Light

Light travels in straight lines

- Its travel is represented by a ray
- A ray is a straight-line a with an arrow showing the direction of travel

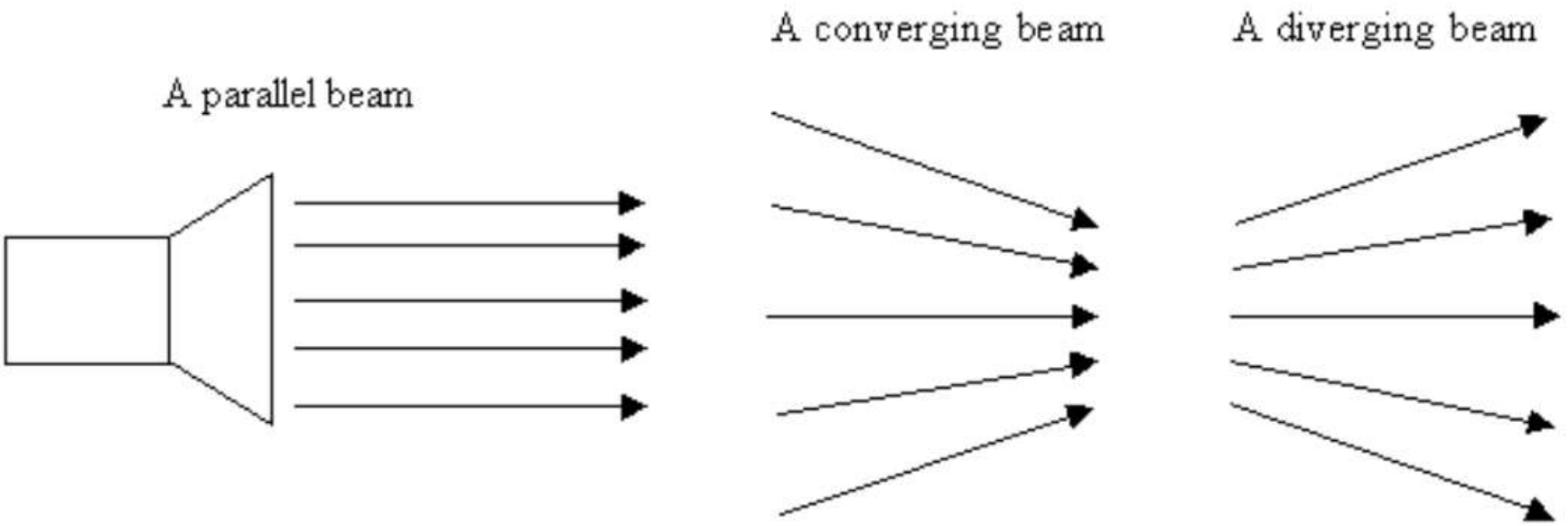
A ray

A group of rays represent a beam of light

A beam

There are three main types of beams of light:

- Parallel beams
- Convergent beams
- Divergent beams



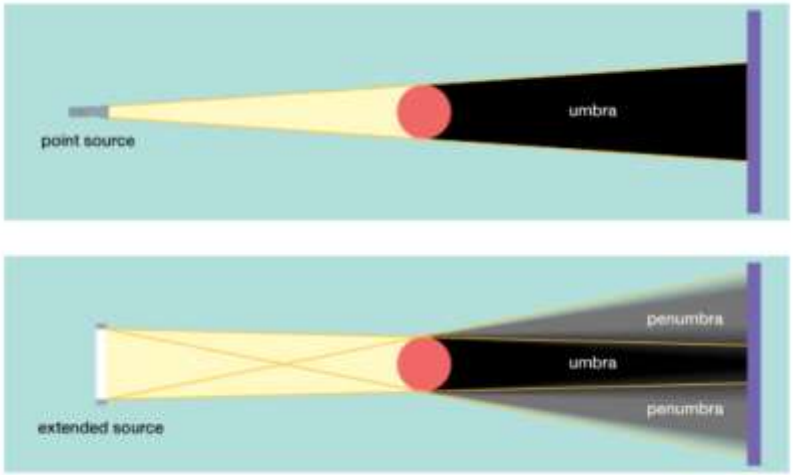
- A torch light creates a divergent beam,

- Headlights on a car creates parallel beams,

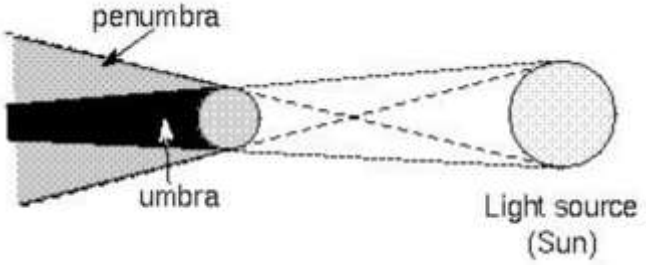
- A magnifying glass creates convergent beams, attempt to draw a beam of light to show a convergent beam using the diagram below

Shadows

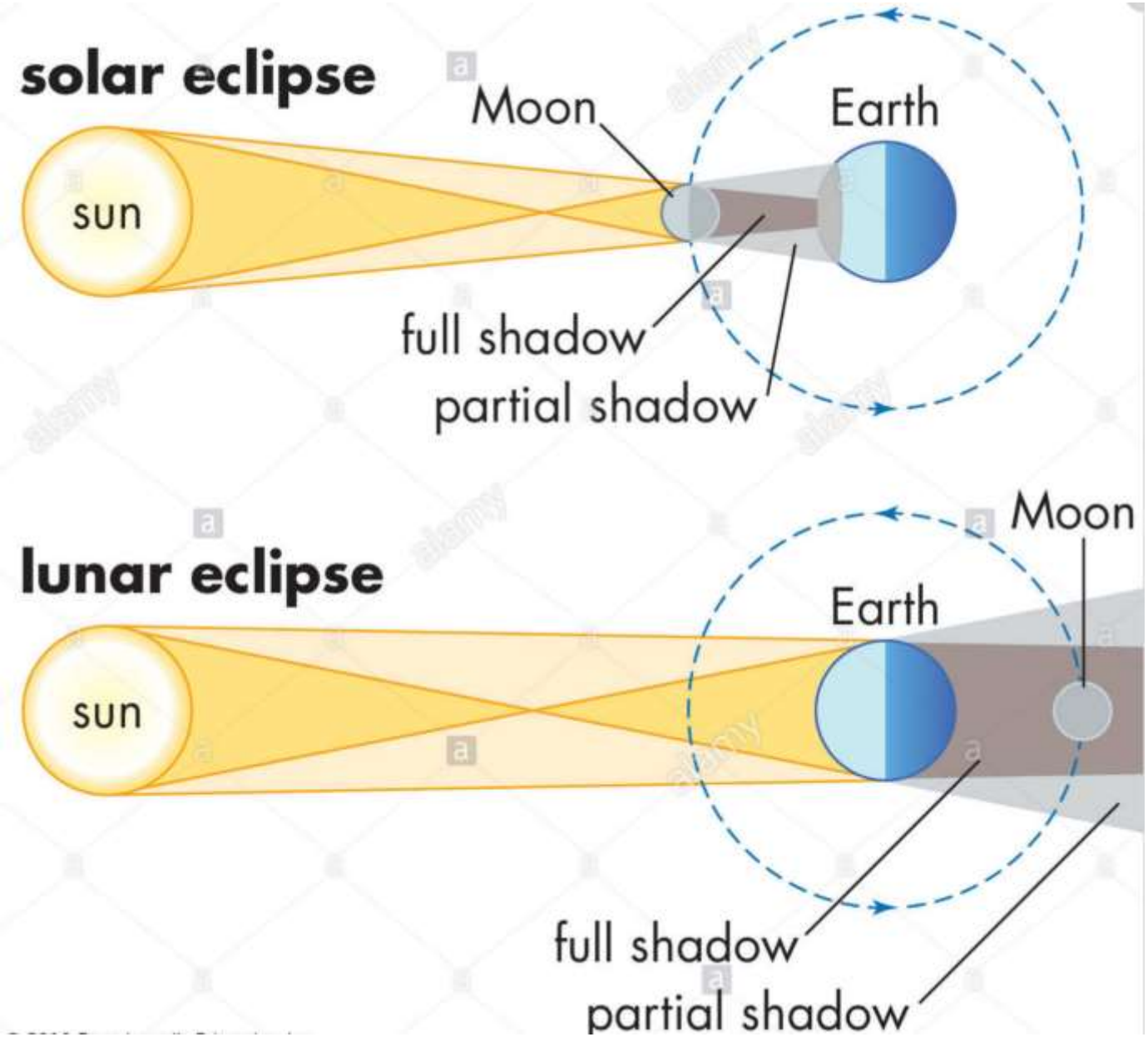
- When light is totally or partially absorbed, a shadow is formed.
- Shadow formation differs for a point and extended sources of light.



- The SUN acts as an extended source of light.



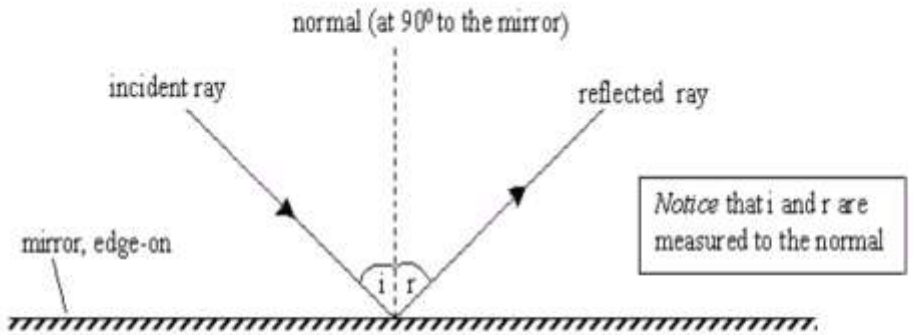
Solar and Lunar Eclipses



Reflection and Refraction of Light

- Reflection is the “bouncing” of light off a surface. The ray does NOT pass through the medium.
- For reflection, the angle of incidence is equal to the angle of reflection.

Laws of reflection

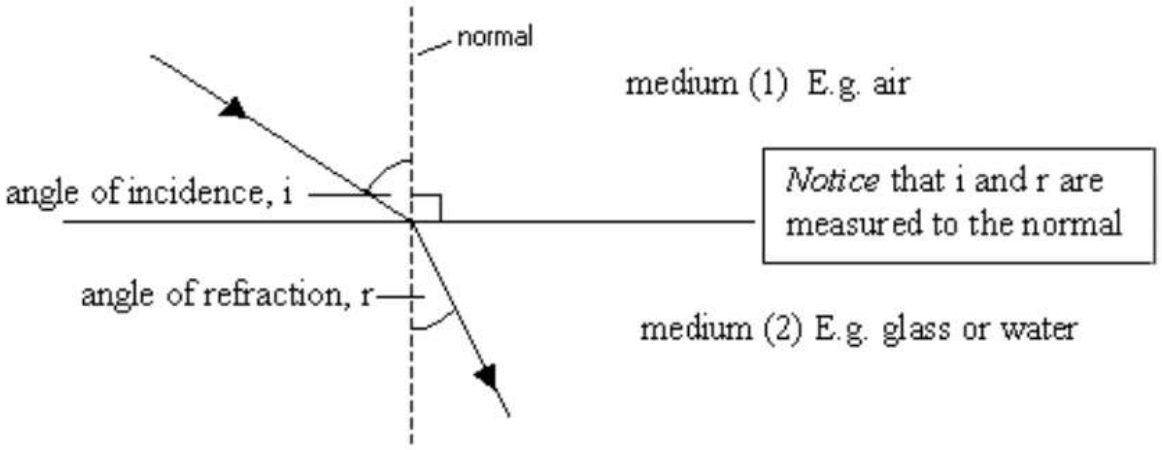


There are two laws of reflection:

1. *The incident ray, the reflected ray and the normal at the point of incidence are all in the same plane* – hence, they can be drawn on a flat piece of paper, as in the above diagram
2. *The angle of incidence equals the angle of reflection* (i = r in the above diagram)

Refraction

- Anything through which light can pass is called a “medium”. This includes air, glass and a vacuum.
- When light passes from one medium to another it changes direction – we say that it is “refracted”

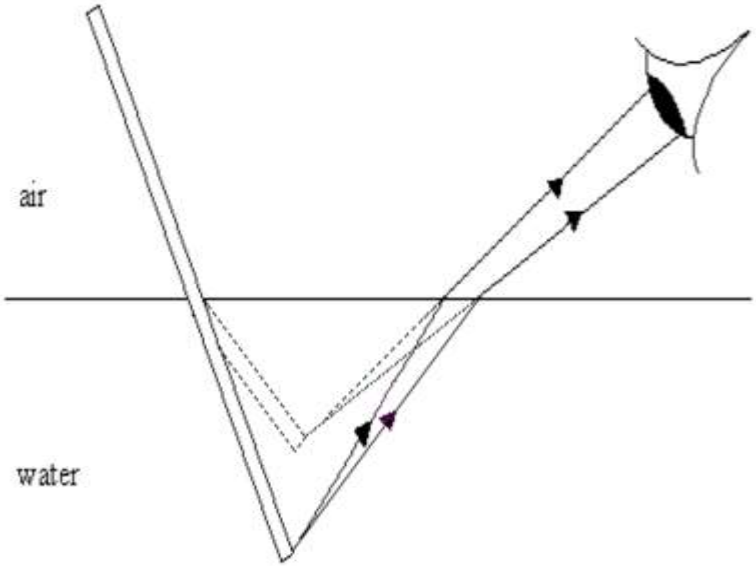


- *Refraction occurs because light changes speed when it enters a new medium*

“Bending” of a stick under water

'Bending' of a stick under water

Consider rays coming from the end of a stick under water:



In this case, the light rays speed up as they pass from the water into the air, so they bend away from the normal. As previously described, the rays that enter the eye are, in effect, 'projected' back along straight lines by the eye/brain, and where they appear to meet, a point is seen in focus - but in this case, the point is above the true point of origin of the rays. This explains why the stick appears to be bent - and why a pond appears to be shallower than it actually is.

Dispersion of Light

- Dispersion is the separation of white light into its component colors due to refraction.
- Visible light is made up of the spectrum of rainbow of colors:

RED-ORANGE-YELLOW-GREEN-BLUE-INDIGO-VIOLET

Dispersion of white light in a glass prism