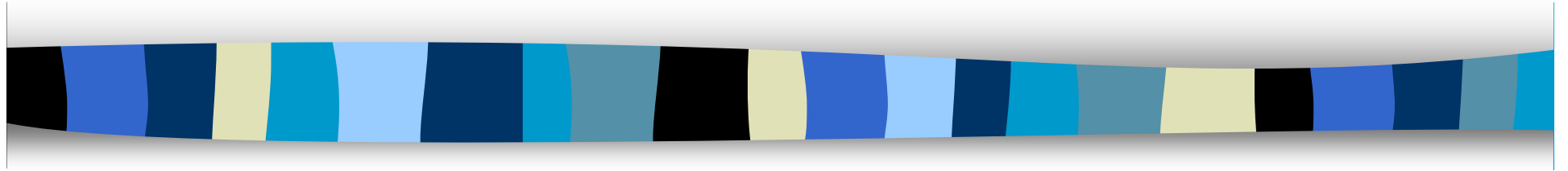




How A Camera Works



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What Is A Camera?

- A camera is a device for forming and recording images that takes stages of motion. It is just a box, which can capture images.
- It makes a copy of a scene on film by collecting light from that scene and turning it into a picture.



Different Parts Of A Camera

Film

The film inside is sensitive to light. It is coated with chemicals, which change when light shines on them.

Viewfinder

The viewfinder shows you the picture you are about to take with the camera. Some viewfinders allow you to look through them and the camera lens at the same time.

Focus Setting

The focus setting is turned to alter the position of the lens until the object is in focus. Some cameras focus on an object automatically.



Different Parts Of A Camera

Aperture

The aperture is the hole that is made when the shutter opens. The aperture control lets the right amount of light into the camera.

Lens

The lens refract light that comes from an object, and focuses it as a sharp image on the film. With some cameras, you can adjust the lens to focus on objects at different distances.



Different Parts Of A Camera

Shutter

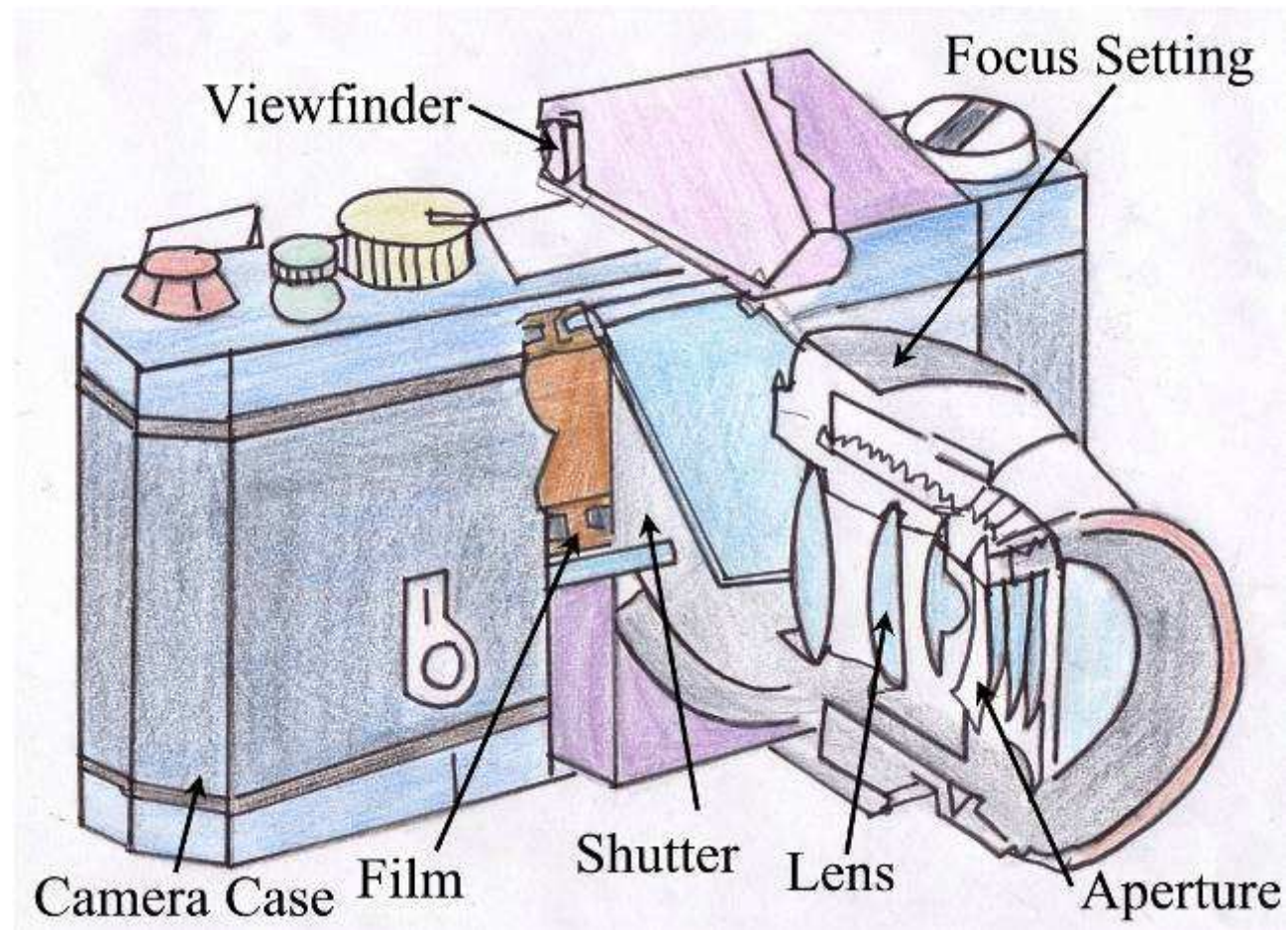
The shutter is like a small gate that opens for a very short time to let in the light, before closing again.

The shorter the time it stays open, the less light enters the camera.

Camera case

The camera case is normally colored black so that no unwanted light reaches the film.

Different Parts Of A Camera





Aperture

- The aperture is just a hole, which is placed behind the camera lens.
 - This can be made larger or smaller.
- When the aperture is small, some of the light rays that go into the lens do not reach the film but it does reduce the amount of light that hits the film, making the image darker.
- Changing a camera's aperture affects both the brightness of an image and the depth of field.



Shutter

- All cameras have a shutter between the lenses at the front and the film at the back.
- The shutter is mostly closed so that light cannot get to the film.
- When you press the button to take the photo, the shutter opens briefly and then closes again.
- The time for which the shutter is open is called the shutter speed.

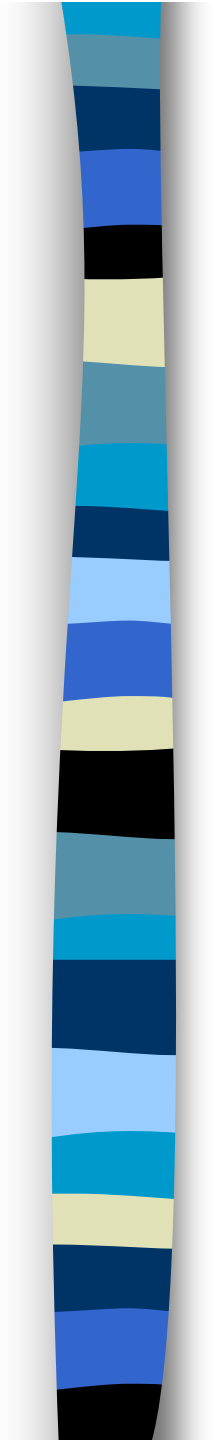


Shutter Speed & Camera Shake

- Most photographs are taken with a shutter speed of between $1/60$ and $1/250$ of a second.
 - On some cameras, you have to set the shutter speed by turning a dial.
 - Each setting gives a shutter speed about twice as fast as the one before.
 - When the shutter is open, even small camera movements make the image a blurred picture.
- This is called a camera shake. This happens if the shutter speed is below $1/60$ of a second.

Film

- The film is a long roll and has gear teeth/sprocket teeth that fit into holes along each edge to wind the film along for the next photograph.
- When a photo is taken, a motor runs the gear teeth of the film which winds on the film with a new blank area.





How The Camera Works

- The lens on the front of a camera makes a picture appear on the film inside the camera.
- By looking into the viewfinder, you can see the picture that the camera will take.
- You then press the shutter release to take the photo.
- The light rays that come from an object in front of the camera are refracted (bent) by the lens to project an image of the object onto the film.



How The Camera Works

- The image is upside down and back to front, but the picture is seen the right way when a print or slide is made.
- When the shutter release is pressed, the shutter opens for a fraction of a second and exposes the film.
- The exposure is so short that moving objects appear to be still.
- The lens may also have an aperture that opens or closes to let more or less light through the lens.
 - The aperture is opened if the scene being photographed is not brightly lit.



Convex Lens

- If you looked through a convex lens at an object, it would be magnified and would be bigger than its actual size.
- Convex lens is a sort of converging lens which is thicker in the middle than at the edges.
 - Both surfaces of the lens curve outwards.
 - The light rays pass through them, are then refracted and come closer together, or converge.

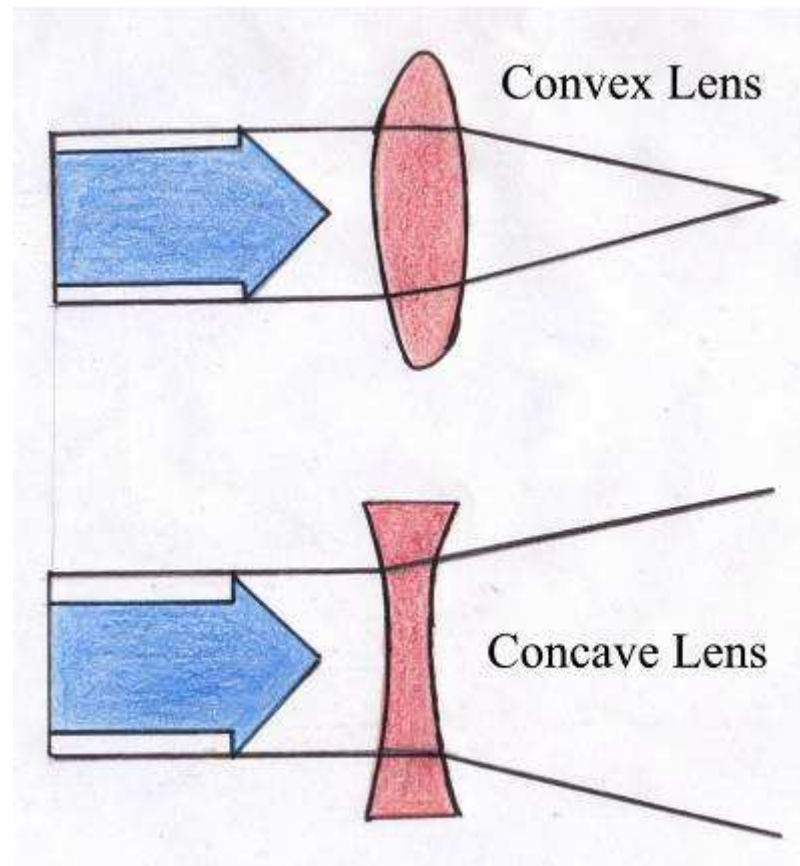
Concave lens

- The light rays spread out or diverge.

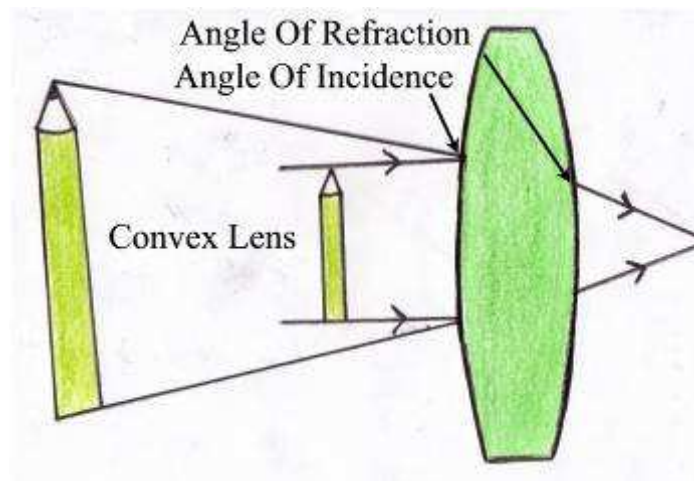
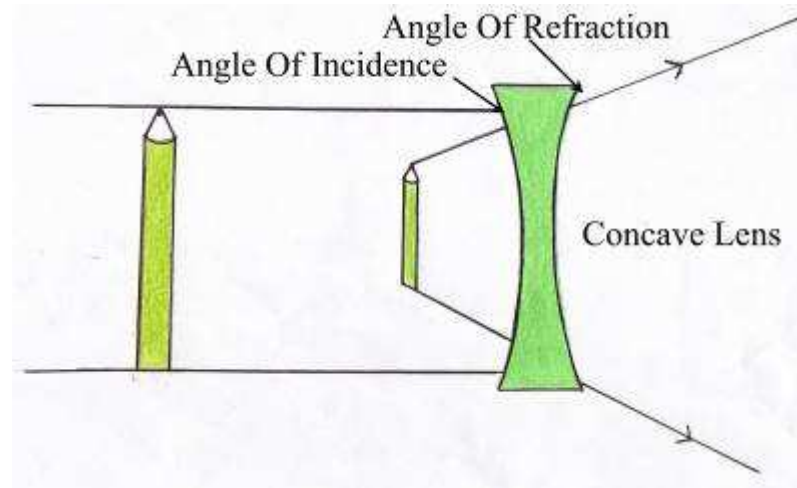
Convex And Concave Lens

■ Light Waves

■ Light Waves



An Object Seen Through Lenses





The Science Behind The Camera

Refraction

Refraction is the breaking or bending of light rays. When light passes from one substance to another, it may also change direction.

Light rays travel at different speeds as they pass through different substances.

The amount of light that is refracted depends on two things :

1. The colour of the light. Red light bends less than violet light.
2. The angle of which the light reaches the surface of the second substance.

This is called the **angle of incidence**. The angle at which the light leaves the second substance is called the **angle of refraction**.



Lenses

- The most important component of the camera is the lens.
- Most lenses are made out of a curved piece of glass.
- It works by having beams of light bounce off of an object and redirect them so they come together to form an image that looks just like the scene in front of the lens.
- This is because when light travels from one source to another it changes speed.
- Light travels more quickly through air than it does through glass as the lens slows it down.



Lenses

- When light passes through the glass lens, it will be reflected in one direction as it enters the lens, and goes another way as it leaves the lens.
- The shape and size of the lens will show the type of image that is shown after the light has passed through.
- As well as the shape and size of the lens, the position of the lens shows how large or how small the picture will be, as can be seen with a magnifying glass.



Lenses

- The lens's angle of view is known as its 'focal length'.
- All camera lenses have their own focal length which is written somewhere on the lens.
- The focal length is the distance between the centre of the lens and the focal plane inside the camera where the light coming through the lens creates an image of the object being photographed.
- Wide-angle lenses give a wider view of what we usually see with our eyes.



Light

- The light is very important when taking a picture. If you have too little light in the photo it becomes dark and if you have a large amount of light, it becomes too bright.
- You may need to adjust the amount of light by using the shutter.
- Having it narrow doesn't allow much light in and having it wide open will allow as much light as it can possibly take.



Reflection

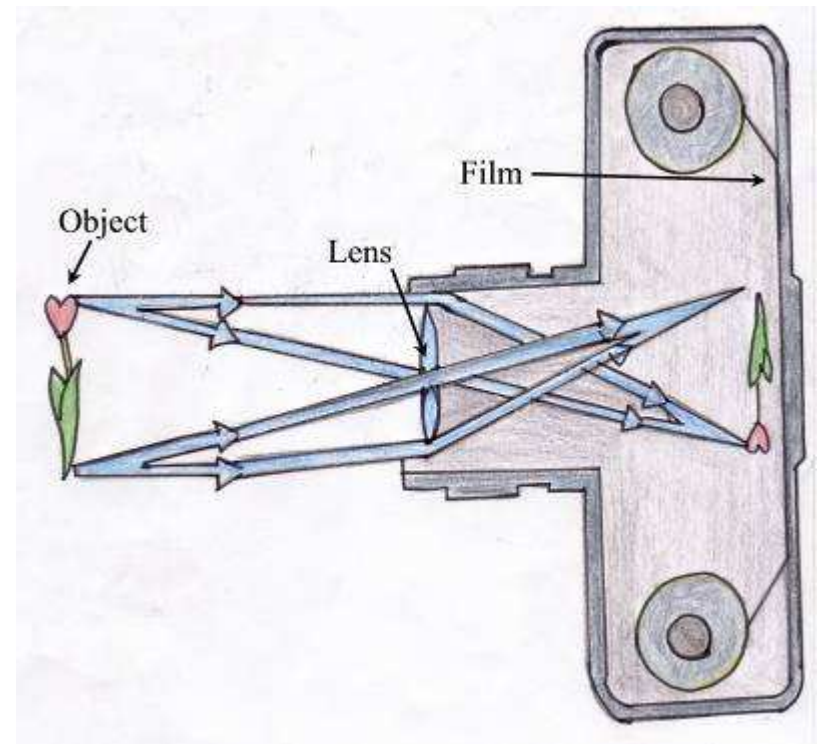
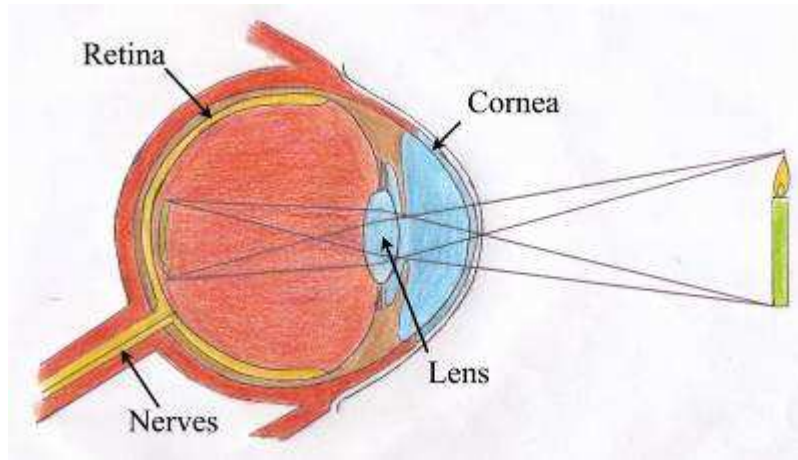
- Reflection is the bouncing off, of light rays from another material.
- The light is reflected back and enters your eyes. Your eyes allow you to see to object in colour. It is in focus.



Eye

- The camera is like our eye because it has a lens.
- Light rays from an object, such as a flower, are focused by its lens on to a light-sensitive film inside the camera.
- At the back of each eye, there is a thin layer of cells called the retina. These cells are extremely sensitive to light. When you look at an object, a small image of it appears upside down on the retina of each eye. The nerves inside the eye send information about this image to your brain.
- Our brain pieces together all the information it is given and builds a picture of the object that you have been looking at. It also turns the image on the retina, the right way out for us.

Comparing The Eye To The Camera





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