

# Waves

## 2. Light

### CONCEPT 3

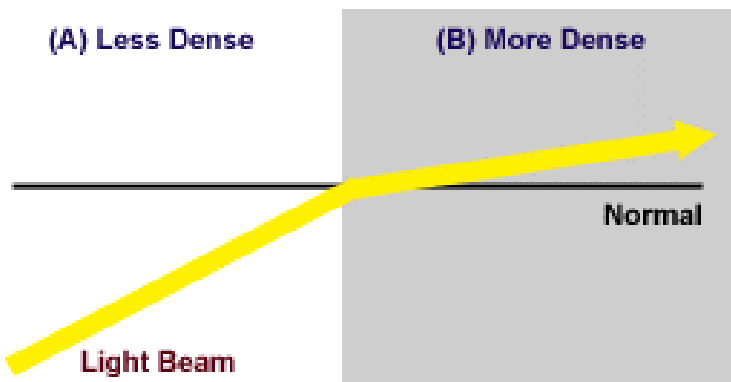
#### REFLECTION OF LIGHT

##### NOTES

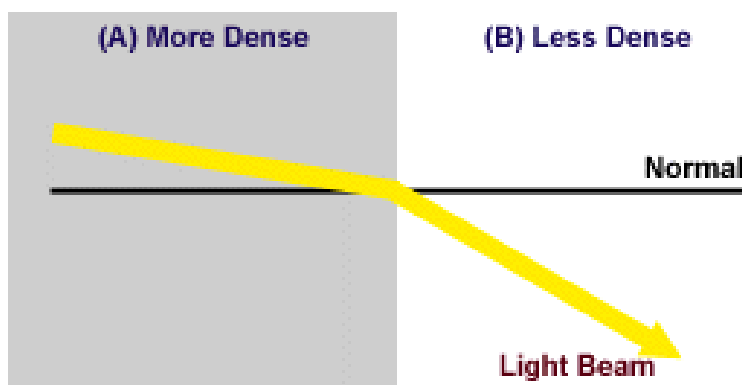
We usually think of light travelling in straight lines and mostly it does. However, we can make light bend by making it pass from one transparent material to another if the two materials have a different density.

Light travels through transparent materials such as air and glass. It travels faster in air because air is less dense than glass. It is this change in speed at the boundary between the two materials that causes the light to bend. This is called refraction.

When light travels from a less dense material to a more dense material it bends towards the normal.

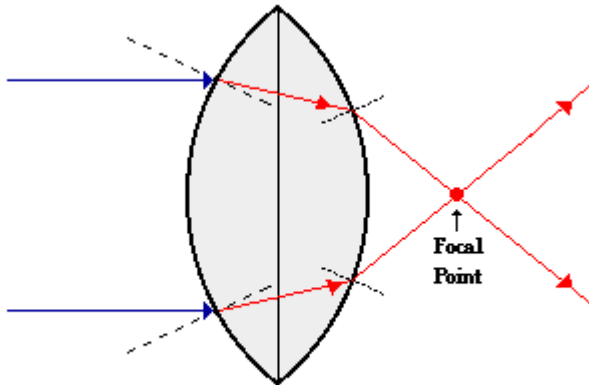


When light travels from a more dense material to a less dense material it bends away from the normal.



Lenses are used in cameras, projectors, microscopes and telescopes. They use the principles of refraction to bend light. There are two main types of lens: convex and concave. A convex lens bulges outwards in the middle. It makes light rays bend towards one another, or converge:

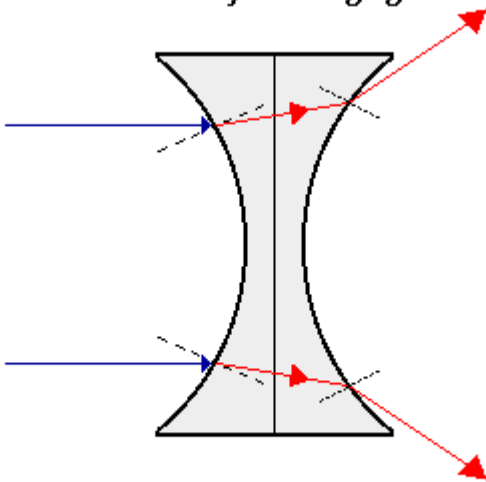
### Refraction by a Converging Lens



**Incident rays which travel parallel to the principal axis will refract through the lens and converge to a point.**

A concave lens is thicker around the edges and curves inwards in the middle. It makes light rays spread out, or diverge:

### Refraction by a Diverging Lens



**Incident rays traveling parallel to the principal axis will refract through the lens and diverge, never intersecting.**

## EXTEND YOUR KNOWLEDGE

Our eyes see objects because the light rays entering the eye are refracted by the lens in our eye and focus an image on the retina where the image is detected. In long sightedness the eye doesn't refract the light enough. In short sightedness the eye refracts the light too much. Glasses and contact lenses contain either concave or convex lenses in order to correct for long or short-sightedness. They bend light rays as they enter the eye.

Concave lens for short-sightedness   Convex lens for long-sightedness