

Al-Saudia Virtual Academy



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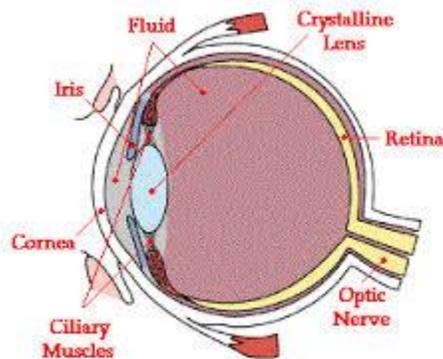
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Reflection of Light and Optical Instruments

Human Eye:

The eye ball is nearly spherical in structure. Its outer layer is thick and opaque and is called sclerotic. The front portion of sclerotic is called Cornea and it is transparent. Inside the sclerotic there is a black pigment layer called choroids whose front portion known as Iris. At the center of iris, there is opening called pupil of the eye. This iris contracts in bright light and elongate in dim light. In this way the size of pupil is controlled. Behind this iris there is a soft transparent convex lens which forms the image of the object at the back of the eye ball, called retina. There are nerve linings in the retina which are connected to the optic nerves. The sensation of image formed on the retina is conveyed to the brain through optic nerve.

The lens is supported by ciliary muscles which can increase or decrease the curvature of the lens thus changing the focal length of lens. The focal length of lens changes to the distance between the object and the eye so that clear image is formed at the retina.



Defects of vision:

1. SHORT SIGHTEDNESS (MYOPIA)

The eye having this defect can see near objects clearly. The distant objects are not clearly visible. This defect may be due to eye ball of large size or short focal length of the eye lens. In this defect the image of the distant object is formed in front of retina. This defect may be corrected by using a concave lens.

2. LONG SIGHTEDNESS (HYPERMETROPIA)

The eye having this defect can see distant objects clearly. The near object is not clearly visible. This defect may be due to eyeball of small size or long focal length of the eye lens. In this defect the image of the near object is formed behind the retina. This defect may be corrected by a using convex lens.

ASTIGMATISM:

If the cornea of the surface of the eye is not perfectly spherical. The eye has different focal point in different planes and the image is not clearly formed on retina. Astigmatism is corrected by using a symmetrical lens having different radii of curvature in different planes.

LACK OF ACCOMMODATION (PRESBYOPIA):

At old age the ciliary muscles get weak resulting in the lack of accommodation. This defect is called presbyopia and can be corrected by using bi-focal lenses. The convex part is on the lower side to see near objects and concave part in the upper side to see the distant object clearly.

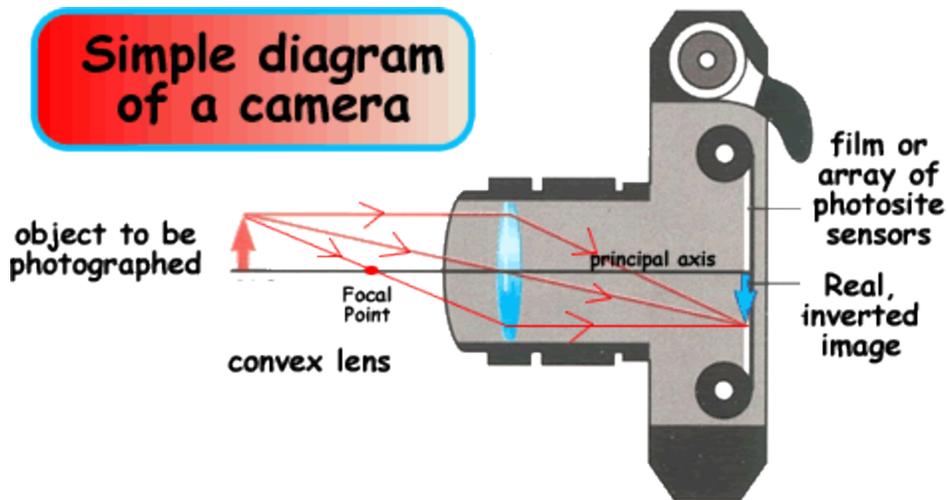
CAMERA:

It is an optical instrument by which permanent image of an object is obtained on a sensitive screen. It consists of a light proof container blackened inside to absorb energy (light). In ordinary camera, a convex lens is situated at the front to produce real and inverted image of the object on the screen situated at the back of the camera. The lens of the camera can be moved in or out with the help of mechanical mount in order to get sharp image.

There is a shutter between the film and the lens. When a photograph is taken, the shutter opens for a while and closes by pressing a button. Thus light is made to fall for a very short time on the sensitive screen.

The formation of clear images depends on following factors:

- i. Diameter of the aperture of the camera.
- ii. Focal length of the lens.



Total internal reflection:

When a ray of light enters from denser to rarer medium it bends away from the normal, therefore the angle of refraction $\angle r$ is greater than the angle of incidence.

When angle of incidence increases, the angle of refraction also increases but it remains greater than the angle of incidence. At certain angle of incidence, angle of refraction becomes 90° . This angle of incidence is called critical angle. If angle of incidence is made greater than critical angle the angle of refraction becomes greater than 90° and the light is totally reflected back into the same denser medium. (As shown in fig). This phenomenon is called total internal reflection.

