

# Lesson 1. The Exposure Triangle.



## The three elements are:

**ISO** – the measure of a digital camera sensor's sensitivity to light

**Aperture** – the size of the opening in the lens when a picture is taken

**Shutter Speed** – the amount of time that the shutter is open

Understanding the digital photography exposure triangle:

It is at the intersection of these three elements that an image's exposure is worked out.

Most importantly – a change in one of the elements will affect the others. This means that you can never really think of just one. You need to think of all three.

The Window

Imagine your camera is like a window with shutters that open and close.

Aperture is the size of the window. If it's bigger more light gets through and the room is brighter.

Shutter Speed is the amount of time that the shutters of the window are open. The longer you leave them open the more that comes in.

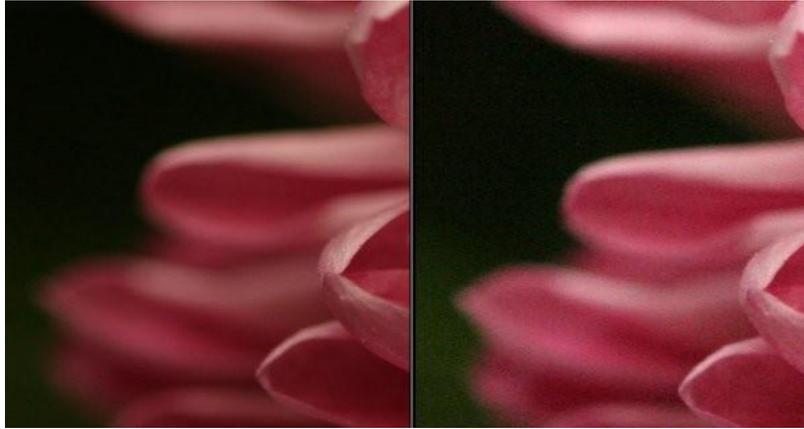
Now imagine that you're inside the room and are wearing sunglasses (hopefully this isn't too much of a stretch). Your eyes become desensitized to the light that comes in (it's like a low ISO).

There are a number of ways of increasing the amount of light in the room (or at least how much it seems that there is). You could increase the time that the shutters are open (decrease shutter speed), you could increase the size of the window (increase aperture) or you could take off your sunglasses (make the ISO larger).

## Lesson 2. What is ISO?

In Digital Photography ISO measures the sensitivity of the image sensor. The lower the number the less sensitive your camera is to light and the finer the grain.

Higher ISO settings are generally used in darker situations to get faster shutter speeds. For example an indoor sports event when you want to freeze the action in lower light. However the higher the ISO you choose the noisier shots you will get. Below are two examples – the one on the left is taken at 100 ISO and the one of the right at 3200 ISO



## Questions to Ask When Choosing ISO

When choosing the ISO setting ask yourself the following four questions:

**Light** – Is the subject well lit?

**Grain** – Do I want a grainy shot or one without noise?

**Tripod** – Am I using a tripod?

**Moving Subject** – Is my subject moving or stationary?

If there is plenty of light, and you want little grain, and the subject is stationary, generally use a low ISO rating.

If it's dark, and you purposely want grain, if you don't have a tripod and/or your subject is moving you might consider increasing the ISO as it will enable you to shoot with a faster shutter speed and still expose the shot well.

Of course the tradeoff of this increase in ISO will be noisier shots.

**Situations where you might need to push ISO to higher settings include:**

**Birds in flight** – where your subject is moving fast yet you may have limited light available.

**Hides** – often low in light

**Night or evening photography**

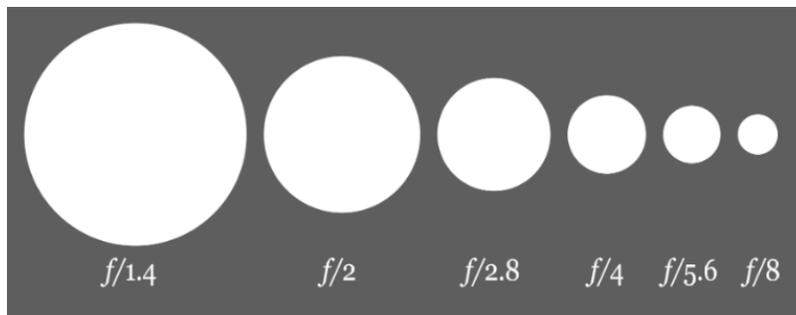
ISO is an important aspect of digital photography to have an understanding of if you want to gain more control of your digital camera. Experiment with different settings and how they impact your images today.

## Lesson 3. What is Aperture?

Put simply – Aperture is **'the opening in the lens.'**

When you hit the shutter release button of your camera a hole opens up that allows your cameras image sensor to catch a glimpse of the scene you're wanting to capture. The aperture that you set affects the size of that hole. The larger the hole the more light that gets in – the smaller the hole the less light.

Aperture is measured in 'f-stops'.



You'll often see them referred to as f/numbers – for example f/2.8, f/4, f/5.6, f/8, f/22 etc. Moving from one f-stop to the next doubles or halves the size of the amount of opening in your lens (and the amount of light getting through). Remember that a change in shutter speed from one stop to the next doubles or halves the amount of light that gets in also – this means if you increase one and decrease the other you get the same amount of light in.

One thing that causes a lot of new photographers' confusion is that large apertures (where lots of light gets through) are given f/stop smaller numbers and smaller apertures (where less light gets through) have larger f-stop numbers. So f/2.8 is in fact a much larger aperture than f/22. It seems the wrong way around when you first hear it but you'll get the hang of it.

## Depth of Field and Aperture

There are a number of results of changing the aperture of your shots that you'll want to remember as you consider your settings. The most noticeable one will be the depth of field that your shot will have.

Depth of Field (DOF) is the amount of your shot that will be in focus. Large depth of field means that most of your image will be in focus whether it's close to your camera or far away (like the picture to the left where both the foreground and background are largely in focus – taken with an aperture of f/22).

Small (or shallow) depth of field means that only part of the image will be in focus and the rest will be fuzzy (like in the flower at the top of this post (click to enlarge). You'll see in it that the tip of the yellow stems are in focus but even though they are only 1cm or so behind them that the petals are out of focus. This is a very shallow depth of field and was taken with an aperture of f/4.5).

Aperture has a big impact upon depth of field. Large aperture (remember it's a smaller number) will decrease depth of field while small aperture (larger numbers) will give you larger depth of field.

It can be a little confusing at first but the way I remember it is that small numbers mean small DOF and large numbers mean large DOF.

### Compare the following two pictures.



The first picture below on the left was taken with an aperture of f/22 and the second one was taken with an aperture of f/2.8. The difference is quite obvious. The f/22 picture has both the flower and the bud in focus and you're able to make out the shape of the fence and leaves in the background.

The f/2.8 shot (2nd one) has the left flower in focus (or parts of it) but the depth of field is very shallow and the background is thrown out of focus and the bud to the right of the flower is also less in focus due to it being slightly further away from the camera when the shot was taken.

The best way to understand aperture is to get your camera out and do some experimenting. Go outside and find a spot where you've got items close to you as well as far away and take a series of shots with

different aperture settings from the smallest setting to the largest. You'll quickly see the impact that it can have and the usefulness of being able to control aperture.

### **Some styles of photography require large depths of field (and small Apertures)**

For example in most landscape photography you'll see small aperture settings (large numbers) selected by photographers. This ensures that from the foreground to the horizon is relatively in focus.

On the other hand in portrait photography it can be very handy to have your subject perfectly in focus but to have a nice blurry background in order to ensure that your subject is the main focal point and that other elements in the shot are not distracting. In this case you'd choose a large aperture (small number) to ensure a shallow depth of field.

Macro photographers tend to be big users of large apertures to ensure that the element of their subject that they are focusing in on totally captures the attention of the viewer of their images while the rest of the image is completely thrown out of focus.

## **Lesson 4. What is Shutter Speed?**

**Shutter speed is 'the amount of time that the shutter is open'.**

**Shutter speed is measured in seconds** – or in most cases fractions of seconds. The bigger the denominator the faster the speed (ie 1/1000 is much faster than 1/30).

In most cases you'll probably be using shutter speeds of 1/60th of a second or faster. This is because anything slower than this is very difficult to use without getting camera shake. Camera shake is when your camera is moving while the shutter is open and results in blur in your photos.

If you're using a slow shutter speed (anything slower than 1/60) you will need to either use a tripod or some type of image stabilization (more and more cameras are coming with this built in).

Shutter speeds available to you on your camera will usually double (approximately) with each setting. As a result you'll usually have the options for the following shutter speeds – 1/500, 1/250, 1/125, 1/60, 1/30, 1/15, 1/8 etc. This 'doubling' is handy to keep in mind as aperture settings also double the amount of light that is let in – as a result increasing shutter speed by one stop and decreasing aperture by one stop should give you similar exposure levels

Some cameras also give you the option for very slow shutter speeds that are not fractions of seconds but are measured in seconds (for example 1 second, 10 seconds, 30 seconds etc). These are used in very low light situations, when you're going after special effects and/or when you're trying to capture a lot of movement in a shot. Some cameras also give you the option to shoot in 'B' (or 'Bulb') mode. Bulb mode lets you keep the shutter open for as long as you hold it down.

When considering what shutter speed to use in an image you should always ask yourself whether anything in your scene is moving and how you'd like to capture that movement. If there is movement in your scene you have the choice of either freezing the movement (so it looks still) or letting the moving object intentionally blur (giving it a sense of movement).

To freeze movement in an image (like in the surfing shot below) you'll want to choose a faster shutter speed and to let the movement blur you'll want to choose a slower shutter speed. The actual speeds you should choose will vary depending upon the speed of the subject in your shot and how much you want it to be blurred.



**Motion is not always bad.** There are times when motion is good. For example when you're taking a photo of a waterfall and want to show how fast the water is flowing, or when you're taking a shot of a racing car and want to give it a feeling of speed, or when you're taking a shot of a star scape and want to show how the stars move over a longer period of time. In all of these instances choosing a longer shutter speed will be the way to go. However in all of these cases you need to use a tripod or you'll run the risk of ruining the shots by adding camera movement (a different type of blur than motion blur).

**Focal Length and Shutter Speed** - another thing to consider when choosing shutter speed is the focal length of the lens you're using. Longer focal lengths will accentuate the amount of camera shake you have and so you'll need to choose a faster shutter speed (unless you have image stabilization in your lens or camera). The 'rule' of thumb to use with focal length in non-image stabilized situations) is to choose a shutter speed with a denominator that is larger than the focal length of the lens. For example if you have a lens that is 50mm 1/60th is probably ok but if you have a 200mm lens you'll probably want to shoot at around 1/250.

### **Shutter Speed – Bringing it Together**

Remember that thinking about Shutter Speed in isolation from the other two elements of the Exposure Triangle (aperture and ISO) is not really a good idea. As you change shutter speed you'll need to change one or both of the other elements to compensate for it.

For example if you speed up your shutter speed one stop (for example from 1/125th to 1/250th) you're effectively letting half as much light into your camera. To compensate for this you'll probably need to increase your aperture one stop (for example from f16 to f11). The other alternative would be to choose a faster ISO rating (you might want to move from ISO 100 to ISO 400 for example)

# Lesson 5. Digital Camera Modes

## Automatic Modes



### Automatic Mode

Auto mode tells your camera to use its best judgment to select shutter speed, aperture, ISO, white balance, focus and flash to take the best shot that it can. With some cameras auto mode lets you override flash or change it to red eye reduction. This mode will give you nice results in many shooting conditions, however you need to remember that you're not telling your camera any extra information about the type of shot you're taking so it will be 'guessing' as to what you want. As a result some of the following modes might be more appropriate to select as they give your camera a few more hints (without you needing to do anything more).



### Portrait Mode

When you switch to portrait mode your camera will automatically select a large aperture (small number) which helps to keep your background out of focus (i.e. it sets a narrow depth of field – ensuring your subject is the only thing in focus and is therefore the centre of attention in the shot). Portrait mode works best when you're photographing a single subject so get in close enough to your subject (either by zooming in or walking closer) so that you're photographing the head and shoulders of them). Also if you're shooting into the sun you might want to trigger your flash to add a little light onto their face.



### Macro Mode

Macro mode lets you move you closer into your subject to take a close up picture. It's great for shooting flowers, insects or other small objects. Different digital cameras will have macro modes with different capabilities including different focusing distances. When you use macro mode you'll notice that focusing is more difficult as at short distances the depth of field is very narrow (just millimeters at times). Keep your camera and the object you're photographing parallel if possible or you'll find a lot of it will be out of focus. You'll probably also find that you won't want to use your camera's built in flash when photographing close up objects or they'll be burnt out. Lastly – a tripod is very useful in macro shots as the depth of field is so small that even moving towards or away from your subject slightly can make your subject out of focus.



### Landscape Mode

This mode is almost the exact opposite of portrait mode in that it sets the camera up with a small aperture (large number) to make sure as much of the scene you're photographing will be in focus as possible (ie it give you a large depth of field). It's therefore ideal for capturing shots of wide scenes, particularly those with points of interest at different distances from the camera. At times your camera might also select a slower shutter speed in this mode (to compensate for the small aperture) so you might want to consider a tripod or other method of ensuring your camera is still.



### Sports Mode

Photographing moving objects is what sports mode (also called 'action mode' in some cameras) is designed for. It is ideal for photographing any moving objects including people playing sports, pets, cars, wildlife etc. Sports mode attempts to freeze the action by increasing the shutter speed. When photographing fast moving subjects you can also increase your chances of capturing them with panning of your camera along with the subject and/or by attempting to pre focus your camera on a spot where the subject will be when you want to photograph it (this takes practice).

## Semi Automatic Modes

### Aperture Priority Mode (A or AV)

This mode is really a semi-automatic (or semi-manual) mode where you choose the aperture and where your camera chooses the other settings (shutter speed, white balance, ISO etc.) so as to ensure you have a well-balanced exposure. Aperture priority mode is useful when you're looking to control the depth of field in a shot (usually a stationary object where you don't need to control shutter speed). Choosing a larger number aperture means the aperture (or the opening in your camera when shooting) is smaller and lets less light in. This means you'll have a larger depth of field (more of the scene will be in focus) but that your camera will choose a slower shutter speed. Small numbers means the opposite (ie your aperture is large, depth of field will be small and your camera will probably choose a faster shutter speed).

### Shutter Priority Mode (S or TV)

Shutter priority is very similar to aperture priority mode but is the mode where you select a shutter speed and the camera then chooses all of the other settings. You would use this mode where you want to control over shutter speed (obviously). For example when photographing moving subjects (like sports) you might want to choose a fast shutter speed to freeze the motion. On the opposite side of this you might want to capture the movement as a blur of a subject like a waterfall and choose a slow shutter speed. You might also choose a slow shutter speed in lower light situations.

### Program Mode (P)

Some digital cameras have this priority mode in addition to auto mode (in a few cameras Program mode IS full Auto mode... confusing isn't it!). In those cameras that have both, Program mode is similar to Auto but gives you a little more control over some other features including flash, white balance, ISO etc. Check your digital camera's manual for how the Program mode differs from Automatic in your particular model.

## Fully Manual Mode

### Manual Mode

In this mode you have full control over your camera and need to think about all settings including shutter speed, aperture, ISO, white balance, flash etc. It gives you the flexibility to set your shots up as you wish. Of course you also need to have some idea of what you're doing.

## Lesson 6. How to Hold a Camera



One of the common problems that many new digital photographers have is 'camera shake' where images seem blurry – usually because the camera was not held still enough while the shutter was depressed. This is especially common in shots taken in low light situations where the shutter is open for longer periods of time. Even the smallest movement of the camera can cause it and the only real way to stop it is with a tripod.

Adding to camera shake is a technique that is increasingly common with digital camera users of holding the camera at arm's length away from them as they take shots – often with one hand. While this might be

a good way to frame your shot the further away from your body (a fairly stable thing) you hold a camera the more chance you have of swaying or shaking as you take your shot.

Tripods are the best way to stop camera shake because they have three sturdy legs that keep things very still – but if you don't have one then another simple way to enhance the stability of the camera is to hold onto it with two hands.

While it can be tempting to shoot one handed, two hands will increase your stillness (like three legs on a tripod being better than one).

**Use your right hand to grip the right hand end of the camera.** Your forefinger should sit lightly above the shutter release, your other three fingers curling around the front of the camera. Your right thumb grips onto the back of the camera. Most cameras these days have some sort of grip and even impressions for where fingers should go so this should feel natural. Use a strong grip with your right hand but don't grip it so tightly that you end up shaking the camera. The positioning of your left hand will depend upon your camera but in general it should support the weight of the camera and will either sit underneath the camera or under/around a lens if you have a DSLR.

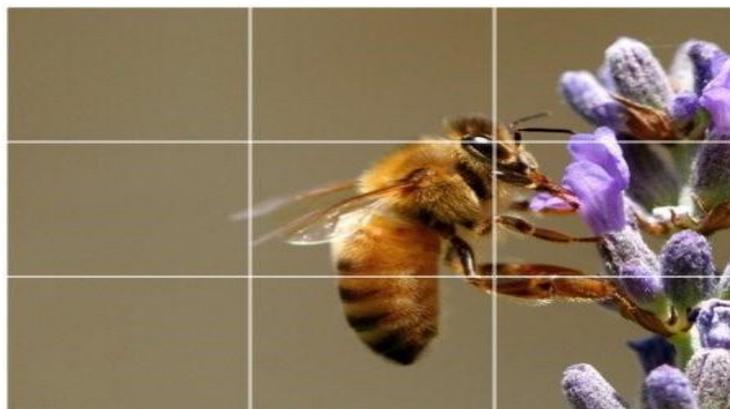
If you're shooting using the view finder to line up your shot you'll have the camera nice and close into your body which will add extra stability but if you're using the LCD make sure you don't hold your camera too far away from you. Tuck your elbows into your sides and lean the camera out a little from your face (around 30cm).

Add extra stability by leaning against a solid object like a wall or a tree or by sitting or kneeling down. If you have to stand and don't have anything to lean on for extra support put your feet shoulder width apart to give yourself a steady stance. The stiller you can keep your body the stiller the camera will be.

Another quick bonus tip on how to hold a camera – before you take your shot take a gentle but deep breath, hold it, then take the shot and exhale. The other method people use is the exact opposite – exhale and before inhaling again take the shot. It's amazing how much a body rises and falls simply by breathing – being conscious of it can give you an edge.

Of course each person will have their own little techniques that they are more comfortable with so you need to find what works best for you

## Lesson 7. Rule of Thirds



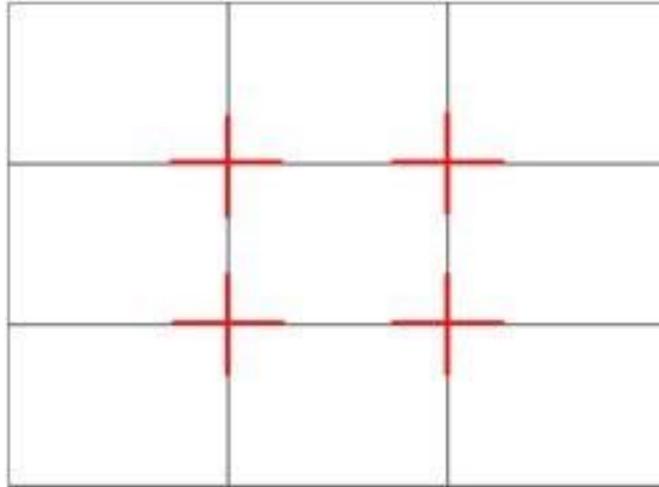
The Rule of Thirds is perhaps the most well-known principle of photographic composition.

The “Rule of Thirds” one of the first things that new digital photographers learn about in classes on photography and rightly so as it is the basis for well balanced and interesting shots.

As we know, rules are sometimes meant to be broken. However it is wise that if you intend to break a rule you should always learn it first.

## What is the Rule of Thirds?

The basic idea 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.

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.

## Lesson 8. EV Compensation Explained



I've been using the EV (Exposure Value) button on my camera more than any of the other buttons so I thought I would share with you why and when I use it. Remember that I shoot with a Nikon so shutter speed and aperture are controlled with the front and back wheels not buttons ;). But before I get into that, let me briefly explain to you what the EV button is and what it does.

To put it simply, the EV button allows you to quickly underexpose (darken) or overexpose (brighten) your image. How it works is pretty simple. When you're taking a photo, the camera's job is to adjust itself by changing the shutter speed and/or aperture to properly expose your shot so that it's not too bright or too dark. Some cameras do this better than others but that's another story. When you play with the EV button, what you're doing is telling the camera to either brighten or darken the photo from the optimal exposure it perceives.

You can use the EV button in **P** (programed auto), **S** or **Tv** (shutter priority) or **A** (aperture priority) modes. **In P mode**, the camera will adjust the EV by changing the shutter speed and/or the aperture. **In S/Tv mode**, since you set the shutter speed manually, it will adjust the aperture to compensate. **In A mode**, the camera will change the shutter speed since you manually control the aperture.

**NB: You cannot use the EV button to under or overexpose your photo in M (manual) mode** since you control both the shutter speed and aperture manually.

Let's look at an example

. The 1st shot is without EV compensation, in other words how the camera sees proper exposure.

No EV compensation



Overexposed by +1 EV.



Overexposed by +2 EV.



Underexposed by -1 EV.



Underexposed by -2 EV.



So, as you can see, the camera adjusted the shutter speed to let in more or less light to fulfill the request.

## **When to Use EV Compensation**

### **When you need more shutter speed:**

Birds can move pretty fast sometimes and to freeze their movement you need as high a shutter speed as possible. And if they're also far away you need to reduce or eliminate blur from camera shake. In A mode and set the aperture wide open (smallest number) to get the most light. Then bring the EV down by roughly 0.7. It's better to have a crisp darker shot than having a properly exposed blurry shot.

### **When your subject is brighter/darker than your background:**

### **When the sky is bright:**