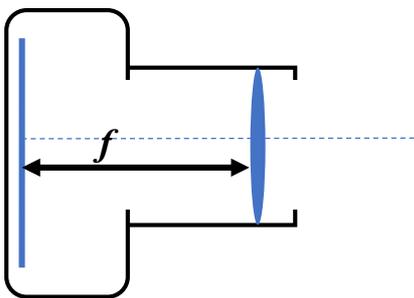


Focal Length and Angle of View

Most SLR cameras allow you to remove the lens and substitute another one in its place. If you look online or in a photography magazine you will see that there are many different types of lenses and these can vary in price from under a hundred pounds to many thousands of pounds.

What is Focal Length?

All simple, convex lenses have a point at which they produce a sharp, focused image. Think about a magnifying glass, you move it slightly so that you can focus on a small object. The distance from the lens to the point of focus is called the focal length. In a camera, you move the lens slightly so that the film or sensor is at the focal length of the lens.



The diagram shows a very simple camera system with a single lens and a film or sensor at the back. Light comes into the camera and falls onto the film.

The lens is mounted on a screw which means that if you rotate the barrel then the distance between the lens and the film changes.

By doing this, the photographer is able to place the lens at its exact focal length from the film. So the image will be in focus.

What Difference does Focal Length Make?

The lens that is placed on the front of a modern camera is actually a collection of many different lenses all working together. The *effective focal length* of that lens will be a combination of a number of factors: the lenses contained within it and the size of the sensor that the light is falling on.

I took two photographs of a gate. I used the same camera but I changed the focal length of the lens (I was using a zoom lens in this case). I had to also change my distance to the gate in order to get comparable pictures.

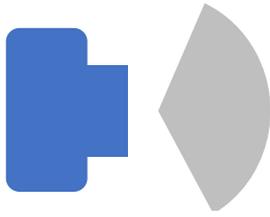


This photograph was taken with a 24mm lens, also called a *wide angle* lens. You can see the gate and most of the big field behind it.



This photo was taken with a 105mm, or *telephoto* lens. You can't see as much of the field but notice how close the trees seem to be.

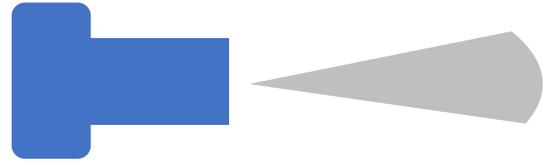
Angle of View (or Field of View)



A short focal length has a wider angle of view than a longer focal length lens. This means that it is able to take in more of the surroundings when you use this type of lens.



This picture was taken at a focal length of 24mm. Notice that you can see a lot of the sky and the tree to the left. The trees on the far bank look quite distant though. Look at how the hull is distorted by the wide angle lens



Longer focal length lenses allow you to show detail of more distant objects but the angle of view is narrowed ... you can't see as much of the surroundings as you can with a shorter focal length lens.



This is taken at 105mm and I was further away from the boat. You can't see as much of the far bank of the river but what you can see looks closer than in the wide angle view. This is called *foreshortening* and it is a feature of long focal length.

Focal length and Depth of Field

Both of the images shown above have a deep depth of field, meaning that both the foreground and the background are in focus (remember, you do this by having a small aperture ... which is a larger f number).

But if you want to create an image with a shallow depth of field you get a much more pronounced effect if you use a longer focal length lens. In fact, it is hard to achieve a shallow depth of field image with a wide-angle lens.

The foreshortening effect of the telephoto lens causes the background to appear adjacent to the subject in the foreground. If the depth of field is shallow then the out-of-focus background will contrast more with the in-focus foreground. In reality, the background is a long way away from the foreground ... but in your picture, the telephoto lens, makes them seem much more close.

Types of Lens

With many SLRs you are able to remove the lens and replace it with a different one. There are many different types with each one suited to a particular type of photography. Lenses that have a fixed focal length are sometimes called *prime lenses*. Below are examples of images taken with just three different prime lenses.

8mm



This is an extreme wide-angle or fisheye lens. On some cameras it is able to give you a 180° field of view (in practice you have to be careful not to include your feet in the photograph). The image is very distorted: in a similar way to looking at your reflection in the back of a spoon.

50mm



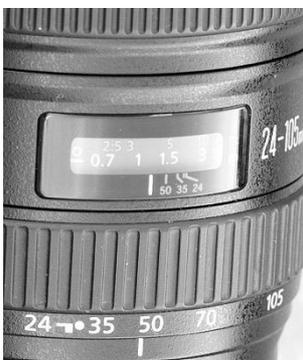
A 50mm lens is meant to produce a similar field of view to our own eyes. They have been popular in reportage and street photography

135mm



This is a telephoto lens. It allowed me to focus on the butterfly without having to get too close and scare it off. The long focal length has allowed me to use a short depth of field and throw the plants in the background, which could have been distracting, completely out of focus.

Zoom lenses are a complicated combination of different lenses which allow the photographer to vary the focal length of the lens system. This is why zoom lenses are often referred to by the range of focal lengths that they offer. So, for example, an 18-55 lens means that you can shoot with a wide-angle 18mm focal length then zoom up to a standard 55mm focal length for another shot ... *or any focal length in between.*



On a zoom lens there will usually be a sequence of numbers that line up with a mark. In the photograph shown here they are the numbers at the bottom of the image. That is an indication of the focal length of the lens system ... so, in this case, the system is operating with a 50mm focal length.

The numbers in the window above it relate to the point of focus of the lens. This will be different for different lenses, in some cases going from a under a centimeter all the way to ∞ (infinity).