SNC2D PHYSICS

LIGHT & GEOMETRIC OPTICS

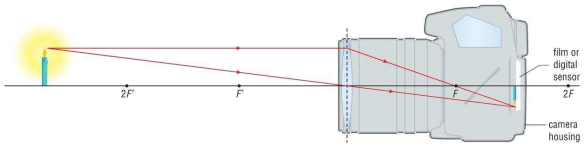
- Applications of Lenses (P.482-492)

Applications of Lenses

Lenses make use of the phenomenon of refraction. Optical devices that involve lenses have been used for centuries. These devices have benefitted humans greatly and have often led to great advances in knowledge. In this section, you will examine some of these optical devices.

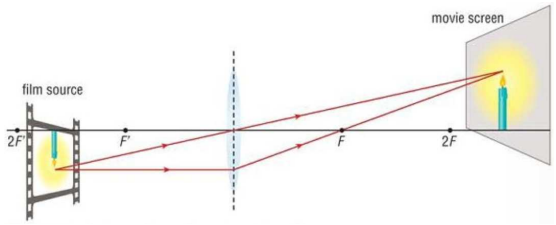
Applications of Lenses – Camera

A camera uses a converging lens. When the object being photographed is farther from the lens than 2F', the camera produces a real image that is smaller than the object and upside down (inverted). This image is recorded on film or a digital sensor. "Focusing" is when the lens moves in or out until the light rays converge to form a sharp image.



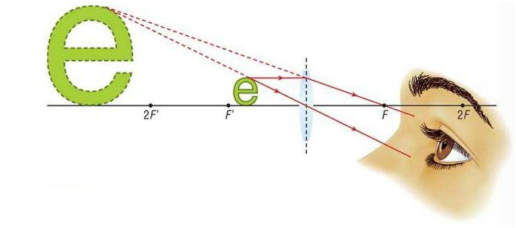
Applications of Lenses – Movie Projector

A movie projector is, in a sense, the opposite of a camera. A projector takes a small object (the film) and projects a large, inverted, real image on a screen. Because the image is larger than the object, the film must be located between F′ and 2F′. Also, because the image is inverted, the film must be loaded into the projector upside down so what we see is upright.



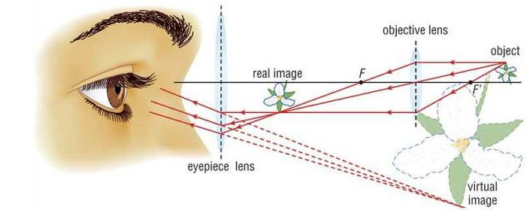
Applications of Lenses – Magnifying Lens

A magnifying lens is a converging lens. To produce a clear image an object is placed between the focus and the lens. This produces a larger, upright, virtual image. A magnifying lens allows us to see objects in more detail than with unaided eyes. For example, you might use a magnifying lens to read small print in a book, or to help remove a tiny splinter from your skin.



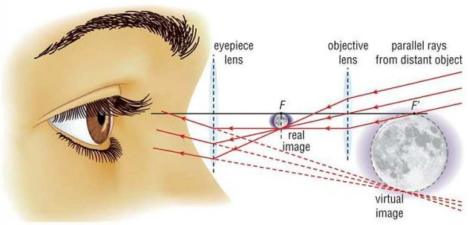
Applications of Lenses – Compound Microscope

A compound microscope is an arrangement of two converging lenses. The lens closest to the object (ie the objective lens) produces a real image of the object. We do not see this image because it is formed inside the body tube of the microscope. The lens we look in (ie the eyepiece lens) then produces a larger, inverted virtual image of this real image. It is this virtual image that we see when we look into the eyepiece of a microscope.



Applications of Lenses – Refracting Telescope

A refracting telescope, which helps us see objects that are very far away such as the Moon, operates on the same principle as a compound microscope – except the object is much farther away. Like a compound microscope, though, two converging lenses produce a real image that we do not see and a larger, virtual image that we do see.



✔ Check Your Learning

1. (a) Why is a refracting telescope not suitable for viewing objects on Earth?
   (b) How is a refracting telescope and a microscope similar in design?

   (a) the image is upside down
   (b) both use two converging lens to create an enlarged, virtual image that is upside down

✔ Check Your Learning

WIKI (PHYSICS)

- ✎.... 2DPHYS - WS9 (Applications of Lenses)
- ✎.... 2DPHYS - ASG2 (The Microscope)