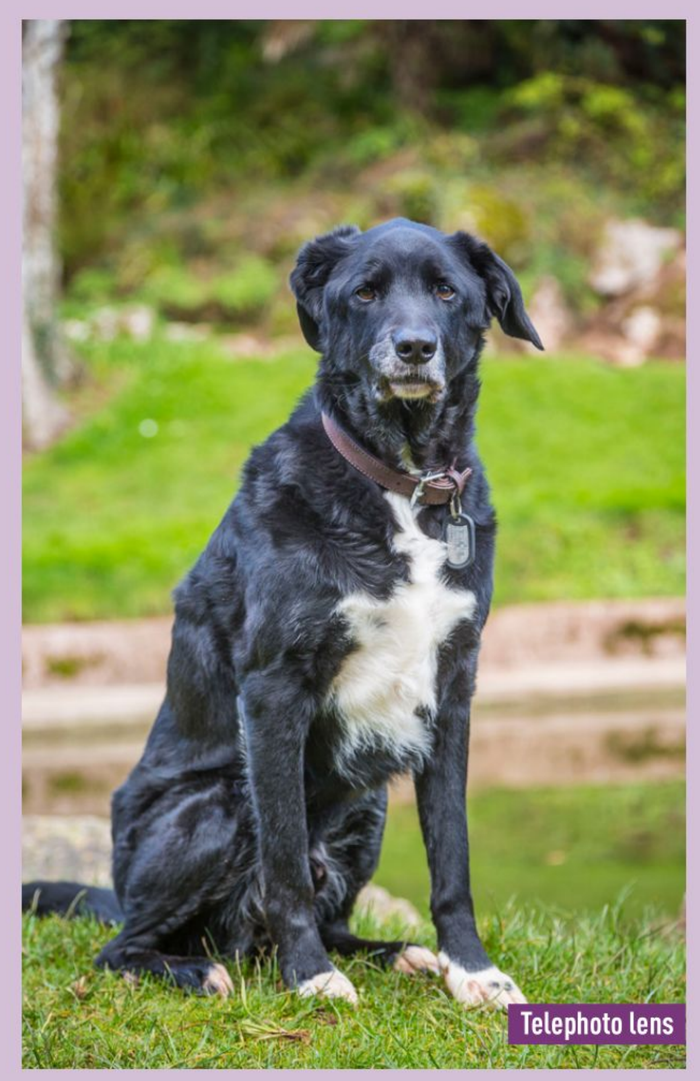
Changing the angle of view is important to remember when shooting subjects. If you use a short focal length to take a photo at close range the parts that are closest to the camera will appear disproportionately larger, distorting the shape of the subject. In our example, the result is a very distorted front of the car with the rest of it very tiny in relation to the grille and headlights.

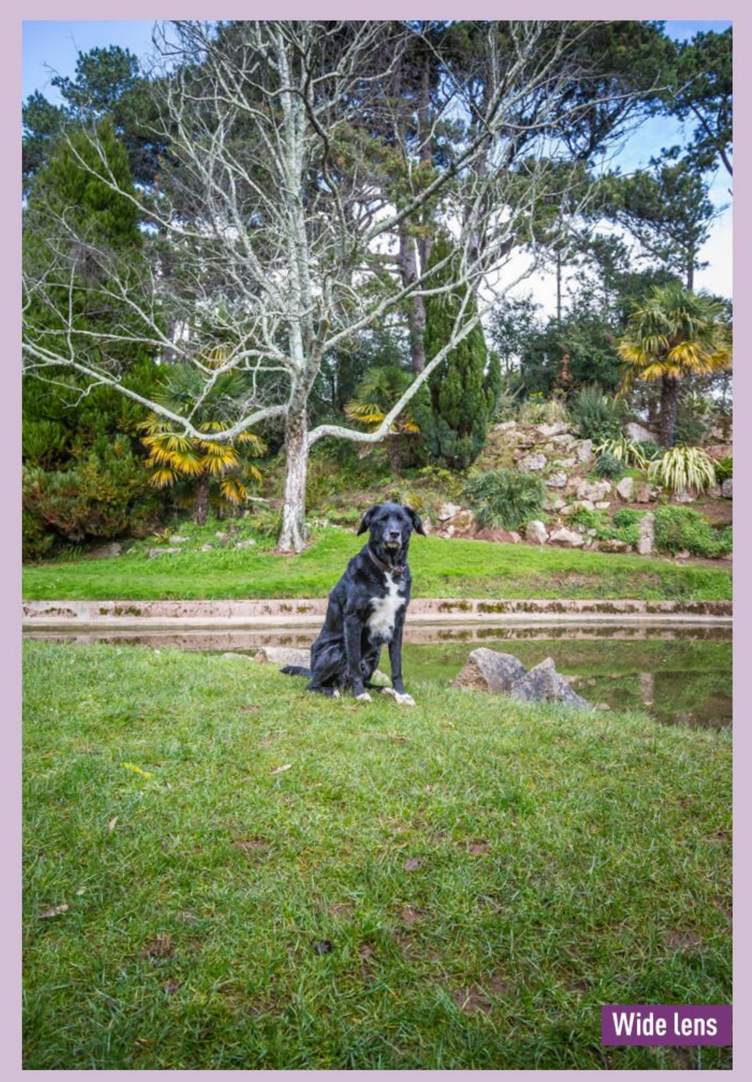
Most photographers would choose to step back a little and zoom in. The most popular choice is a focal length of about 35-100mm, since this results in less distortion.



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 Bailey the dog 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 sharper.





TELEPHOTO LENS

Careful focusing with a long telephoto lens can pick out individual subjects despite busy surroundings, such as focusing on Bailey the dog at the park with lots of visual distractions behind him. 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.

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

Understanding how aperture works

Aperture can control how much of your picture is sharp and how much is out of focus


WIDE APERTURE


NARROW APERTURE

Apart from the role that aperture plays in controlling the exposure in your image, it is also the key ingredient in defining how much of your image is sharp and how much is out of focus. If you want your landscape shots to be as sharp as possible from front to back, or you want a close-up of a butterfly to be the only thing that is sharp in the scene, then it's aperture that will do that for you.

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 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 haven't encountered it before.

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

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

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.

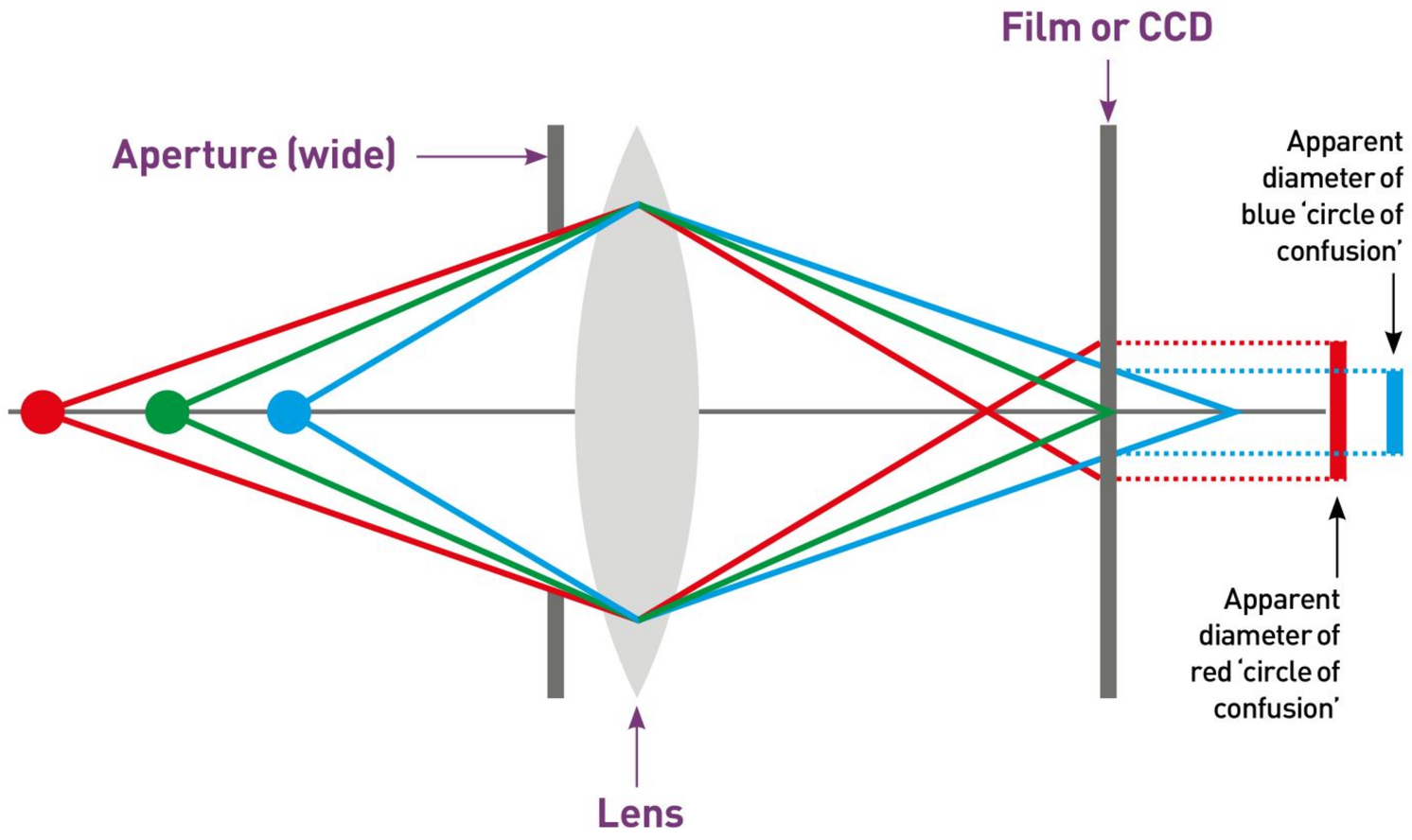
APERTURE RING

How aperture works

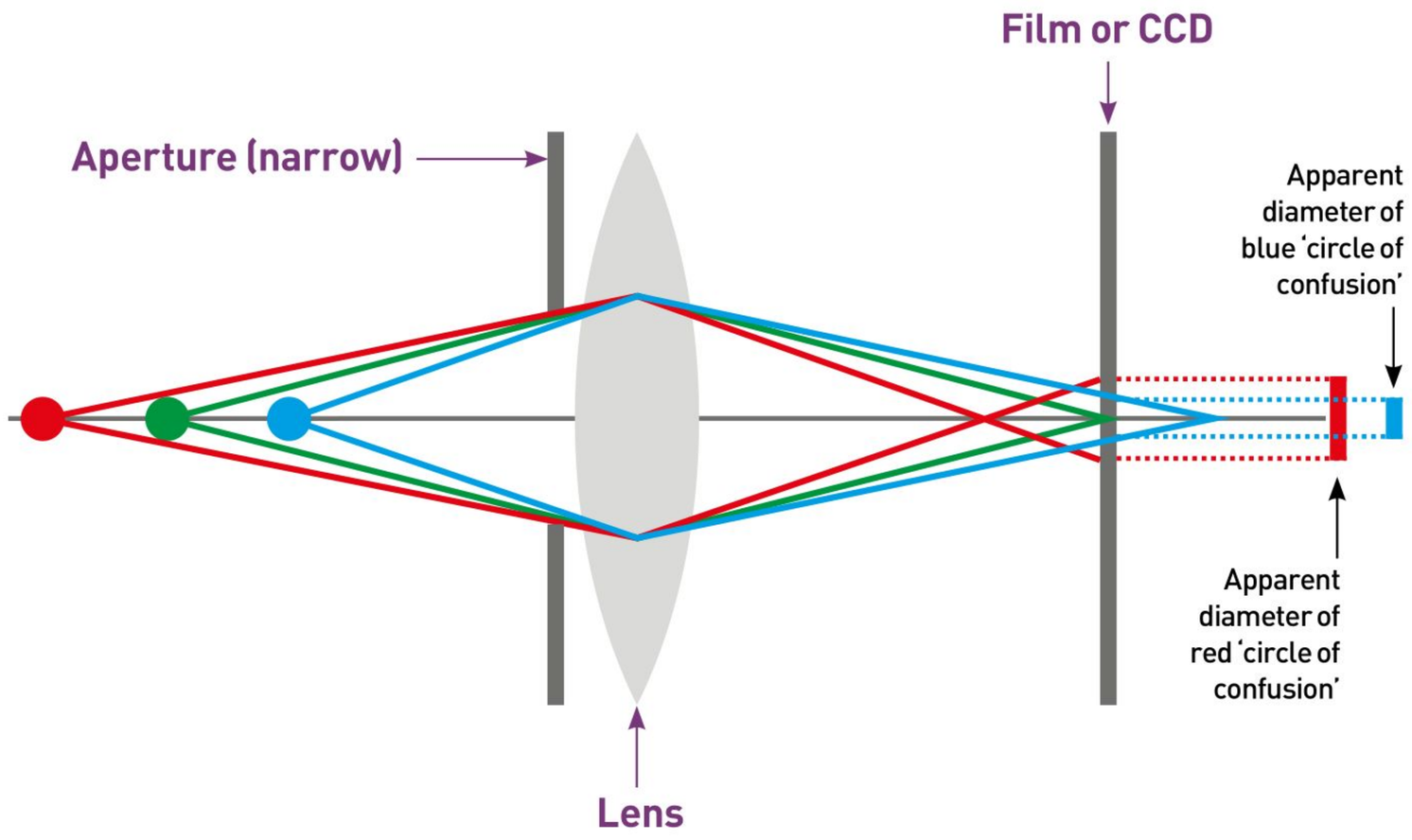
Explaining exactly why altering the size of the lens aperture alters the depth of field is a little complicated, but a few simple diagrams should help to shed some light on the matter. For a start, let's clear up some popular misconceptions about the difference between focus and sharpness.

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.

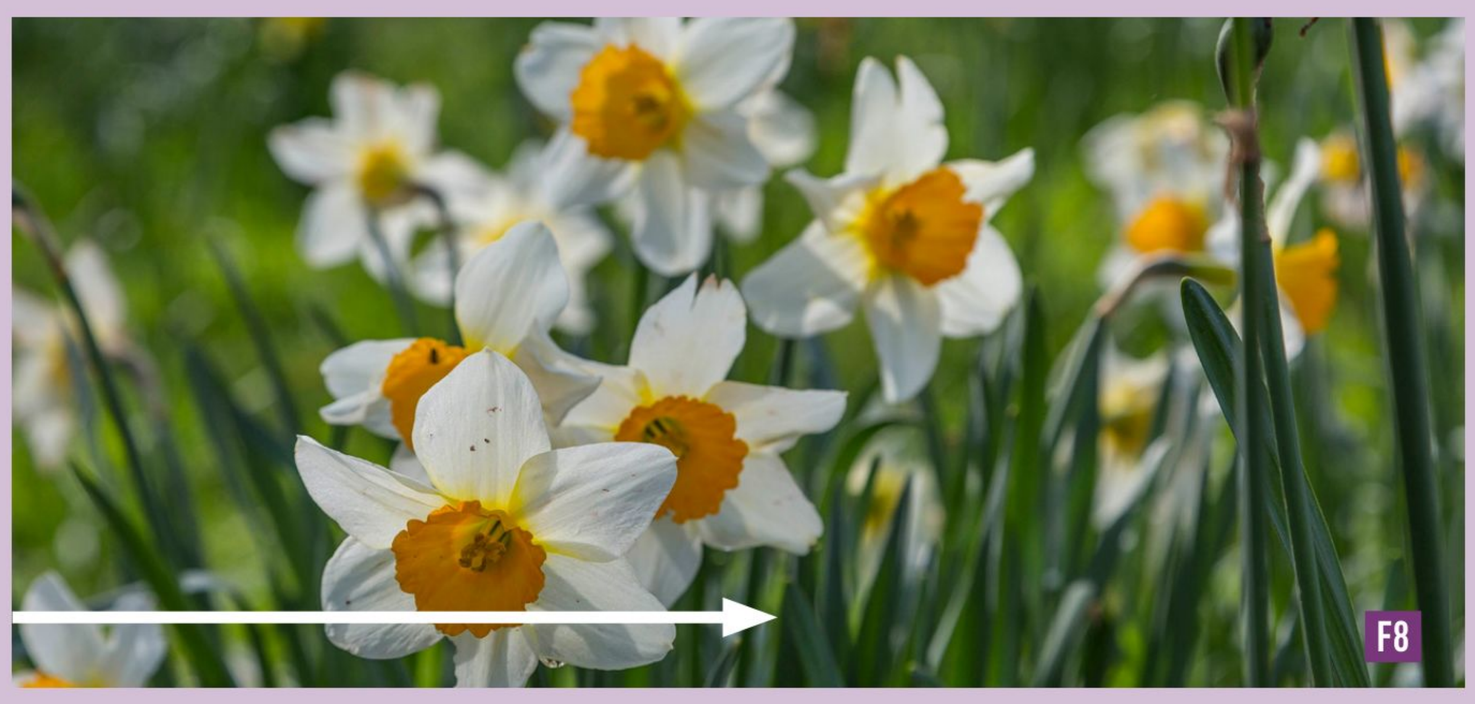
In some cases, it may be desirable to have the entire image sharp, and a large DOF is appropriate. In other cases, a small DOF may be more effective, emphasizing the subject while de-emphasizing the foreground and background. In cinematography, a large DOF is often called deep focus, and a small DOF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

In the examples shown here, at f4, the front flower nearest the camera on the left is the only object in sharpest focus and the rest are still blurred.

At f8 the area of acceptable focus has increased so that the flowers behind are coming into sharper focus.

Shooting at f16 brings them, and the ones further away from the camera, into even sharper focus.

Stopping the camera down to its narrowest aperture of f22 has the nearest group of flowers looking sharp. If you were able to stop this lens down to f/32, the flowers furthest away to the right of shot will become sharply focused too.



> "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."

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, which involves a bit of maths to calculate.

Controlling the light

Accurate exposure in challenging outdoor lighting conditions is the key to good photos

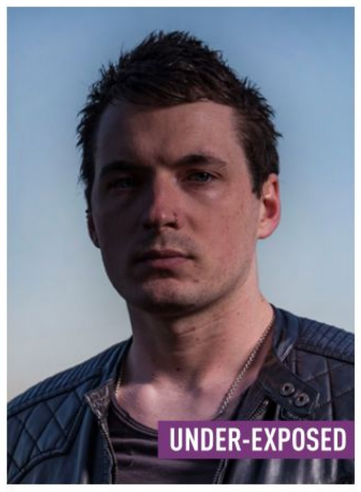
Light, and how it affects your scene is the basis of photography. Controlling how your camera handles exposure is a key technical skill that is one of the major methods you can employ to improve your photography. Leaving your camera in auto exposure mode when shooting selfies at a party is one thing, but trying to capture the best sunrise possible is going to require finesse. Relying on your camera to correctly, and automatically, meter a scene with difficult lighting conditions, is going to give you results you may not have been expecting.

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 portrait of a brightly lit fair skinned male shot against a dark stone background. This was taken using a typical camera set on automatic exposure. As you can see the camera has over-exposed the man's face.

In this second example the same camera has been used to photograph another male, but this time standing in front of a blue sky. The camera's automatic exposure system has under-exposed the shot, leaving the man's face in deep shadow with little detail visible.



So what went wrong? 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.

FIG 1. ORIGINAL SCENE

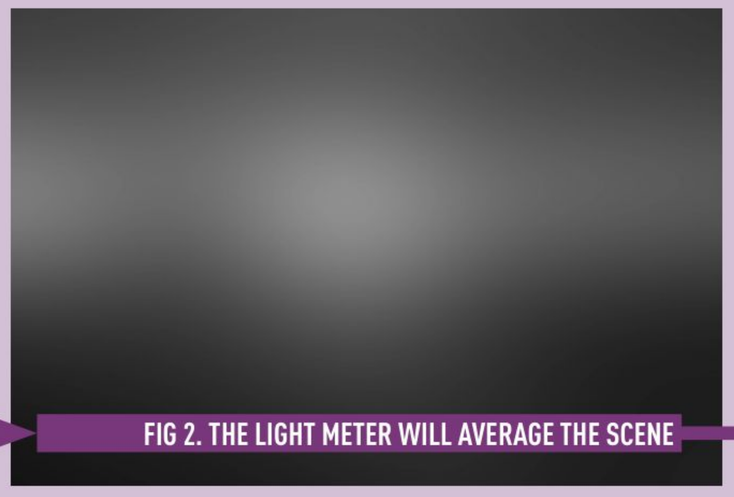


FIG 2. THE LIGHT METER WILL AVERAGE THE SCENE

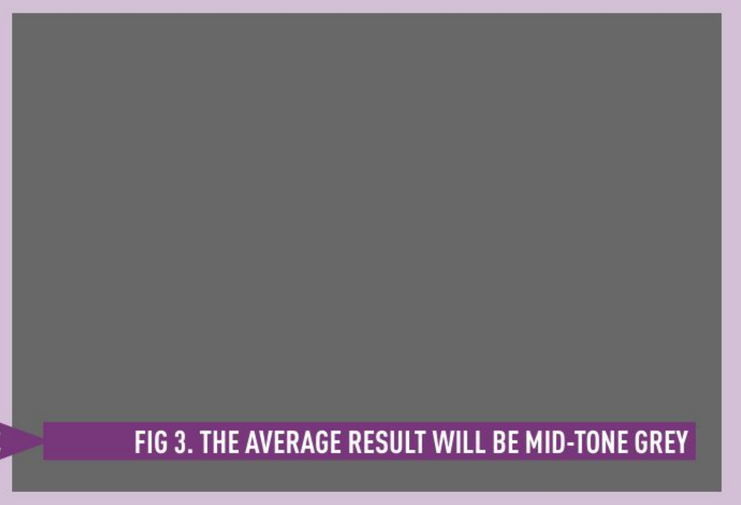


FIG 3. THE AVERAGE RESULT WILL BE MID-TONE GREY

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."

Fade to grey

Take a look at the main picture above. What you see there is a bright desert sunrise, 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, midway 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. 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 RGB 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 that is one stop higher or lower.

"The difference between one zone and the next is equivalent to the difference between one exposure setting and another that is 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):

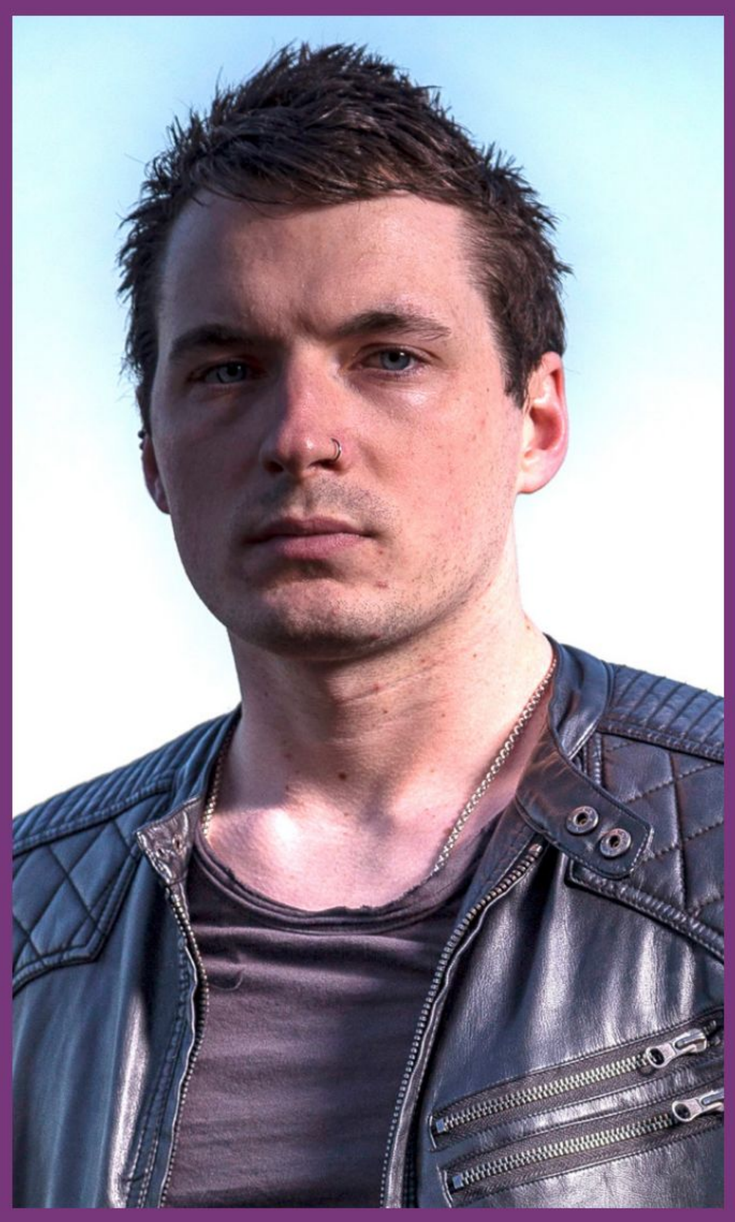
Zone 0	Pure black, no details or texture visible.
Zone 1	Black tone but no texture. This is normally as black as you want to get in a picture.
Zone 2	First hint of texture and detail, very deep shadow.
Zone 3	Dark materials, details visible.
Zone 4	Dark foliage. Dark stone. Landscape shadow. Shadow on 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 1/100th at f/5.6 to 1/100th at f/4. In the resulting shot the background details start to burn 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 2 texture and detail, leaving the man'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. Controlling 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."

Keep an eye on white balance

Outdoor colour balance can sometimes be a challenge


DAYLIGHT, WITH DAYLIGHT WHITE BALANCE


DAYLIGHT, WITH CLOUDY WHITE BALANCE

If you look at a white snow-covered scene, your brain takes over and manipulates what you see, so that it matches your expectation of what white should look like. So, what you see, even under differing lighting conditions, is white. If you put a camera in the same scene, it does not make any such adjustments and adapt to a certain expectation. The camera will simply record the colours that are 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 presets 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 can see an image taken outdoors on a bright cloudy day. As you can see, when the camera is set to the daylight setting that suits this lighting, the light areas of the scene are neutral. The same scene looks very different when the camera's white balance is set to cloudy colour temperature. Now there is a distinct reddish-orange cast.

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,


DAYLIGHT, WITH DAYLIGHT WHITE BALANCE


DAYLIGHT, INCANDESCENT WHITE BALANCE

if the camera has been set for incandescent light, the scene appears to have a very blue cast. Sunlight 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 flash lighting on an overcast evening around dusk. With the camera set for flash white balance, the skin tones of the subjects are quite natural looking. However, if you set the camera to fluorescent white balance, then the image is overpowered with a blue cast.

Know your camera

Nearly all digital cameras offer white balance adjustments accessible either from a settings menu or, typically on higher spec 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!

Preset white balance

All digital cameras offer choice of white balance presets, 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. ■

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

TYPICAL WHITE BALANCE VALUES

BLUE SKY - 10,000

SHADE, BLUE SKY - 7,500

SHADE, PARTLY CLOUDY - 7000

SHADE, DAYLIGHT

OVERCAST SKY - 6000

AVERAGE NOON DAYLIGHT - 5,500

EARLY AFTERNOON SUNLIGHT - 5,000

MID AFTERNOON SUNLIGHT - 4,500

EARLY MORNING/ EVENING SUNLIGHT - 3,500

LIGHTBULB - 3,000

SUNRISE/SUNSET - 2,500

CANDLE FLAME - 1,800

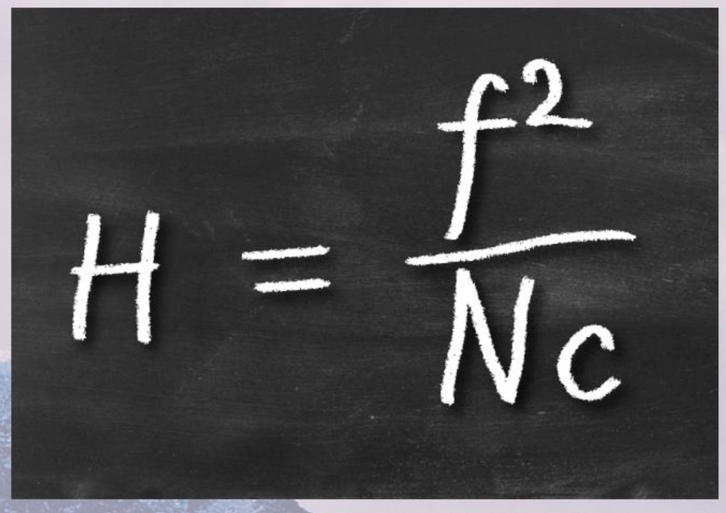
Landscapes and hyperfocal distance

How to make your outdoor shots as sharp as they can be

Landscape photography is one of those genres where sharpness is everything. Wide angle shots of amazing vistas usually require front to back sharpness in your scene to maintain all the detail that was present. The viewer of the final photograph will appreciate the image more if their eye is able to take in all that detail. It will make the photograph 'live' for them. Nothing ruins a shot more than the image being fuzzy and blurry when you need it to be tack sharp. The problem however, is that in many cases in landscape photography you have a foreground element as well as a distant object that you want to be in as sharp focus as possible at the same time. Shooting with a wide angle lens and setting a very narrow aperture of f/22 or even f/32 will yield greater depth of field but you will also run into the optical phenomenon known as diffraction, which is a softening of the image due to the bending of light rays as is passes through the narrow aperture of your lens. This means you will normally be operating around the f8 - f/16 mark when setting aperture. You may find that the depth of field provided at these apertures is not enough to render everything you need in sharp focus.

This is where the hyperfocal distance comes into play. When you focus on an object, technically speaking, only that point of focus is sharp. Beyond that focus point, extending both in front of and behind, is a plane of focus running parallel to the camera sensor. This area is known as the depth of field and it is this region that is deemed to contain an area of acceptable sharpness. They key to hyperfocal distance is knowing the closest distance at which a lens can be focused while keeping objects at infinity as acceptably sharp as possible. Everything from half the hyperfocal distance out to infinity will be in focus.

A very basic rule of thumb is to compose your scene and then focus roughly one third of the distance into the scene. This can be quick and reasonably helpful, particularly where your scene has excluded the horizon or near foreground, but rarely is it optimal to get the best out of the depth of field. You could use your camera's live view function to visually set focus on the most distant object in your scene and then slowly adjust the focus closer whilst keeping an acceptably sharp background. Finally of course, there is the mathematical way to calculate the exact point. There is a bit of assumed knowledge when using the mathematical formula. You will need to provide the focal length of the lens you are using, the Circle of Confusion value for a given sensor size, which is the largest blurred spot that the human eye can detect (usually a value of around 0.03 - 0.02) and the f-stop you are using. If you have a calculator you can do the following:



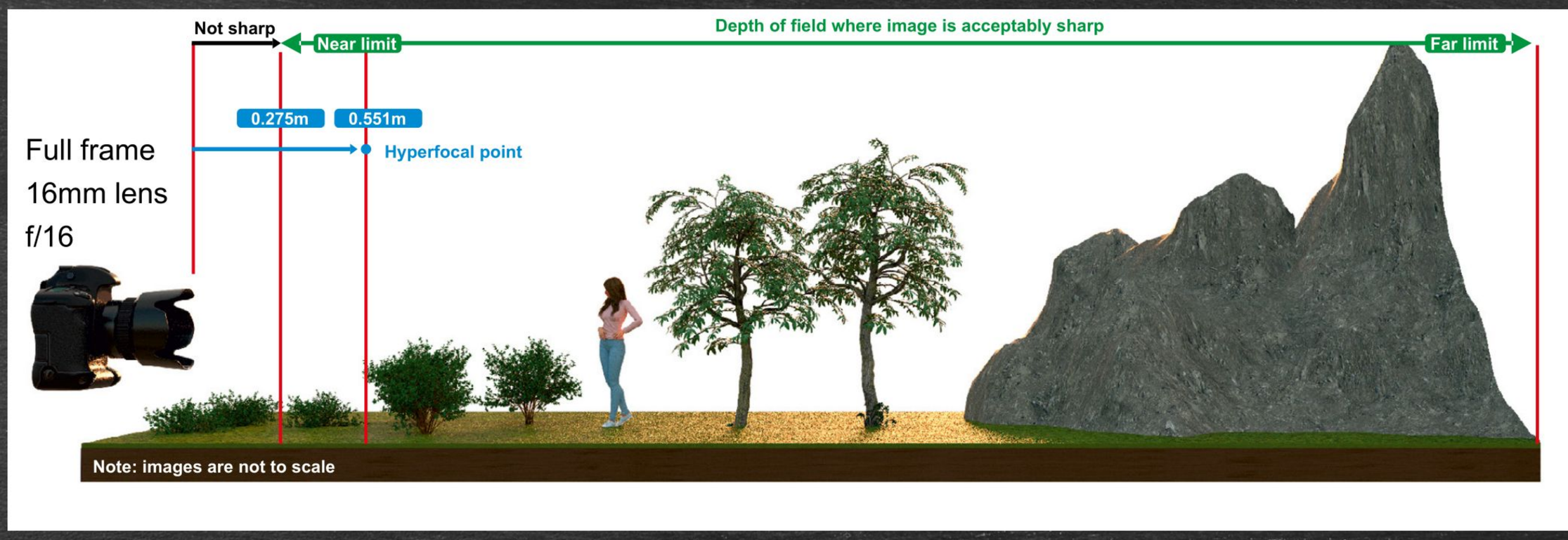
H = Hyperfocal distance
f^2 = focal length x focal length
N = Aperture number (f-stop)
c = Circle of confusion

The result, in millimetres, will be the distance at which you need to focus to attain greatest depth of field. Thankfully there are plenty of on-line calculators and apps for your phone that can do all the heavy lifting for you. Just so we can say we understand the theory, let's try out a couple of examples as shown here. We're using a full frame camera with a Circle of Confusion value of .029 as an average on a 16mm lens and a 50mm lens. Both are set at an aperture of f/16. ■

Example 1 - 16mm lens @ f/16

$$H = \frac{16mm \times 16mm}{f/16 \times 0.029} = 551mm\ (0.551m)$$

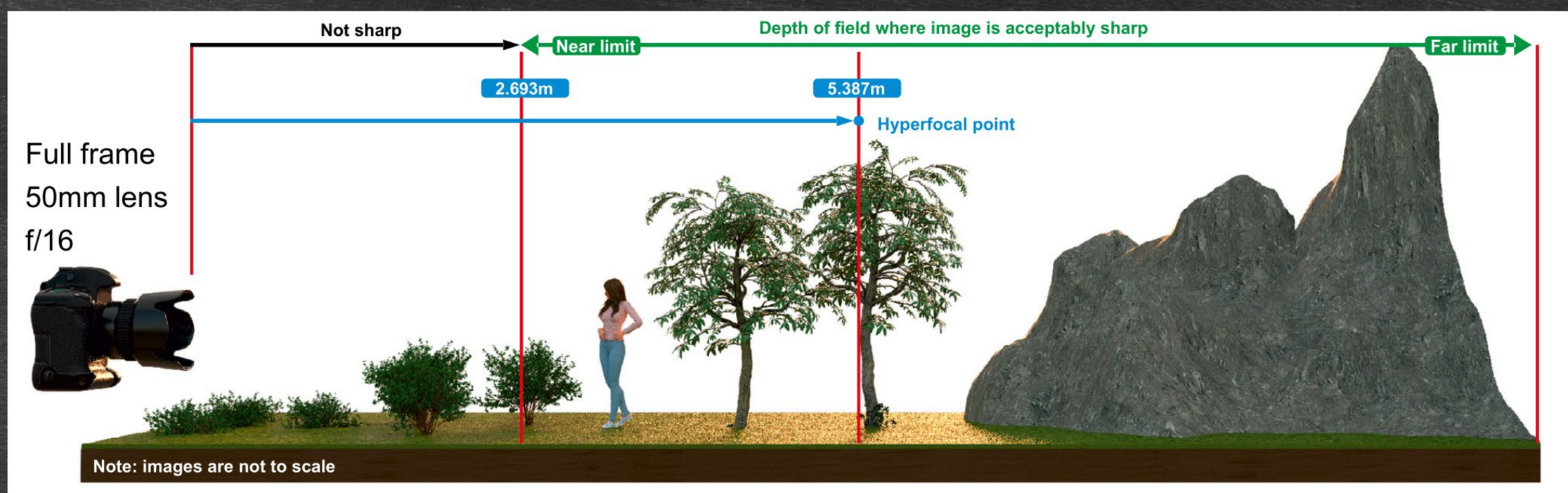
The near limit of acceptable sharpness is half of the hyperfocal value, stretching out to infinity.



Example 2 - 50mm lens @ f/16

$$H = \frac{50mm \times 50mm}{f/16 \times 0.029} = 5387mm\ (5.387m)$$

The near limit of acceptable sharpness is half of the hyperfocal value, stretching out to infinity.



The rules of composition

Make a good picture great with some simple tips

The addition of elements in a scene can make or break a photograph. If you cover up the boat in the lower left of the shot with your thumb, does the shot seem unbalanced and incomplete without it?

The difference between a good shot of your favourite view becoming a truly awesome landscape is simply down to how you compose the shot and the elements within it. A tree here, a lake there, it all adds up to elevate a photo to a piece of photographic art. There is a certain balance to a photo that is achieved by following some basic rules that will help you take better pictures. As in all things, it comes down to practice, but here is a quick introduction to the most useful rule of them all.

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 the need to hold the camera steady.

The Rule of Thirds

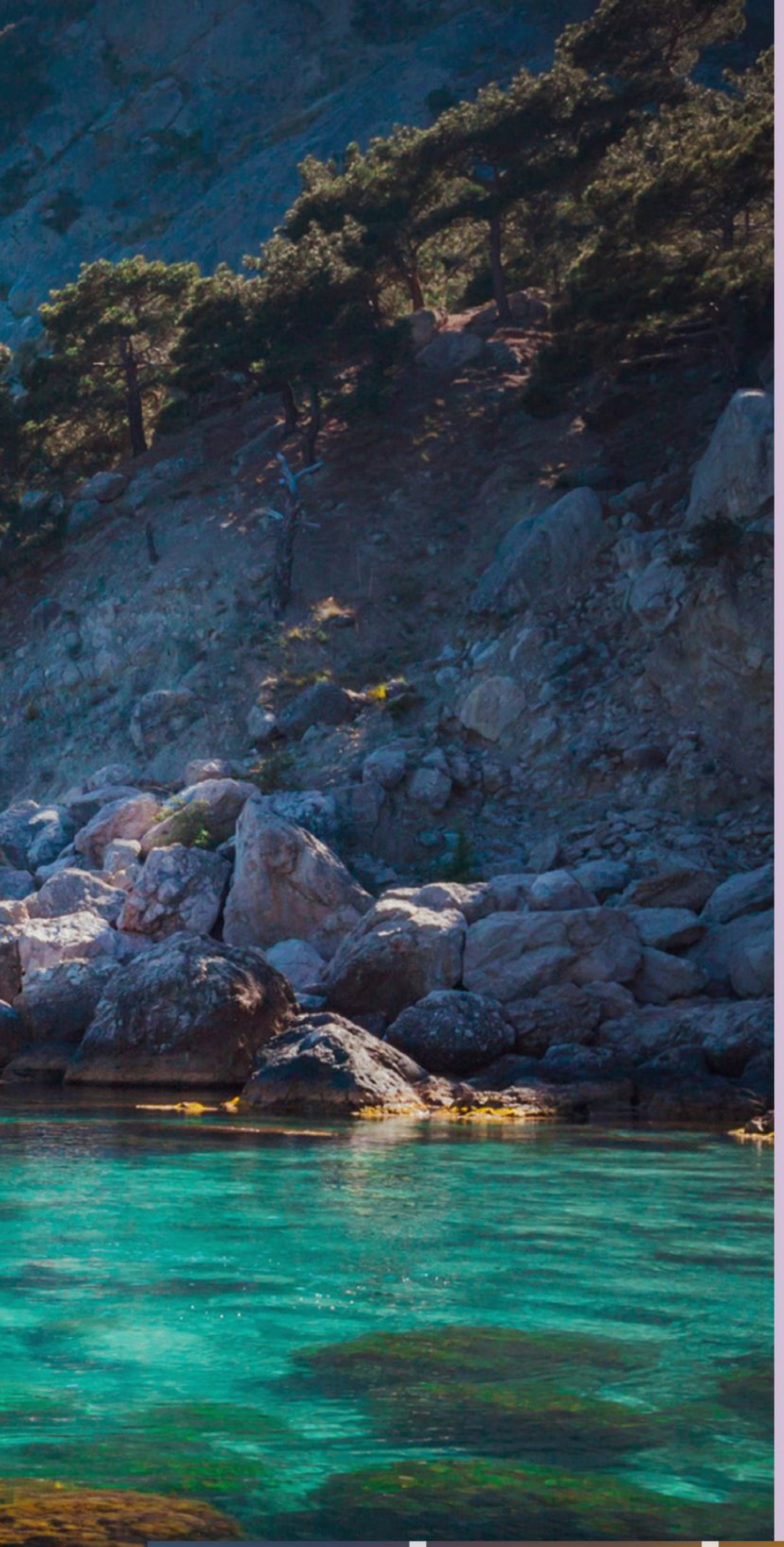
The most commonly used compositional technique is called the Rule of Thirds, and it's really very simple. Let's take a look at an example landscape picture [1]. It's a nice enough shot, correctly exposed, in focus and nicely lit, but now look at the next example [2]. Doesn't that look better? It's obviously the same scene, and taken from roughly the same position, but this composition is much more appealing. The reason it works is because the rock 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.

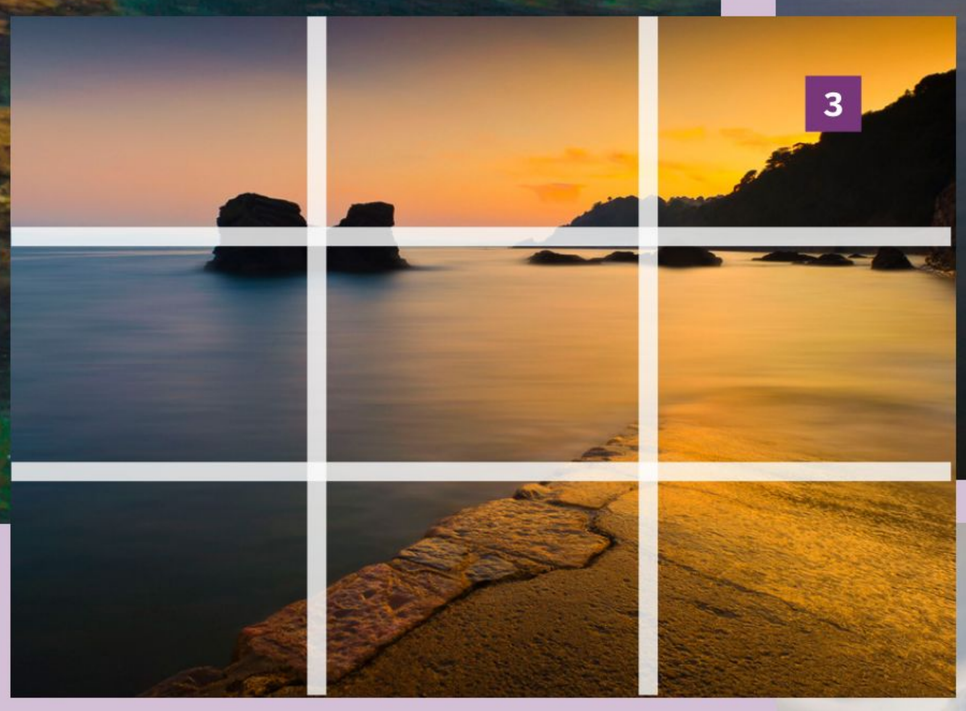
The best way to apply the Rule of Thirds is to imagine the frame divided up into thirds both vertically and horizontally, rather like a Noughts and Crosses (Tic Tac Toe for those in the USA) grid [3]. If you position the main elements of the image on these imaginary lines, or better yet on the intersections 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 [4].

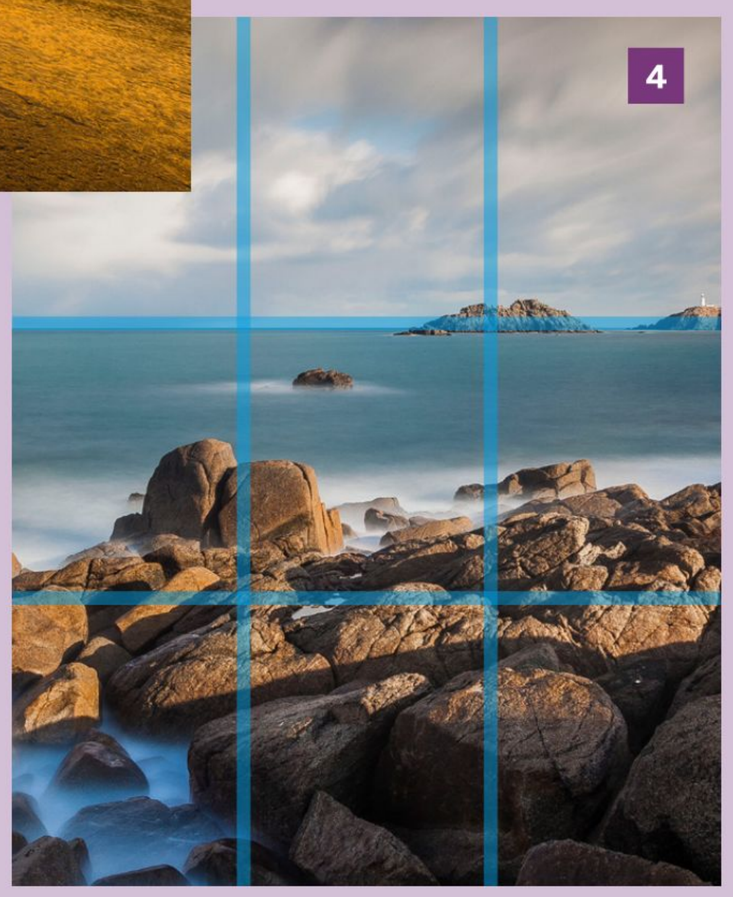
Portraits can also benefit from Rule of Thirds composition. By positioning a subject's eye at a point where the imaginary lines intersect [5], will give your portrait balance and really help to draw the viewer's attention into the picture.

Most digital cameras feature an option to superimpose the Rule of Thirds grid on the monitor screen to make this type of composition easier. Now you know why it is there. ■





> "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."



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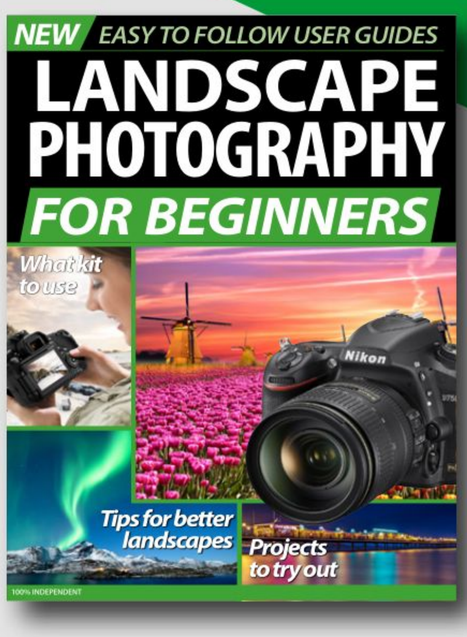

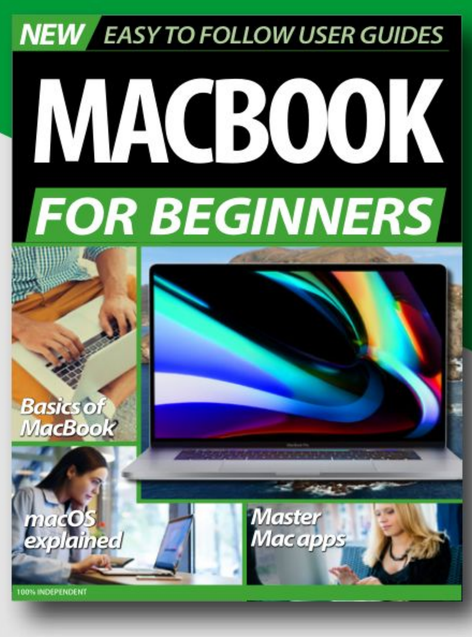

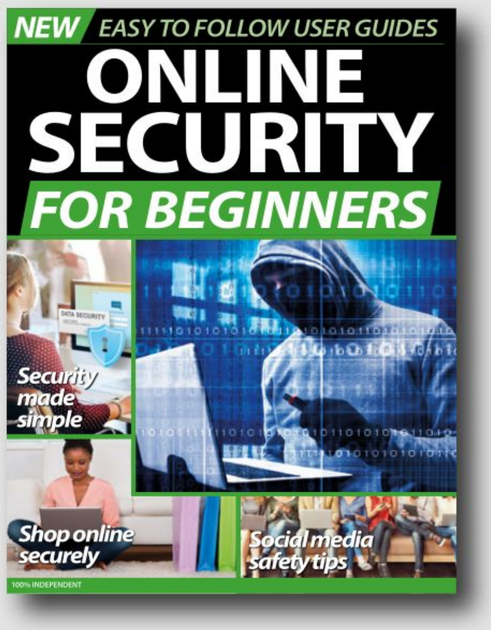

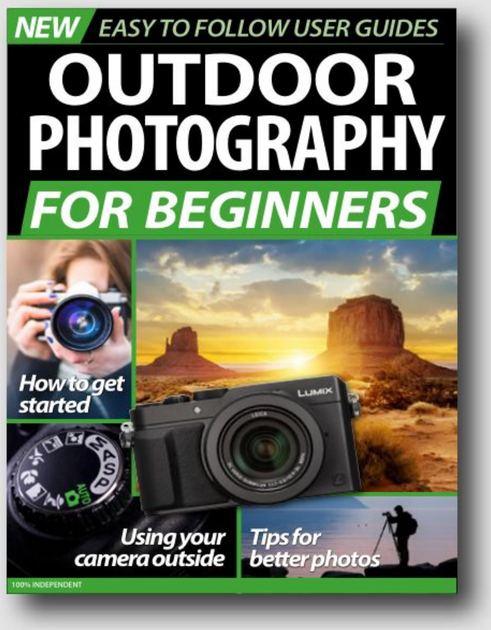

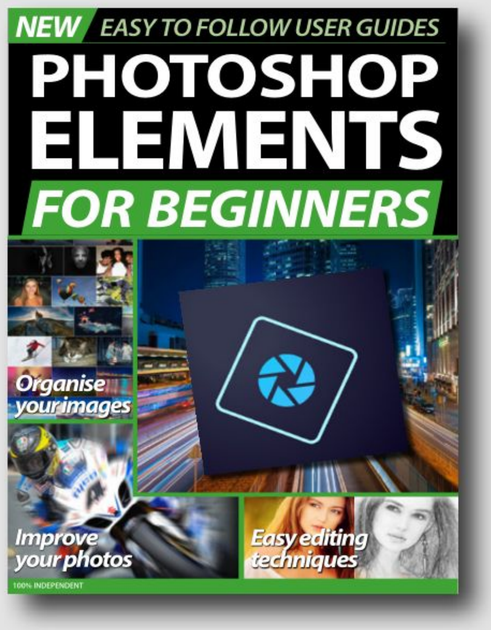

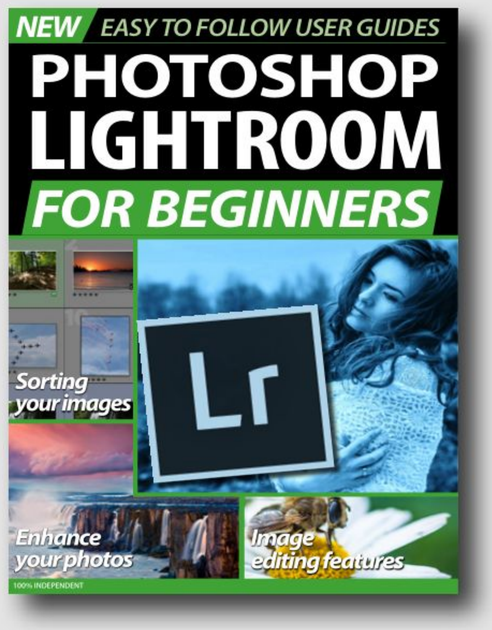

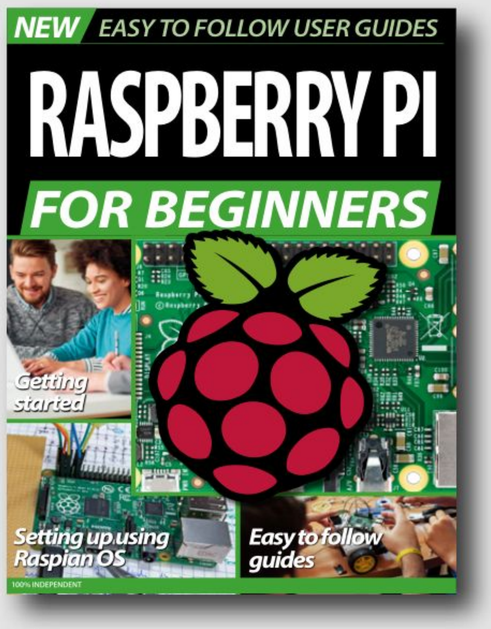

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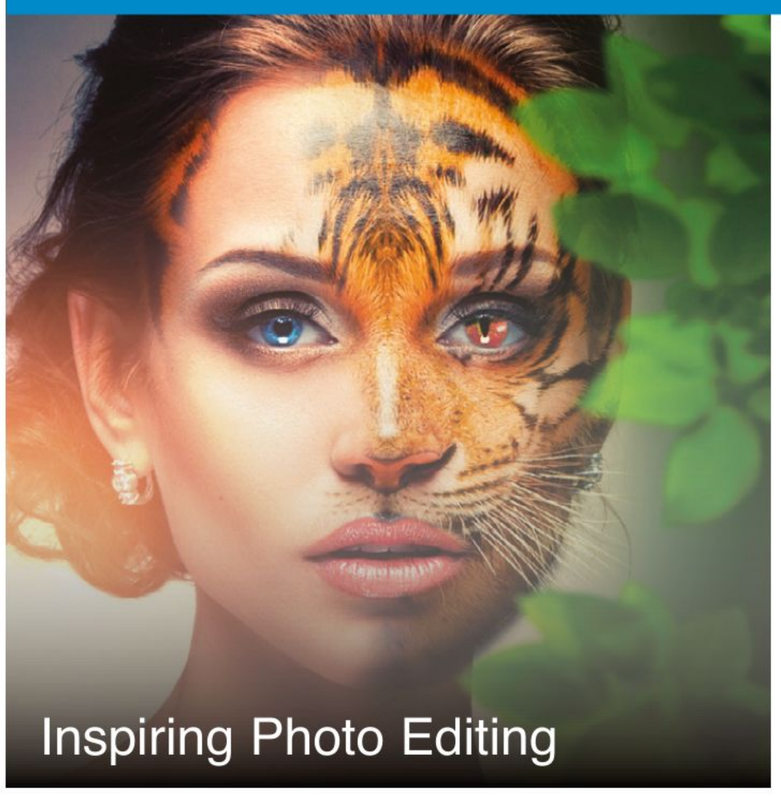

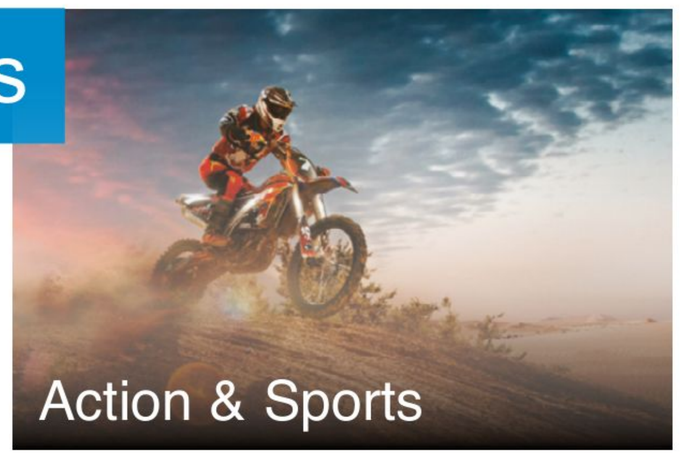

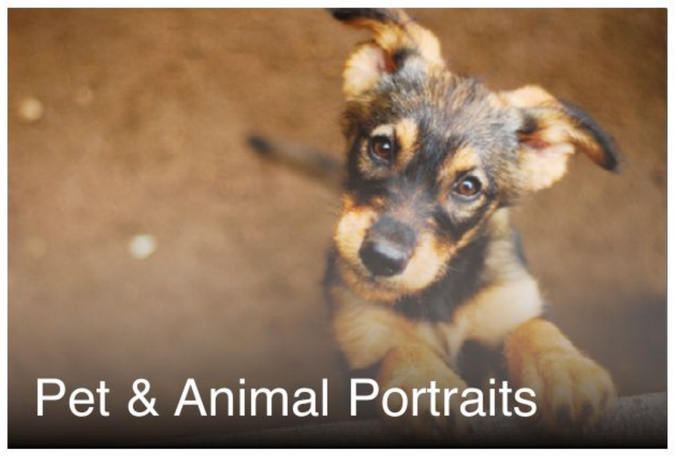

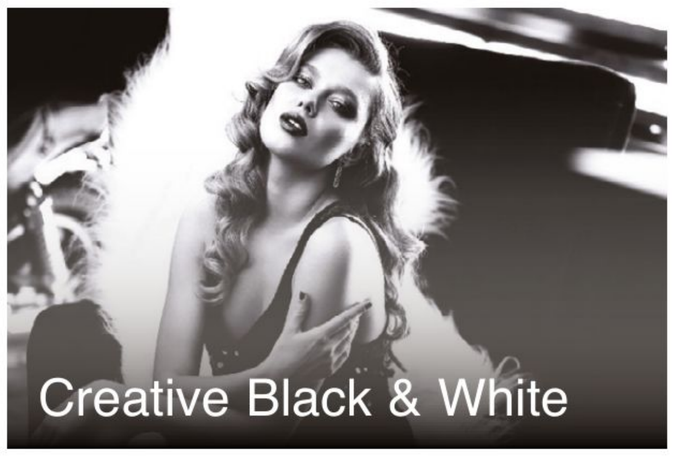

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