

About Lenses

We can get a sharp image without any lens, but only if the aperture that the light comes through is only a pinhole. The resulting exposure times will be very long. Use of a lens to focus the light allows a bigger aperture without loss of sharpness, and so more reasonable exposure times.

The distance from the lens to the sensor is called the focal length of the lens, and is given in millimetres.

Longer focal length lenses give bigger images but with a smaller field of view.

A lens with the same field of view as the human eye is called a **normal** lens. For “full frame” digital cameras 50mm is normal, while for the more common APS-C sensors normal is 32 or 34mm.

A lens longer than normal is called a **telephoto**, as it brings things closer, while a shorter than normal lens is called a **wide-angle**, as it can see more. Wide-angle lenses can give distortion, particularly if not held horizontally.

One feature of SLR cameras is that we can change the lens. It is recommended that you turn off your camera before changing lens, and change as quickly as possible to keep out dust. If working outside, turn your back to the wind. Be careful not to damage the projections at the base of the lens, used by the camera body to control the lens.

We can control the size of the aperture in the lens. Bigger apertures let in more light, while smaller apertures give an overall sharper picture. A lens with a big maximum aperture (eg f2.8) will be bigger and heavier and more expensive than one with a smaller maximum aperture (eg f3.5). *More light allows faster exposures* – look at the lenses used by sports photographers.

Longer lenses let in less light than shorter lenses. To allow us to compare settings between different lens and different apertures we have the **“f-stop”** aperture numbers. The f8 setting for example will let in the same amount of light, no matter what the lens. The “standard” f-stops are 1.4, 2.0, 2.8, 4, 5.6, 8, 11, 16, 22, 32. For any of these apertures, changing to the next larger (eg 2.8 to 2.0) will let in twice as much light, and changing to the next smaller (eg 2.8 to 4) lets in half as much light. Modern lenses are not restricted to these apertures, but can use intermediate values too.

For different photo opportunities we can use different lenses, but carrying a lot of lenses can make a photo outing very tiring, so we can get **“zoom”** lenses with changeable focal lengths. Making a lens with a large range of lengths involves a sacrifice of quality, so generally a shorter range zoom will be better than a larger range, with the unchangeable **prime** lens giving the best quality.

For APS-C sensor cameras, a good starting zoom would be 18-55mm, giving focal lengths both sides of the normal 34mm. For short telephoto work add a 50-200mm, and for a wide angle zoom get a 12-20mm. Put your money in glass, not in the camera, and buy the lenses in as big a max aperture as you can manage.

If you move while hand-holding your camera you will get a blurred image, called camera shake, and the longer the lens the more the blurring. To avoid it you need to use a suitably short exposure time. The guideline is to take the focal length, add a half to it, and make it into a fraction of a second. So, for a 50mm lens, $50 + 25 \rightarrow 75$, so use a time faster than $1/75^{\text{th}}$ of a second. For a 200mm, you need faster than $1/300^{\text{th}}$ of a second.

Always use a lens hood. It cuts down on flare and may protect the front of the lens from damage.