



INTRO TO DIGITAL PHOTOGRAPHY

Mastering the Basics

ABSTRACT

Learn and master the basic features of your camera to gain better control of your photos. Individualized chapters on each of the camera's basic functions as well as cheat sheets you can download and print for use while shooting.

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DGMA 3303 Digital Photography

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Camera Controls

Learn the Basics of Your Digital SLR Camera

Camera Controls



Image Sensor



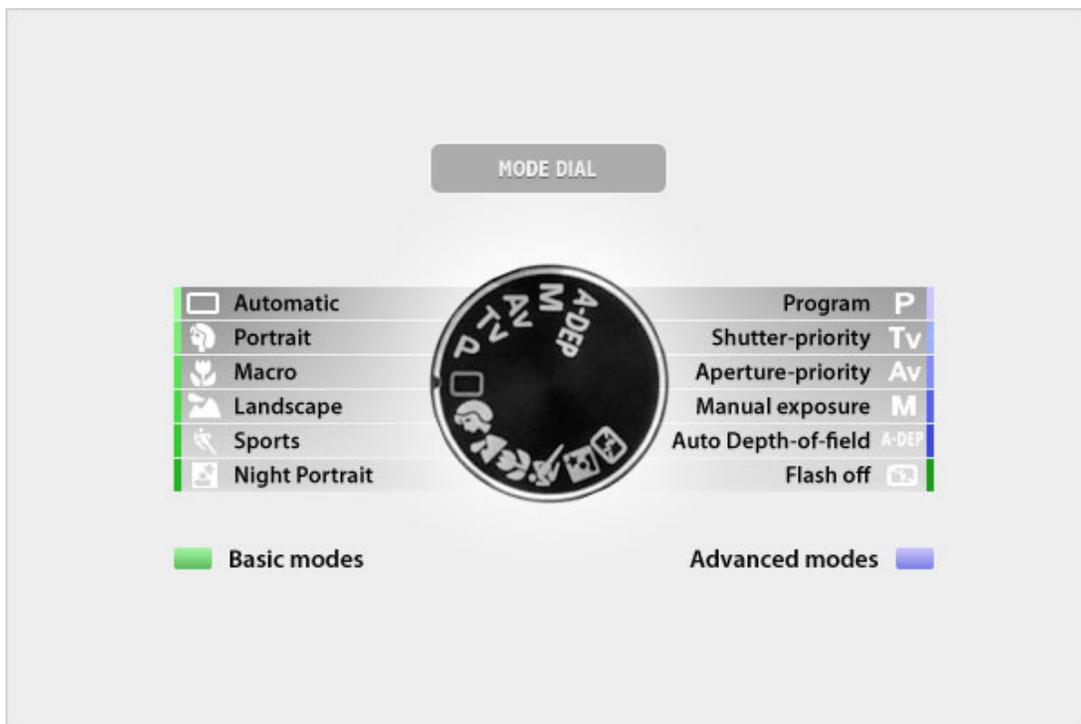
Since the dawn of photography, cameras have captured and stored images on glass plates or on film. Today, digital cameras capture the images on a nifty piece of technology – the image sensor. The image sensor is made up of millions of light sensitive photodiodes set on a grid, where each photodiode records a tiny portion of the image as a numeric value that corresponds to a specific brightness level, which is then used to create your image. Image sensors, whether they are CCD or CMOS, vary from camera to camera but they're basically the same, and the megapixel count shouldn't be a priority in the decision-making process when buying a camera. Why? Because the size of the sensor is actually more important than the number of megapixels.

Camera Lens



A lens is an optical component made out of glass, high quality plastic, or ceramic, which captures the light and assembles it on a point of focus at the matte screen passing through a condensing lens inside the camera. If you are looking for ease of handling, you can go for point-and-shoot cameras with fixed lenses. However if you are concerned about picture quality, you should invest in a digital SLR (DSLR) camera with interchangeable lenses. Interchangeable lenses allow you to have much more control of your images, and to be far more creative than you can be with a point-and-shoot camera. All in all, DSLR cameras produce a more professional photograph.

Camera Modes



DSLR cameras are equipped with a variety of shooting modes that increase the automatic decision making of the camera. These cameras, thankfully, have semi-automatic and manual modes too, which put the control back in your hands for more technical and creative applications. In PROGRAM mode, the camera sets the exposure, but the user can adjust the white balance, ISO, focusing and metering. There are two semi-automatic modes: 1) Shutter Priority (Tv) is where the user sets the shutter speed and the camera determines the aperture. Shutter Priority allows the user to control how “the action” is captured. 2) Aperture Priority (Av) where the user selects the aperture and the camera determines the shutter speed. Aperture Priority allows the user to control the depth-of-field.

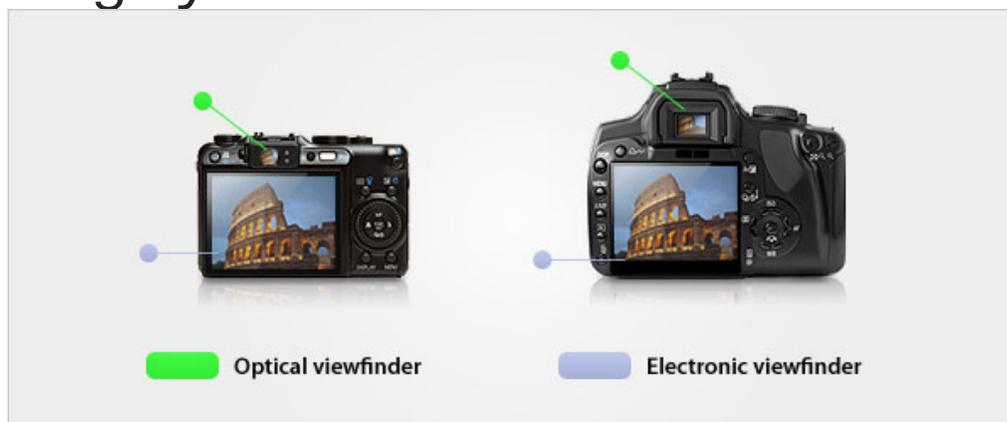


Built-in Flash



A built-in flash is provided with every digital camera. The camera's computer determines need for flash according to the exposure metering, focusing and zoom systems. On compact cameras the built-in flash is triggered to go off in perfect sync with the shutter, but it's hard to control the timing and intensity of the flash. This can result in washed-out photos. DSLRs have pop-up flashes that can be controlled in various ways to be in-sync with the shutter or drag behind the shutter; in addition the intensity can be manipulated in accordance to the overall light of the scene. DSLR cameras allow for more pleasing and artistic use of the flash.

Viewing System



Most digital cameras have two viewing systems – the optical viewfinder and the electronic viewfinder. While both systems show you what the lens sees, the electronic viewfinder can tell you other things about the nature of your digital image. One area where the electronic viewfinder is superior is in determining color balance. The electronic viewfinder can show where the highlights are overexposing (and if you'll need to compensate). What is great is that you'll see this in real-time. The optical viewfinder puts you directly inside the mechanical world of the camera, and tends to perhaps give you a better sense of the composition because you're seeing exactly what the lens is seeing, not an electronic approximation.

Image File Formats

Understanding Digital Photo File Formats

You've taken your pictures, now where do they actually go? The images reside on the memory card in your camera, but the more important question is "How many photos can I store on the card or on my computer's hard drive?" The answer to that comes down to one basic thing – image quality. Essentially the various image file formats that are available to you differ in how much actual photographic information (this includes metadata) you wish to "store" within in each image file, and how much is thrown away. That's the basic nature of compression – the elimination of potentially extraneous information, and the three main image file formats are JPEG, TIFF, and RAW.

File Compression

File compression can be achieved in basically two ways: lossless and lossy. A lossless compression algorithm does not discard any information from the file. Moreover, it looks for efficient ways to represent an image without compromising on its original quality. On the other hand, a lossy compression algorithm reduces the file size by compromising to a certain extent on the image quality.

JPEG

JPEG (which stands for *Joint Photographic Expert Group*) is the most popular form of storing digital images. When you shoot using JPEG you get more photos on your memory card, and it's faster (in terms of saving the image to the camera and in photo manipulation later). However, JPEG is perhaps the worst of the three, because the compression algorithm used to save the image disregards far too much image information that cannot be reconstructed during decompression. JPEG usually achieves a 10:1 to 20:1 compression with little perceptible loss of image quality. You can adjust the amount of compression, so you can control the image quality and the file size. JPEG compression discards so much information that it is much more difficult to effectively post process your image (i.e. correcting color, sharpness and increasing the size of the image).

In addition, the re-edited and saved image loses still more quality (think of it as Xeroxing a photocopy). Each subsequent re-edit and save of a JPEG further reduces the quality. JPEGs are perfectly fine for most uses of digital

photography (hence their overwhelming popularity), as they are smaller files and make distributing the snapshots of your trip to Hawaii or a wild night at the club that much easier.

TIFF

TIFF (which stands for *Tagged Image File Format*) is considered the standard photographic file format, because it is a highly flexible format that uses a lossless compression algorithm, so there's no image degradation during compression. This ability to store image information in a lossless format makes a TIFF file very useful for archiving images. Unlike a JPEG, a TIFF file may be edited and re-saved without losing any image quality. In addition, when using a third party image processor like Adobe's Photoshop, you retain access to the individual layers of an edited and saved image, so you can revisit them in the future. There are two types of TIFF configurations – 16-bit and 8-bit; 16-bit provides you with more information to manipulate the final image in the digital darkroom (i.e. color saturation changes, color balance changes, brightness & contrast changes, etc.), and 8-bit (best for archiving and printing), which retains all the “work” you've done on the photo (the layers), but saves to a relatively smaller size. In general, TIFF files can be quite large... easily ranging up to 48MB per image. But this added file size allows for very large blow-ups with no digital artifacts in the print. The one downside of TIFF is that the majority of cameras do not shoot in a dedicated TIFF file format.

RAW

RAW is basically just that – the raw, unprocessed, naked image. Think of it as the digital negative, because it performs the same function as negatives do in film photography. Just like with film negatives, RAW files need to be “processed” into a viewable format (usually TIFF or JPEG). Also, RAW files – like film negatives – have a wide dynamic range. So what's the point of shooting RAW? You shoot RAW if you expect to do a good amount post processing work in your digital darkroom. Let's say you shot indoors under tungsten lights, but you forgot to change the camera's white balance from daylight. If you save the image as a JPEG, you'll be junking most of the color information and you'll end up with that red/yellow image (that we've all cringed at). With a JPEG you can't get that lost information back, manipulating the image would be difficult, and you still might not get a pleasing image. However, as a RAW file, all the color data is still available, and you can recover the image; correct the white balance and... voila, a much more appealing photograph.

Conclusion

So you're asking yourself: Which format? That's a decision that you make based upon your photographic wants and needs. It's more than just considering file size; it's anticipating how much post processing work that you might have to do get the best image possible. One major drawback to RAW is that there's no standardization, so each camera manufacturer has their "style" of RAW. Professionals mainly shoot in RAW because they need to be able to make as many unrestricted changes as the client wants for the final image, and you may want that too. You need to be computer savvy to get the most out of RAW. In addition, the unprocessed nature of RAW files allows you to keep options open for the future with your images as new photo imaging software comes out and your ability to edit images changes . While JPEG is one of the most widely used file formats allowing you to save an image as a small file and high quality, TIFF and RAW formats are larger in size but maintain exceptionally good picture quality, which is preferred by most of the professional photographers.

Understanding Digital Camera Modes

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Having a good understanding of the digital camera modes is essential to control the exposure in photography. Whether you are a beginner or an advanced amateur, you should know what each camera mode does and when it should be used, under what circumstances.

1) What are Digital Camera Modes?

Digital Camera Modes allow photographers to control the parameters of an exposure, specifically, **Shutter Speed**, **Aperture** and **ISO**. While certain modes can fully automate the camera exposure, there are other modes that let the photographer manually control some or all parameters of the exposure.



Back in the old days, there was no such thing as a camera mode – everything was manual. Photographers had to manually set the aperture, shutter speed and choose the right type of film for their cameras. To evaluate the intensity and the amount of light, they used to carry special light metering devices that measured the light and provided the exposure information, which they would then use in their cameras. In 1938, Kodak introduced a film camera with an integrated light meter and in 1962, a Japanese company called “Topcon” introduced the first SLR camera that measured the light coming through the lens into the camera. What this meant, was that photographers no longer needed to carry special light meters with them – the camera would do it for them. New “Automatic” camera modes started appearing on cameras, which would

evaluate the amount of light that passed through the lens and would automatically pick the right exposure parameters to produce a properly-exposed picture.

Today, most digital cameras have various types of camera modes that can be used in different situations. While most point and shoot cameras concentrate on automatic modes for simplicity's sake, more advanced cameras feature modes that allow both automatic and manual exposure control.

2) Types of Camera Modes

Here are the four main types of camera modes that can be found in most digital cameras today:

1. **Program** (P)
2. **Shutter Priority** (Tv) or (S)
3. **Aperture Priority** (Av) or (A)
4. **Manual** (M)

3) Program Mode

In “Program” mode, the camera automatically chooses the Aperture and the Shutter Speed for you, based on the amount of light that passes through the lens. This is the mode you want to use for “point and shoot” moments, when you just need to quickly snap a picture. The camera will try to balance between aperture and shutter speed, increasing and decreasing the two based on the intensity of light. If you point the camera to a bright area, the aperture will automatically increase to a bigger number, while keeping the shutter speed reasonably fast. Pointing the camera to a darker area will decrease the aperture to a lower number, in order to maintain a reasonably fast shutter speed. If there is not enough light, the lens aperture will stay at the lowest number (maximum aperture), while the shutter speed will keep on decreasing until it reaches proper exposure.

I personally never use this mode, since it does not give me much control over the exposure. There is a way to override the camera-guessed shutter speed and aperture by moving the control dial (on Nikon cameras it is the dial on the back of the camera). If you rotate the control dial towards the left, the camera will decrease the shutter speed and increase the aperture. If you rotate the dial towards the right, the camera will increase the shutter speed and decrease the aperture. Basically, if you needed to get a faster shutter speed for freezing action, you would rotate the dial to the right, and if you needed to get a large **depth of field**, you would rotate the dial to the left.

4) Shutter-Priority Mode

In “Shutter Priority” mode, you manually set the camera’s shutter speed and the camera automatically picks the right aperture for you, based on the amount of light that passes through the lens. This mode is intended to be used when motion needs to be frozen or intentionally blurred. If there is too much light, the camera will increase

the lens aperture to a higher number, which decreases the amount of light that passes through the lens. If there is not enough light, the camera will decrease the aperture to the lowest number, so that more light passes through the lens. So in Shutter Priority mode, the shutter speed stays the same (what you set it to), while aperture automatically increases and decreases, based on the amount of light. In addition, there is no control over subject isolation, because you are letting the camera control the depth of field.

I try not to use this mode either, because there is a risk of getting an overexposed or underexposed image. Why? Because if the amount of ambient light is not sufficient and I set the shutter speed to a really high number, my exposure will be limited to the aperture/speed of my lens. For example, if the maximum aperture of my lens is f/4.0, the camera will not be able to use a lower aperture than f/4.0 and will still shoot at the fast shutter speed that I manually set. The result will be an underexposed image. At the same time, if I use a very slow shutter speed when there is plenty of light, the image will be overexposed and blown out.

5) Aperture-Priority Mode

In “Aperture Priority” mode, you manually set the lens aperture, while the camera automatically picks the right shutter speed to properly expose the image. You have full control over subject isolation and you can play with the depth of field, because you can increase or decrease the lens aperture and let the camera do the math on measuring the right shutter speed. If there is too much light, the camera will automatically increase the shutter speed, while if you are in a low-light environment, the camera will decrease the shutter speed. There is almost no risk of having an overexposed or an underexposed image, because the shutter speed can go as low as 30 seconds and as fast as 1/4000-1/8000th of a second (depending on the camera), which is more than sufficient for most lighting situations.

This is the mode that I use 95% of the time, because I have full control over the depth of field and I know that the image will be properly exposed under normal circumstances. The metering systems in most modern cameras work very well and I let the camera calculate and control the shutter speed for me.

6) Manual Mode

As the name suggests, “Manual” mode stands for a full manual control of Aperture and Shutter Speed. In this mode, you can manually set both the aperture and the shutter speed to any value you want – the camera lets you fully take over the exposure controls. This mode is generally used in situations, where the camera has a hard time figuring out the correct exposure in extreme lighting situations. For example, if you are photographing a scene with a very bright area, the camera might incorrectly guess the exposure and either overexpose or underexpose the rest of the image. In those cases, you can set your camera to manual mode, then evaluate the amount of light in darker and brighter areas and override the exposure with your own settings. Manual mode is

also useful for consistency, if you need to make sure that both shutter speed and aperture stay the same across multiple exposures. For example, to properly stitch a panorama, all shots that you are trying to put together need to have the same shutter speed and aperture. Otherwise, some images will be darker, while others are lighter. Once you set the shutter speed and aperture to the values of your choice in manual mode, your images will all have consistent exposures.



NIKON D700 @ 28mm, ISO 200, 1/200, f/20.0

I only use this mode in extreme situations, when shooting panoramas or when using on-camera or off-camera flashes.

7) Where Can I Set the Camera Mode?

The camera mode dial is typically clearly visible on all entry-level and semi-professional cameras – it is a large rotatable circle that has the modes listed as “P”, “S”, “A” and “M” in Nikon DSLRs and “P”, “Tv”, “Av” and “M” in Canon DSLRs. Here is a picture of the mode dial on the Nikon D5000 DSLR (highlighted in red circle):



And Canon 50D:



On professional cameras, the mode dial might not look the same. Take a look at the picture of the Nikon D300s, where it is a small “Mode” button on the top right hand side of the camera:



8) What About ISO?

In most DSLR cameras, the ISO does not automatically change in the above camera modes, so you have to set it manually. If you do not want to manually set the ISO all the time and have an “Auto ISO” feature in your camera, enable it, then set the maximum ISO to “800-1600” and your minimum shutter speed to something like 1/200th of a second. If you notice too much noise, change your maximum ISO to a lower number. If you do not have an “Auto ISO” feature, then set your ISO to the lowest ISO number and increase it in low-light situations.

9) What About Other Camera Modes?

Many of the entry-level and semi-professional cameras have other modes such as “Portrait”, “Landscape”, “Macro”, “Sports” and “Night”, depending on the camera (professional cameras do NOT have these modes). I won't go through any of these modes for three reasons:

1. They are simply a combination of the above four modes plus some camera-specific settings
2. Different cameras have different custom modes and you should not get used to any of them. If you ever switch to a different camera brand or get a professional camera, you might get lost, just because you relied too much on a specific custom mode.
3. All of these custom modes are evil :) Stop using them and learn the four main camera modes explained in this article.



Understanding Your Camera's Drive Modes

Srlounge.com

Usually, when you press the shutter button on your camera, you take one photo. If you want take another photo, you just press the shutter button again. This is what is known as Single Shot drive mode and it is the default drive mode for all cameras. While this is great when you want to take your time between each shot, but there are also other drive modes that are more specialized for different scenarios. Not every camera has all of these functions, but these are generally the more popular options that you may see on a typical camera.

Single Shot

The Single Shot is the default drive mode and will only take one photo each time you press the shutter button. This is the best mode for the majority of shooting situations. You won't have to worry about taking too many shots each time you press the shutter button and filling up your memory card quickly.

Continuous/Burst

In the Continuous or Burst drive mode, your camera will keep capturing the images continuously as long as you are holding down the shutter button. This is great when you are shooting fast-moving subjects like a sports event or active kids, and you want to have a sequence of photos in quick succession. You can then pick and choose the best captured moment out of the batch of photos, or use all of them to illustrate the motion of the subject.

Some cameras may only offer one burst rate or frames-per-second (fps) speed for this mode, but other cameras may offer different speed options for Continuous shooting.

Low: In Low Continuous shooting, the camera will take multiple shots at a slower pace. This is good if you want to take several variations of a movement, but not quickly fill up your memory card.

High: If you are shooting faster action like a person sprinting or jumping, you would want to use the High Continuous Burst mode in order to capture the maximum amount of images.



Additionally, each camera's maximum frames-per-second speed is determined by several factors.

1) *Continuous AF vs. Single AF:* Many cameras give you the option to just autofocus for the first image only or to continuously track the focus for all the images in the burst. The first option is usually the faster of the two because once the first AF is locked all the camera has to do is take as many photos as it can.

The latter tends to be slower because for each shot, the camera has to recheck focus to make sure your subject is still in focus. This second option is important if you are shooting a fast moving subject that is moving towards or away from you, especially if you are shooting with a shallow depth of field and the subject may have out of the plane of focus by the time the second or third shot is captured.

2) *The camera internal hardware:* Just like the engine system of a car, the camera's sensor size, buffer speed, and processor performance all play a part in how fast the camera can take a burst of images.

3) *Buffer size:* The buffer size in a camera relates to how many photos can be stored in the camera's image pipeline they are processed and moved to the memory card. Once you hit the buffer capacity, the Continuous burst rate will slow down considerably as the camera waits for a free space to clear up in the buffer.

4) *Image quality:* Typically, when you are shooting RAW files, the burst rate is less than when you are shooting Jpegs. Because RAW files are larger, they will fill up the buffer faster than Jpeg files. Many cameras will also let you choose the megapixel size or image quality for either the RAW or Jpeg.

5) *Memory card speed:* The speed of the memory card can also play a part on the frame-per-second rate. The faster the images can be transferred from buffer to card, the longer you can shoot at maximum frames per second.

Quiet Mode

A DSLR camera has a mirror box that has to move out of the way in order for the sensor to capture an image. Normally, the rapid movement of the mirror box creates some noise. This is usually not a big deal, but when you are shooting in a quiet environment where you are required to be more discreet, like a wedding ceremony in a church, you would want to use Quiet drive mode. This works just like a Normal drive mode, except that the mirror box is raised more slowly and is brought down more slowly in order to minimize noise.

Self-Timer

The self-timer mode adds a time delay from moment you hit the shutter button to the moment that the sensor captures the image. You may have used this when you want be a part of a group picture and you let the camera count down 10 seconds while you run over to the group. You can also use this when you are shooting a very long exposure and you don't want to add any movement that occurs when you press the shutter button. Typically, you are given a 2-second timer and a 10-second timer. Some cameras will also give a customizable timer option.

Remote

The remote shutter function works when you have a wired or wireless remote that will trigger the shutter button. You typically use this when you are using a slow shutter speed and don't want to contribute any vibration to the camera. This is popular with landscape photographer as well.

Mirror Lock-Up

Finally, another way to minimize any vibration caused by the mirror is to simply have it be locked in the open position and away from the sensor. This way, all the camera has to do is take the photo. Because the mirror will block the viewfinder in this position, you will have to get your focus and composition dialed in before activating the Mirror Lock-up. Some cameras allow you to use the Mirror Lock-up in conjunction with either the self-timer or the remote drive mode to further reduce any added vibration.

Tips with Your Drive Mode

Check Your Drive Mode before Shooting

This may seem obvious, but it is a good practice to double check your drive mode whenever you use different drive modes during a shoot. The last thing you want to do is the wrong mode at the wrong time, like accidentally setting it to self-timer when you have to catch the bride and groom's first kiss.

Know When to Use Continuous/Burst with Continuous AF

When you are shooting Continuous images, know when to use continuous AF or not. If the subject is moving towards or away from you, it is generally a good idea to use continuous AF unless you are confident that you have a deep enough depth-of-field that the subject will remain sharp throughout the burst of images.

Use Remote, Self-Timer, or Mirror Lock-up for Long Exposure Shots

Finally, as I discussed earlier, the Remote, Self Timer, and Mirror Lock-up drive mode are great when you have the camera on a tripod and you are either shooting a still subject like landscape or shooting with long exposure.

Focusing Modes

Understanding Autofocus Modes

Nothing ruins a photograph more than a blurry, unsharp image. One of the godsend of modern DSLR technology is the autofocus feature. But as useful as autofocus is, sometimes the camera gets it wrong and focuses on the wrong subject. Additionally, there are situations where autofocus just can't cut it. The fantastic thing about autofocus on today's cameras is that you can let it do all the work to get the super-sharp images. The four primary focus modes (Continuous, Single, Automatic and Manual) give you a tremendous amount of flexibility to capture exactly what you want.

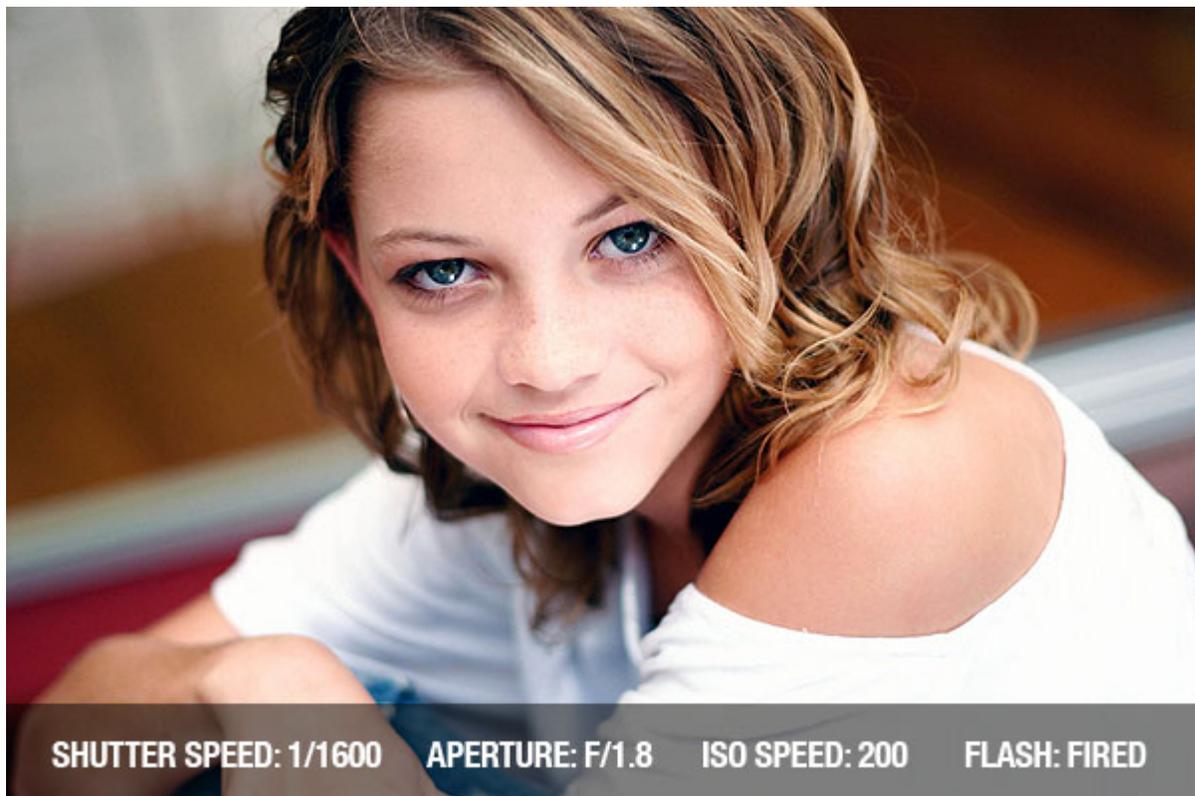
Continuous Focusing Mode



AI Servo AF (Canon)/AF-C (Nikon) stands for Continuous Focus and this mode is most useful for keeping moving objects sharp within the viewfinder as you track the object. As soon as you begin to depress the shutter release, the camera goes into action and begins to focus. In Continuous focusing mode, the camera detects the subject's movements and refocuses accordingly to keep the object

sharp as a tack. This mode uses a lot of battery power because it is continuously focusing and refocusing. In addition, the autofocus technology might not accurately predict the direction in which a chaotic, fast-moving subject is going to move... so you might still get a blur.

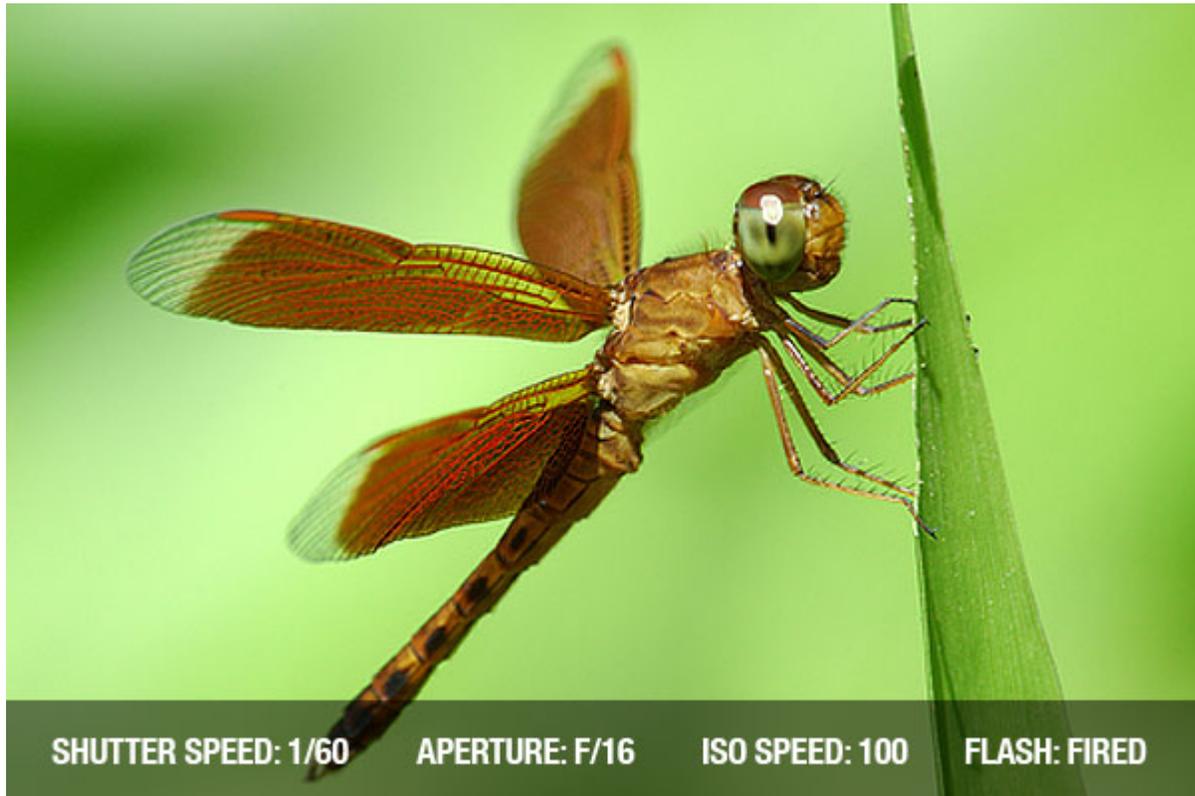
One Shot Focusing Mode



Next we have One-Shot AF (Canon)/AF-S (Nikon), which represent single-focus capability. In this mode, when you depress the shutter release halfway, the camera focuses on the subject just once – there’s no continuous adjustment. This mode saves battery power, and is ideal for subjects that aren’t moving. However, this mode falls short when you’re trying to capture something that’s changing positions. So unless you’re trying to get a quick shot of a deer in the early morning or hoping to immortalize Tony Romo getting tackled, then One Shot mode is probably your best bet.



Automatic Autofocus Mode



The last autofocus mode is AI Focus AF (Canon)/AF-A (Nikon), which stands for Automatic Autofocus. This is a relatively new feature which has turned out to be quite useful. In this mode the camera's focusing computer jumps back and forth between AF-C and AF-S (Nikon)/One-Shot AF and AI Servo AF (Canon) depending on the situation. This is the default autofocus mode on cameras that have this feature. You have to remember that photography can be an art, and in art you have to go with what's in your mind's eye. You never know what's going to happen next or what's going to catch your eye, so it's useful to have the camera make quick focus adjustments. This feature maintains focus if you change subjects or the subject moves.

Manual Focusing Mode



Manually focusing the camera is perhaps the most frustrating barrier between good and great photography. Achieving perfect focus requires using the distance measurements on the lens barrel and even perhaps measuring the distance from the lens to the subject with a tape measure; high-end photographers shoot products this way, and so do fine art photographers who are using medium format cameras. This will give you the most accurate focus point. What if you can't take a tape measure up to a subject? Well, you have to rely on your internal sense of sharpness and know the critical focus zone that you have at the specified aperture. There is a diopter adjustment on most DSLRs (it's right next to the viewfinder) that lets you make minute adjustments to the focusing capacity based upon any irregularities in your individual eyesight. You can also use the Depth of Field preview button to help determine focus, but this is a more advanced technique. Manual focus is important when you focus on a non-traditional subject, for example, a subject that is in the background when the foreground is busy and dominating.

Conclusion

All DSLRs allow you to turn off the autofocus and let you work with the focus ring to acquire sharp focus. Some people might find this time consuming or difficult, but as we said, photography is an art. You can use focus as means of drawing attention to or away from certain subjects. Or perhaps you want the entire frame to be out of focus to a certain degree because you want to create a dream-like quality to your image. It's up to you. In addition, the autofocus modes have difficulty shooting through certain seemingly transparent objects that are in front of a subject, like a wire fence or quasi-reflective glass; in these cameras the autofocus mode could focus on the wire fence and not the animal behind it. In this situation, you can "outthink" the autofocus mode by depressing the shutter halfway and acquiring sharp focus on the subject in the distance.

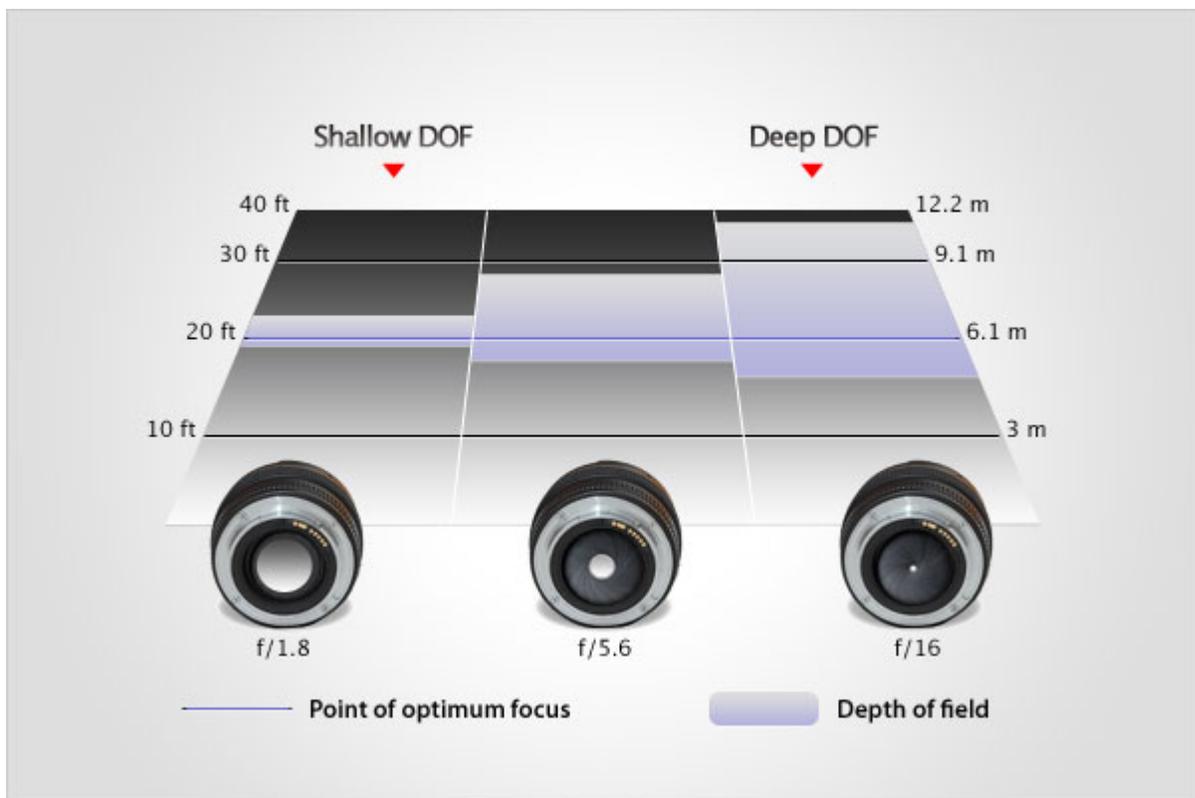


Focusing Basics

Understanding Depth of Field in Photography

In this section we're going to discuss several crucial elements for exercising greater creative control over your final photographic image. Other than lighting, composition and focus (which includes depth of field) are the main elements that you can exercise complete command over. Focus enables you to isolate a subject and specifically draw the viewer's eye to exactly where you want it. The first thing to understand about focus is depth of field.

Depth of Field



Depth of Field (DOF) is the front-to-back zone of a photograph in which the image is razor sharp.

As soon as an object (person, thing) falls out of this range, it begins to lose focus at an accelerating degree the farther out of the zone it falls; e.g. closer to the lens or deeper into the background. With any DOF zone, there is a Point of Optimum focus in which the object is most sharp.

There are two ways to describe the qualities of depth of field – shallow DOF or deep DOF. Shallow is when the included focus range is very narrow, a few inches to several feet. Deep is when the included range is a couple of yards to infinity. In both cases DOF is measured in front of the focus point and behind the focus point.

DOF is determined by three factors – aperture size, distance from the lens, and the focal length of the lens. Let's look at how each one works.

Aperture



The aperture is the opening at the rear of the lens that determines how much light travels through the lens and falls on the image sensor.

The size of the aperture's opening is measured in f-stops – one of two sets of numbers on the lens barrel (the other being the focusing distance). The f-stops work as inverse values, such that a small f/number (say f/2.8) corresponds to a larger or wider aperture size, which results in a shallow depth of field; conversely a large f/number (say f/16) results in a smaller or narrower aperture size and therefore a deeper depth of field.

Small vs Large Aperture



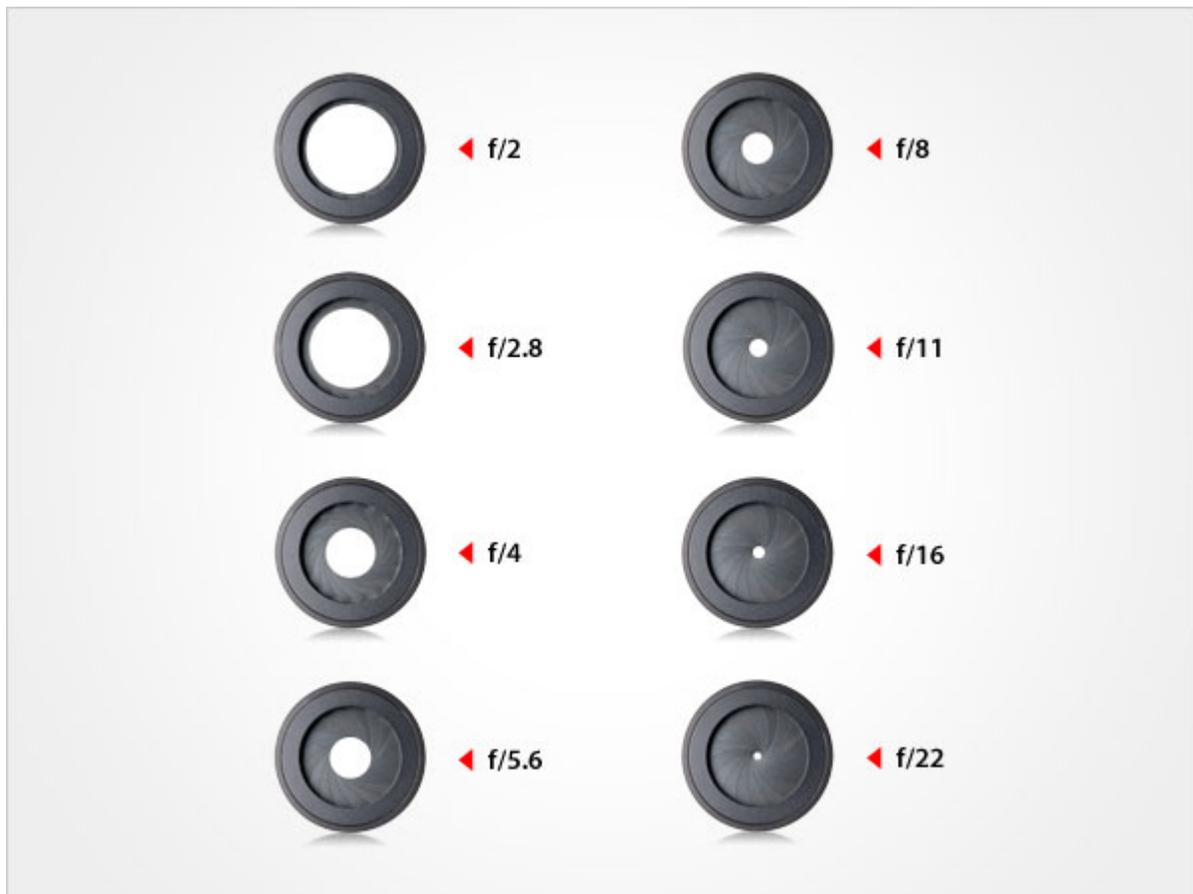
Manipulating the aperture is the easiest and most often utilized means to adjust Depth of Field.

To achieve a deep, rich and expansive DOF, you'll want to set the f-stop to around f/11 or higher. You may have seen this principle demonstrated when you look at photos taken outside during the brightest time of the day. In such a case, the camera is typically set at f/16 or higher (that Sunny 16 Rule) and the

Depth of Field is quite deep – perhaps several yards in front of and nearly to infinity beyond the exact focus point.

Let's take a look at these two photos as examples. The left side of the photo has an expansive DOF, most likely shot around noon (notice the short, but strong shadows), with an f/22 aperture. The right side of the photo has an extremely shallow DOF; probably an f/2.8 aperture setting. However, to achieve an identical proper exposure, the shutter speed is probably closer to 1/1000th to compensate for the increased amount of light entering the lens at f/2.8.

Aperture Range



The aperture range identifies the widest to smallest range of lens openings, i.e. f/1.4 (on a super-fast lens) to f/32, with incremental “stops” in between (f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16, and f/22).

Each f-number represents one “stop” of light, a stop is a mathematical equation (which is the focal length of the lens divided by the diameter of the aperture opening) that determines how much light that enters the lens regardless of the length of the lens. Such that an f/4 on a 50mm has smaller opening than an f/4 on a 200mm, but an equivalent amount of light travels through both lenses to reach the image sensor thus providing the same exposure. Each movement up the range (say f/2 to f.2.8) reduces the amount of light by one-half and each movement down the range (say f/11 to f/8) doubles the amount of light passing through the lens. It’s important to understand this concept and how it affects exposure because it works in tandem with the shutter speed (we’ll discuss this in another section) to establish a given exposure value.

Basically, when you change the aperture size one stop, you have to shift the shutter speed one stop in the opposite direction to maintain a consistent exposure... and this change in aperture alters the depth of field (DOF) accordingly.

Distance from the Lens

The last element affecting depth of field is the distance of the subject from the lens – you can adjust the DOF by changing that distance.

For example, the closer an object is to the lens (and the focus is set on that object) the shallower the DOF. Conversely, the reverse is true – the farther away an object is and focused on, the deeper the DOF. Changing the distance to subject is the least practical way to manipulate the depth of field, and by changing the distance from a subject to the lens, you immediately change your image’s composition. To maintain the compositional integrity of the shot, but still have the change in DOF from a distance, you can change the focal length (either by changing lenses or zooming in).

Why does changing the focal length negate the effects on DOF? This is because the visual properties of a given lens either provide either greater DOF (shorter lenses) or shallower DOF (longer lenses). The physical properties of a lens at a given focal length also affect the depth of field. A shorter focal length lens (say 27mm) focused at 5 meters, set at f/4 has a deeper DOF (perhaps from 3 meters in front and 20 meters behind) than a longer focal length (say 300mm), also set at f/4 focused at 5 meters. The 300mm lens has a remarkably shallow depth of field.

Incidentally, to help you with this, every lens has a manual with a DOF chart for each f/stop and the major focusing distances. DOF is just a matter of physics, and it's important to grasp this concept.



Conclusion

Manipulation of depth of field is a good way to modify the characteristics of your photo, and manipulating the aperture is the ideal way to do this because it has little or no effect on composition. You simply need to change the shutter speed (or change the light sensitivity – ISO) to compensate for the changes in the exposure from the adjustments to the f-number. Changes in distance and focal length also affect DOF, but these changes have trade-offs in terms of composition.

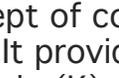
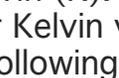
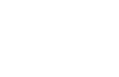
Therefore, changes to aperture are the best way to manipulate DOF without affecting a photo's composition.

White Balance

Understanding White Balance in Digital Photography

White balance (WB) is considered as one of the most important settings of a digital camera. Let’s consider a scenario where you want to capture the beauty of sea waves hitting the shore with an overcast sky at the background. Sounds interesting? Well, if you don’t use the correct white balance setting of your digital camera, you may get a picture with colors different from the actual ones. Therefore, in order to produce a beautifully exposed image with true to life colors, you must learn to effectively use the white balance setting of your digital camera.

Color Temperature

WB SETTINGS	COLOR TEMPERATURE	LIGHT SOURCES
	10000 - 15000 K	Clear Blue Sky
	6500 - 8000 K	Cloudy Sky / Shade
	6000 - 7000 K	Noon Sunlight
	5500 - 6500 K	Average Daylight
	5000 - 5500 K	Electronic Flash
	4000 - 5000 K	Fluorescent Light
	3000 - 4000 K	Early AM / Late PM
	2500 - 3000 K	Domestic Lightning
	1000 - 2000 K	Candle Flame

To understand the concept of White Balance, you need to first understand the concept of color temperature. Color temperature is a characteristic of visible light. It provides a method of describing these characteristics and is measured in Kelvin (K). A light having higher color temperature will have more blue light or larger Kelvin value as compared to lower light, which has a smaller Kelvin value. The following table shows the color temperature of various sources of light.



How does the Light Affect the Color?



You must have noticed some photos turn out with an orange/yellow cast if shot under tungsten lighting or a bluish cast if shot under fluorescent lights. This occurs because each source of light possesses a different color temperature. A digital camera can measure the colors in the red, green, and blue light of the spectrum, as reflected to its sensors. In a photo taken under the midday sun there is the whole spectrum of light (which makes up “white” sunlight). Under these conditions, the colors in an image appear nearest to the “true” colors. An image taken under tungsten bulb (a normal household incandescent bulb) without adjusting the digital camera for white balance produces the dull orange shade as it spreads the biased light. Similarly, an image taken under the fluorescent lighting produces a brighter bluish cast. However, it is possible to shift the color in the desirable direction, provided you have a good understanding of your digital camera and its settings.

Why to Adjust the White Balance?

Since different sources of light have different color hues, a picture taken with a normal white balance under artificial lighting conditions transmits the low heat to the camera's sensor. This light touches the red bits of the spectrum, which results into dull yellow or orange shades in the picture. Though the human eyes can automatically adjust to different lights and color temperatures to sense right color, a camera needs to be adjusted to different lights for accurate color reproduction. By adjusting the white balance setting of your digital camera, you can alter the required light or temperature to produce the most accurate colors in a digital image.

Preset White Balance Settings

 AWB Auto	 Tungsten	 Fluorescent	
 Daylight	 Cloudy	 Flash	 Shade

Auto – The Auto setting helps in adjusting the white balance automatically according to the different lighting conditions, but you can try other modes to get better results.

Tungsten – This mode is used for light under a little bulb like tungsten, and it is often used while shooting indoors. The tungsten setting of the digital camera cools down the color temperature in photos.

Fluorescent – This mode is used for getting brighter and warmer shots while compensating for cool shade of fluorescent light.

Daylight – This mode is for the normal day light setting, while shooting outdoors. Many cameras do not have the Daylight mode.

Cloudy – This mode is ideal for while shooting on a cloudy day. This is because it warms up the subject and surroundings and allows you to capture better shots.

Flash – The flash mode is required when there is inadequate lighting available. This mode helps pick the right White Balance under low light conditions.

Shade – A shaded location generally produces cooler or bluer pictures, hence you need to warm up the surroundings while shooting shaded objects.

Manual White Balance

You can also adjust your digital camera manually by setting a white object as the reference point. This is done to guide the camera how white the object would look in a particular shot. It is advisable to manually adjust the white balance when taking a picture to compensate for the changing lighting conditions. As the daylight changes during early morning and late evening hours, the varied light intensity is easily perceived by the camera. Therefore, you need to correct the white balance regularly while shooting during these times of the day. To manually set the white balance in your image, you first point your camera at a pure white object, set the exposure and focus. Now, activate the white balance on the object by pressing the button. It may take few seconds for the camera to perceive the shot, but it will this color setting until the next white balance is performed.

Conclusion

Some people consider it amateurish to use pre-determined settings, when in fact there may be times when we are in a rush and cannot adjust everything manually. Also remember that using these modes will teach you about photography and ideal settings for different conditions. If in doubt, you can use Auto mode, then adjust the settings manually. Auto settings are there to be used so try them all, and become familiar with what each one does.

The Exposure Triangle

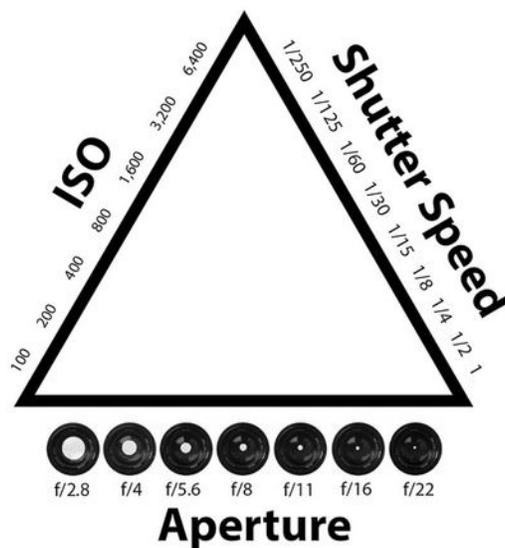
A Beginner's Guide

LAST UPDATED ON MARCH 5, 2018 BY [ELIZABETH](#) – [PHOTOLIFE.COM](#)

For many starting out in photography, the relationship between aperture, shutter speed, and ISO can be confusing. To further muddy the water, the terms 'stop' and 'f-stop' are often used interchangeably but refer to different things. In this article, I would like to take some of the mystery out of these concepts by talking about the exposure triangle and why it is important to understand for those who are starting out. Please keep in mind that the concepts in this article are oversimplified to make it easy for beginners to understand, especially when it comes to ISO.

1) The Exposure Triangle

Aperture, shutter speed, and ISO make up the three sides of the exposure triangle. They work together to produce a photo that is properly exposed. If one variable changes, at least one of the others must also change to maintain the **correct exposure**. For more information on this topic, you may wish to check out our **detailed summary** of exposure.



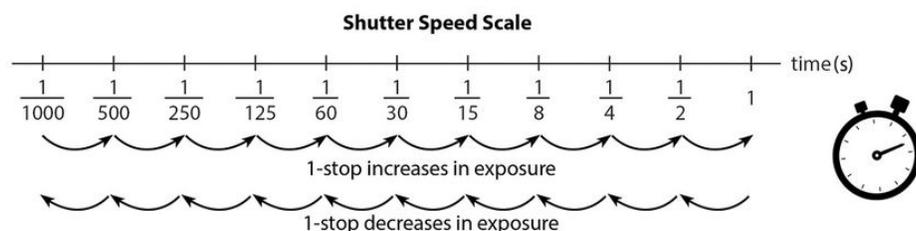
2) Stop!

Before we go too far, let's start our discussion by talking about a **stop of light**. Understanding what a stop is is key to understanding the exposure triangle. In photography, a stop refers to the doubling or halving of the amount of light that makes up an exposure. Each photo that we take requires a certain quantity of light to expose it correctly. Adding a stop of light by doubling the exposure will brighten an underexposed image. Conversely, decreasing an exposure by one stop (halving the amount of light) will darken an overexposed image.

So how do you add or take away a stop of light? To do this, we need to change the aperture, shutter speed, and/or ISO. Let us look at each of these individually.

3) Shutter Speed

Shutter speed is the length of time light is allowed to hit the sensor. It is measured in seconds. Shutter speed is probably the easiest of the exposure triangle sides to understand. To double the amount of light, we need to double the length of the exposure. For example, moving from a shutter speed of $\frac{1}{60}$ s to $\frac{1}{30}$ s will add a stop of light because the shutter will remain open twice as long. Changing from a shutter speed of 1s to $\frac{1}{8}$ s will decrease the exposure by three stops. Why? From 1s to $\frac{1}{2}$ s is one stop. Then $\frac{1}{2}$ s to $\frac{1}{4}$ s is another stop. Finally, $\frac{1}{4}$ s to $\frac{1}{8}$ s is a further halving of the time the shutter remains open or the third stop.



4) Aperture

Aperture refers to the size of the circular hole in the lens that lets in light. The bigger the hole, the more light that reaches the sensor. In fact, each time you double the area of that opening, you double the amount of light or increase the exposure by one stop. On the other hand, if you half the area of the opening, you half the amount of light hitting the sensor. And you guessed it; that will decrease the exposure by one stop.

Now without getting too technical, an f-stop is a ratio that relates to the size of that opening. Mathematically it is equal to the focal length of the lens divided

by the diameter of the lens. At first glance the values on the f-stop scale are confusing. The numbers don't seem to make any sense. Why do small values correspond to larger openings and vice versa? For a simple explanation, keep reading.

To understand why large f-stop numbers refer to small openings and small f-stop numbers refer to large openings requires a bit of math. Don't worry; I will try and keep it simple. If you take the ratio I mentioned above:

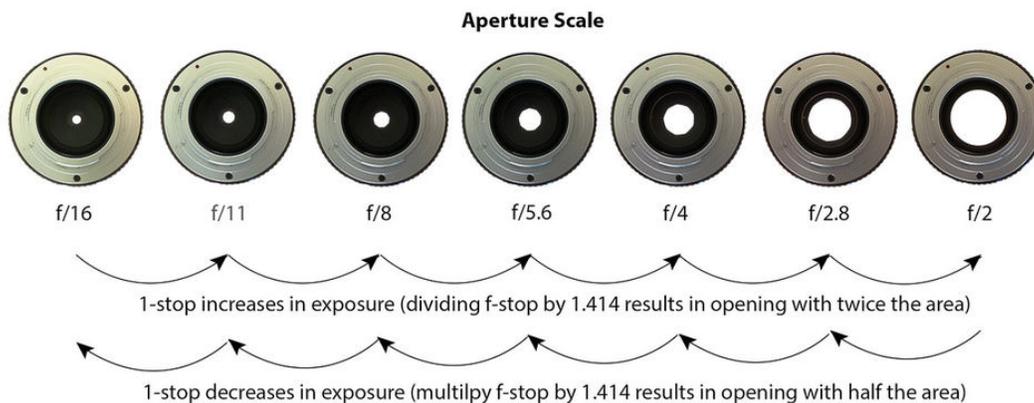
$$\text{f-stop} = \text{focal length} / \text{diameter}$$

and rearrange it for diameter, you get:

$$\text{diameter} = \text{focal length} / \text{f-stop}$$

What this means is that for any given focal length, we can calculate the diameter of the aperture by dividing the focal length by the f-stop value. But when you divide a given focal length by a large f-stop number, the result is a small diameter. Therefore, the area of the opening is small. Conversely, if you divide the same focal length by a small f-stop number, you get a large diameter. And a large diameter means a bigger area and more light passing through the opening.

Also, it turns out that to double the area of the opening, the f-stop needs to be divided by the square root of two (1.414). That is why the f-stops are not nice round numbers. To half the area, the f-stop needs to be multiplied by the square root of two.



If you are so inclined, prove this to yourself with a little geometry. Remember that the area of a circle is:

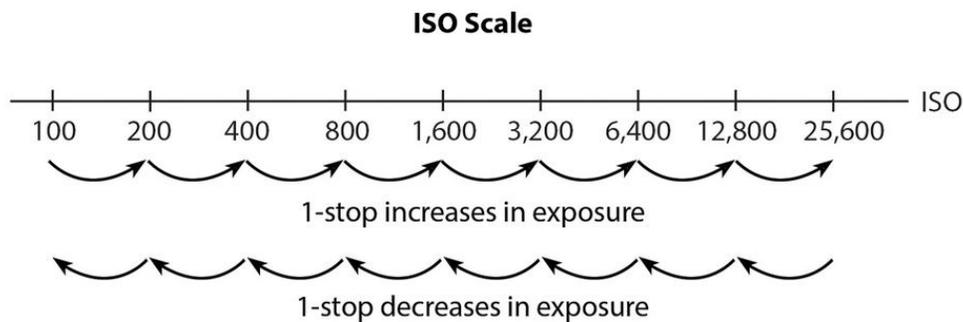
$$\text{Area} = (\pi/4)\text{diameter}^2$$

Try calculating the area of the aperture for a lens with a 50mm focal length using different f-stop values. As you move up the f-stop scale, you should see the areas doubling.

5) ISO

The final variable in the exposure triangle is **ISO**. You can think of ISO as the sensitivity of the digital sensor (although it is a lot more complicated than that). Higher values of ISO mean that the sensor does not need to collect as much light to make a correct exposure. Low ISO values mean that the sensor will have to gather more light to make the exposure.

Here is the ISO scale. Like shutter speed, this scale is easy to understand. Doubling the ISO equates to a one stop increase in exposure. Halving the ISO leads to a reduction of the exposure by one stop.



6) The Bucket Analogy

For any photograph, there is only one mathematically correct exposure. However, there are hundreds of combinations of aperture, shutter speed and ISO that can be used to create that exposure. The combination we choose depends on what our artistic vision for that image is. For now, let's just look at how the three variables in the exposure triangle work together. In my next article, I will talk about how to use aperture, shutter speed, and ISO artistically.

For any given exposure, if one of the three variables change, you must adjust one (or both) of the others in the opposite direction. For example, if you decided to decrease your shutter speed by two stops, you will need to increase your aperture or ISO by two stops. You could also change both aperture and ISO by one stop with the same effect.

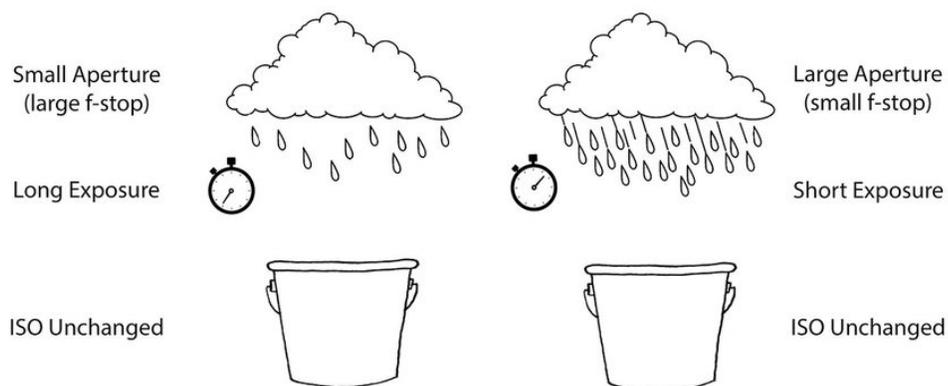
As another example, say you increased your ISO by four stops. Then you would need an equivalent decrease of four stops in aperture or shutter speed (or a combination of the two).

So let's put it all together using an analogy. Instead of light, let's talk rain. Specifically filling up buckets with rain water. The exposure will be the total amount of water collected. Let's say our 'exposure' is one gallon.

In this analogy, 'shutter speed' is the length of time we leave the bucket outside in the rain to fill up. How hard it is raining is our 'aperture.' A downpour would be a wide open aperture (large opening, small f-stop number) while a light sprinkle would equate to a tiny aperture (small opening, large f-stop value).

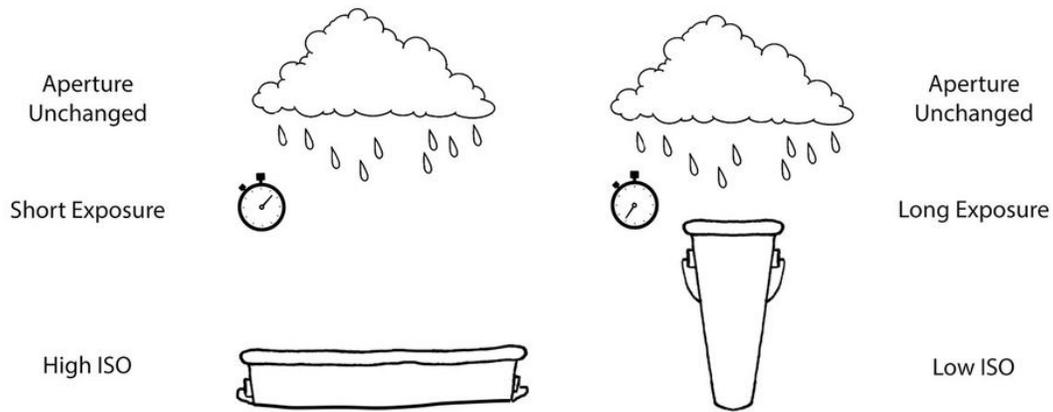
Finally, the width of the bucket represents 'ISO.' Now, all our buckets have to measure one gallon to collect the correct 'exposure.' However, a very shallow, wide bucket (think very sensitive, high ISO) will fill up much faster than a tall, skinny bucket (low ISO).

There are many scenarios which will collect our one-gallon 'exposure.' To make things a bit easier, we will fix one variable, and let the other two change. Let's start by fixing ISO. If we have two buckets that are the same shape, we could put one out in a downpour for a short length of time to collect one gallon. Or, we could put the other out for a long time during a light sprinkle to collect that same gallon of water. However, if we put the bucket out for a long time in a downpour, we would over expose our image. Water would be spilling out onto the ground! Conversely, putting the bucket out in a light sprinkle for a short length of time would not fill up the bucket. Our bucket would be under exposed.

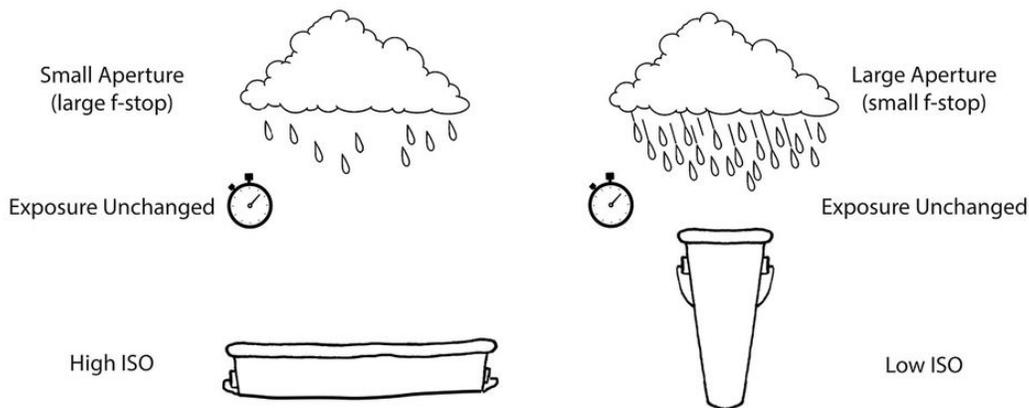


Here is another scenario. This time let's assume that there is a steady rain. If we have a wide bucket, we won't need to leave it out for long to collect a gallon of

rain. However, if we put out a skinny, tall one-gallon bucket in the same rain, it will take much longer to fill the bucket up.



Lastly, let's fix the time we leave the buckets outside. To collect one gallon of water we could put the wide, shallow bucket out in a light rain. Or, we could put the tall, skinny bucket out in a downpour for the same time to collect exactly one gallon of rain water.



As you can see, there are lots of combinations of 'shutter speed,' 'aperture' and 'ISO' that yield one gallon of 'exposure.' Is one combination better than another? Well, that depends on how you want your photograph to look. What is important is the understanding that if you increase or decrease one variable in the exposure triangle by a number of stops, you must make up for that by decreasing or increasing one of the others (or a combination of the others) by an equal number of stops.

7) Conclusion

A stop is the doubling or halving of the light that makes up an exposure. We can add or subtract stops by changing the aperture, shutter speed, or ISO. So the next time someone tells you that you need to increase your exposure by a couple of stops, you will hopefully know what they mean and how to do it.

Introduction to Aperture in Photography

LAST UPDATED ON APRIL 17, 2018 BY [NASIM MANSUROV](#) – [PHOTOLIFE.COM](#)

Many photographers struggle with some of the most basic and fundamental concepts of exposure in photography, getting frustrated with not being able to take good pictures. Unfortunately, some get stuck in automated modes, preferring to let their cameras decide everything for them. In order to help our readers explore the full potential of their camera gear, we will start by exploring one of the pillars of photography – aperture (the other two being *ISO* and *Shutter Speed*). Without a doubt, Aperture is the most important of the three, simply because it affects so many different variables of an image. It can add dimension to your photographs by blurring the background, and it also alters the exposure of your images by making them brighter or darker. In this article, we will cover everything you need to know about aperture, all in very simple language.



By adjusting your Aperture, you can change the depth of field in an image, as shown here.

What is Aperture?

Aperture is a hole within a lens, through which light travels into the camera body. It is an easy concept to understand if you just think about how your eyes work. As you move between bright and dark environments, the iris in your eyes either expands or shrinks, controlling the size of your pupil. In photography, the “pupil” of your lens is called your *aperture*. You can shrink or enlarge the size of

the aperture to allow more or less light to reach your camera sensor. The image below shows an aperture in a lens:

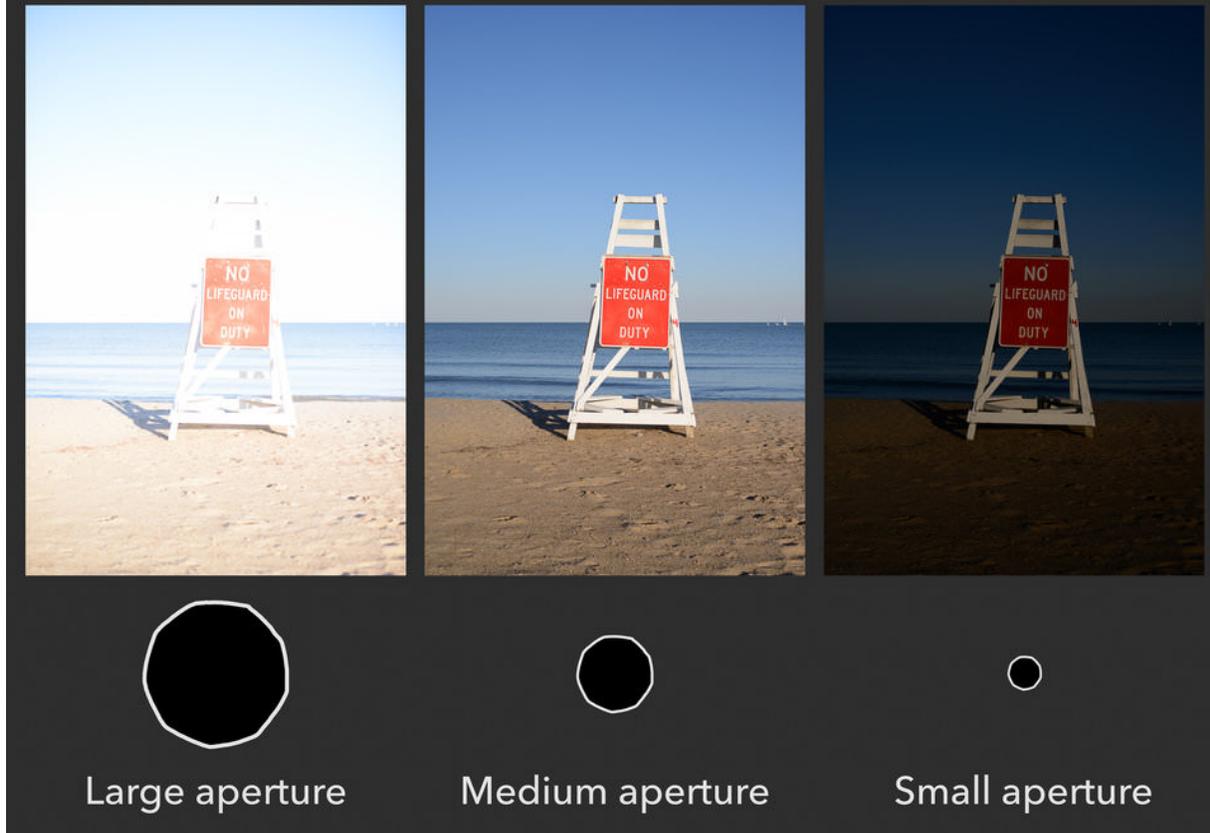


Aperture is like the “pupil” for your camera system, which can open and close to change the amount of light that passes through. Note the nine aperture blades in this lens, which form a diaphragm to block any light that tries to pass, except through the center. The technical definition of aperture is: “The opening in a lens through which light passes to enter the camera.”

Effects of Aperture: Exposure

Aperture has several effects on your photographs. One of the most important is the brightness, or *exposure*, of your images. As aperture changes in size, it alters the overall amount of light that reaches your camera sensor – and therefore the brightness of your image. A large aperture (a wide opening) will pass a lot of light, resulting in a brighter photograph. A small aperture does just the opposite, making a photo darker. Take a look at the illustration below to see how aperture affects exposure:

Capturing different amounts of light



In a dark environment – indoors, or at night – you will probably want to select a large aperture to capture as much light as possible. This is the same reason why your pupils dilate when it starts to get dark.

Effects of Aperture: Depth of Field

The other critical effect of aperture is something known as *depth of field*. Depth of field is the amount of your photograph that appears sharp from front to back. Some images have a “thin” or “shallow” depth of field, where the background is completely out of focus. Other images have a “large” or “deep” depth of field, where both the foreground and background are sharp.



This photograph has a thin depth of field – a “shallow focus” effect.

In the image above, only the word “Cougar” is in focus due to my careful choice of aperture. Specifically, I used a large aperture here, which naturally results in a shallow focus effect. If I had chosen a much smaller aperture, the entire photo from front to back might have appeared sharp, without any clear out-of-focus background.

One trick to remember this relationship: a **large** aperture results in a **large** amount of background blur. This is often desirable for portraits, or general photos of objects where you want a blurry background. For example, one reason why the photo below works well because it has a blurry background (and pleasing **bokeh**):



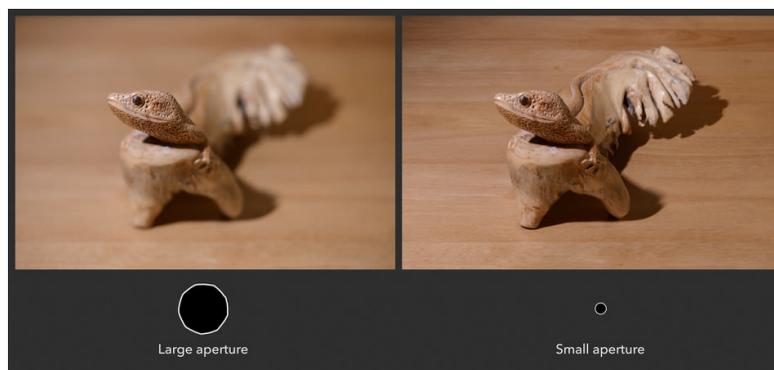
Taken at a large aperture with a portrait lens.

On the other hand, a **small** aperture results in a **small** amount of background blur, which typically is ideal for things like landscape and architectural images. In the landscape photo below, I used a small aperture to ensure that both my foreground and background were as sharp as possible from front to back:



Taken at a small aperture to avoid background blur as much as possible.

And here is a quick comparison to show the two side by side – a large aperture and a small aperture:



If you're wondering, I adjusted my **shutter speed** to equalize the brightness of these two images.

What Are F-Stop and F-Number?

So far, we have only discussed aperture in general terms like *large* and *small*. However, every aperture can also be expressed as a number known as an “f-number” or an “f-stop.” Whenever you see an aperture value, the letter “f” will appear before the number, like f/8.

Most likely, you have noticed this on your camera before. On your LCD screen or viewfinder, your aperture will look something like this: f/2, f/3.5, f/8, and so on. Some cameras omit the slash and write f-stops like this: f2, f3.5, f8, and so on. For example, the camera below is set to an aperture of f/8:

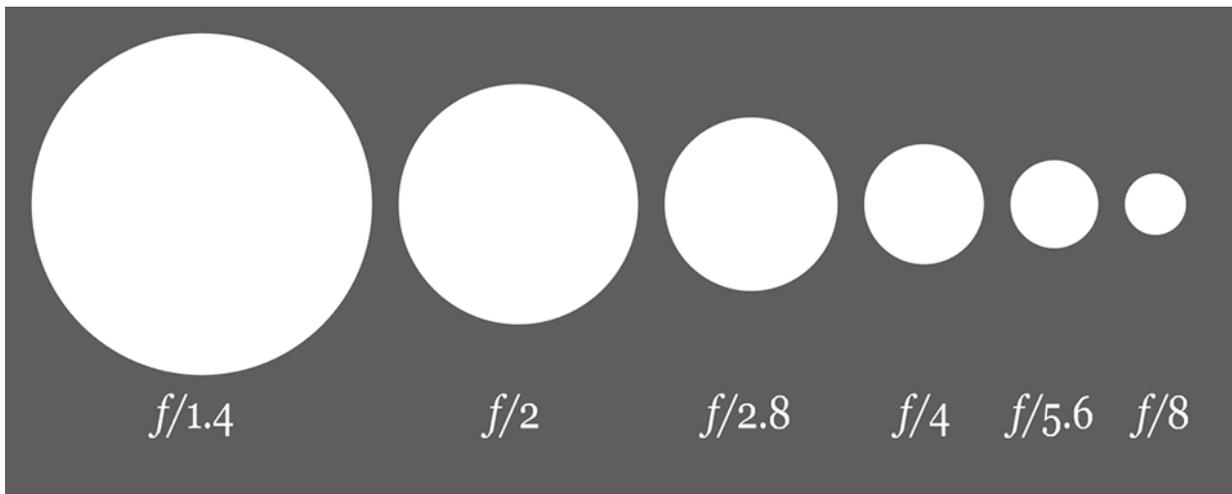


Aperture is labeled in f-numbers. In this case, I’m using an aperture of f/8. So, f-stops are a way of describing the size of the aperture (how open or closed the aperture blades are) for a particular photo.

Size of Aperture: Large vs Small Aperture

There's a catch – one important part of aperture that confuses beginning photographers more than anything else. This is something you really need to pay attention to and get correct: Small numbers are large apertures. And large numbers are small apertures.

That's not a typo. For example, $f/1.4$ is **larger** than $f/2.0$ and much larger than $f/8.0$. Most people find this awkward, since we are used to having larger numbers represent larger values. Nevertheless, this is a basic fact of photography. Take a look at this chart (image courtesy of [Wikipedia](#)):



As you can see, an f-stop like $f/8$ represents a much smaller aperture opening than something like $f/1.4$.

This causes a huge amount of confusion among photographers, because it's completely the reverse of what you would expect at first. However, as strange as it may sound, there is a reasonable and simple explanation that should make aperture much clearer to you: *Aperture is a fraction.*

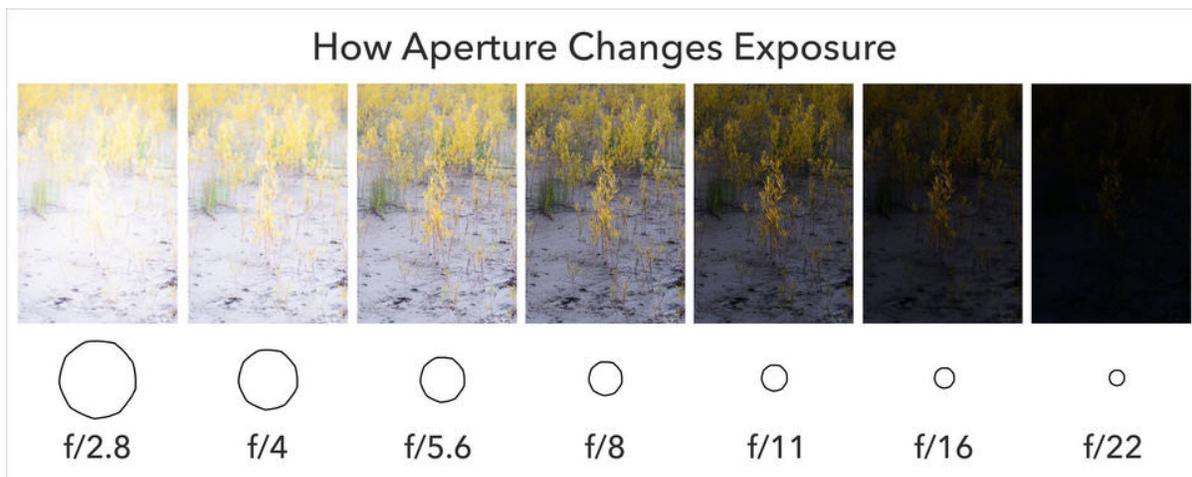
When you are dealing with an f-stop of $f/10$, for example, you can think of it like the fraction $1/10$ th. Hopefully, you already know that $1/10$ th is clearly much smaller than a fraction like $1/2$. For this exact reason, an aperture of $f/10$ is smaller than an aperture of $f/2$. Here's a real-world comparison to demonstrate how this looks in practice:



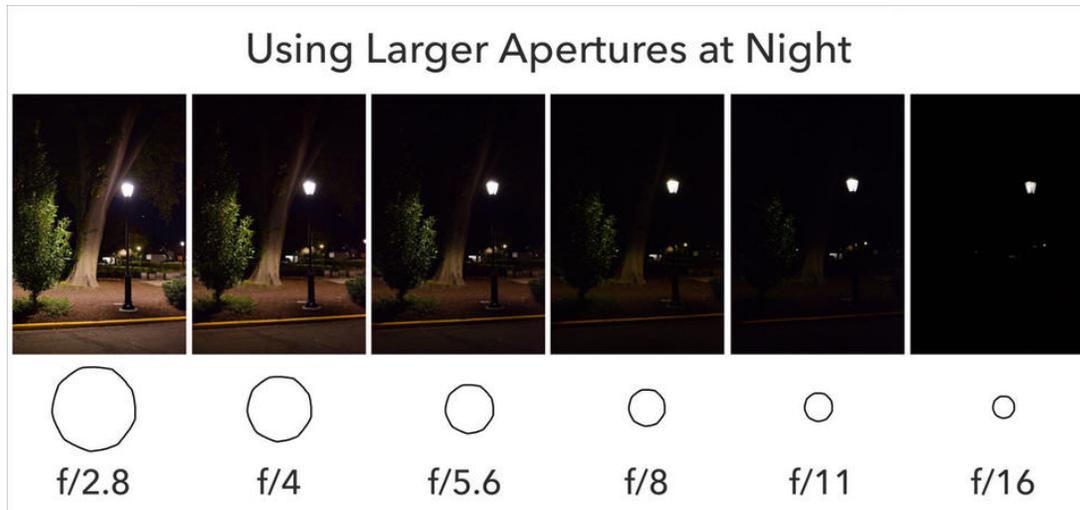
So, if photographers recommend a *large aperture* for a particular type of photography, they're telling you to use something like f/1.4, f/2, or f/2.8. And if they suggest a *small aperture* for one of your photos, they're recommending that you use something like f/8, f/11, or f/16.

How to Pick the Right Aperture

Now that you're familiar with some specific examples of f-stops, how do you know what aperture to use for your photos? Let's jump back to exposure and depth of field – the two most important effects of aperture. First, here is a quick diagram to demonstrate the brightness differences at a range of common aperture values:

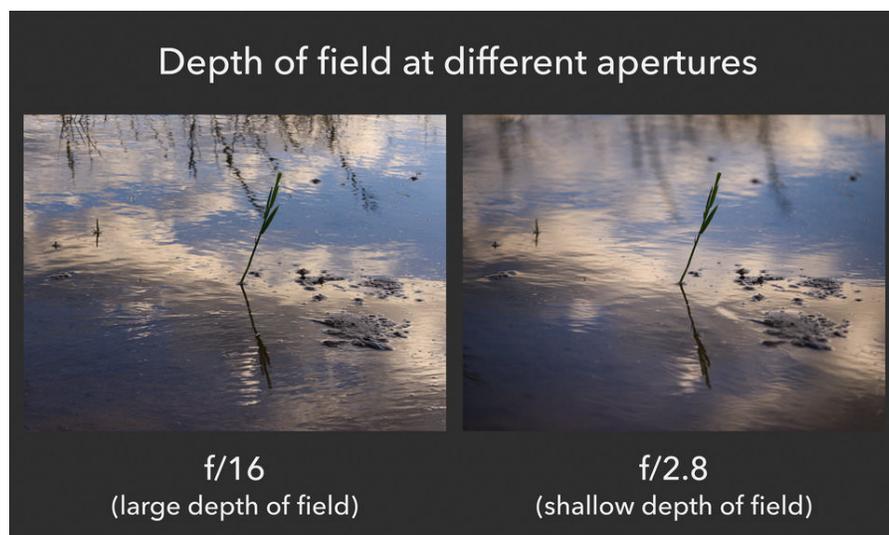


Or, if you're in a darker environment, you may want to use large apertures like f/2.8 to capture a photo of the proper brightness (once again, like when your eye's pupil dilates to capture every last bit of light):



As far as depth of field, recall that a large aperture like f/2.8 will result in a large amount of background blur (ideal for shallow focus portraits), while apertures like f/8, f/11, or f/16 will help you capture sharp details in both the foreground and background (ideal for many landscapes).

Don't fret if your photo is too bright or dark at your chosen aperture setting. Most of the time, you'll be able to adjust your **shutter speed** to compensate – or raise your **ISO** if you've hit your sharp shutter speed limit.



I equalized the brightness of these photos by changing my shutter speed, or the f/2.8 photo would be much brighter.

Here is a quick chart that lays out everything we've covered so far:

The aperture scale								
f/1.4	f/2.0	f/2.8	f/4.0	f/5.6	f/8.0	f/11.0	f/16.0	f/22.0
Very large aperture.	Large aperture.	Large aperture.	Moderate aperture.	Moderate aperture.	Small aperture.	Small aperture.	Very small aperture.	Very small aperture.
Lets in a huge amount of light.	Half as much light.	Half as much light.	Half as much light.	Half as much light. (This is a very "medium" aperture.)	Half as much light.	Half as much light.	Half as much light.	Half as much light. By this point, your photos are very dark.
Super thin depth of field.	Thin depth of field.	Thin depth of field.	Moderate depth of field.	Moderate depth of field.	Fairly large depth of field.	Fairly large depth of field.	Huge depth of field.	Huge depth of field.

Setting Your Aperture

If you want to select your aperture manually for a photo (which is something we highly recommend), there are two modes which work: *aperture-priority* mode and *manual* mode. Aperture-priority mode is written as "A" or "Av" on most cameras, while manual is written as "M." Usually, you can find these on the top dial of your camera (read more also in our article on [camera modes](#)):



In aperture-priority mode, you select the aperture, and the camera automatically selects your shutter speed. In manual mode, you select both the aperture and shutter speed manually.

Lens Limitations: Which Apertures Are Available?

Every lens has a limit on how large or how small the aperture can get. If you take a look at the specifications of your lens, it should say what the maximum and minimum apertures are. For almost everyone, the maximum aperture will be more important, because it tells you how much light the lens can capture at its maximum (basically, how dark of an environment you can take photos). A lens that has an aperture of $f/1.4$ or $f/1.8$ as the maximum aperture is considered to be a “fast” lens, because it can pass through more light than, for example, a lens with a “slow” maximum aperture of $f/4.0$. That’s why lenses with large apertures usually cost more.

The minimum aperture is not that important, because almost all modern lenses can provide at least $f/16$ as the minimum aperture. You will rarely need anything smaller than that for day-to-day photography.

With some zoom lenses, the maximum aperture will change as you zoom in and out. For example, with the Nikon 18-55mm $f/3.5-5.6$ lens, the largest aperture shifts gradually from $f/3.5$ at the wide end to just $f/5.6$ at the longer focal lengths. More expensive zooms tend to maintain a constant maximum aperture throughout their zoom range, like the [Nikon 24-70mm \$f/2.8\$](#) . Prime lenses also tend to have larger maximum apertures than zoom lenses, which is one of their major benefits.

The maximum aperture of a lens is so important that it’s included in the name of the lens itself. Sometimes, it will be written with a colon rather than a slash, but it means the same thing (like the Nikon 50mm 1:1.4G below).



Conclusion

Aperture is clearly a crucial setting in photography and it is possibly the single most important setting of all. That's because depth of field and exposure have such major effects on an image, and your choice of aperture changes *both of them*. Aperture also has a number of other effects that are too extensive to fit in this article. So, we have another article that covers [every single effect aperture has](#).

Knowing how important aperture is, it shouldn't be a surprise that, at Photography Life, we shoot in aperture-priority or manual mode 100% of the time (with aperture-priority mode most of all). We never want the camera to select the aperture for us. It's just too important, and it is one of those basic settings that every beginner or advanced photographer needs to know in order to take the best possible images.

Introduction to Shutter Speed in Photography

LAST UPDATED ON APRIL 17, 2018 BY [NASIM MANSUROV](#) - [PHOTOLIFE.COM](#)

One of the three pillars of photography is Shutter Speed, the other two being **Aperture** and **ISO**. Shutter speed is responsible for two particular things: changing the brightness of your photo, and creating dramatic effects by either freezing action or blurring motion. In this chapter of *Photography Basics*, we will explain everything you need to know about shutter speed, in very simple language.



My shutter speed in this image: 1/30th second.

What is a Camera Shutter?

Shutter speed exists because of something known as your **camera shutter** – which, simply put, is a curtain in front of the camera sensor that stays closed until the camera fires. When the camera fires, the shutter opens and fully exposes the camera sensor to the light that has passed through your lens. After the sensor is done collecting the light, the shutter closes immediately, stopping the light from hitting the sensor. The button that fires the camera is also called “shutter” or “shutter button,” because it triggers the shutter to open and close.

What is Shutter Speed?

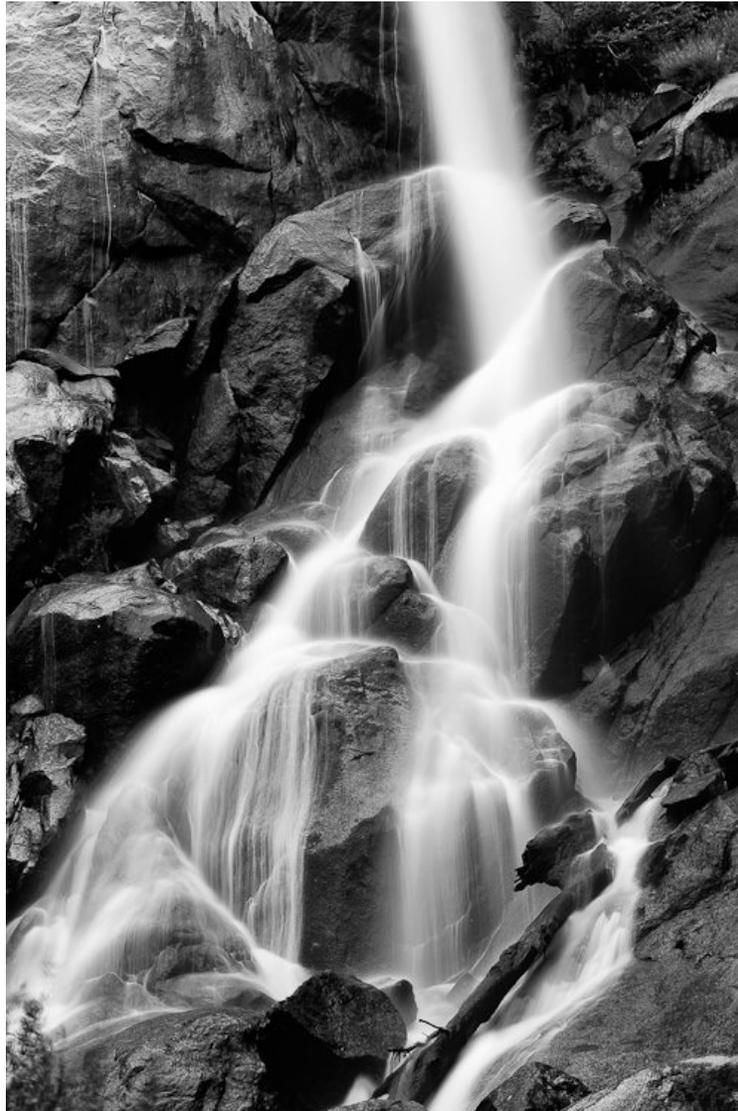
Shutter speed is the *length of time* your camera shutter is open, exposing light onto the camera sensor. Essentially, it’s how long your camera spends taking a photo. This has a few important effects in how your images will appear.

When you use a long shutter speed, you end up exposing your sensor for a significant period of time. The first big effect of shutter speed is **motion blur**. If your shutter speed is long, moving subjects in your photo will appear blurred along the direction of motion. This effect is used quite often in advertisements of cars and motorbikes, where a sense of speed and motion is communicated to the viewer by intentionally blurring the moving wheels.



Motion blur.

Slow shutter speeds are also used to photograph the Milky Way or other objects at night, or in dim environments with a tripod. Landscape photographers may intentionally use long shutter speeds to create a sense of motion on rivers and waterfalls, while keeping everything else completely sharp.



Shutter speed: 5 seconds (a long shutter speed).

On the other hand, shutter speed can also be used to do just the opposite – freeze motion. If you use an especially fast shutter speed, you can eliminate motion even from fast-moving objects, like birds in flight, or cars driving past. If you use a fast shutter speed while taking pictures of a water, each droplet will hang in the air completely sharp, which might not even be visible to our own eyes.



Shutter speed: 1/1600th second (a fast shutter speed)

All of the above is achieved by simply controlling the shutter speed. In summary, quick shutter speeds freeze action, while long shutter speeds create an effect of motion when you photograph moving objects.

How Shutter Speed is Measured

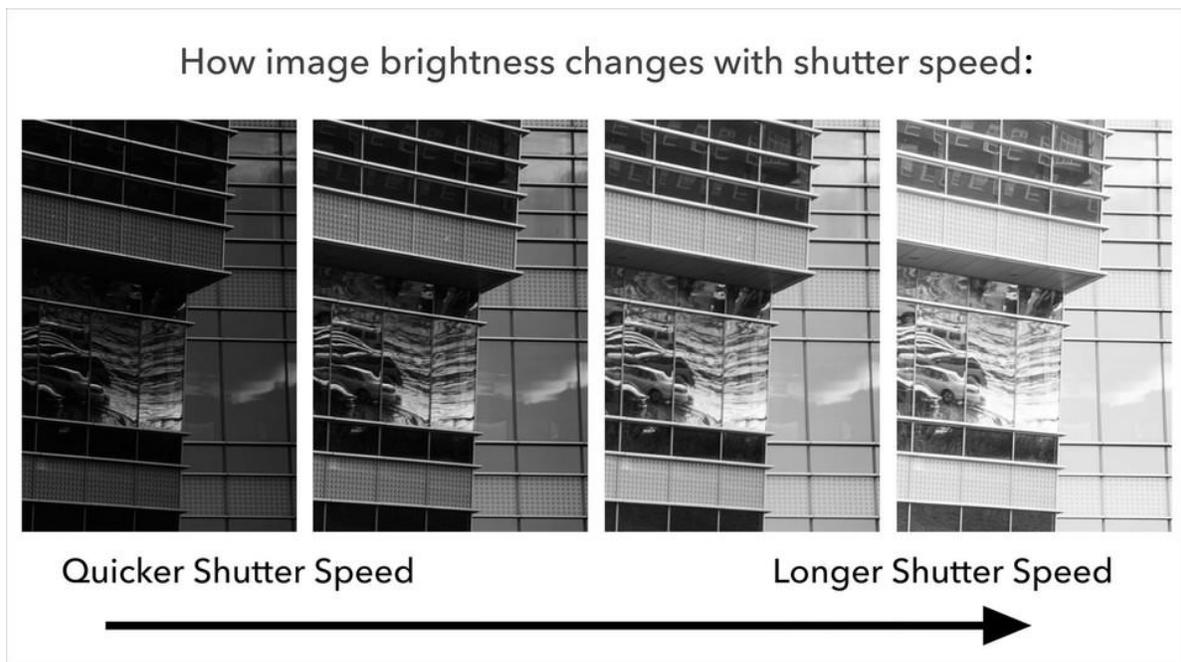
Shutter speeds are typically measured in fractions of a second, when they are under a second. For example 1/4 means a quarter of a second, while 1/250 means one two-hundred-and-fiftieth of a second (or four milliseconds).

Most modern DSLRs and mirrorless cameras can handle shutter speeds of up to 1/4000th of a second, while some can handle much quicker speeds of 1/8000th of a second and faster. On the other hand, the longest available shutter speed on most DSLRs or mirrorless cameras is typically 30 seconds. You can use a longer shutter speed by using external remote triggers, if necessary.

Shutter Speed and Exposure

The other important effect of shutter speed is on exposure, which relates to the brightness of an image. If you use a long shutter speed, your camera sensor gathers a lot of light, and the resulting photo will be quite bright. By using a

quick shutter speed, your camera sensor is only exposed to a small fraction of light, resulting in a darker photo.



However, shutter speed is not the only variable which affects the brightness of an image. There are also **Aperture** and **ISO**, along with the actual brightness of the scene in front of you. So, you have some flexibility when you're deciding on a shutter speed, but you need to pick your other settings carefully.

Shutter speed can be a vital tool to capture a photo of the proper brightness. On a sunny day, you may need to use a fast shutter speed so that your photo isn't overexposed. Or, if it is dark out, a long shutter speed may be necessary to avoid a photo that is too dark (which, in turn, could require a tripod, due to motion blur from handholding the camera). For many people, this is the **main reason to adjust shutter speed**: to make sure your photos are the proper brightness. Still, motion blur concerns are also very important, and should not be overlooked.

Fast, Slow and Long Shutter Speeds

A fast shutter speed is typically whatever it takes to freeze action. If you are photographing birds, that may be 1/1000th second or faster. However, for general photography of slower-moving subjects, you might be able to take pictures at 1/200th second, 1/100th second, or even longer without introducing motion blur.



Shutter speed: 1/2000 second (quite fast)

Long shutter speeds are typically above 1 second – at which point, you will need to use a tripod to get sharp images. You would use long shutter speeds for certain types of low-light/night photography, or to capture movement intentionally. If anything in your scene is moving when you use long shutter speeds, it will appear very blurry.

In between, shutter speeds from 1/100th second to 1 second are still considered relatively slow. You may not be able to handle them without introducing camera shake from your hands, especially close to the one-second mark. Also, this strongly depends upon your lens. Some lenses, such as the [Nikon 70-200mm f/2.8](#), have specific image stabilization (also known as “vibration reduction”) technologies within the lens that can help photographers take pictures at very slow shutter speeds when hand-holding cameras, without introducing camera shake. Other lenses do not have vibration reduction, which means you need to use the [reciprocal rule](#) instead to determine how long your shutter speed should be without introducing blur from camera shake. It is also important that you know [how to hold a camera](#).

How to Set Shutter Speed

Most cameras handle shutter speeds automatically by default. When the camera is set to “Auto” mode, the shutter speed is selected by the camera without your input (and so are [aperture](#) and [ISO](#)). However, you can still set shutter speed manually if necessary:

1. By setting the camera to “[Shutter Priority](#)” mode, you choose the shutter speed, and the camera automatically selects the aperture.
2. By setting the camera to “[Manual](#)” mode, you choose both shutter speed and aperture manually.

Within both of these modes, you can choose to set ISO manually or automatically.

In most cases, we recommend letting the camera select the correct shutter speed for you. Still, watch to be certain that you aren’t introducing too much motion blur in a photo (or freezing motion that you want to be blurred). I cover more of this in an article on [camera modes](#), but I tend to shoot in “Aperture Priority” mode 95% of the time, letting the camera calculate the shutter speed automatically.

How to Find Shutter Speed

Do you know how to find what your camera shutter speed is set to? It is typically very easy to find the shutter speed. On cameras that have a top panel, the shutter speed is typically located on the top left corner, as circled:



If your camera does not have a top LCD, like some entry-level DSLRs, you can look through the viewfinder, where you will see the shutter speed on the bottom-left side. And if your camera has neither a top LCD nor a viewfinder, like many mirrorless cameras, you can see your shutter speed simply by looking on the back screen.

On most cameras, shutter speed will not show up directly as a fraction of a second – it will typically be a regular number. When the shutter speed is longer than or equal to one second, you will see something like 1" or 5" (with the quotation sign to indicate a full second).

If you still cannot find the shutter speed, set your camera to “Aperture Priority” mode, and make sure that you have turned “AUTO ISO” off. Then, start pointing around your camera from dark to bright areas. The number that changes will be your shutter speed.

Introduction to ISO in Photography

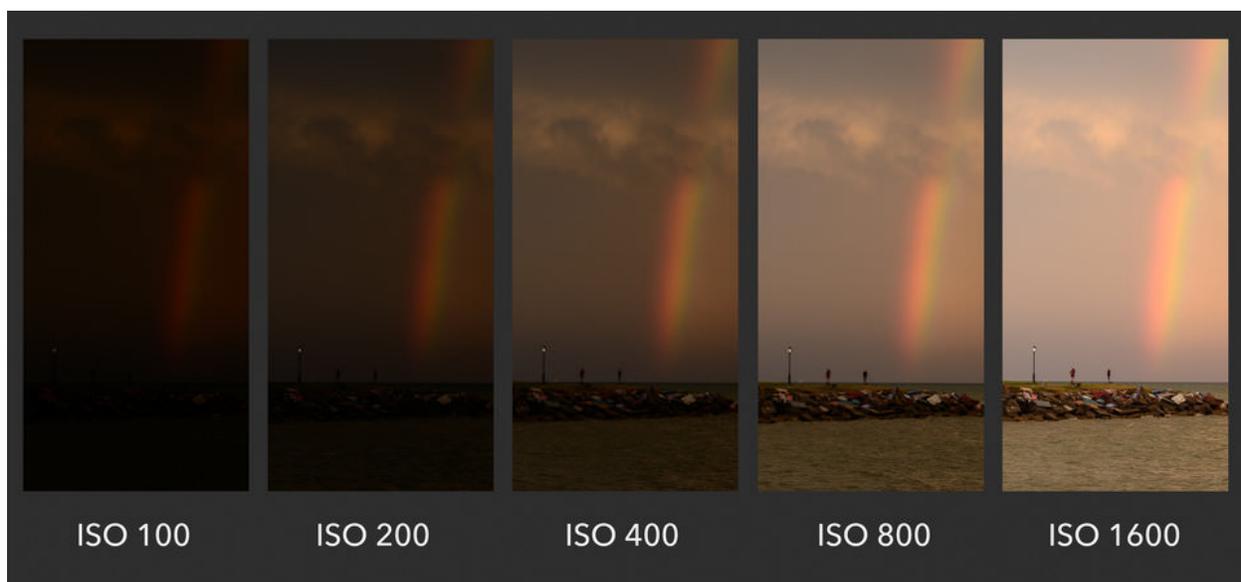
LAST UPDATED ON APRIL 17, 2018 BY [NASIM MANSUROV](#) - [PHOTLIFE.COM](#)

One of the three pillars of photography that can dramatically affect the look of your images is camera ISO (the other two being **shutter speed** and **aperture**). Like those two settings, ISO controls the brightness of your photos, and it is a crucial setting to use properly if you want to take the best possible images. In this chapter of *Photography Basics* article, we will explain ISO using simple language and examples so that you can make the most of it for your own photography.

What is ISO?

In very basic terms, ISO is simply a camera setting that will brighten or darken a photo. As you increase your ISO number, your photos will grow progressively brighter. For that reason, ISO is a good tool to help you capture images in dark environments or be more flexible about your aperture and shutter speed settings.

However, raising your ISO has consequences. A photo taken at too high of an ISO will show a lot of grain, also known as *noise*, and might not be usable. So, brightening a photo via ISO is always a trade-off. You should only raise your ISO when you are unable to brighten the photo via shutter speed or aperture instead (for example, if using a longer shutter speed would cause your subject to be blurry).



Note how much brighter the image gets when ISO is increased from 100 to 1600



Common ISO Values

Every camera has a different range of ISO values (sometimes called *ISO speeds*) that you can use. A common set is as follows:

- ISO 100 (low ISO)
- ISO 200
- ISO 400
- ISO 800
- ISO 1600
- ISO 3200
- ISO 6400 (high ISO)

Quite simply, when you double your ISO speed, you are doubling the brightness of the photo. So, a photo at ISO 400 will be twice brighter than ISO 200, which will be twice brighter than ISO 100.

What is Base ISO?

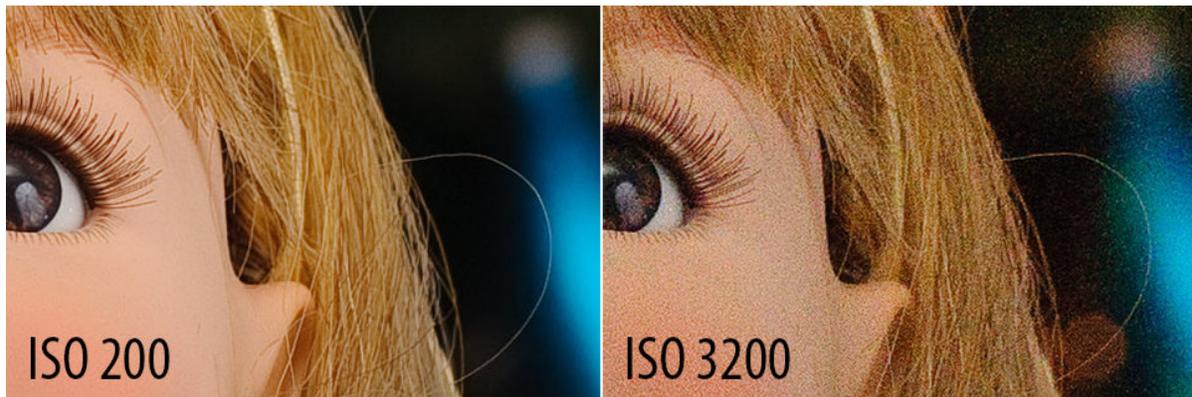
The lowest native ISO on your camera is your “base ISO”. This is a very important setting, because it gives you the potential to produce the highest image quality, minimizing the visibility of noise as much as possible. Some older DSLRs and a number of modern cameras, such as the Fuji X-T2 have a base ISO of 200, whereas most modern digital cameras have a base ISO of 100. Optimally, **you should always try to stick to the base ISO to get the highest image quality**. However, it is not always possible to do so, especially when working in low-light conditions.

Side note:

Some cameras have extended “HI” and “LO” values for ISO that might stretch beyond their native range. However, these are completely simulated and lower your image quality. We recommend avoiding them.

Low vs High ISO Noise Visibility

To give an example of two photos taken at different ISO values, take a look at the comparison below. Pay attention to the level of noise (graininess and blotchy colors) in the images:



The difference is clear – the image at ISO 3200 has much more noise than the one at ISO 200 (which I brightened with a long shutter speed instead). This is why you should avoid high ISOs whenever possible, unless conditions require you to use them.

How to Change ISO

Changing your ISO varies from camera to camera. Here are some common ways to change ISO:

- To start, enter a mode that lets you select the ISO yourself. Get out of Auto mode, and go to **Manual**, **Shutter Priority**, **Aperture Priority**, or **Program** (we tend to prefer Aperture Priority or Manual).
- For entry-level DSLRs and mirrorless cameras, you probably need to open a menu (possibly the “quick menu”) and find the section for ISO. Select the value you want, or set it to Auto.
- For higher-end cameras, there may be a dedicated “ISO” button on the camera. Press it while spinning one of the wheels to change your ISO setting. If you don’t see a button labeled “ISO”, it is still possible that your camera will let you program one to perform this task.
- Other cameras may have a dedicated wheel that already has various ISO settings marked. This makes things even easier.

Check your camera manual if you still aren’t sure. However, it is worth being very familiar with how to change your ISO setting quickly, since it’s something you will likely be adjusting quite often, especially if you shoot in low light conditions without a tripod or flash.

What ISO Should You Use?

Many photographers understand the basics of ISO, but they aren't sure which ISO value to actually pick in the field. In practice, there's a reason why your camera allows such a wide range of ISO settings: Different situations call for different ISOs. Below, we will cover some of the common scenarios you may come across.

When to Use Low ISO

As discussed above, you should always try to stick to the lowest ISO (base ISO) of your camera, which is typically ISO 100 or 200, whenever you can. If there is plenty of light, you are free to use a low ISO and minimize the appearance of noise as much as possible.

Even in dim or dark environments, you still might be able to use a low ISO. For example, if you have your camera mounted on a tripod or sitting completely still on a table. In that case, you can safely use a low ISO and brighten your photo via a long shutter speed instead, since you won't introduce camera shake. However, keep in mind that if your camera does use a long shutter speed, anything that is moving will look like a ghost:

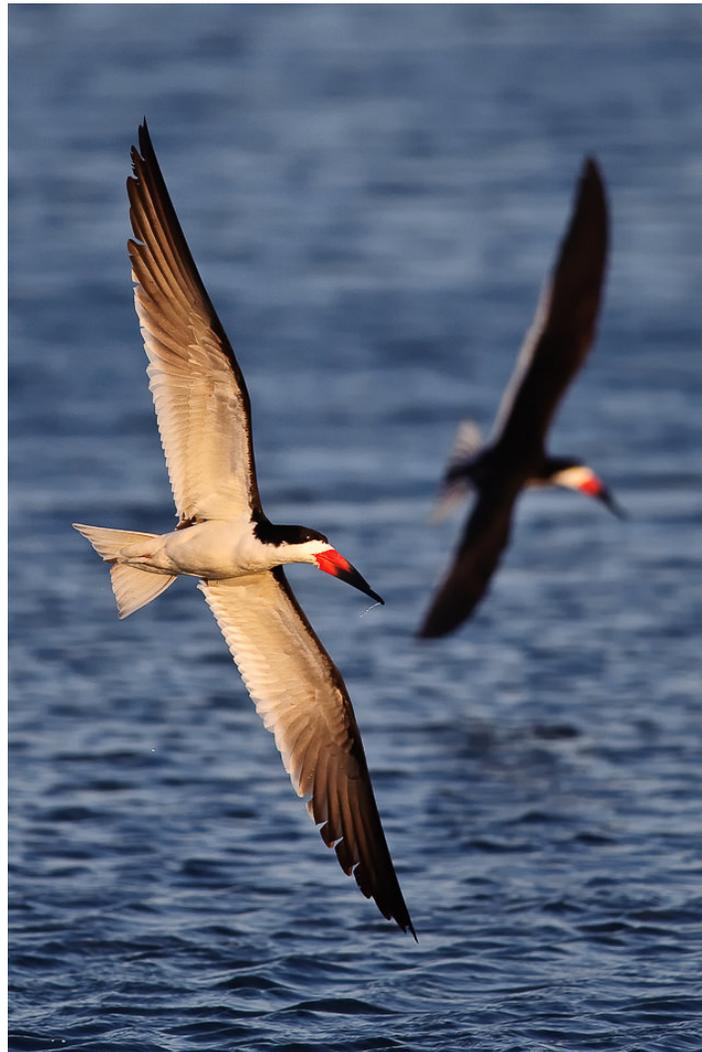


Oh No! It's a GHOST ATTACK!

Just kidding, of course! That's my lovely nephew being the subject of my long exposure test. I set the camera to the lowest ISO to retain the detail, which required a long shutter speed of five seconds in order to capture a bright enough photo. My nephew sat still, while my friend stepped in for a brief moment to introduce the ghost :)

When to Use High ISO

Even though it is ideal to use low ISOs, there will be plenty of times when a high ISO is necessary in order to take a good photo in the first place. The simple reason is that you are often fighting against *motion blur*, and you will need to pick between a sharp photo at a high ISO, or a blurry photo at a low ISO. Take a look at the image below:



NIKON D700 + 300mm f/4 + 1.4x TC @ 420mm, ISO 800, 1/2000, f/5.6

I captured these Black Skimmers at 1/2000th of a second and ISO 800. Here, my camera needed 1/2000th of a second to fully freeze the birds while they were in flight. What would have happened if I had set ISO 100 on my camera instead? I would have needed a shutter speed of 1/250th of a second to capture a bright photo. At that setting, there would have been a lot of unwanted motion blur in the picture, since the birds were moving so fast. In short, I would have ruined the picture.

The bottom line is that you should increase the ISO when there is not enough light for the camera to capture a sharp, bright photo any other way. When I shoot handheld photos indoors without a flash, I always set my ISO to a higher number to capture the moment without introducing blur. Or, when photographing ultra-fast action like in the bird picture above, raising your ISO is often necessary.

On most cameras, there is a setting for **Auto ISO**, which works great in low-light environments. The beauty of this setting is that you input the *maximum ISO* you are willing to use, so that the camera does not cross that limit. Personally, if I want to limit the amount of noise in a photo, I will set my maximum ISO to something like ISO 800, 1600, or 3200. The downside is that the camera will start using progressively longer shutter speeds if it reaches these ISO limits, which leads to more motion blur. Everything is a trade-off!

Minimizing Noise and Maximizing Image Quality

Some photographers think that the best way to capture high-quality images is to use Base ISO 100% of the time. However, as demonstrated above, that simply is not true. Sometimes, you'll be in dark environments when you have no choice but to use a higher ISO.

You should only use base ISO when there is enough light to do so. Don't try to force ISO 100 in a dark environment, or your photos will come out way too dark. Similarly, if you're using a fast shutter speed to capture action, it's essentially the same as taking pictures in a dark environment (since you strictly limit the amount of time your camera sensor is able to capture light). So, for certain types of sports and action photography, a high ISO might be your only option.

To maximize your image quality, here are the four steps you need to follow:

1. Select the aperture setting that will provide your desired **depth of field**.

2. Set your ISO to its base value, and put your shutter speed to whatever setting provides a proper exposure.
3. If your subject is blurry, progressively raise your ISO and use a faster shutter speed until motion blur disappears.
4. If your ISO is getting too high and you still have the ability to use a wider aperture, open it up until the ISO gets to a more manageable level, even if it means sacrificing some of your desired depth of field.

That's all it takes! If you follow these steps, you'll capture the maximum image quality each time. You'll find the ideal balance between noise, motion blur, and depth of field.

Common ISO Myths and Misconceptions

ISO has a lot of myths surrounding it, including some that are quite common to hear. In this section, we will quickly address some of those concerns so that you are not misled about this topic in the future.

Is ISO “Sensor Sensitivity”?

This is the most common myth related to ISO. It is something you will see all over the web (and in print). However, although it may help you to think of ISO as “acting like” camera sensor sensitivity, that's not what it actually does. Instead, digital sensors only have a single sensitivity, regardless of your ISO. It is more accurate to say that ISO is like a *mapping* to tell your camera how bright the output photo should be, given a particular input exposure.

Is ISO Part of Exposure?

No, ISO is not part of exposure. Shutter Speed and Aperture brighten your photo by **physically capturing more light**. ISO doesn't do that; instead, it essentially brightens the photo you already captured. So, photographers don't consider it to be a component of exposure.

Is Raising ISO Just Like Brightening Your Photo on a Computer?

This is a clever question, but, again, it is simply a misconception. Brightening a photo on your computer can act in many ways like raising your ISO, since it does make noise more visible (and it leads to a brighter image). But the simple difference is that raising your ISO in the camera nearly always provides better image quality than brightening a photo on your computer. In other words, it is better to use ISO 800 when necessary, rather than brightening an ISO 100 photo to a huge degree in post-processing software like Lightroom!

Understanding Metering and Metering Modes

LAST UPDATED ON FEBRUARY 12, 2018 BY [NASIM MANSUROV](#) - [PHOTOLIFE.COM](#)

Every modern DSLR has something called “Metering Mode”, also known as “Camera Metering”, “Exposure Metering” or simply “Metering”. Knowing how metering works and what each of the metering modes does is important in photography, because it helps photographers control their exposure with minimum effort and [take better pictures](#) in unusual lighting situations. In this understanding metering modes article, I will explain what metering is, how it works and how you can use it for your digital photography.

When I got my first DSLR (Nikon D80), one of my frustrations was that some images would come out too bright or too dark. I had no idea how to fix it, until one day, when I learned about camera metering modes.

1) What is Metering?

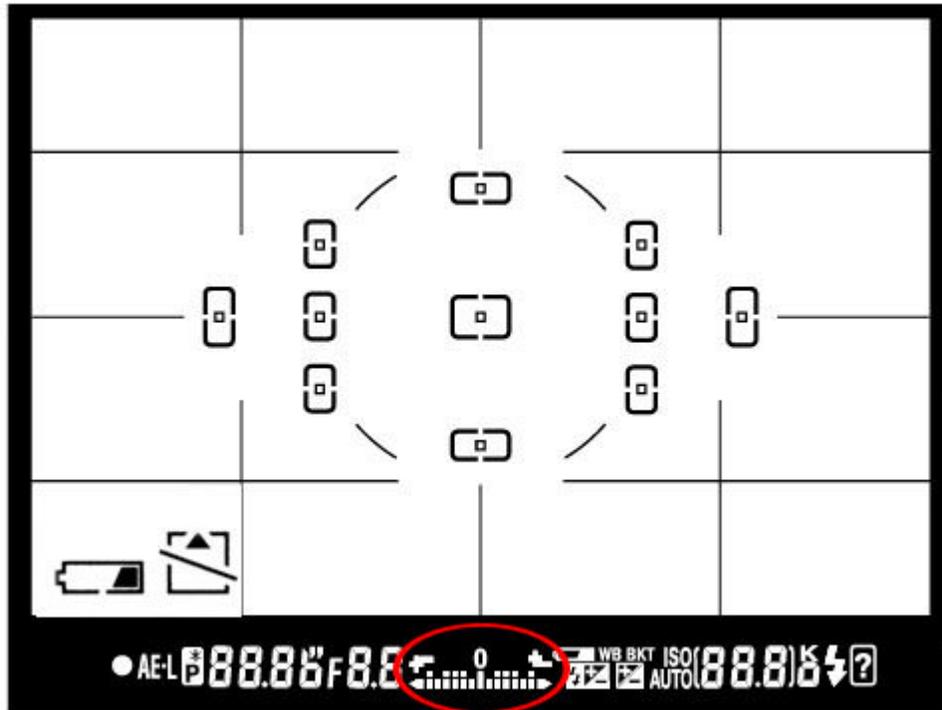
Metering is how your camera determines what the correct [shutter speed](#) and [aperture](#) should be, depending on the amount of light that goes into the camera and the [ISO](#). Back in the old days of photography, cameras were not equipped with a light “meter”, which is a sensor that measures the amount and intensity of light. Photographers had to use hand-held light meters to determine the optimal exposure. Obviously, because the work was shot on film, they could not preview or see the results immediately, which is why they religiously relied on those light meters.

Today, every DSLR has an integrated light meter that automatically measures the reflected light and determines the optimal exposure. The most common metering modes in digital cameras today are:

1. [Matrix Metering](#) (Nikon), also known as Evaluative Metering (Canon)
2. [Center-weighted Metering](#)
3. [Spot Metering](#)

Some Canon EOS models also offer “Partial Metering”, which is similar to Spot Metering, except the covered area is larger (approximately 8% of the viewfinder area near the center vs 3.5% in Spot Metering).

You can see the camera meter in action when you shoot in [Manual Mode](#) – look inside the viewfinder and you will see bars going left or right, with a zero in the middle, as illustrated below.



If you point your camera at a very bright area, the bars will go to “+” side, indicating that there is too much light for the current exposure settings. If you point your camera at a very dark area, the bars will go to the “-” side, indicating that there is not enough light. You would then need to increase or decrease your shutter speed to get to “0”, which is the optimal exposure, according to your camera meter.

A camera meter is not only useful for just the [Manual Mode](#) – when you choose another mode such as [Aperture Priority](#), [Shutter Priority](#) or [Program Mode](#), the camera automatically adjusts the settings based on what it reads from the meter.

1.1) Problems with Metering

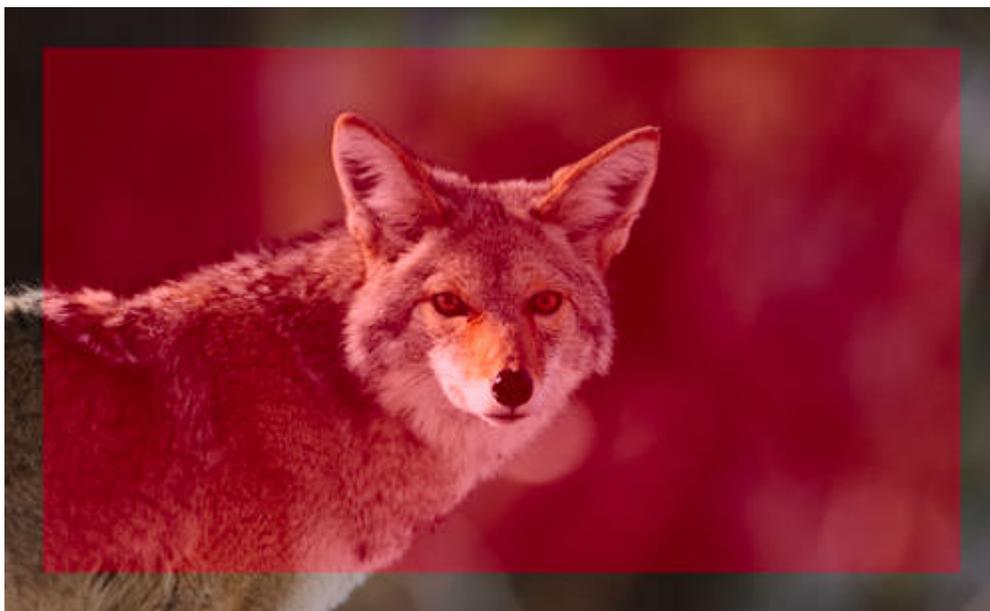
Camera meters work great when the scene is lit evenly. However, it gets problematic and challenging for light meters to determine the exposure, when there are objects with different light levels and intensities. For example, if you are taking a picture of the blue sky with no clouds or sun in the frame, the image will be correctly exposed, because there is just one light level to deal

with. The job gets a little harder if you add a few clouds into the image – the meter now needs to evaluate the brightness of the clouds versus the brightness of the sky and try to determine the optimal exposure. As a result, the camera meter might brighten up the sky a little bit in order to properly expose the white clouds – otherwise, the clouds would look too white or “overexposed”.

What would happen if you added a big mountain into the scene? Now the camera meter would see that there is a large object that is much darker (relative to the clouds and the sky), and it would try to come up with something in the middle, so that the mountain is properly exposed as well. By default, the camera meter looks at the light levels in the **entire frame** and tries to come up with an exposure that balances the bright and the dark areas of the image.

2) Matrix / Evaluative Metering

Matrix Metering or Evaluative Metering mode is the default metering mode on most DSLRs. It works similarly to the above example by dividing the entire frame into multiple “zones”, which are then all analyzed on individual basis for light and dark tones. One of the key factors (in addition to color, distance, subjects, highlights, etc) that affects matrix metering, is where the camera focus point is set to. After reading information from all individual zones, the metering system looks at where you focused within the frame and marks it more important than all other zones. There are many other variables used in the equation, which differ from manufacturer to manufacturer. Nikon, for example, also compares image data to a database of thousands of pictures for exposure calculation.



You should use this mode for most of your photography, since it will generally do a pretty good job in determining the correct exposure. I leave my camera metering mode on matrix metering for most of my photography needs, including landscape and portrait photography.



3) Center-weighted Metering

Using the whole frame for determining the correct exposure is not always desirable. What if you are trying to take a headshot of a person with the sun behind? This is where center-weighted metering comes in handy. Center-weighted Metering evaluates the light in the middle of the frame and its surroundings and ignores the corners. Compared to Matrix Metering, Center-weighted Metering does not look at the focus point you select and only evaluates the middle area of the image.



Use this mode when you want the camera to prioritize the middle of the frame, which works great for close-up portraits and relatively large subjects that are in the middle of the frame. For example, if you were taking a headshot of a person with the sun behind him/her, then this mode would expose the face of the person correctly, even though everything else would probably get heavily overexposed.

4) Spot Metering

Spot Metering only evaluates the light around your focus point and ignores everything else. It evaluates a single zone/cell and calculates exposure based on that single area, nothing else. I personally use this mode a lot for my bird photography, because the birds mostly occupy a small area of the frame and I need to make sure that I expose them properly, whether the background is bright or dark. Because the light is evaluated where I place my focus point, I could get an accurate exposure on the bird even when the bird is in the corner of the frame. Also, if you were taking a picture of a person with the sun behind

but they occupied a small part of the frame, it is best to use the spot metering mode instead. When your subjects do not take much of the space, using Matrix or Center-weighted metering modes would most likely result in a silhouette, if the subject was back-lit. Spot metering works great for back-lit subjects like that.



Another good example of using spot metering is when [photographing the Moon](#). Because the moon would take up a small portion of the frame and the sky is completely dark around it, it is best to use Spot metering – that way, we are only looking at the light level coming from the moon and nothing else.

Some DSLRs like the Canon 1D/1Ds are capable of multi-spot metering, which basically allows choosing multiple spots to measure light and come up with an average value for a good exposure.

5) How to Change Camera Metering Mode

Unfortunately, this varies not only from manufacturer to manufacturer, but also from model to model. On the Nikon D5500, for example, it is done through the menu setting (Info button). On professional cameras such as the Nikon D810 and Nikon D5, there is a separate button on the top left dial for camera metering. Changing metering on Canon cameras also varies from model to model, but generally it is done through a key combination (“Set” button), camera menu or a dedicated metering button close to the top LCD.

What is Exposure Compensation & How to Use It

LAST UPDATED ON MARCH 5, 2018 BY [NASIM MANSUROV](#) – [PHOTOLILFE.COM](#)

In this article, we will go over what exposure compensation is on a digital camera and how you can take advantage of it to make adjustments to your exposure when shooting in camera modes such as aperture priority, shutter priority, program mode and other scene modes of your camera. Every modern camera today has a built-in capability to adjust exposure settings in order to make it easier to properly expose images. In simple terms, the idea is to be able to control the brightness of an image, so that it does not end up looking too bright or too dark. To be able to do this, one has to use the Exposure Compensation feature, which is typically provided either as a dedicated button on a camera, or as a dial that one can move from positive exposure compensation to negative. Let's take a look at how you can utilize this great feature on your camera and take a full control of your exposure.

Before we show you where you can find the exposure compensation feature on your camera, let's explore what it does and in what camera modes the feature can be used. But first, it helps to have a good understanding of **exposure**, which is the sum total of the three most important settings in all of photography: **shutter speed**, **aperture**, and **ISO**. Collectively, these form what is known as the **exposure triangle**.

What is Exposure Compensation?

Exposure Compensation allows photographers to override exposure settings picked by camera's light meter, in order to darken or brighten images before they are captured. Since camera meters work by evaluating light reflected off subjects and are standardized on middle gray (also known as 18% gray), any time a camera is pointed at something very dark, the meter will work the opposite way by brightening up the exposure, whereas a very bright subject will cause the meter to darken the exposure. This is done in order to get as close to the middle gray as possible, so that the resulting image is not too dark or too bright. While this works out quite well in most cases, one might experience **overexposure or underexposure** in more challenging lighting conditions, where the camera meter might be adjusting the exposure too aggressively. This is where Exposure Compensation comes into play, with photographer manually taking control of the brightness of the image and overriding it using the exposure compensation feature of the camera.

Let's take a look at an example, where my camera's metering system did a poor job at properly exposing the scene:



Underexposed image based on camera's meter (shot in Aperture Priority Mode)
DSC-RX100M4 + 24-70mm F1.8-2.8 @ 10.15mm, ISO 200, 1/13, f/11.0

While shooting in **Aperture Priority mode**, the camera's meter ended up underexposing the image, because the scene was rather challenging – the sky and the white sand in the foreground were bright, so the camera ended up darkening the whole image, which resulted in my subjects in the scene appearing way too dark.

To address this problem, I used the Exposure Compensation feature of my camera and dialed +1 EV (Exposure Value), which resulted in a much brighter image:



Properly exposed image after dialing +1 EV using Exposure Compensation
DSC-RX100M4 + 24-70mm F1.8-2.8 @ 10.15mm, ISO 200, 1/6, f/11.0

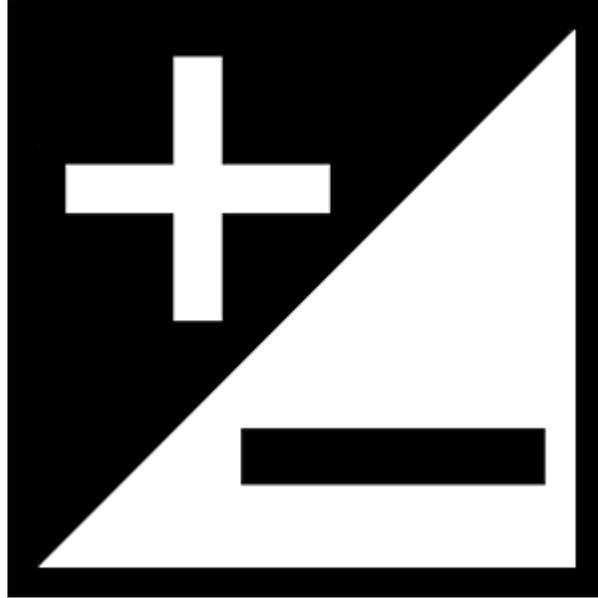
The image is now properly exposed, with the whole scene appearing much brighter compared to what the camera thought was the right brightness. By using the Exposure Compensation feature of the camera, I was able to take care of the problem in a matter of seconds.

Note: if you are wondering how different metering modes impact your images, please see our detailed article on [Camera Metering Modes](#).

How to Use Exposure Compensation?

In order to use exposure compensation, you must be in one of the **camera modes** that utilizes the camera meter, such as aperture priority, shutter priority, program mode, or any other “scene” mode that performs automatic exposure adjustments. Unless one has **Auto ISO** turned on, exposure compensation will do absolutely nothing in Manual mode. Once the proper camera mode is selected, it will be possible to adjust the brightness of the image by using the exposure compensation feature of the camera.

So where do you find the exposure compensation feature on a camera? Unfortunately, it all varies by camera make and model. While most cameras will have a dedicated button on either top or the back of the camera, some cameras might have this feature available only through a dial. Identifying the exposure compensation button on a camera is pretty easy – look for a button that has plus and minus signs, similar to the following illustration:

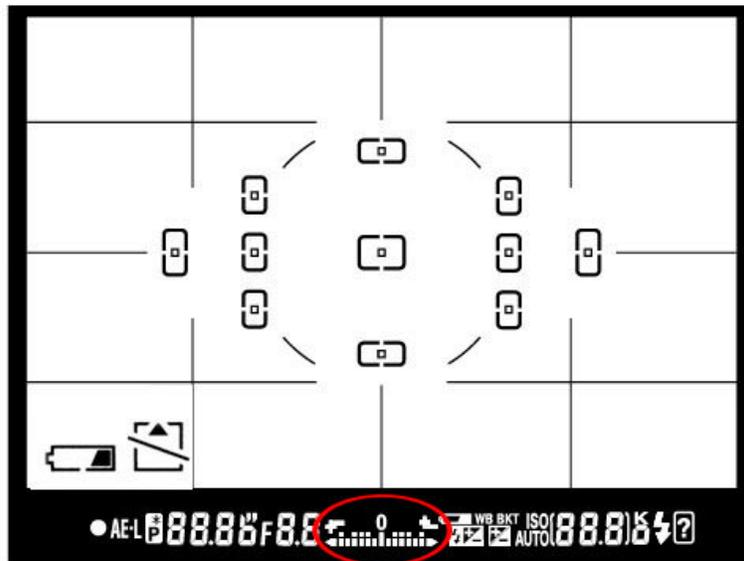


And if you cannot find such a button, there might be a dial on the top or the back of the camera that goes from a negative value to a positive value, such as -3 to +3, with small increments in between. If you are having a hard time finding the exposure compensation button / dial, please check your camera manual for details.

If you are using a Nikon DSLR, it will most likely be a button near the shutter release of the camera:



Since DSLR cameras have optical viewfinders, they will have an exposure compensation area within the viewfinder that looks like the following:



As you start making adjustments to your exposure through exposure compensation, you will notice a bar going to the left or to the right of the middle “0” value, which indicates that you are dialing negative (-) or positive (+) exposure compensation (if you have never used this feature, you might not even see the area highlighted in red until an exposure compensation value is added).

If you are using a mirrorless camera, adjusting exposure compensation should brighten or darken the image on the camera’s LCD and electronic viewfinder (EVF), making it easy to see the end result. Along with the automatic brightness adjustments, there should be an information overlay that shows the current exposure compensation value. It might be shown in one, or multiple areas of the viewfinder:



Once you make adjustments to exposure compensation, the +- EV values will be shown in the LCD and the EVF. If you cannot see those values after making changes, you might need to turn on informational overlays from the camera menu.

How Exposure Compensation Works

Exposure compensation works by adjusting one or more of the exposure variables, depending on what camera mode you are using. When shooting in Aperture Priority mode, the photographer sets the camera's **Aperture**, while the camera automatically sets the **Shutter Speed** depending on the reading from the camera meter. When adjusting exposure via exposure compensation, the photographer essentially overrides the shutter speed set by the camera. Take a look at the below sample chart, where we will try to adjust exposure using exposure compensation in aperture priority mode:

CAMERA METERED EXPOSURE (APERTURE PRIORITY)

CAMERA METERED EXPOSURE (APERTURE PRIORITY)

f/1.4	f/2.0	f/2.8	f/4.0	f/5.6
1/1000	1/500	1/250	1/125	1/60

Dialing in -1 EV via exposure compensation will increase the shutter speed from 1/250th of a second to 1/500th of a second, while keeping the aperture constant:

APERTURE PRIORITY, -1 EV EXPOSURE COMPENSATION

f/1.4	f/2.0	f/2.8	f/4.0	f/5.6
1/1000	1/500	1/250	1/125	1/60

This essentially darkens the image, since there is less light hitting the sensor. On the other hand, if we dial +1 EV, we will end up with a brighter image and the shutter speed will be halved, resulting in a brighter image:

APERTURE PRIORITY, +1 EV EXPOSURE COMPENSATION

APERTURE PRIORITY, +1 EV EXPOSURE COMPENSATION

f/1.4	f/2.0	f/2.8	f/4.0	f/5.6
1/1000	1/500	1/250	1/125	1/60

When shooting in Shutter Priority mode, using the exposure compensation feature will impact the camera's aperture instead of shutter speed. Let's start with the same base exposure, where we set 1/250th of a second as the shutter speed:

CAMERA METERED EXPOSURE (SHUTTER PRIORITY)

f/1.4	f/2.0	f/2.8	f/4.0	f/5.6
1/1000	1/500	1/250	1/125	1/60

Dialing in -1 EV via exposure compensation will adjust the camera's aperture from f/2.8 to f/4.0, while keeping the shutter speed constant:

SHUTTER PRIORITY, -1 EV EXPOSURE COMPENSATION

SHUTTER PRIORITY, -1 EV EXPOSURE COMPENSATION				
f/1.4	f/2.0	f/2.8	f/4.0	f/5.6
1/1000	1/500	1/250	1/125	1/60

Whereas dialing in +1 EV will open up the aperture to f/2.0 and thus brighten the image:

SHUTTER PRIORITY, +1 EV EXPOSURE COMPENSATION				
f/1.4	f/2.0	f/2.8	f/4.0	f/5.6
1/1000	1/500	1/250	1/125	1/60

When shooting in Manual Mode, the only variable that can change is **Camera ISO**, but it first has to be set to **Auto ISO**, as pointed out earlier. It would work similarly as in the above cases, except both aperture and shutter speed would remain constant.

Exposure Compensation with Advanced Metering Systems

Although I have stated above that metering systems on cameras standardize on middle gray, many of the modern cameras now come with sophisticated metering systems that are capable of recognizing scenes based on pre-loaded data and make necessary adjustments to the exposure, essentially minimizing the use of the exposure compensation feature.

Some cameras are even able to recognize the presence of people in an image, basing exposure primarily on people's skin tones in order to reduce the chance of over or underexposure. Because of such advancements, our cameras might require less and less manual intervention by using the exposure compensation feature. However, no matter how intelligent our cameras are going to get, knowing how to quickly make exposure adjustments is still important, not just because you might need to use it one day, but also because you can push the limits of your camera by taking advantage of such techniques as exposing to the right.



GFX 50S + GF63mmF2.8 R WR @ 63mm, ISO 160, 1/500, f/5.6

Exposing to the Right

Although there is no such thing as “proper exposure” for every scene due to the fact that we as photographers often pick relative brightness of the scene depending on what we are trying to portray (such as intentionally darkening an image to highlight silhouettes, as in the image above), there are cases where one can make exposure adjustments using the exposure compensation feature in order to get the best out every image. This technique, known as “Exposing to the Right”, allows photographers to make images as bright as possible without blowing out any highlights, which essentially results in obtaining images of highest-quality possible. Be warned that this is not a beginner technique by any means though, as it requires shooting in **RAW vs JPEG** to get the best results. If

you would like to explore this topic in more detail, please see our [Exposing to the Right](#) article.

Taking the Shot

Getting off Auto – Manual, Aperture and Shutter Priority modes explained

A Post By: [Darlene Hildebrandt](#)

You may have heard that once you get a DSLR you need to learn to shoot in manual and only ever use that mode. That if you are using the Aperture or Shutter Priority you're cheating and if you want to be more like a pro you have to shoot in Manual only, all the time. To that I say "horse pucky"! (if you're old enough to remember M.A.S.H. you'll get that reference).

HOW TO GET OFF AUTO

Manual, Aperture & Shutter Priority modes explained



What you'll learn from this article:

- what each of the A (Av), S (Tv) and M modes are, a definition of each
- what types of situations I would choose each of them and why
- some advantages of A (Av) and S (Tv) over manual
- some advantages of Manual and when it's the only choice
- some things to look out for

The three manual shooting modes what are they?

1. **Manual mode:** this mode puts you in full control of the three settings on your camera that control the exposure (commonly known as the exposure triangle). ISO, aperture and shutter speed. In manual you will be making all of those choices.
2. **Aperture priority:** (*A on Nikon, Av on Canon*) this mode has you in control of two of the three exposure controls: ISO and aperture. The camera will select an appropriate shutter speed to give you a correct exposure.
3. **Shutter priority:** (*S on Nikon, Tv on Canon*) this mode once again puts you in control of two of the three exposure settings, this time it is ISO and shutter speed. The camera will select the aperture for a correct exposure.

There are of course other factors involved that will affect the exposure such as what Metering Mode you're using and Exposure Compensation. More on the latter later.



Shot in Aperture mode to control Depth of Field

How do you decide which mode to use?

I actually use the Aperture and Shutter priority modes more often than I use Manual. How I decide which mode to use is based on my subject matter and what is my goal of the image as follows:

- **I choose Aperture Mode when I want to control depth of field (DoF)** as my top priority. Such as to create shallow DoF for a portrait, people photos, or any time I want a blurred background (choose a large aperture like f2.8 or f1.8). That also applies if I want a larger DoF as well such as for a landscape photo, group portraits, or shots where I want maximum detail and sharpness (choose a smaller aperture like f11 or smaller)
- **I choose Shutter Mode when my top priority is controlling motion**, either freezing or blurry it. So freezing for subjects like sports or action and I will choose a faster shutter speed such as 1/500th or faster depending on the subject. Subjects like flowing water, waterfalls, or panning a moving subject I will select a slower shutter speed like 1/15th for panning and 2-5 seconds for flowing water. (for more on this topic read my article [Using Shutter Speed to Freeze or Blur Motion](#))
- **I switch to Manual Mode in a few specific instances:** doing a portrait where the subject is not moving; night photography; pretty much any time I'm using a tripod; doing HDR bracketed exposures (even though my camera does 7 on AEB I still use Manual when on tripod); when using studio lighting; certain times when using a speedlight (such as working in a dark room and I want to maintain some ambient light levels)

Here's some example images taken with each of the modes as explained above.



Shot in Aperture mode to control Depth of Field



Shot using Shutter Priority to use a panning technique and slow shutter speed



Shot in manual mode for night photography challenges

Things to watch out for and keep in mind

ISO: remember that when you select either A or S mode you are still choosing the ISO

I usually select my ISO first, based on the lighting conditions I'm shooting in. If it's bright sunlight I go to 100 or 200. If it's subdued light, shade or overcast I might bump it up to 400. For indoors or dimly lit rooms I may go to 800 or higher up to 3200 if necessary (you need to test to know the upper limits of your ISO and where you're comfortable shooting with your camera, mine will yield pretty decent results even at 6400 and beyond). How I know I've gone high enough with the ISO, is if I have a fast enough shutter speed to eliminate camera shake when hand holding. If I'm on a tripod, I'm usually shooting a ISO 100 or 200 because I can use any shutter speed safely.

Check your shutter speed when in A mode

Just because the camera is picking the shutter speed does not mean it will give you a nice sharp image. Yes it will choose a shutter speed to give you the correct exposure, but if you set up your camera for ISO 100 at f16 in dark room

you'll wind up with a pretty slow shutter speed like 1/2 of a second perhaps, and without a tripod you'll get blur from camera shake. So keep your eye on the shutter speed the camera is picking and if it is too slow (I suggest you follow the 1/focal length rule for minimum shutter speed – for more on getting sharp images read my article [5 tips for Getting Sharper Images](#)) readjust the ISO, the aperture or both – picking a higher ISO will help, so will choosing a larger aperture like f4 as that will let the camera pick a faster corresponding shutter speed.



Multiple bracketed exposures using Manual for HDR processing taken during my [Drumheller Workshop](#)

Watch for exposure warning notices in A or S modes

Your camera is pretty smart but it can only work within its own limitations. So it will tell you if you've gone outside that boundaries of what it can adjust for you. This will show up as a flashing warning in your viewfinder. I'll give you an example for both Aperture and Shutter modes.

Scenario #1 in Aperture mode if you choose say ISO 800, F1.8 on a bright sunny day the camera will tell you there is simply too much light and give you a flashing shutter speed (your fastest) like 1/4000th of a second. If you take the photo it will be overexposed which is what the camera is warning you above. Choose a lower ISO or smaller aperture and try again until the warning is gone.

Scenario #2 in shutter mode in a darkened room with settings of ISO 400 and 1/1000th of a second you will likely get a flashing aperture shown in your viewfinder (the largest your lens goes to such as f3.5 or f5.6). To correct this you need to choose a slower shutter speed and likely a larger ISO as well until that warning disappears. Side note: this is why kit lenses with a maximum aperture zoomed in of f5.6 become somewhat limiting. Grab yourself a simple 50mm f1.8 for low light conditions, it's an inexpensive great lens to have in your bag



Painting with Light during night photography on my [Drumheller workshop](#)

Exposure compensation in Manual

There is often confusion among students about using Exposure Compensation when in Manual mode. This behaves differently depending in the camera you have, in Canons for example it just doesn't apply, as it has no affect. When using a Nikon if you shift the Exposure Compensation to say +2 what it does it adjusts the scale you see in your viewfinder to reflect that so if you then set the exposure to match the "0" mark it will give you a +2 exposure. I'd personally find that even more confusing, so if you want +2 just set your exposure in Manual so that it shows +2 on the scale.

Summary

Steps I use are these:

1. choose ISO first
2. decide whether motion or depth of field are most important and choose my shooting mode
3. set my shutter speed or aperture for the results I want
4. check for warnings and slow shutter speeds
5. review image and correct as necessary



Darlene Hildebrandt is the Managing Editor of dPS. She is also an educator who teaches aspiring amateurs and hobbyists how to improve their skills through articles, online photography classes, and travel tours. Get her free ebook **10 Photography Challenges to help you take better pictures** or join a **photo tour to some exotic places**.

If you enjoyed this article, you might also like...

10 Questions to Ask When Taking a Photo

A Post By: [Darren Rowse](#)



What goes through your mind in the moments as you raise your digital camera up to take a shot and before you press the shutter? If you're like many digital photographers you're not thinking about too much – you just want to capture the moment and then move on.

However getting in the habit of asking some simple questions can help take your images to the next level. Here's 10 questions to get in the habit of asking while framing your shots. I've included links in each one to further reading on the topics. I hope you find them helpful:



1. What story am I telling?

This is an important question and one that should help you to make any number of decisions in terms of composition, framing, exposure etc. In essence what you're asking is 'why am I taking this shot? What is its purpose and what am I trying to convey?' Is it purely a way to keep a record of a moment, are you trying to capture the emotion of a moment, is it possibly a shot to give to someone, is it part of a larger series of shots or will it be the only shot to commemorate the moment etc. Read more on [telling stories with photos](#)



2. What is the visual focal point of this shot?

What will viewers of this picture naturally have their eye drawn to in this scene? Once you've identified this focal point you can think about where to place it in the frame (consider the [rule of thirds](#) for example).

There are a variety of ways that you can enhance a focal point – some of which we [explore here](#).



3. What competing focal points are there?

Once you've identified what you do want your viewers eyes to be drawn towards and have placed it in the frame – scan your eyes over the shot and see if there are any competing focal points and ask yourself whether they add to or take away from the image? Secondary focal points can add depth to shots but they can also be very distracting and so you might need to reposition yourself or adjust your focal length and/or depth of field to accommodate or remove them from your shots (read more on [removing clutter from photography](#)). Also

keep in mind that if your shot has more than one focal point that it might be worth taking two shots, one of each focal point, in order to keep things simple.



4. What is in the background and foreground?

One of most common places for distractions in digital photography is the background of your shots. Run your eyes over the space behind your subject to see what else is in the image (do the same for the foreground). Consider whether you want the background in focus or nice and blurry.

[Read more on getting backgrounds right.](#)



5. Am I close enough?

Another common mistake in digital photography is taking shots where your subject is too small in the frame. Shots that fill the frame with your subject tend to be much more dynamic and show a lot more detail of your subject. To get this effect you have the option of moving yourself closer, moving your subject closer or using a longer focal length to give the effect of closeness.

[Read more on filling your frame.](#)



6. What is the main source of light?

Always give consideration to how your subject is lit. Without light you'll lose detail and clarity in your image and your camera will have to compensate by doing things like increasing ISO and lengthening shutter speeds (which could lead to noisy and blurred images). What is the main source of light, where is it coming from, is there enough light, do you need artificial light sources (flash etc), do you need to stabilize your camera on a tripod to stop camera shake

due to low light etc. Read more on using artificial light [here](#) and [here](#) as well as [photographing moving subjects in low light conditions](#).



7. Is my Framing Straight?

It's amazing how many otherwise good photos are spoiled by framing that is slightly offline. Sloping horizons and slightly leaning people or buildings should always be in the back of your mind to check. Read more on [getting horizons horizontal](#) and [getting other lines straight](#).

Also related to this question is that of 'Am I holding my Camera correctly?' Many people don't and as a result suffer from camera shake and framing mistakes.



8. What other perspectives could I capture this subject from?

Put 10 digital camera owners in front of a scene and most of them will take exactly the same shot from the same position. Make your images stand out from the crowd by challenging yourself to not only take the standard shots that everyone else will get but to [find creative and fresh angles and perspectives to shoot from](#).

Read more on [adding variety to your Digital Photography](#).



9. How would holding the camera in the other format change this shot?

Many photographers get into the habit of always holding their camera the same way (horizontally/landscape or vertically/portrait). While it's OK to have a preference one way or the other it's also worth remembering that changing the

format can drastically change the impact of the shot. Don't forget you can also hold your camera at an angle for an effective result too.



10. How will the eye travel through this image?

This is related to asking about focal points but gets in touch with the fact that while you're photographing a still image your viewers eyes don't remain still as they look at an image. People tend to follow lines and are attracted to shapes and colors so considering all of these different visual elements and cues can help improve your shots considerably. Read more on [horizontal](#), [vertical](#) and [diagonal lines](#) and how they impact a shot.

Of course you probably won't remember all the questions and you're unlikely to go through each of them with every shot you take – however next time you head out with your **digital camera** concentrate on asking yourself at least one or two of them as you take your shots. As you do you'll find that they become more automatic and in time you'll naturally take digital photography shots that take into account all of these elements.



Darren Rowse is the editor and founder of **Digital Photography School** and **SnapnDeals**. He lives in Melbourne Australia and is also the editor of the **ProBlogger Blog Tips**. Follow him on **Instagram**, on **Twitter** at **@digitalPS** or on **Google+**.

6 Ways to Use Shutter Speed Creatively

A Post By: [Barry J Brady](#)

In many ways, [shutter speed](#) is an inaccurate term. I read an article a few years ago and the photographer referred to shutter speed as shutter time. The logic was spot on. A shutter always opens or closes at the same “speed”. The key value is how long the shutter stays open, hence shutter time. On Canon cameras the shutter speed function (shutter priority) on the mode dial is abbreviated to Tv, which stands for “Time Value”, and is a more accurate description of what this article is about. I am going to refer to shutter time as opposed to shutter speed, it sounds crazy, but it will make more sense. The reason this definition is important is because, we are going to be looking at how you can use the time that the shutter is open (and gathering light onto the sensor) creatively.



In a sense, shutter time is a bit like time travel. Your camera's shutter can open and shut in 1/8000th of a second. Think about that. Take one second, divide it by 8000 and one of those units is the time your shutter was open. That is very quick. On the other end of the spectrum, you can shoot super long exposures of 20 or 30 minutes. That means the shutter stays open for that length of time. Again, amazing. Think of all that light falling onto the sensor during that time, and the images that can be created doing so.

The shutter time becomes more than simply a moment in time, it could be a split second (literally) or a few seconds. The resulting image will capture and freeze the moment or, with a longer shutter time, there will be blurred

movement. This is the fun part of photography. In many ways, your camera can “see” events that happen which you cannot. The camera can capture a frozen moment and suspend your subject in that moment forever, this is like magic. The compelling images are amazing to see and are reasonably easy to make, so let’s take a look at a few of them and see how they are done.

1. Freezing the moment

These are the images we all know about; ones that have captured a [frozen moment in time](#). Normally these are sports images, the winning goal, or the knockout punch connecting. They are intriguing to most people and are compelling because we can’t freeze the moment in our eyes. We see a moving, continuous rendition of the events happening in front of us. You have seen “slo-mo” shots of the winning goal; the frozen moment image is that equivalent.

These images take a bit of practice to get right. Lets assume for a moment, you are photographing a soccer match. It is great to get action shots, but you will want to get any shots of the teams scoring goals. You will then need to have the correct lens. In [sports photography, it will be a pretty long zoom or telephoto lens](#). Most sports photographers will use 400mm and longer. You will also need to keep your camera steady. A tripod in these cases is somewhat impractical as you need to be able to move the camera quickly and easily to follow the game. A monopod is normally what works best.



Depending on the lighting conditions you need to make sure you have a shutter time that captures the players in mid-action. You also need to take the lighting into consideration. If you are shooting in an outdoor arena, the natural light may

be sufficient, but if you are in an indoor arena, you might need to be more aware of your exposure. In that case, you may need to [push your ISO up high](#) enough to allow you to freeze your subject. In most sports 1/1500th of a second is the starting point for freezing action. In very fast sports like ice hockey, soccer, rugby and so on, you may need to be shooting at even faster speeds than that. This is how you set up the shots.

Technique

How to do it: Set your aperture to an aperture setting of f/2.8 or f/4.5. This will allow for a quicker shutter time, which will in turn freeze the action. If you are shooting a sporting event in the sunlight, you may need to have your shutter time set to 1/1500 or faster. If this is still not freezing the action, make the shutter time even quicker. Try and anticipate the action and release the shutter at the moment you think it will happen. Be aware that your focus will need to be spot on. With a wide aperture, you run the risk of misfocusing and missing a shot. I once heard a sports photographer say this " If you see the goal in your viewfinder, you missed the shot". When you do get that shot though, it will be worth it.

2. The decisive moment

Henri Cartier-Bresson coined the phrase, "[The Decisive Moment](#)". Do a [google image search on Cartier-Bresson](#) and the decisive moment, you will see many of his great images. He was well known as a street and people photographer, and he believed that you need to choose the precise moment when something happens to hit the shutter release. As you can imagine, this is not easy. Sometimes this might mean you need quick reflexes. Most of the time, it requires patience. He would often set up the shot, get the framing right and then wait. You don't want to wait for hours, but be patient, sit there for 20 or 30 minutes and watch the scene. Take note of how people are moving into, and out of your frame. When time is right, or the perfect subject (person, vehicle, animal, whatever you choose) moves into the best position, release your shutter at that moment. This will take practice and more than a few shots to get it right, but when you do, you will be ecstatic. The shot will look candid, but you will know what it took to get that image. Many people assume Cartier-Bresson's images were simply shot quickly from the hip, but much of the time they were planned and he waited patiently for the decisive moment.

Technique

How to do it: You need to think of a scene you would like to capture, visualize it. You may want to capture the comings and goings at a coffee shop in your city. You may want to have someone with a red coat sitting outside, sipping coffee. You should then set up and frame your shot, then sit there until the scene unfolds. Someone with a yellow jacket may sit down, which might work too. So be flexible, but be patient, sooner or later the shot will unfold.



3. Abstract and creative blur

As I said earlier, shutter time is a bit like time travel. You can capture an infinitesimally small slice of a moment, and in other cases you can capture seconds, or even minutes. When the shutter is open, light is coming through your lens and falling onto the camera's sensor. If you allow this to happen for a long enough time, some part of your image will blur. Sometimes blur in an image is unwanted. This happens when your shutter time is too long, your camera moves unintentionally, and the image is ruined.



The kind of blur I am talking about here is **intentional blur**. This technique can be used to make slightly, or completely, abstract images, depending on the shutter time. The longer the shutter time, the more movement there is, and the more blur you will see. Blurring can be the result of your subject moving, you moving the camera, or both. If your subject is moving and the camera moves, the blur can be very dynamic. If your camera is on a tripod and the subject moves, this creates a sense of speed.

Technique

How to do it: Set your aperture to f/5.6 or higher (smaller opening). Attempt this in low light conditions, just before and just after sunset. Set your shutter time to 1/10th of a second or longer. Release the shutter and move the camera quickly from left to right. You can rotate the camera, move it up and down, or

even just shake it in your hand while the shutter is open. In this technique, you will be moving the camera and the scene could have moving elements in it too (i.e. a car or a bus could be driving past, or people could be walking in the scene). The results will be random and unusual, but with practice, you can create some pretty compelling abstract images.



Camera swirl, this image was made by rotating the camera anti-clockwise while the shutter was open

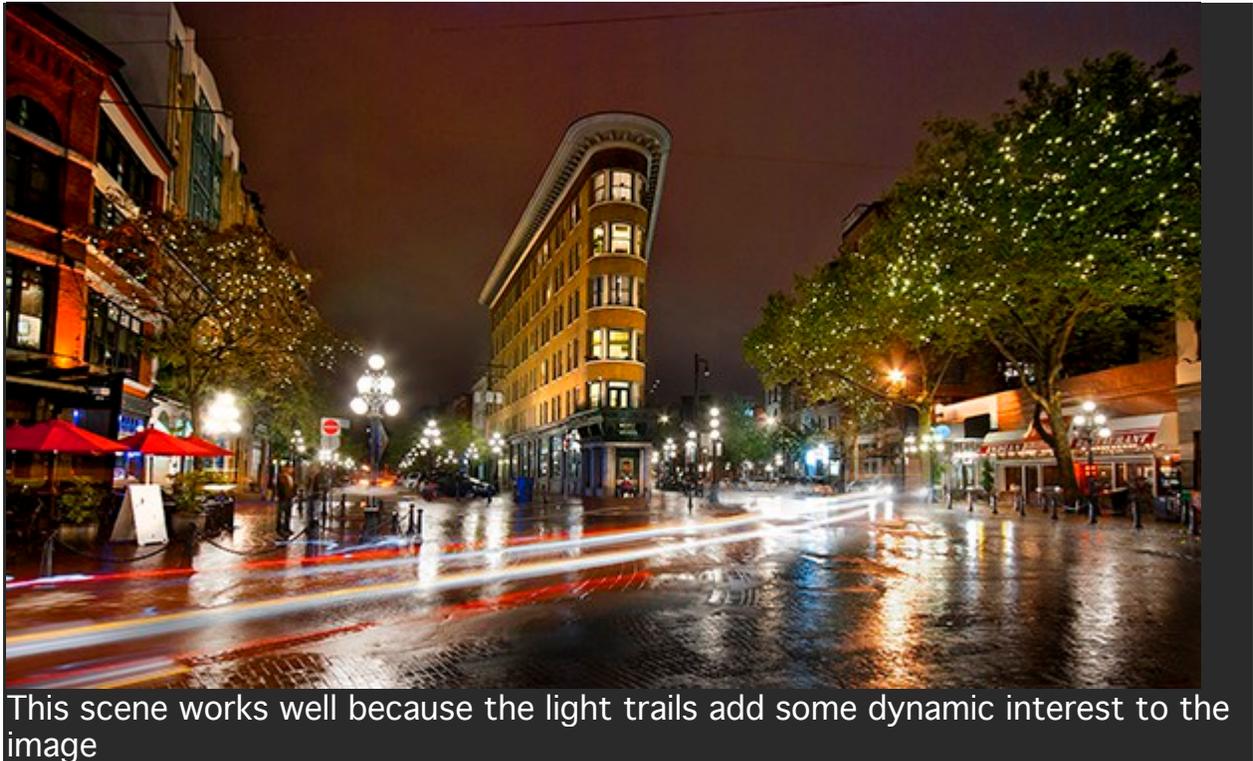
4. Low light exposures

The goal in [low light exposures](#) is to have the scene in focus, and only one part in the scene moving. This is particularly interesting at night when you get light trails from a vehicle driving through your scene. You can do this in the early evening or evening if it has become dark. These images are compelling because the light trails from the vehicle seem to hang magically in the air while the vehicle itself is invisible. Another great time to shoot longer exposures is [during the blue hour](#); the 20 to 30 minutes of soft blue light that fills the sky after the sun has set. This is a great time to do longer exposures too as the sky will look blue and your subject (a city or a landscape scene) will be well lit.

Technique

How to do it: Set your camera up on your tripod. Select an aperture setting of f/8 to f/11. Set your shutter time to expose correctly for the scene. Depending on the light your shutter time could be anywhere from 1/10th of a second to three or four seconds. As it gets darker, your shutter time will need to increase. Set yourself up in a position where something will be moving – cars, boats or

even people can work well for this. Take a few shots to see how it is all working and make any adjustments. The important technique here is timing. If you want to get a shot with the car lights streaming through your shot, time it so that you release the shutter as the car is in the best place in your scene, similar to the decisive moment.



5. Long exposures

As the name suggests, these are [longer shutter times](#). In some cases, they may be 20-30 seconds long, but for some really interesting images, you will want keep the shutter open for 15-20 minutes. Long exposures require the use of [a 10 stop Neutral Density filter](#). This filter will block out the light sufficiently to allow you to open your shutter for long periods of time. The results can be amazing. You can use the ND filter in the day to make your shutter time longer. “Why would I want to do that?”, you might ask. You might have a scene with a windmill in it and you want to blur the movement of the windmill as it rotates. You might also want to create a seascape scene where the waves look silky and smooth. In these cases, an ND filter will be very useful.



ISO 100, f/11, just under 13 minute exposure.

Technique

How to do it: Set up your camera on a tripod. Set your aperture to anywhere between f/11 and f/16. In these images, you will want to have an exposure time of 15-30 seconds and longer. You will need a cable release to go beyond 30 seconds on your exposure. You want a lot of movement in the scene, whether it is light trails or clouds moving across the sky. The longer you have the shutter open, the more surreal the image will become.

If you have an ND filter, set up your shot first, use autofocus to get everything in focus, then switch your camera to manual focus. The reason is, once you put the ND filter on your lens, the scene will become very dark. If your camera is on autofocus, it may struggle to find a focal point. If that happens, your lens will “hunt” for something to focus on and you won’t be able to get the shot, or it may be out of focus. So, once you have focused your image, switch to manual focus and mount the ND filter onto your lens to make the shot. Be aware, long exposure photography can really eat up battery life, so carry spare batteries if you have them, especially on cold winter evenings!



This image was exposed for four minutes, which softened the water and the clouds

6. Panning

This technique, when done correctly, can produce amazing results, but it's not easy. Panning is when you focus on a subject that is moving, and you move your camera in a horizontal plane with them. During that movement, you will release the shutter. Your exposure time will depend on the subject and the light, but in this technique you don't want to freeze the action, you want to suggest movement. A longer shutter time is preferable, so you may be shooting at 1/30th or slower. To pan effectively, you will need to practice a few shots, here are some pointers.

Technique

How to do it: Firstly, stand with a wider stance than normal. When you pan with your subject, move your body from the hips up. Timing is key, release the shutter when you think the subject is in a good position in the frame. Follow through, don't stop the movement when you release the shutter, keep moving with your subject (and at the same speed as the subject) until the shutter closes (think golf swing).



A panning shot creates a very unique sense of movement.

The next step is to go out there and get these shots. I would recommend you make an effort to try at least 20 to 30 shots of each of these techniques. Play with the settings, see what works and what doesn't. Let me know what you think and maybe even put some of the results in the comments, let's see what you get.



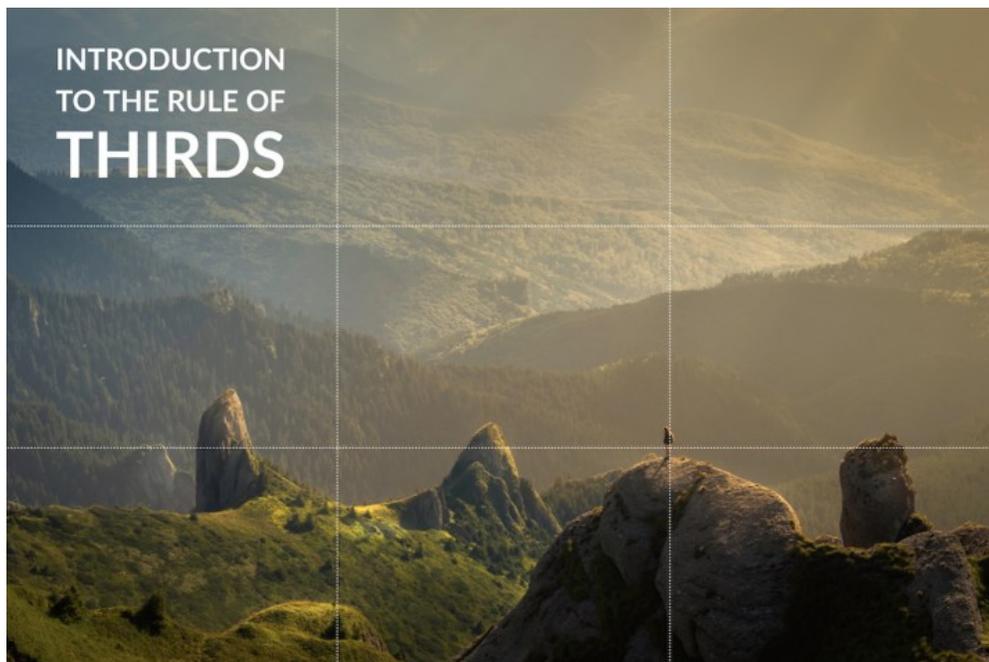
Barry J Brady is a Fine Art Landscape and commercial photographer based in Vancouver, BC. He is also an addicted traveller and loves travelling to far off places and capturing their essence. Barry is an entertaining and experienced photography teacher and public speaker. He loves nothing more than being behind his camera or showing other photographers how to get the most out of their camera. To see more of his work, visit his site [here](#). You can also join Barry on a photography workshop in Canada. Click [here](#) to find out more.

Composition

Rule of Thirds

A Post By: [Darren Rowse](#)

The **Rule of Thirds** is perhaps the most well-known ‘rule’ of photographic composition.



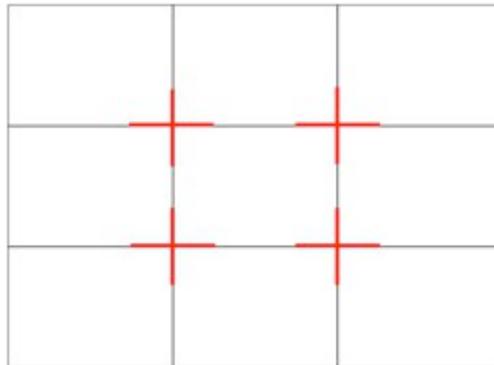
The “Rule of Thirds” one of the first things that beginner photographers learn about in classes on photography and rightly so as it can help you create well balanced and interesting shots.

I will say right up front however that rules are meant to be broken and ignoring this one doesn’t mean your images are necessarily unbalanced or uninteresting. However a wise person once told me that if you intend to [break a rule](#) you should always learn it first to make sure your breaking of it is all the more effective!

Also keep in mind it’s just one composition technique of many – we have [quite a few articles on other techniques and rules of composition here](#).

What is the Rule of Thirds?

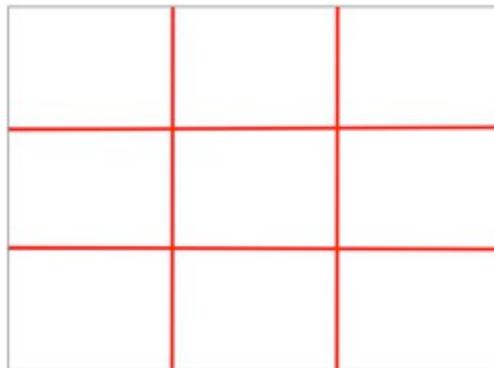
The basic principle behind the rule of thirds is to imagine breaking an image down into thirds (both horizontally and vertically) so that you have 9 parts. As follows.



As you're taking an image you would have done this in your mind through your viewfinder or in the LCD display that you use to frame your shot.

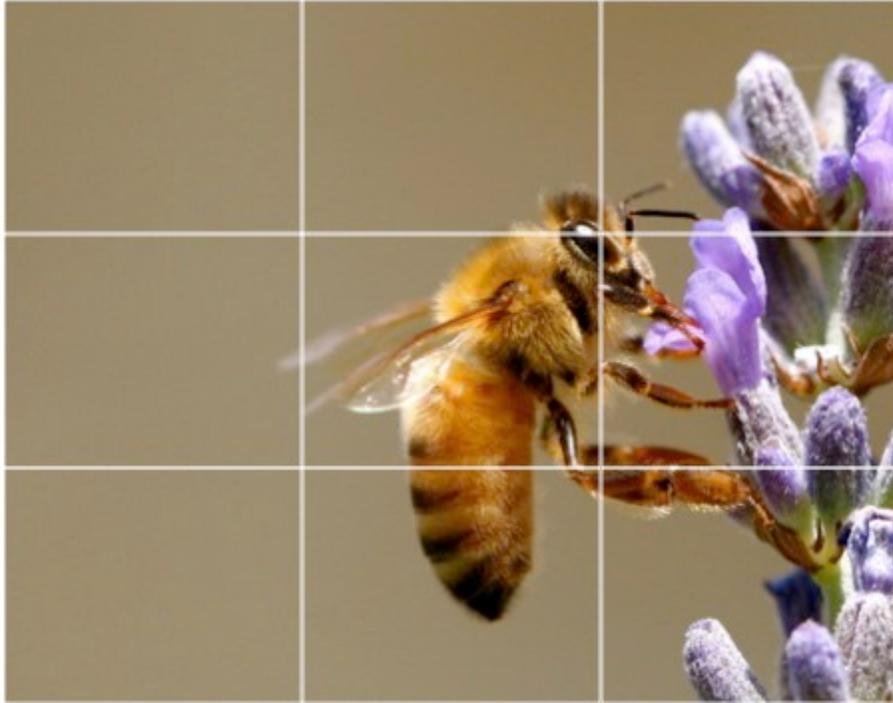
With this grid in mind the 'rule of thirds' now identifies four important parts of the image that you should consider placing points of interest in as you frame your image.

Not only this – but it also gives you four 'lines' that are also useful positions for elements in your photo.

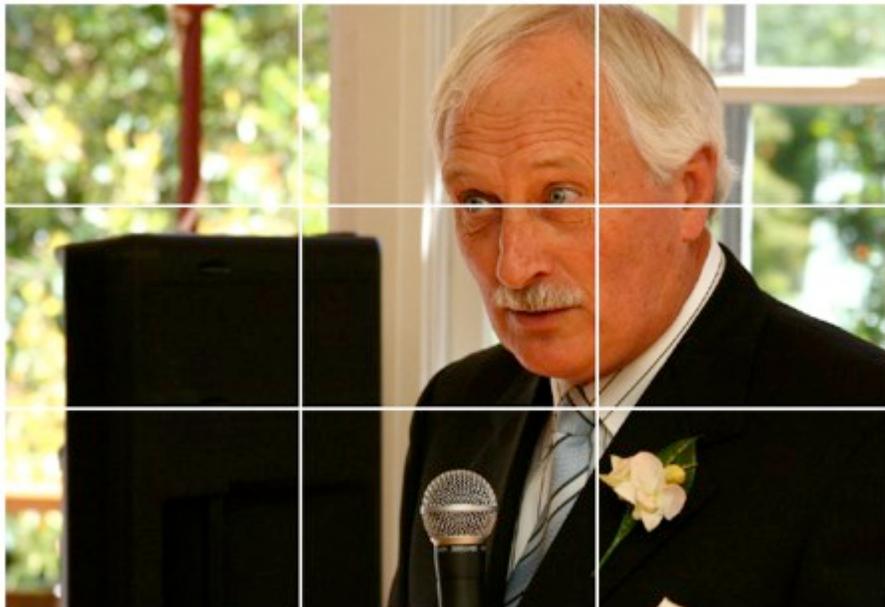


The theory is that if you place points of interest in the intersections or along the lines that your photo becomes more balanced and will enable a viewer of the image to interact with it more naturally.

Studies have shown that when viewing images that people's eyes usually go to one of the intersection points most naturally rather than the center of the shot – using the rule of thirds works with this natural way of viewing an image rather than working against it.

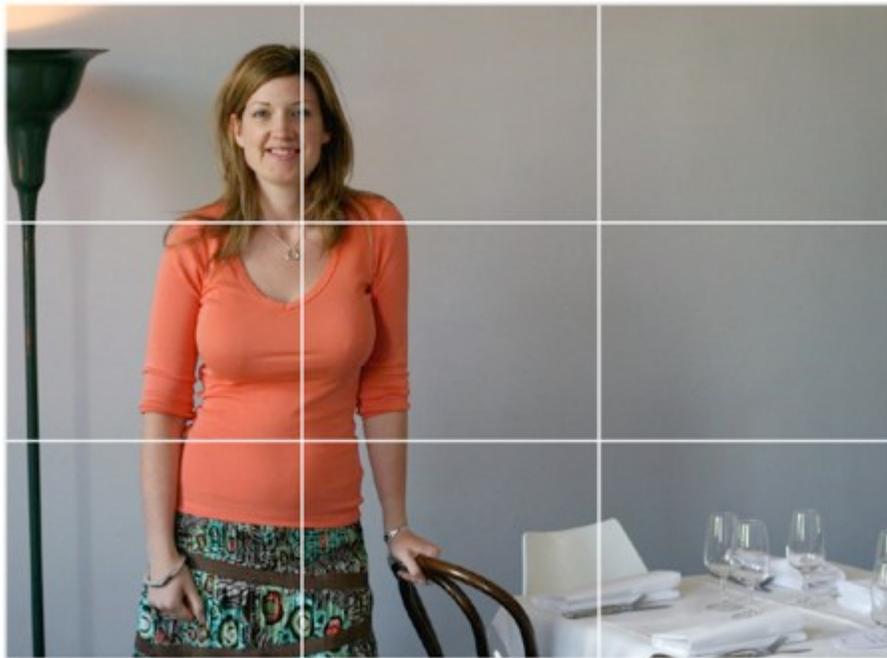


In addition to the above picture of the bee where the bee's eye becomes the point of focus here are some of examples:



Another Example of the Rule of Thirds

In this image I've purposely placed the head of my subject on one of the intersecting points – especially his eyes which are a natural point of focus for a portrait. His tie and flower also take up a secondary point of interest.



In this shot I've placed the subject along a whole line which means she is considerably off center and therefore creating an additional point of interest. Placing her right in the center of the frame could have resulted in an 'awkward' shot.

In a similar way a good technique for landscape shots is to position horizons along one of the horizontal lines also as I've done with the following shot (I'll let you imagine the lines).



Using the Rule of Thirds comes naturally to some photographers but for many of us takes a little time and practice for it to become second nature.

In learning how to use the rule of thirds (and then to break it) the most important questions to be asking of yourself are:

- What are the points of interest in this shot?
- Where am I intentionally placing them?

Once again – remember that breaking the rule can result in some striking shots – so once you’ve learnt it experiment with purposely breaking it to see what you discover.

Lastly – keep the rule of thirds in mind as you edit your photos later on. Post production editing tools today have good tools for cropping and reframing images so that they fit within the rules. Experiment with some of your old shots to see what impact it might have on your photos.



Darren Rowse is the editor and founder of [Digital Photography School](#) and [SnapnDeals](#). He lives in Melbourne Australia and is also the editor of the [ProBlogger Blog Tips](#). Follow him on [Instagram](#), on Twitter at [@digitalPS](#) or on [Google+](#).

Using Focal Points in Photography

A Post By: [Darren Rowse](#)



By Robert Parviainen

Next time you take your digital camera out and line it up for a shot pause before you press the shutter button and ask yourself:

“What is the Focal Point in this Picture?”

Some other ways to ask the same question might include – What is the central point of interest? What will draw the eye of the viewers of this picture? What in this image will make it stand out from others? What is my subject?

The reason a focal point is important is that when you look at an image your eye will generally need a ‘resting place’ or something of interest to really hold it.

Without it you'll find people will simply glance at your shots and then move on to the next one.

Once you've identified a point of interest or focal point you then should ask yourself how you can enhance it.

6 Techniques to Enhance the Focal Point in an Image

A focal point can be virtually anything ranging from a person, to a building, to a mountain, to a flower etc. Obviously the more interesting the focal point the better – but there are other things you can do to enhance it's power including but certainly not limited to:

- **Position** – Place it in a prominent position – you might want to start with the **rule of thirds** for some ideas.
- **Focus** – Learn to use Depth of Field to **blur out other aspects in front or behind your focal point**.
- **Blur** – If you really want to get tricky you might want to **play with slower shutter speeds** if your main subject is still and things around it are moving.
- **Size** – making your focal point large is not the only way to make it prominent – but it definitely can help.
- **Color** – **using contrasting colors** can also be a way of setting your point of interest apart from it's surroundings.
- **Shape** – similarly contrasting shapes and textures can make a subject stand out – especially patterns that are repeated around a subject.

Keep in mind that a combination of above elements can work well together.

Lastly – don't confuse the viewer with too many competing focal points which might overwhelm the main focal point. Secondary points of interest can be helpful to lead the eye but too many strong ones will just clutter and confuse.



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Getting Horizons Horizontal

A Post By: **Darren Rowse**

One of the first ever tips I was given when I began taking photos as a teenager was to watch the horizon when framing a photograph.

The day after I was given this tip I went back through all of my photo albums (I was using film cameras back then) and discovered that a fairly large proportion of the images I'd been taking looked a little like this one.



While there is a lot to like about the above picture there's an obvious mistake with it when you know what to look for. The roof of the building is crooked (sloping down to the left). While this might actually be the case in real life (it is an old building) the problem goes further when you look at the place where the water meets the sky.

Oceans don't slope upwards (even though there is some hills in the background of this picture). When I took this photo I was so concerned with getting the colors right (I'll write about polarizing filters another day) that I completely forgot to look at the horizon and make sure that it was level.

This is an elementary mistake that many photographers make. It has the ability to spoil otherwise brilliant shots.

Of course at times you might want to experiment with holding your camera at different kinds of angles and put your horizon purposely offline my rule of thumb is to either make it perfectly flat or very obviously off line. 'Slightly' off horizontal does nothing except make your photos viewers feel dizzy or lean their heads when they view your shots.

How to Get Your Horizons Straight

The simplest way to get your horizon horizontal simply line it up with the top or bottom of your view finder. Keep in mind that the edge of your frame in your viewfinder or LCD screen will be the edges of the actual image and will be the reference point for the eventual viewers of your shots to work out whether your shot is straight or not.

Many cameras also have markers in their view finder (often a rectangle or set of focussing spots). These can often be used to help line up your horizons mid frame.

Some cameras have a ‘rule of thirds’ mode where they overlay a grid in your LCD/viewfinder to show you where to place your points of interest. While they’re not intended to help you get your images stright – they can be helpful markers to show you where a level line is.

Lastly, if you’re struggling with getting horizons straight consider buying a small spirit level. You’ve probably seen builders use big ones (they have a little bubble in them to show you when something is straight). You can also get little ones to attach to your camera that work similarly. For example Adorama sell a [“Adorama Single Bubble Level](#) (pictured above/right) for this purpose.



PS: a lot of photo editing software these days comes with a ‘straighten’ or ‘rotate’ feature so if this tip has made you go back through your old photos and you’ve shots that are crooked you might want to learn how to use these tools. I use iPhoto and ‘fixed’ the above shot in less than 5 seconds (see below).



Tools like iPhotos straightening one can have a real impact on your photography and I'd recommend learning how to use them.



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Fill Your Frame

A Post By: **Darren Rowse**

I'm constantly amazed by how the most simple photography techniques produce the most effective results.

One such lesson that I always start new photographers off with is among the simplest you'll ever find:

Time and time again I'm approached by people to look at their photos and time and time again I'm amazed that people continue to take shots where you almost have to squint to make out their subjects because they are so distant.

While empty spaces can be used effectively in photos to create stunning results (we'll cover this in a future tip) you're much more likely to get a 'wow' from those looking at your photos if your shots are filled with interest.



People

This technique is particularly important when taking pictures of people whose facial features tend to disappear when you move more than a few meters away from them.

While it can be appropriate to take shots that put a person in context with the environment that they are in, if they get lost in the picture you might as well just take a shot of the scene and leave

them out of it.

Here's an example of this applied with a couple of shots that I took at the Australian Open, a couple of years apart.

In the first year I only had a little point and shoot camera with me which meant despite being in the front row the following was as close as I could get with it's 3x Optical Zoom lens.

This year I had my DSLR with me and was shooting with a 200mm lens.

I also spent less time shooting in the larger courts and more time on outside courts where I could get in much closer to the action physically.

The difference in the quality of shots was remarkable.

This was mainly due to the use of the DSLR and better quality lenses, but it was also a vast improvement due to the fact that I was able to fill my frame with the players.

Shots came alive with rippling muscles, grimaces on faces and even sweat spraying off players as they hit balls.

Here's a couple of shots to compare with the one to the left.



Still Life

Having said that filling your frame is important when photographing people, it's also a very effective technique when photographing 'things' or scenes. I learned this lesson on my first trip to Europe a number of years back when on returning I was surprised to find that the shots that got the biggest reactions from people were not the shots that I thought were technically the best shots.

Instead what people responded to were shots that I'd taken on the run in market place situations by putting my little point and shoot digital camera up close to food. While many of the shots were poorly framed, badly exposed and had little planning – they were the shots people 'oohed' and 'aahed' about. Here's two of them.

So how do you fill your frame?



You've largely got three options:

1. **Use your Optical Zoom** – most point and shoot digital cameras these days come with a zoom lens and all DSLRs are able to be fitted with one. Use them.
2. **Use your Legs** – most photographers have a built in zoom in the form of their legs. Don't just rely upon your cameras zoom but actually position yourself effectively for close in shots.
3. **Crop your Shots** – the other option is to zoom in manually at home after you've taken your shots. This is a handy option to have but I personally prefer to use one of the first two options where I can because cropping shots later means if you want a large image that you'll find that it becomes more pixelated. This is a good option if you're just trimming shots but any major cropping will result in a loss of quality of your image.

Digital Zooms – Another option that many digital camera owners use is to utilize their 'digital zoom'. Most digital cameras these days have boast about having digital zooms but don't tell you that to use them will decrease the quality of your shots in a similar way that cropping your shots can. In essence a digital zoom fills your frame by increasing the size of pixels in your shots when can leave you with a grainy impact. I would highly recommend switching off your digital zoom feature and relying upon option 1 and 2 above. If you still need to get in closer you can always crop your shots and achieve the same results as using your digital zoom.



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9 Tips for Getting Backgrounds Right

A Post By: [Darren Rowse](#)



Photo by igglybwiggs

Backgrounds present both opportunities and challenges to photographers. On the one hand they can put a subjects in context and make it stand out in a way that highlights it wonderfully – but on the other hand backgrounds can overwhelm subjects and distract from them.

Some of the common problems that photographers have with backgrounds include:

- **Distracting Focal Points** – we’ve all seen this happen – we line up a shot of a friend to take as a portrait and just as we press the shutter someone else pops their head up over their shoulder with a silly face. The result is that the real focal point of the shot becomes the face pulling person. This is an extreme example of distracting focal points in the background but it’s something that happens quite a lot.
- **Protruding Elements from Subjects Heads** – I nearly didn’t include this one but it’s so common that I just had to mention it. When shooting a portrait one of the common mistakes is for some background element to look like it’s

sticking up out of a person's head – like a horn. It's often trees (as in the photo to the left) but could be anything. These shots can be quite comical but can also really throw the composition of a shot off.

- **Competing Lines** – if your subject has lines in it and your background also has strong lines they can compete in such a way that the image becomes busy or so that the lines clash with one another.

1. Check your Background Before Hitting the Shutter Release

Ok – this strategy isn't rocket science, in fact you'd think it almost goes without saying – but unfortunately it doesn't and many of the mistakes that I see in photographs could have been avoided simply by checking the background before taking the shot and taking some sort of evasive action.

Always scan the background of your shots before taking a shot. Look for colors that don't fit with the rest of the image, bright patches that might distract the eye, lines that clash, people that don't belong etc.

2. Move Your Subject

This is once again a fairly simple technique but is probably the first thing you should consider. Quite often asking a portrait subject to take a step to the left or right will fix things either by putting the distraction behind them or by putting it out of frame.



3. Change your Shooting Angle

If you have distracting elements in the background of a shot but can't move your subject another strategy is to move yourself and shoot from a new angle. This might mean rotating around your subject but could also include getting down low to make the sky the background or even getting up high and shooting down onto your subject to make the background the ground.



Shooting from slightly higher than your subject makes the ground the background which eliminates any distractions above the horizon.

4. Using Aperture to Blur Backgrounds

One of the most useful things to learn as a way to combat distractions in backgrounds (and foregrounds) is to use the power of your lens to throw the background out of focus using depth of field. What you're trying to achieve with this technique is a nice blurred background where you can't really make out what's going on there.



Choosing a larger aperture blurs out distracting background elements.

The easiest way to do this is to use a wide aperture (the smaller the number the wider the aperture). The wider your aperture the more blurry your background should become.

The quickest way to see the impact of this strategy is to switch your camera into aperture priority mode and to take a number of shots at different apertures. Start with an aperture of $f/20$ and work your way down – one stop at a time. Once you get down to under $f/4$ you'll start seeing the background in your shots getting blurrier and blurrier.

5. Using Focal Length to Blur Backgrounds

Another way to help get your backgrounds nice and blurry is to use a lens with a long focal length. Longer tele-photo do help a little to get narrower depth of field (although the amount is less than many think). In actual fact the impact is smaller than it seems and the main reason for the change is that with a longer focal length the subject actually takes up more space in the frame. Lots of arguments have been had over whether focal length impacts this – you can read more about it [here](#) and [here](#) – I'll leave it to the experts to discuss the finer points but will say that using longer focal lengths does seem to have some impact and is worth experimenting with.

6. Place Subjects In front of Open Spaces

Placing your subject a long way in front of other objects will also help to make those objects more blurry. For example if you have the choice between shooting your subject standing right in front of a brick wall or standing in front of an open field – the open field shot will have a much more blurred background simply because the brick wall is just centimeters from your subject and inside the focal range whereas an open field stretches off into the distance where everything will be out of focus.



Placing your subject in an open space helps blur the background

7. Fill your frame with your subject

One of the most effective ways of removing distractions from backgrounds is to remove the background altogether by totally filling the frame with your subject. Get up close and/or use your zoom lens to tightly frame the shot and you'll not only remove distractions but could end up with a high impact shot as well.



Filling the frame with your subject (or her hat) can help eliminate all manner of distractions.

8. Make your Own Background

Sometimes there just isn't any suitable background and so you might want to consider making your own. This could range from buying a purpose built studio background or simply buying some cloth to do the job for you.

I know of one keep photographer who goes out shooting photographic portraits and carries large colored sheets of card with him to put up on walls to act as a background.

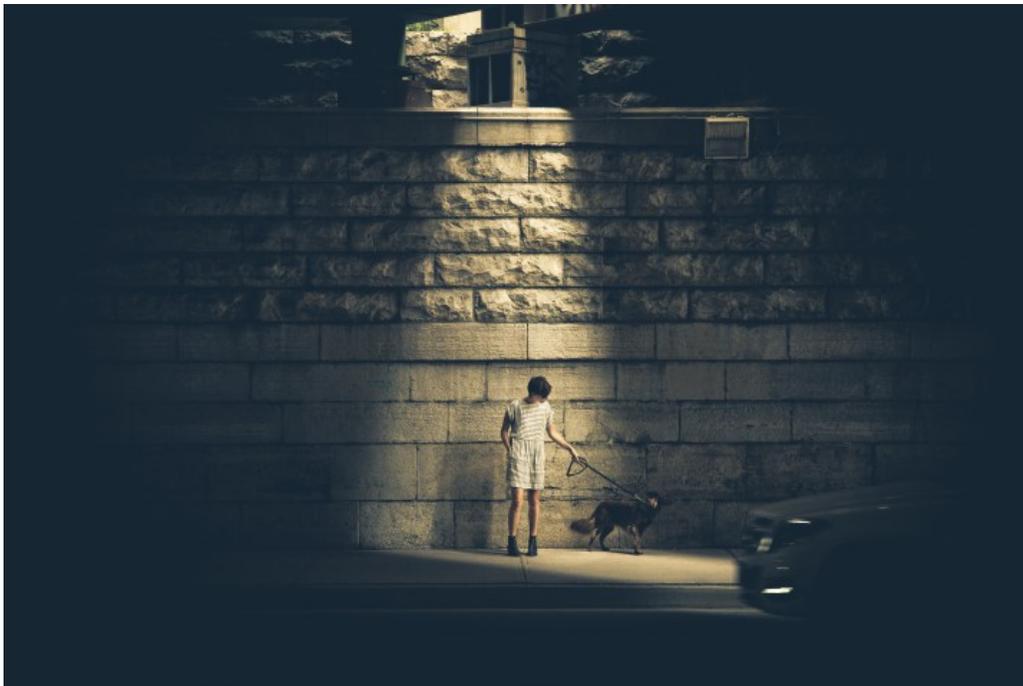
The other thing to keep in mind is that in many instances you can move things around in the background of your shots (especially if you're shooting indoors). For example I was recently photographed in my home for a newspaper and the photographer had me move a number of pieces of furniture during the shoot

because they were distracting in the shots. It took a little effort but the impact in the shots was quite incredible.

9. Keep a Look out for Great Backgrounds

Perhaps the best tip I can give you is to always be on the look out for great backgrounds. As you go about your day to day life keep an eye out for backgrounds that you could use for future shoots – both those that could provide plain non distracting options but also those that could add character, texture and interest to your shots.

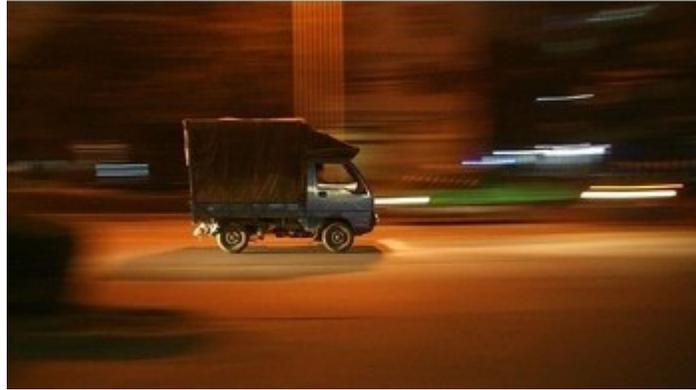
Some photographers I know keep a file of locations for shoots so that whenever they've got a portrait shoot to do they have a variety of great options that they can use.



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12 Ways to Add Randomness & Creativity to Your Photography

A Post By: **Darren Rowse**



One of the wonderful things about digital photography is the creativity that you can engage in once you've got your image on your computer and in Photoshop. All kinds of effects can be achieved to make your shots look any number of ways.

But what about in-camera techniques for more creative and artistic shots?

Here are twelve fun in-camera hacks to experiment with to get more abstract and artistic shots – the results are only limited by your imagination!

1. Move your Camera



Every good photography course drums into its participants the importance of keeping your camera absolutely still while shooting to ensure fantastically sharp images.

Of course sharp isn't always what you're after and one way to add motion into your shots is to experiment with moving your camera while shooting. Here are a few ways to experiment with:

- **panning** – a technique often used in sports photography.
- **rotate** – ever whirled a child around you? why not do it with your camera and take a shot mid whirl.
- **camera throwing** – not for the faint hearted – this technique involves a long shutter speed, setting the self timer, throwing your camera in the air just before the shutter is released and a safe pair of hands. It's 'extreme photography' and can result in stunning shots (like the one to the right which was a camera throw shot in front of a computer screen) – as well as the need for a new camera.

2. Zooming While Shooting

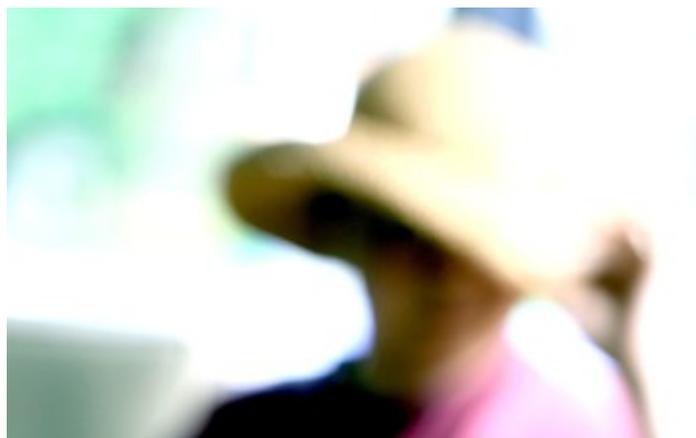


Another way of getting a sense of movement into your images is to keep the camera still but to zoom in or out with your zoom lens while actually taking the shot.

While panning (above) injects a vertical movement into shots – zooming gives your shots a dynamic 3D look and feel.

Combine this with slow sync flash (see below) and you can achieve some pretty special results. Read more about the [Zoom Effect](#).

3. Creative Focusing



One of the most common problems that I see in readers photos is poor focusing with photographers either focusing slightly in front or behind of the part of the image that needs to be sharp.

Why not take your focusing problems and make them worse by some creative focussing where you don't just get it slightly wrong – but make your shots obviously out of focus.

This technique is especially effective when you either have a plain background which means nothing in your shot is in focus – or when there's a secondary element of the image that you leave in focus with the main focal point out of focus enough for it to be obvious but in focus enough to still know what it is.

4. Shoot from your Boots



Putting your camera on the ground and taking shots of your subject from that low angle introduces a completely new and often random point of view for your shots.

You (and the viewers of your images) will see the world from a new perspective, add interesting foregrounds to shots and even capture a few surprising subjects along the way.

This might mean you need to get down low (and get a little dirty) to frame your shots – or you might want to be a little more random than that and introduce luck into the equation and just hold your camera low and see what you get.

5. Over expose your shots



Experiment with different exposure levels.

Bump up your exposure compensation to the max and you'll end up with brightly burnt out images.

This can be particularly effective if you're photographing brightly colorful objects as you can end up with them on a background of bright burnt out parts of the scene.

Check out these [examples of Overexposure](#) for a little more inspiration.

6. Slow Sync Flash



This is a great technique for lower light shooting conditions where there is ambient light that you want to capture in addition to a subject that you'd like to light up with a flash.

Experiment with front or rear curtain flash for different impacts.

Learn more about Slow Sync Flash in our previous tutorials – [Slow Sync Flash](#) and [An Explanation of 2nd Curtain Sync Flash](#). Also check out these [amazing Slow Sync Flash images](#).

7. Get Up High – Monopod extenders and Kite Aerial Photography



On the other end of the spectrum to getting down low (above) is to get your camera up high and shoot down on situations. One fun way to do this is to attach your camera to an extended monopod (or a tripod), a long shutter release cable (or a wireless one if you have one) and start shooting.

This will help you to both photograph things up high (street signs for example) as well as to help you shoot down on scenes that you'd never have been able to see from above before.

This is particularly fun with a wide angle lens (a fish eye can be even more fun)!

Another more extreme technique is one called Kite Aerial Photography where you attach a camera to a kite and take shots from up high. The beach image to the right was taken with this technique!

8. Multiple Exposures

I used to love experimenting with multiple exposures on the same frame with my old film SLR. Many digital cameras don't have the ability to do it – but if you're lucky enough to have one that does you can achieve some fun results.

One way to do it is to take pictures of the same scene at different focal lengths or holding the camera on a slightly different angle. I find this is particularly effective on shots with a repeating pattern.

If you don't have the ability for multiple exposures on your digital camera you can always get similar results in Photoshop using layers.

9. Go Grainy



There's something about shots with lots of grain that adds an element of mood into an image.

Override your camera's ISO settings by boosting them right up to the maximum number available. The higher you go the more noise or grain you'll get.

This can be particularly effective in black and white shots – especially when you blow them up for display.

10. White Balance

Experimenting with different **white balance** settings on your camera can inject different color casts into your images.

White balance settings are meant to be used to help you compensate for different types of lights (each type of light gives off different subtle colors). However, if you know what you're doing you can really **warm up or cool down an image quite a bit and get some lovely and creative images.**

11. Master the Bulb Setting

At the slow end of many digital camera's shutter speed settings is one often labeled 'B' or 'Bulb'.



The bulb setting allows you to keep your shutter open for as long as you hold down the shutter release. This opens up all kinds of possibilities for creativity – particularly in low light situations.

The Bulb is great for capturing light trails (moving traffic at night, a friend drawing out a message with a torch or fireworks) but to get the most of it you'll probably want to secure your camera with a tripod (unless you want to add camera movement into your shot as well).

At the extreme end of bulb settings astro photographers will leave the shutter open for long periods of time (hours) to capture star trails. To do this you'll need a small ISO, small aperture and should be aware that on many cameras it'll drain your batteries significantly.

12. Infrared



Infrared photography is an art of its own (it deserves its own tutorial – as it's something I've not done much of I'd be open to someone writing me one) and can create some amazing shots (black skies, white trees, dark eyes etc).

Not all cameras can capture infra-red light (although many can) but check your manual to see if yours is one of them. If you're in luck grab yourself an IR filter which cuts out non IR light and start experimenting. Because these filters block out a lot of light you'll need to use longer shutter speeds, probably will want to use a tripod and should select faster ISO settings.

The start and end of the day is a great time to shoot in IR.



Darren Rowse is the editor and founder of **Digital Photography School** and **SnapnDeals**. He lives in Melbourne Australia and is also the editor of the **ProBlogger Blog Tips**. Follow him on **Instagram**, on **Twitter** at **@digitalPS** or on **Google+**.

Resources

Cheat Sheets

Manual Photography Cheat Sheet

Manual Photography CHEAT SHEET
BY: MIGUEL YATCO

EXPOSURE

TRY TO KEEP YOUR LIGHT METER AT "0"

OVEREXPOSED

UNDEREXPOSED

APERTURE

f/1.4 f/2 f/2.8 f/4 f/5.6 f/8 f/11 f/16

SHALLOW DEPTH OF FIELD DEEP DEPTH OF FIELD

BRIGHTER *SHALLOW, BLURRED BACKGROUND* *DEEP, EVERYTHING IN FOCUS* DARKER

SHUTTER

BULB 30" 15" 10" 2" 1" 1/25 1/30 1/50 1/100 1/125 1/250 1/320 1/500 1/1000

LONGER EXPOSURE SHORTER EXPOSURE

BRIGHTER *BULB: EXPOSURE TIME UNDER THE CONTROL OF THE PHOTOGRAPHER* DARKER

ISO

100 200 400 800 1600 3200

LOW SENSITIVITY TO LIGHT USE DURING DAY TIME HIGHER QUALITY (SMOOTH)

HIGH SENSITIVITY TO LIGHT USE DURING NIGHT TIME LOWER QUALITY (NOISY)

Brought to you by: **LIVING IN THE STILLS** .tumblr.com

NOTE: VALUES MAY VARY DUE TO DIFFERENT LENSES & CAMERAS!

Good Luck!

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Photography Cheat Sheet



**PHOTOGRAPHY
CHEAT
SHEET**
RELOADED!

WHITE BALANCE

	AWB	AUTO
	DAYLIGHT	
	CLOUDY	
	SHADE	
	TUNGSTEN	
	FLUORESCENT	
	FLASH	
	CUSTOM	

CAMERA MODES

M	MANUAL	M
Av	APERTURE PRIORITY	A
Tv	SHUTTER PRIORITY	S
P	PROGRAM	P
	AUTOMATIC	AUTO

APERTURE

↑ REGULATES THE FILM'S OR IMAGE SENSOR'S DEGREE OF EXPOSURE TO LIGHT

WIDE								NARROW
	F/1.6	F/2.8	F/4	F/5.6	F/8	F/11	F/16	
BRIGHTER		—————				DARKER		
	DEPTH OF FIELD						SHARP IMAGES	

SHUTTER SPEED

↑ THE EFFECTIVE LENGTH OF TIME A CAMERA'S SHUTTER IS OPEN

FAST													SLOW ...		
	1/1000S	1/500S	1/250S	1/125S	1/60S	1/30S	1/15S	1/8S	1/4S	1/2S	1S	2S	15S	BULB	
DARKER	—————												BRIGHTER		

ISO

↑ FILM SPEED/MEASURE OF SENSITIVITY TO LIGHT

Slow	100	200	400	800	1600	3200	FAST
LESS SENSITIVE							MORE SENSITIVE
DARKER	—————						BRIGHTER
	OUTDOORS	INDOORS				NIGHT	

MIGUELGANTIOQUI. 2012.



Shooting Modes Cheat Sheet

MAKE SENSE OF SHOOTING MODES

The mode you choose affects the amount of control you have over camera settings

 Auto mode If you're a complete novice, this mode is ideal because the camera takes care of all the settings automatically.	 Sports mode The flash is switched off and the camera uses faster shutter speeds to help freeze fast-moving subjects.	 Shutter Priority Use this if you want to choose the shutter speed yourself. The camera will set the aperture automatically so that the exposure is correct.
 Auto Flash Off mode The same as Auto, but for museums, theatres or indoor sports venues where using a flash might get you thrown out!	 Close-up mode This favours a smaller aperture to improve depth of field. Consider using a tripod when there's a risk of camera-shake.	 Program AE mode Ideal for general use, or when there's little time to think. The camera sets the shutter speed and aperture but you get to control other settings.
 Portrait mode The camera softens skin tones and uses a wide aperture to throw the background out of focus.	 Night Portrait mode The flash fires to light your subject, but the camera uses a slower shutter speed to capture the background lighting too.	
 Landscape mode Designed for vivid landscape shots taken in daylight. The built-in flash is switched off and you might need a tripod in poor light.	 Manual mode This is designed for experts. You choose the shutter speed and aperture yourself, though the camera still suggests settings.	
 Child mode In this mode, the camera makes backgrounds and clothing colourful but keeps skin tones soft and natural looking.	 Aperture Priority Use this if you want to choose the aperture yourself. The camera will set the shutter speed automatically for correct exposure.	 GUIDE A special feature on the D3100 that shows you what to do as you're taking pictures. It's a great way for beginners to learn about photography.



↑



↓



 Full Auto The idiot 'green square' mode – sets all the camera settings for you automatically.	 Creative Auto Only found on most recent EOS SLRs. Lets you tweak aperture and exposure compensation in a jargon-free way.	 Landscape mode Sets aperture to maximise depth of field, but overrides other settings, see p96.
 Metered manual You set both aperture and shutter speed, but the camera still gives a meter reading (see p97).	 Av You set the aperture, and the camera then sets the shutter speed for you.	 Close-up mode Sets a wide aperture to blur backgrounds, but overrides other settings, see p96.
 Tv You set the shutter speed, and the camera then sets the aperture for you.	 P The camera pairs aperture and shutter speed, but you can tweak them – see below.	 Sports mode Sets a fast shutter speed to freeze action, but controls other settings, too, see p96.
 Movie mode Only found on the mode dial of some newer EOS models that feature HD video recording.	 Portrait mode Sets a wide aperture to blur backgrounds, but overrides other settings, see p96.	 Night portrait mode Combines flash with a slow shutter speed, but fixes other settings, see p96.
 Flash off mode Fully automatic mode that ensures flash does not fire – see full details on p96.	 A-DEP Tweaks aperture and focus to ensure key parts of picture are sharp. See p96.	

F-Stop (Aperature) Cheat Sheet

APERTURE NUMBERS



MAKING SENSE OF F-STOPS

Your at-a-glance guide to aperture scales and what the numbers mean

↑ MORE LIGHT
↑ MORE DEPTH OF FIELD

↓ LESS LIGHT
↓ MORE DEPTH OF FIELD

Full stops	1/2 stops	1/3rd stops
f/2.8	2.8	2.8
	3.3	3.2
	4	3.5
	4.8	4
	5.6	4.5
	6.7	5
	8	5.6
	9.5	6.3
	11	7.1
	13	8
	16	9
	19	10
	22	11
		13
		14
		16
		18
		20
		22

↓ WIDE APERTURES

↑ SMALL APERTURES

Wide apertures

The widest apertures have f-stops with the smallest numbers. The maximum aperture available depends on the lens you're using. On many zoom lenses, for example, the maximum aperture gets smaller as you zoom in.

Medium apertures

The middle apertures on your lens tend to give you the best-quality images. However, they might not give you the amount of depth of field you require. Think of it as a balancing act, with some compromise required.

Small apertures

Most lenses have a minimum aperture of f/22, although some stop at f/16 while others go down to f/32. As aperture gets smaller, depth of field increases. Ultimately, though, the image resolution deteriorates due to diffraction. See page 76 for more on this.

Shutter Speed Cheat Sheet

**FIRST OF
A NEW SERIES
TO COLLECT**

Digital CHEAT SHEET Camera

Find the right shutter speed for every situation!



Learn the lingo: Panning
Lets you add motion blur while keeping your main subject sharp. Track the subject with your camera, pivoting from your hips

SHUTTER SPEED	TYPICALLY USED FOR...
1/4000 sec	Freezing extremely fast movement
1/2000 sec	Freezing birds in flight
1/1000 sec	Freezing motorcycles, cars and other fast vehicles
1/500 sec	Freezing mountain bikes, runners and athletes
1/250 sec	Freezing slow-moving animals or people walking
1/125 sec	Panning motorcycles, cars and other fast vehicles
1/60 sec	Panning mountain bikes close to the camera
1/30 sec	Panning fast-moving cyclists at a distance
1/15 sec	Panning runners, kids or moving animals
1/8 sec	Blurring fast-flowing water close to the camera
1/4 sec	Blurring people walking
1/2 sec	Blurring slow-moving water
1 sec or slower	'Milky' water effects








HOW TO ADJUST SHUTTER SPEED

Use Shutter Priority mode
Select S or Tv on your camera's top dial or menu, then adjust shutter speed with the relevant dial (check your manual). You can go down to around 30 secs for traffic trails.

Set the right ISO
To access slower shutter speeds, use the lowest ISO setting (usually ISO100). If you need a fast shutter speed, you may need a higher ISO, such as ISO400 or above.

Metering Modes Cheat Sheet

NIKON METERING MODES EXPLAINED

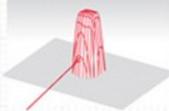
MODES AT A GLANCE

How each of the metering patterns works, and when to use them



Spot

Spot metering only measures the intensity of light over a small circular area around the active AF point, so you need to pay attention to where this is. The area corresponds to roughly 1.5-2.5 per cent of the frame, depending on which Nikon D-SLR you're using.



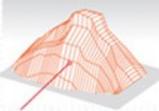
This graph shows how spot metering concentrates around the AF point



The small area around the AF point gives an indication of the region covered by spot metering

3D Color Matrix

The default metering mode on Nikon D-SLRs measures light distribution across the whole frame, together with colour and focus data. It then compares this to an internal database of typical photographic scenes to arrive at a suitable exposure.



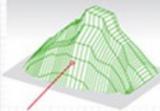
With matrix metering, the shape of the graph changes with each scene



Your current focus point is one of the criteria used by matrix metering to work out the best exposure

Centre-weighted

This mode measures the light across the whole picture area, but strongly biases the resulting reading to the centre of the viewfinder. On more advanced Nikon D-SLRs, you can change the size of this central area, and hence the overall bias.



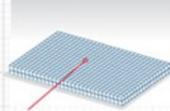
This graph is higher in the middle, where it's heavily 'weighted'



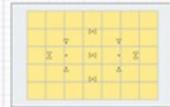
The exposure is based mainly on the central part of the image, though the outer parts have an influence too

Average

This is a variation on the centre-weighted mode that's only available on Nikon's pro D-SLRs. It measures light evenly across the whole frame, which makes it the least sophisticated metering system of all, but for experts it can be the easiest to interpret.



The graph for average metering is flat, as all areas are treated equally



The light across the whole frame is measured as a single value. It's a crude method but can be useful

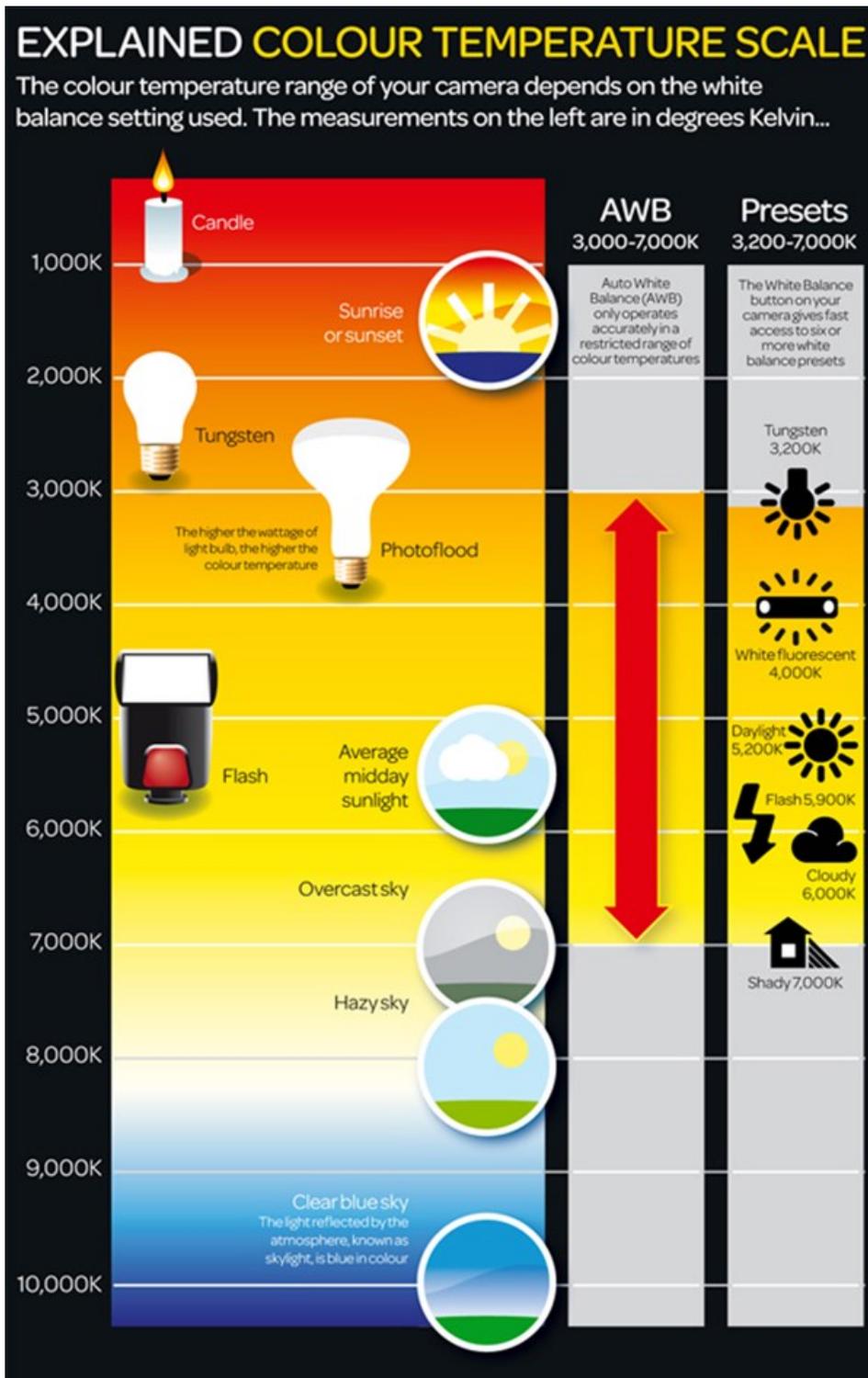
METERING MODES ON YOUR NIKON

Options vary according to model



MODEL	MATRIX	METERING SENSOR	CENTRE-WEIGHTED	AVERAGE?	SPOT
D3000	3D Color Matrix	420 pixels	8mm circle	No	2.5%
D3100	3D Color Matrix	420 pixels	8mm circle	No	2.5%
D3200	3D Color Matrix	420 pixels	8mm circle	No	2.5%
D5000	3D Color Matrix	420 pixels	8mm circle	No	2.5%
D5100	3D Color Matrix	420 pixels	8mm circle	No	2.5%
D90	3D Color Matrix	420 pixels	6, 8 or 10mm circle	No	2.5%
D7000	3D Color Matrix	2016 pixels	6, 8, 10 or 13mm circle	Yes	2.5%
D300s	3D Color Matrix	1005 pixels	6, 8, 10 or 13mm circle	Yes	2.0%
D700	3D Color Matrix	1005 pixels	8, 12, 15 or 20mm circle	Yes	1.5%
D800	3D Color Matrix	91,000 pixels	8, 12, 15 or 20mm circle	Yes	1.5%
D3s	3D Color Matrix	1005 pixels	8, 12, 15 or 20mm circle	Yes	1.5%
D3x	3D Color Matrix	1005 pixels	8, 12, 15 or 20mm circle	Yes	1.5%
D4	3D Color Matrix	91,000 pixels	8, 12, 15 or 20mm circle	Yes	1.5%

White Balance / Color Temperature Cheat Sheet

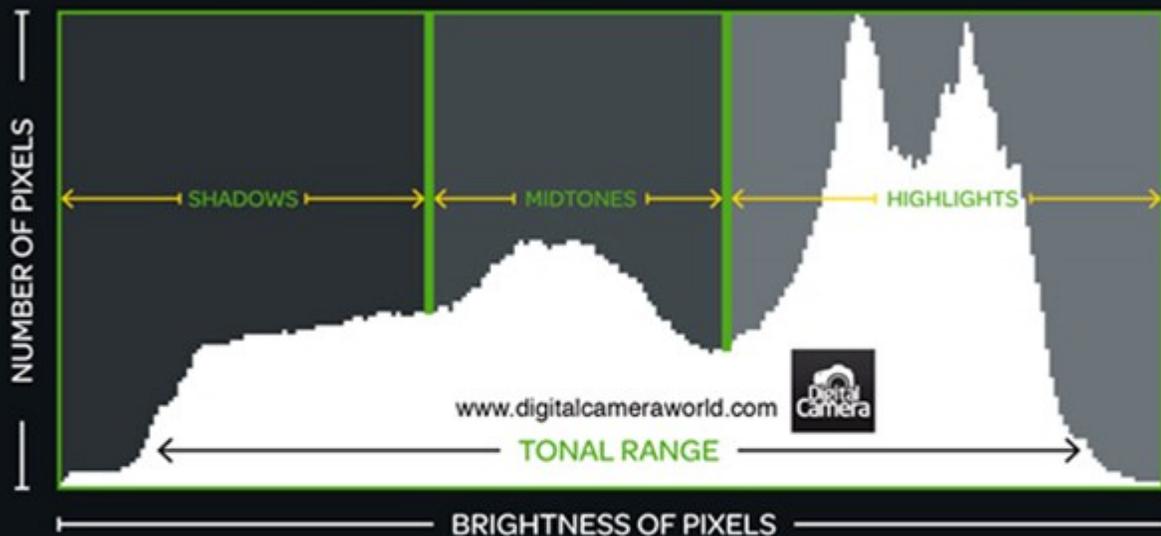


Histogram Cheat Sheet

EXPLAINED HOW TO READ A HISTOGRAM

A camera's histogram is an accurate guide to exposure, as it illustrates the range of tones, or brightness levels, present in an image. You

should review the histogram each time you take a picture, so that you can assess if you need to make any exposure adjustments.



The horizontal axis of the graph represents the brightness level, from darkest on the left to brightest on the right. The vertical axis shows how many pixels in the picture are at that brightness level



Depth of Field Cheat Sheet

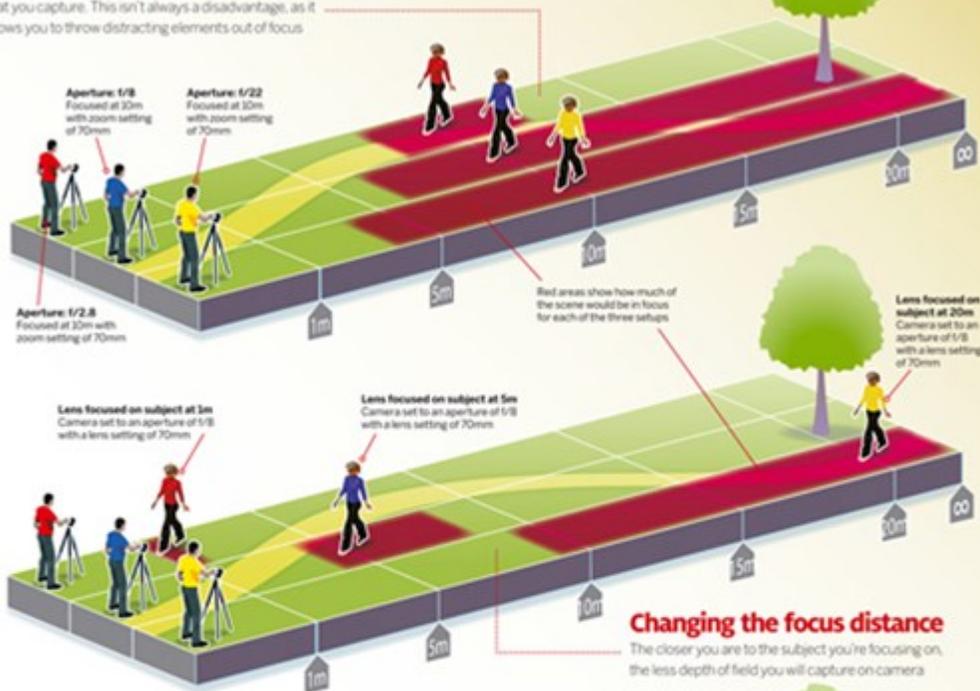
Three ways to affect depth of field

How aperture, focus distance and focal length affect what will appear sharp



Changing the aperture

The wider the aperture you use, the less depth of field that you capture. This isn't always a disadvantage, as it allows you to throw distracting elements out of focus

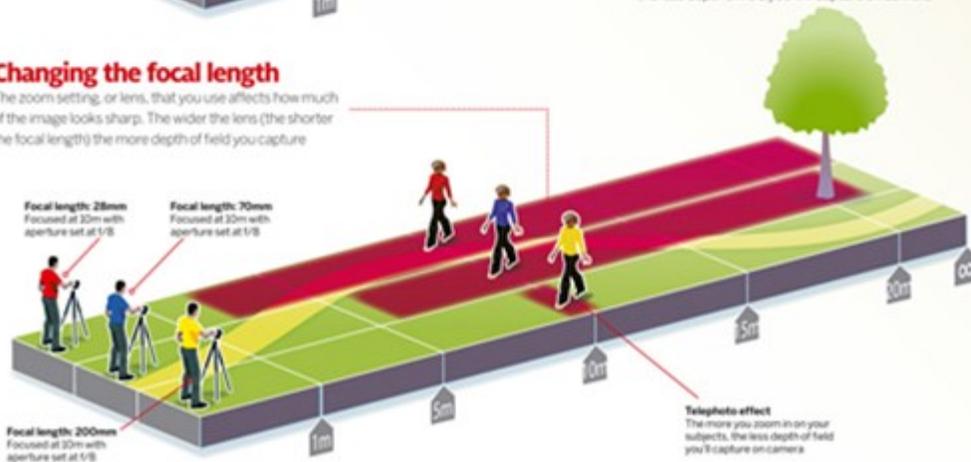


Changing the focus distance

The closer you are to the subject you're focusing on, the less depth of field you will capture on camera

Changing the focal length

The zoom setting, or lens, that you use affects how much of the image looks sharp. The wider the lens (the shorter the focal length) the more depth of field you capture



References

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- <https://www.slrlounge.com/>

Images

- <https://www.flickr.com/photos/nichodesign/albums/72157637827643973>

If you want to view some of my photo work you can do so at –

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