

## Module 1 - Understanding Exposure

Exposure is all about getting the right amount of light to hit the 'sensor', so your image is exposed correctly. So before we get started, I'll just explain what a sensor is!

In the old pre-digital days, the image you took was created on a piece of film, which was exposed to light when the shot was taken, creating the picture as a pattern of light and dark tones.

In digital terms, that film has been replaced with an electronic version, called a sensor. This records the image that is captured, and transfers that data onto your memory card.



In the image above, you can see the sensor inside the body of the camera, when the lens is taken off. Generally, sensors are only visible on mirrorless cameras. If you have a DSLR it will be hidden behind the mirror, and if you have a bridge camera or compact camera, you won't be able to see the sensor inside the camera because the lens is not removable.

The sensor is very fragile so if you can see it, you should never touch it.

### Sensor size

It's worth mentioning here about sensor size. One of the main reasons for choosing a mirrorless or DSLR camera over a compact or bridge camera is the size of the sensor. On the right you can see the comparative sizes, though this is not to scale. In actual terms a full frame sensor is 36mm wide.

Most DSLRs and mirrorless cameras use a sensor the size of the green rectangle, whereas most compacts and bridge cameras use a sensor the size of the pink square – though there are some variations as you can see here. So you can immediately see why you're able to capture much higher quality images.



The bigger the sensor the more ability you have to print an image out very large, or crop a small section from an image without it starting to look 'pixelated'. This is not to say that compact and bridge cameras are bad, they just have some limitations. For most day to day uses they are absolutely fine, and you have the added bonus of a built in zoom with an excellent range.

### So . . . what is 'exposure'?

In any set of lighting conditions, there will be a correct exposure for a shot – e.g. how much light hits the sensor, or in the old days, the film. Too little light and it will be dark and 'under exposed', or too much light and the shot will be pale and 'over exposed' – as you can see here . . .



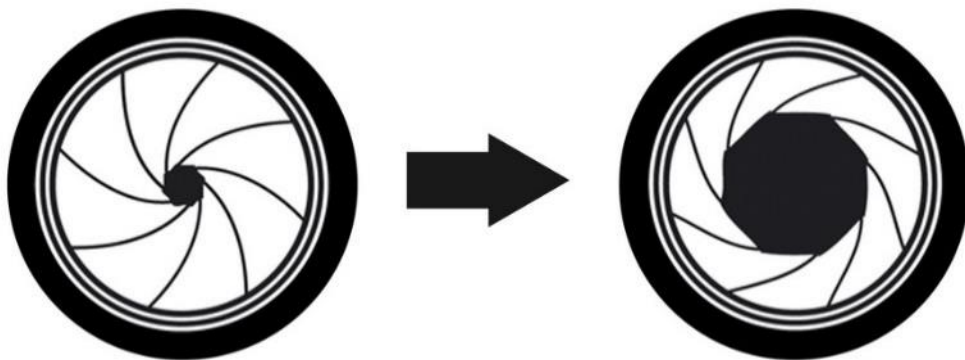
On the left, I allowed too much light to hit the sensor and on the right I did not allow enough light to hit the sensor. So the photographer's aim always to correctly expose each shot, unless you want to intentionally over or under expose – but for the moment, we don't. This is how it should have looked.

So, how do you get the right amount of light onto the sensor? By controlling how much light gets in to the camera when you take the shot – and we have two means of doing this:



### 1. The aperture

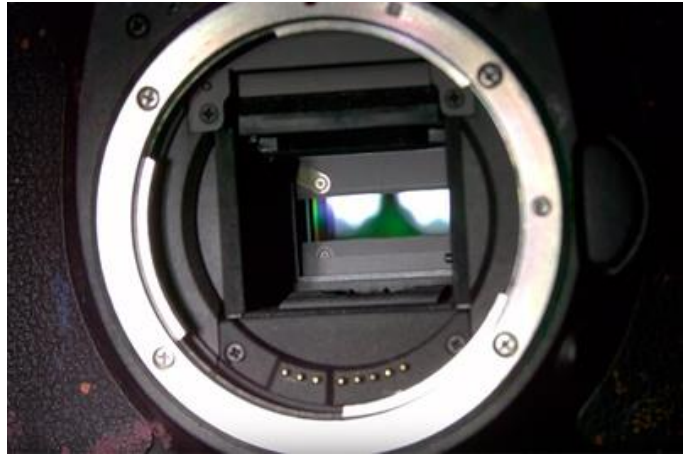
This is the size of the hole in the lens, made bigger or smaller using an iris, much like your eye adjusts the amount of light getting in by making your pupil a different size. It looks something like this – with the small hole (less light) on the left of the diagram, and the larger hole (more light) on the right.



## 2. The shutter speed

This is the amount of time the shutter stays open and exposes the sensor to light. The rest of the time, when the shutter is closed, this stops light getting onto the sensor.

Think of the shutter as being like a curtain, which sits in front of the sensor and stops the light getting in. When you open the curtain, light gets onto the sensor and exposes the image, and when you close it again, the image stops exposing.



You can see the shutter, halfway open, in front of the sensor in this image.

## How shutter speed is defined

I should mention here that shutter speed is referred to in two different ways which are pretty much interchangeable, but can cause confusion. You will hear people talking about fast or slow shutter speeds, and long or short exposures. But these are actually the same, as follows:

- If the shutter is only open for a very short amount of time, then this referred to as a 'fast' shutter speed or a 'short' exposure.
- If the shutter is open for more time, then it's referred to as a 'slow' shutter speed or a 'long' exposure.

## How aperture is defined

Again there are different terms for what is basically the same thing.

- A small hole is usually referred to as a 'narrow' or 'small' aperture.
- A big hole is usually referred to as a 'wide' or 'large' aperture.

**So, when you take a picture, you have to decide on the right aperture (size of hole) and the right shutter speed (length of time the shutter is open) in order to get the correct amount of light onto the sensor, and hence expose the shot correctly.**

## Balancing aperture and shutter speed to give the correct exposure

Usually, the correct exposure is somewhere in the middle. But there is more than just one way of getting that correct exposure.

So, for example – on an average day which is not too bright or too dark, I could choose an average aperture and an average shutter speed and this would give me a correctly exposed image. BUT I could also choose one of the following:

a) a wide aperture (big hole) and a fast shutter speed – so **lots of light, but for not much time**

b) a narrow aperture (small hole) and a slow shutter speed – so **not much light, but for a longer time**

Both of these will result in the same exposure, because both of them will let in the same amount of light eventually – just in different ways.

Think of it like someone opening a door into a dark room. In scenario a) above, we open a large door for just a fraction of a second and x amount of light gets in. In scenario b) we open a small door, but for much longer - a few seconds maybe - so the same amount of light eventually gets in. It just takes longer because the door is smaller.



a) Big hole – small amount of time.



b) Small hole – longer amount of time.

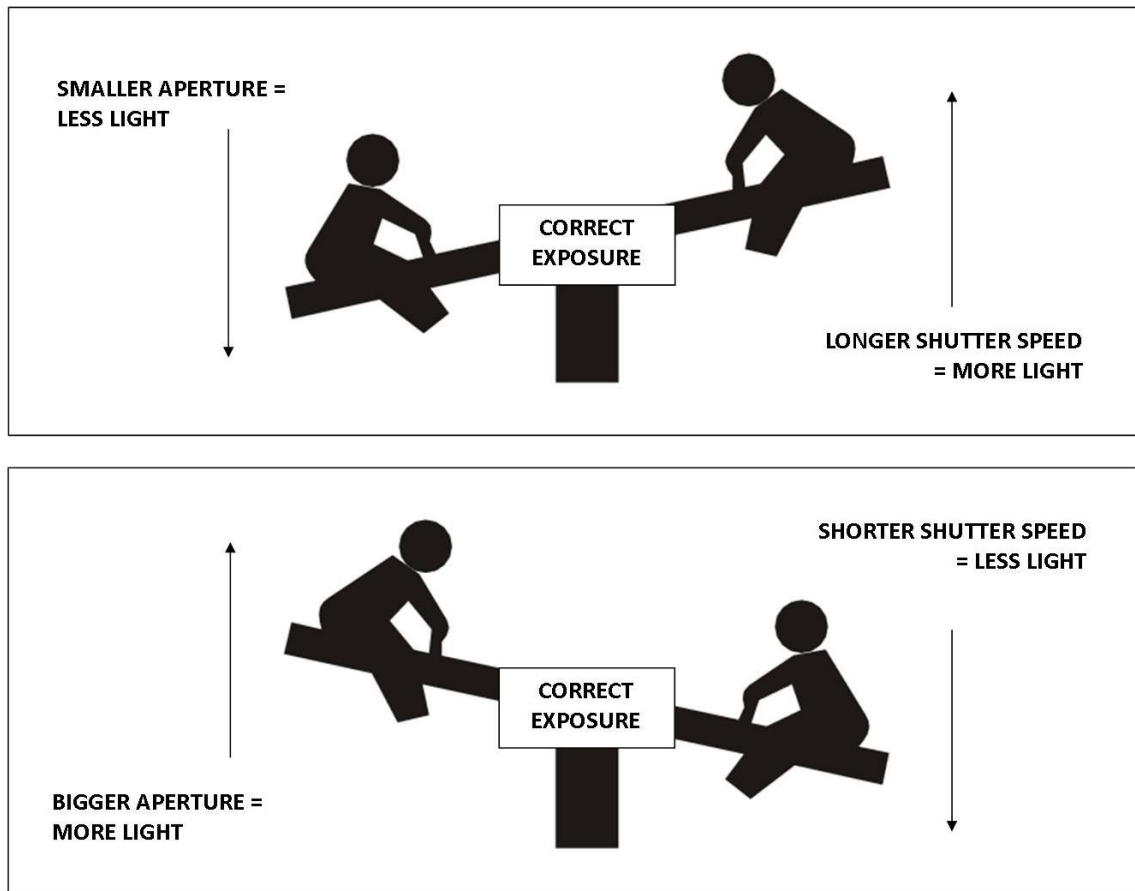
Going back to my 'average' settings – that would equate to a medium sized door, opened for a medium length of time!

This is exactly what is happening with all of the different exposure options. All of them would result in a shot which was exposed to exactly the same level. And this is the key point behind exposure – **there isn't just one right answer for any shot you take.**

The important thing to realise is that if you change the amount of light getting onto the sensor using one of these settings – aperture for example – you then have to alter the shutter speed to compensate for the change.

So, if you make the aperture bigger (increase the size of the hole in the lens) you would let in more light in the same time period – so you have to make the shutter speed faster (open for less time) so that you reduce the amount of light back down again.

Think of it like a see-saw – if one side changes, the other side has to change to compensate.



## Why not just be average?

The obvious question at this point is, so why have lots of options, why not just have those 'average' settings and be done with it? Which is a valid argument - and this is usually what the auto setting on a camera does. It will pick the most 'average' settings for the available lighting conditions.

The reason is that all of those other options - whether you choose a wide or narrow aperture (large or small hole) and whether you choose a fast or slow shutter speed, are all there to create different **artistic effects**. And this is where the creativity comes into photography.

The decision you make about which of the many options to choose from, in order to correctly expose the image, is all about how you want the shot to look, from an artistic perspective.

So that could be things like having a blurry background behind a person, as you see in professional portraits – or having 'silky looking' water in a waterfall that looks like it's moving. All of these effects are created by choosing a specific aperture or a specific shutter speed, and then adjusting the other side of the seesaw to make sure that the exposure remains correct.

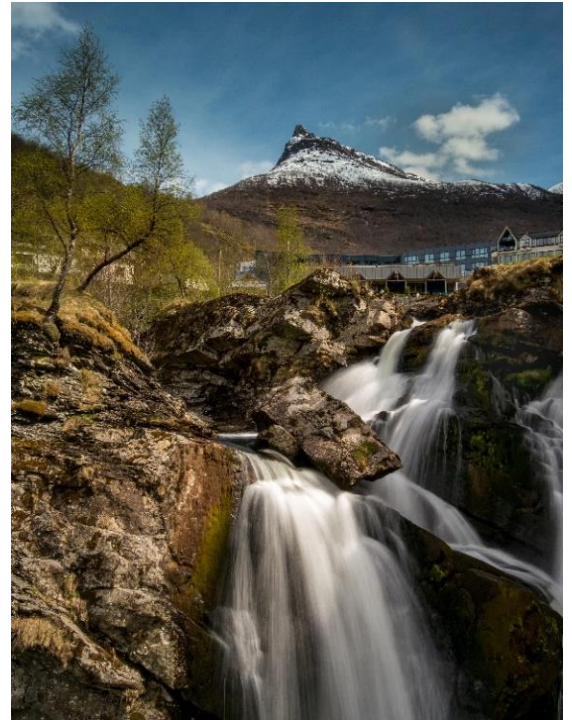
Generally I always recommend choosing the aperture, and then letting the camera decide what the appropriate shutter speed would then be. This is known as 'aperture priority' as opposed to using full manual settings, and I discuss this more in my 'Understanding Aperture' module.



## Some examples of artistic effect

### 1. Slow shutter speed

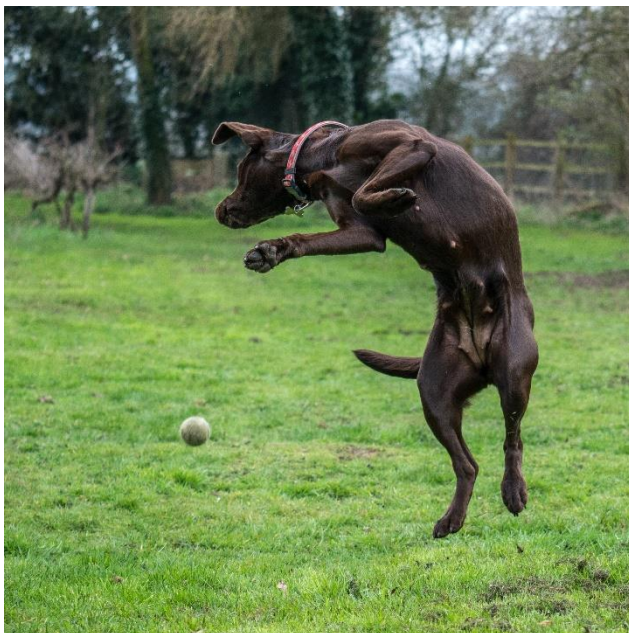
A slow shutter speed (also known as a 'long exposure') will make water, or a car, or a person, look like it is moving



In these examples you can see that car's light trails moved while the shutter was open. Likewise, the water moved while the shutter was open, and so you see a silky effect. The subject physically moves while the shutter is open, creating a streaky or 'moving' effect.

### 2. Fast shutter speed

A fast shutter speed (also known as a short exposure) does the opposite – literally 'freezing' the action. Which makes it ideal for photographing moving subjects where you want to capture them in 'mid action'.



### 3. Wide aperture

A wide or large aperture (size of hole in the lens) will blur the background. And this is also more noticeable if you hold the camera closer to your subject. In this example I focused on elephant, but by choosing a wide aperture, the background and the foreground went out of focus.

This is known as 'shallow depth of field' and I cover more on that in my 'Understanding Aperture' module.



### 4. Narrow aperture

For this shot, I used a narrow or small aperture, and so the background and the foreground are also more in focus, as well as the elephant.

This also demonstrates another artistic effect – as when you use a narrow aperture, it creates a starburst effect on points of light!

This is just a quick couple of examples, to illustrate why we don't just use the average settings all of the time – and why we choose different shutter speeds and apertures, even though we want exactly the same exposure.

**The key thing with all of these is that we used different apertures or shutter speeds but the shot is always correctly exposed, because we adjusted the other setting (the other 'side of the seesaw') to compensate – so that the shot was not over or under exposed.**