

# Lens Basics

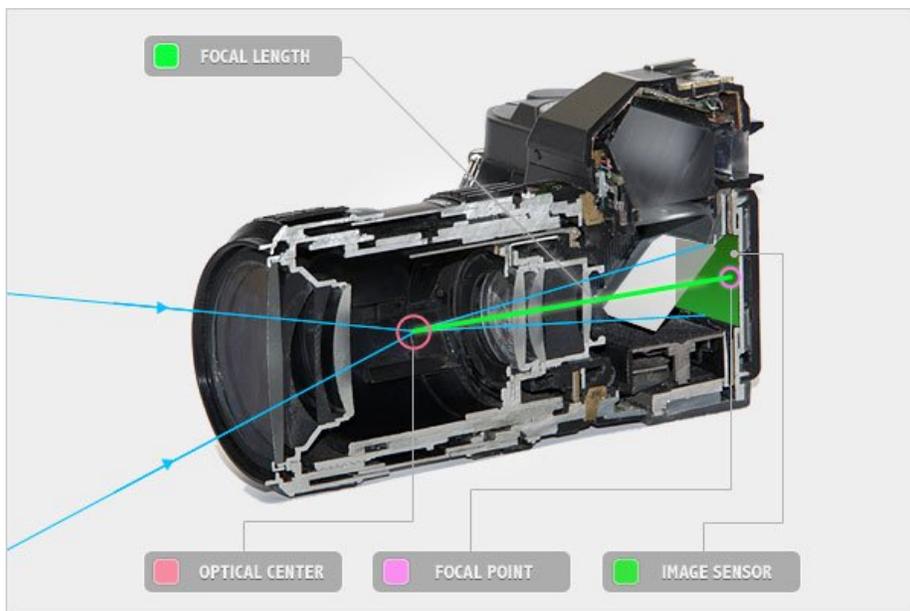
## Understanding Camera Lenses

Attila Kun (<https://www.exposureguide.com/author/attila-kun/>)

The creative use of the lens gives photography its expressive qualities - they shape the way you “see” the world through the viewfinder.

There is an inherent distorting quality to a camera lens, and you have to embrace that to get your vision properly captured on “film” or in the image sensor.

## A The Focal Length



A primary characteristic of a lens is the focal length.

A lens’ focal length is defined as the distance between the lens’ optical center and the camera’s image sensor (or film plane) when focused at infinity.

To understand this definition of focal length, we need to define “optical center” as well. A lens’ optical center is the point (usually though not always) within a lens, at which the rays of light from two different sources entering the lens are assumed to cross.

Shorter focal length lenses provide a wider field of view but offer less magnification. Conversely, longer focal lengths provide a shorter field of view but provide greater magnification.

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On DSLRs, the interchangeable lens' focal length is measured in millimeters.

The focal length of a lens is usually displayed on the lens barrel, along with the size of the adaptor ring.

## B The Lens Ratio



When you look upon the front end of your lens barrel, you'll see a ratio number (1:2.8, 1:2.8-4, 1:3.5-5.6, etc), which is the maximum aperture of the lens.

The aperture determines how much light the lens transmits to the image sensor.

The lower the maximum aperture value will indicate the quality of the lens in terms of brightness. High quality zoom lenses deliver a constant f-stop throughout the focal range (i.e. a  $f/2.8$  at 35mm and a  $f/2.8$  at 80mm); whereas on a lower quality lens, the f-stop varies as you travel up the focal range (i.e. a  $f/3.5$  at 28mm, but a  $f/5.6$  at 80mm); you are losing at least one stop of light as you zoom up the focal length from wide angle to telephoto.

A lens with a low f-number (wide maximum aperture), is a better quality lens and allows you to do more with it.

For example, such a lens is "brighter," allowing you to take photos in low ambient light conditions, yet still register a quality exposure.

In addition, these bright lenses will enable you to achieve a very shallow depth of field.

It is to be noted that any lens that is  $f/2.8$  or lower is considered to be a professional lens, and will have a correspondingly higher price tag.

# 1 Standard/Normal Lens



The standard lens has a fixed focal length (50mm, 85mm, 100mm), and reproduces fairly accurately what the human eye sees – in terms of perspective and angle of view.

For a 35mm film camera or a full-frame DSLR, the 50mm lens is considered standard.

At higher focal lengths (85mm or 100mm) you have an ideal lens for portraiture because when coupled with a wide aperture they thoroughly soften any background detail, thus making it less likely to distract from the main subject.

# 2 Wide Angle Lens



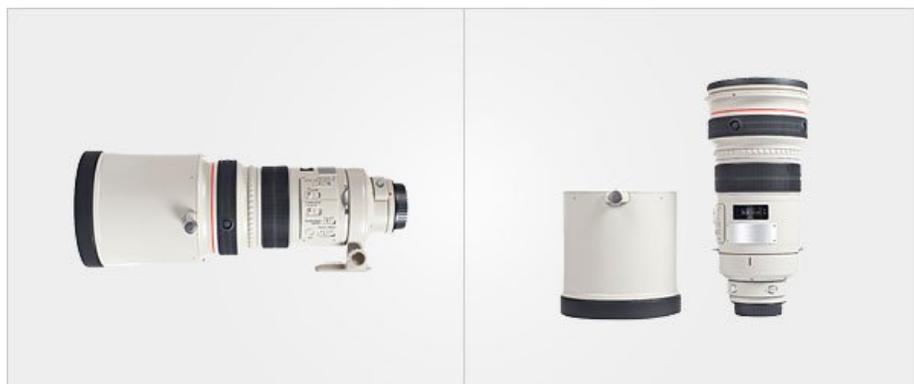
A wide-angle has a shorter focal length (10 thru 42mm) when compared to a standard lens.

This enables you to capture a comparatively wider angle of view. A wide-angle lens is a natural choice for capturing outdoor landscapes and group portraits.

In fact, wide angle can be the only way to capture the complete setting without omitting any important elements in the image.

In this manner, you can use wide-angle lenses to capture a deep DOF.

### 3 Telephoto Lens



Telephoto lenses (100mm – 800mm) can provide you with a narrow field of view.

These long lenses enable you to compress a distance (and compress the sense of depth, as well) and pick out specific objects from far off.

They have a strong resolving power and an inherent shallow DOF, where the slightest lateral moment can take a subject out of view.

Telephoto lenses are great for wildlife, portrait, sports, and documentary types of photography.

They enable you to capture subjects from hundreds of feet away.

### 4 Zoom Lens



Zoom lenses have variable focal lengths, and are extremely useful.

Some can range between a wide-angle and a telephoto (i.e. 24 to 300mm) so you have extensive versatility for composition.

The trade-off with zoom lenses is the aperture. Because of the number of elements required in constructing these lenses, they have a limited ability to open up and allow in light. ▶

So unless you're prepared to outlay a lot of money, you will give up lens speed.

## 5 Fisheye Lens



A fisheye lens is a specialized, wide-angle lens that provides extremely wide images by changing straight lines into curves.

It can sometimes produce circular, convex, or oval images by distorting the perspective and creating a 180° image.

The range of focal length varies between 7~16mm in a fish-eye lens.

## 6 Macro Lens



Macro lenses are used for close-up or "macro" photography.

They range in focal lengths of between 50-200mm. These lenses obtain razor-sharp focus for subjects within the macro focus distance, but lose their ability for sharp focus at other distances.

These lenses enable the photographer to obtain life-size or larger images of subjects like wasps, butterflies, and flowers.

## 7 Tilt-Shift Lens



The Tilt-Shift lens enables you to manipulate the vanishing points, so when you're shooting buildings you can alter the perspective of an image so the parallel lines don't converge, thus eliminating the distorting quality of the lens.

The tilt-shift lens also enables you to selectively focus an image; where only specific portions of the image are in focus and out of focus within the same plane.

## 8 Image-Stabilization Lens

These lenses contain small gyro stabilizer sensors and servo-actuated lens elements, which purportedly correct for camera shake that occurs with longer focal length lens or in low-light conditions when you need to have slower shutter speeds to achieve an effective EV.

It is claimed that these lenses enable the user to shoot handheld at 2 to 4 stop slower shutter speeds (exposure 4 to 16 times longer) than the minimum required for a sharp image.

## C Conclusion

There are many possible lens choices, and all will give you a different and distinct image.

Part of the creativity of the photographer is in selecting the right lens to capture the vision of the world the way she or he sees it, or wants to present it.