Exposure – The relationship between Aperture and Shutter Speeds

Shutter Speeds

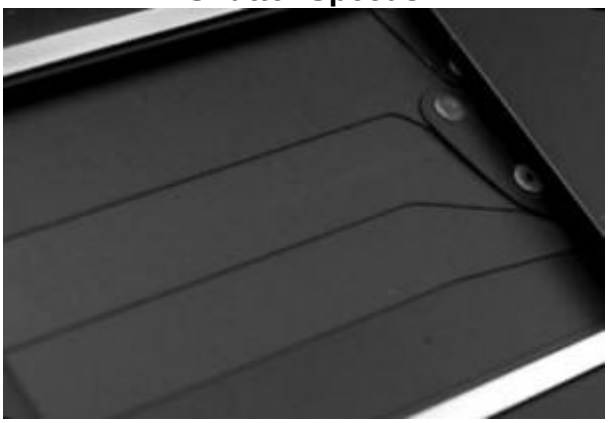


Image of a camera shutter

The camera has a shutter in front of the sensor (some compact cameras have theirs in their lens) and this controls how much light will reach the camera's sensor.

Your average camera will have shutter speeds as follows
(Bearing in mind with digital you can have a lot of in-between options)
4000, 2000, 1000, 500, 250, 125, 60, 30, 15, 8, 4, 2, 1s, 2s, 4s, 8s, 15s, 30s

On the most part we use shutter speeds that are in fractions of a second. On some very old cameras the dial would show 1/1000 for example which is a thousandth of a second. Most cameras today just say 1000, 500, 250 etc and quote the much slower second times with a "s" behind the number like 1s, 2s, 4s etc.

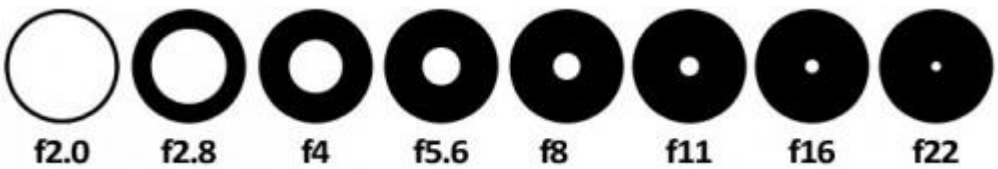
If you remember that those big numbers are fractions you will remember they are short speeds so it's not as backwards as it seem, the bigger the number the smaller the fraction and the short the speed.

Shutter speeds control the amount of movement that will record in an image as well. Using slow shutter speeds will cause – for example – a racing car to blur on the photograph particularly from 1/60th of a second or slower depending on the speed of the car. Likewise the slower the shutter speed the greater the chance of getting camera shake when you camera is not on a tripod.

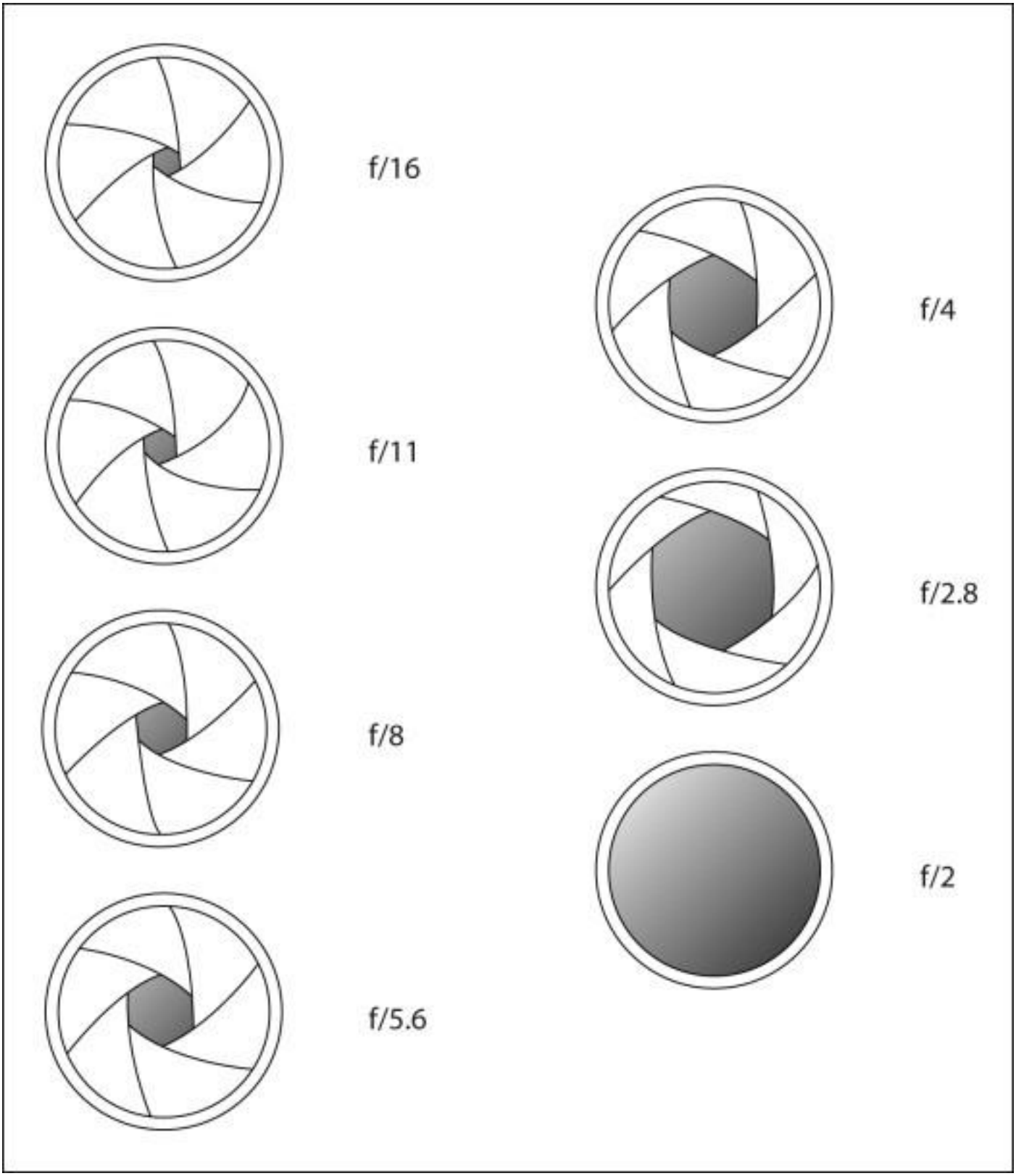
Aperture

This is a variable 'hole' in the lens. The size of this hole is adjusted to control the amount of light passing through the lens, and this, along with shutter speed, this is how the exposure is controlled.

You can see the aperture mechanism in this picture of a lens. It's made up of a series of overlapping metal leaves, and when you adjust the aperture settings, the leaves slide inwards or outwards to make the aperture smaller or larger.



This diagram shows the comparative size of the most common apertures.



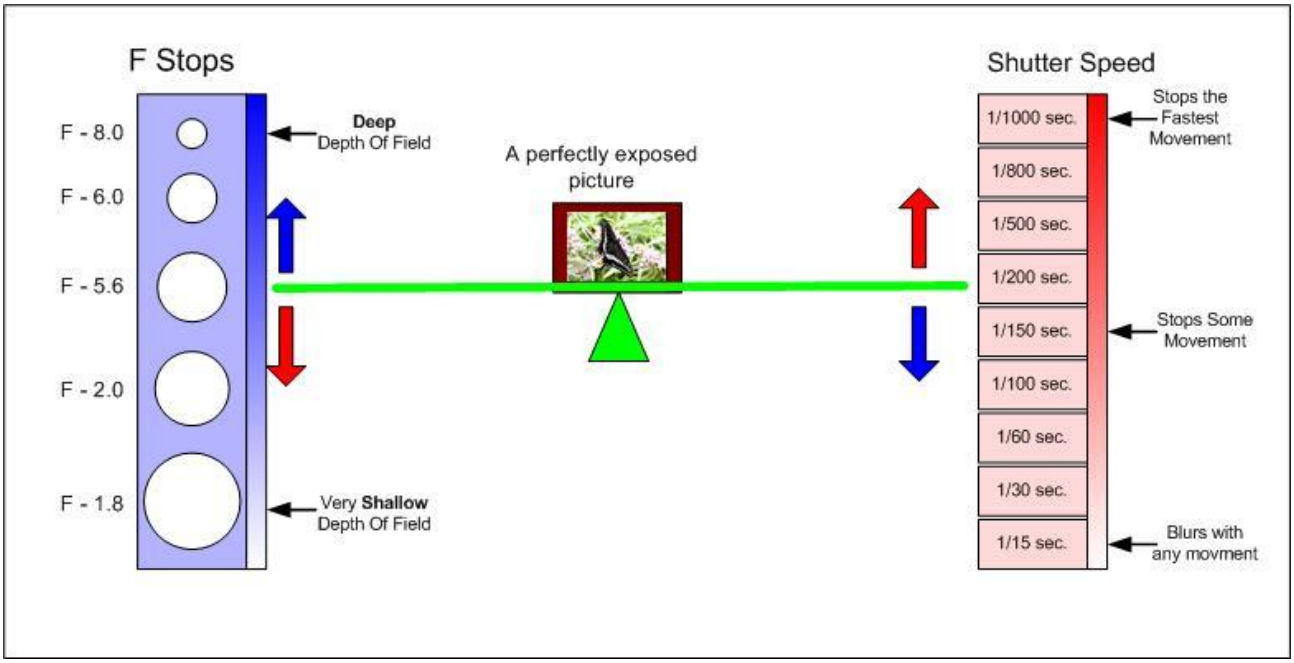
This diagram illustrates the hexagonal shape of an aperture from a camera.

Lens apertures have standard values which apply across all cameras. The higher the number, the smaller the aperture. Each aperture 'step' corresponds to one 'stop' or 1 EV (Exposure Value), and lets through half as much light as the one before. Different lenses have different maximum apertures (a larger aperture has more light-gather power and is a desirable feature). This diagram shows how the aperture size diminishes with a lens that has a maximum aperture of f2 - you can also get f1.4 lenses.

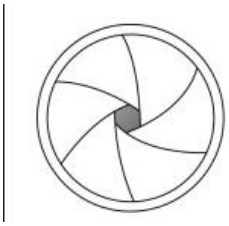
You can get intermediate aperture values too. The ones in the diagram above are the 'full' aperture values, but cameras also offer half-stop values in between and, today, the norm is one-third stop intermediate values. So between f5.6 and f8, for example, there are intermediate values of f6.3 and f7.1.

Relationship Between Aperture and Shutter Speed

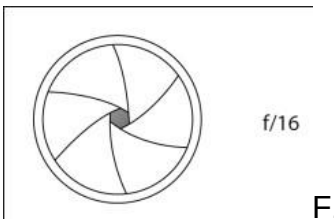
Now, let's look for a moment at the relationship between aperture and shutter speed. In this diagram, various apertures are listed on the left and shutter speeds on the right.



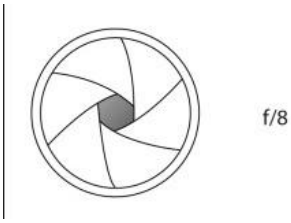
If you adjust the aperture (to a wider aperture) you will need less light and a faster shutter speed. Note the direction of the arrows when you adjust the aperture and shutter speed. Aperture arrow goes down – shutter speed arrow goes up. Inversely, aperture goes up and the shutter speed goes down. Correct/similar exposure can be obtained using the following settings:



F11 at 1/125 sec is the same as



F16 at 1/60 sec which is the same as

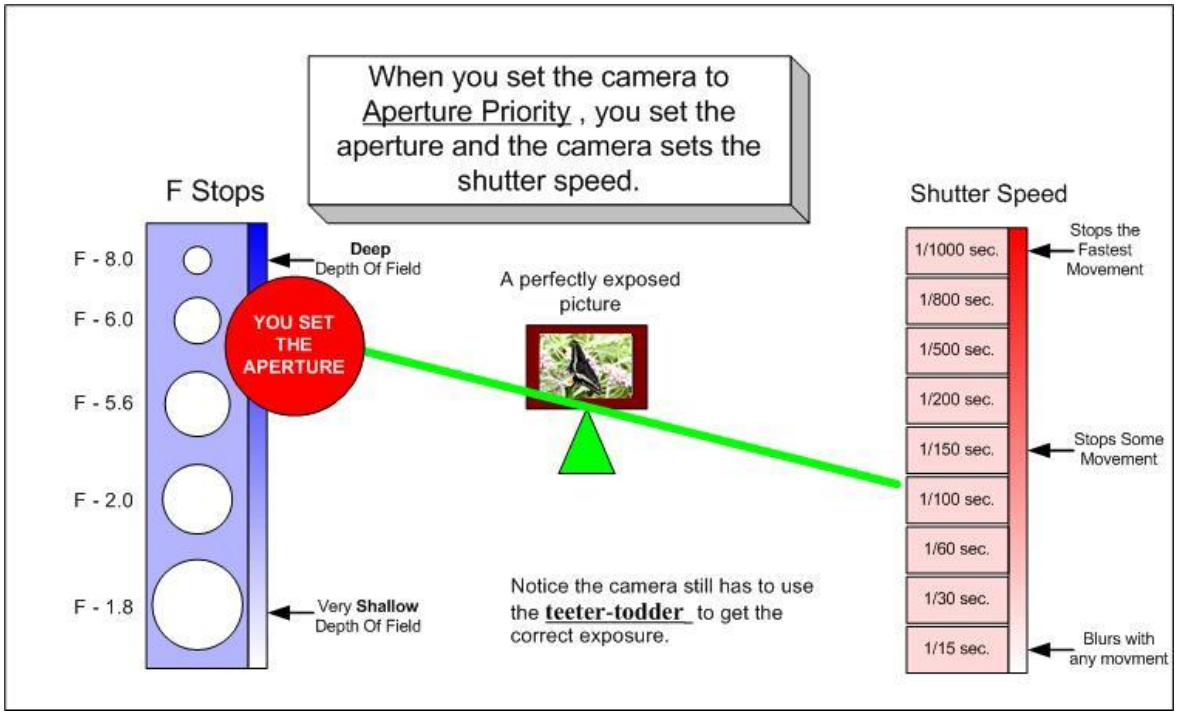


F8 at 1/250 sec

Setting the camera to one of the priority modes.

Aperture Priority

One of these modes is called Aperture Priority. With aperture priority YOU set the aperture and the camera will automatically select a shutter speed to get the correct exposure.



Shutter Priority

Another mode you will find on your camera is the Shutter Priority setting. This works very much like the aperture priority in the last example. With Shutter Priority YOU set the shutter speed and the camera automatically selects the proper aperture. Again the Teeter-Totter concept comes into play; the camera has to adjust the aperture to get the correct amount of light for a correct expose.