

Refraction

Ever noticed how a drinking straw seems to bend in two when it's viewed in a glass filled with water? This is because of *refraction*.

Refraction occurs because light changes speed and direction when it moves from one medium into another.

Medium is the word used by scientists to describe a substance that light will travel through. A medium can be a solid, liquid or a gas.

The straw appears bent because the light travels faster through air than through the liquid. Because it slows down as it enters the liquid, the light bends towards normal.



Investigating Refraction – Bending Light

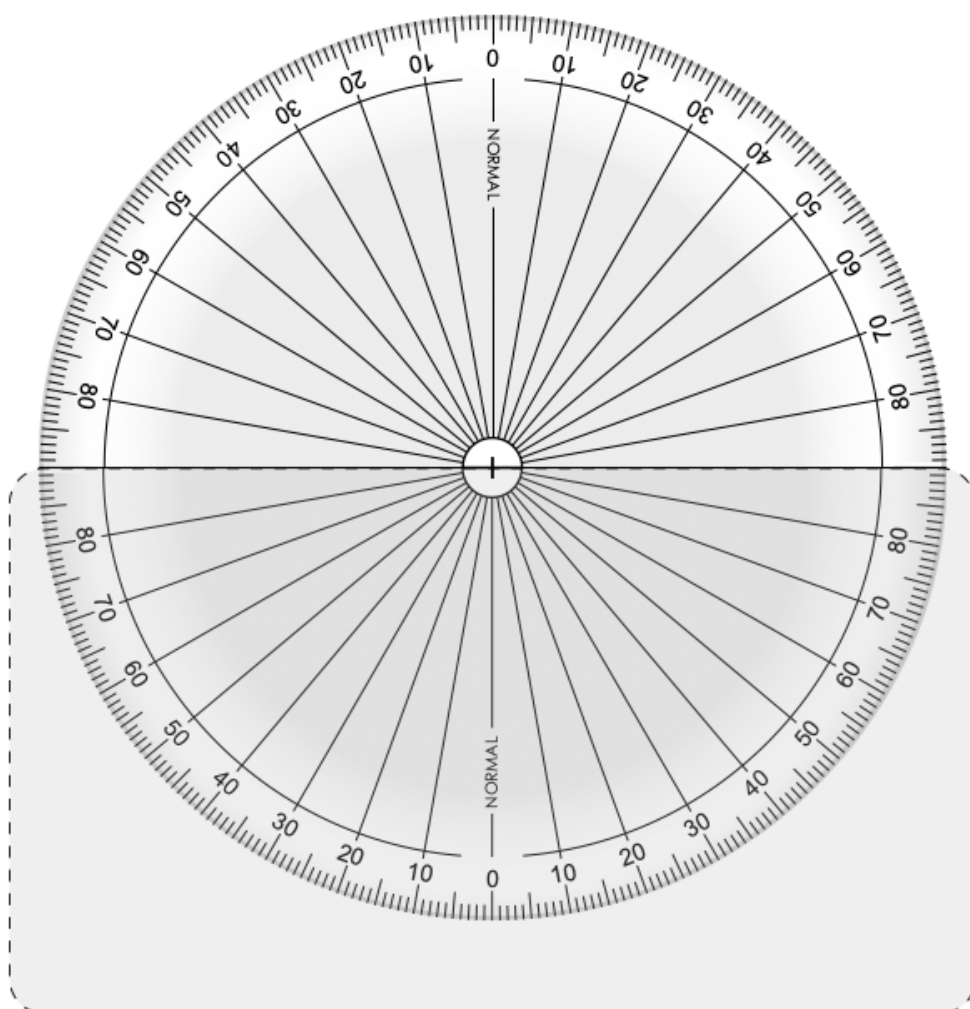
Aim: To investigate how light is affected by changing the substance it is travelling through.

Equipment: Ray box, power source, glass or perspex block, single-slit ray slide.

Method: Collect the equipment from your teacher, and set them up to produce a single beam of light.

Part A: Going from Air to Glass

- Place the glass block in the shaded area below.



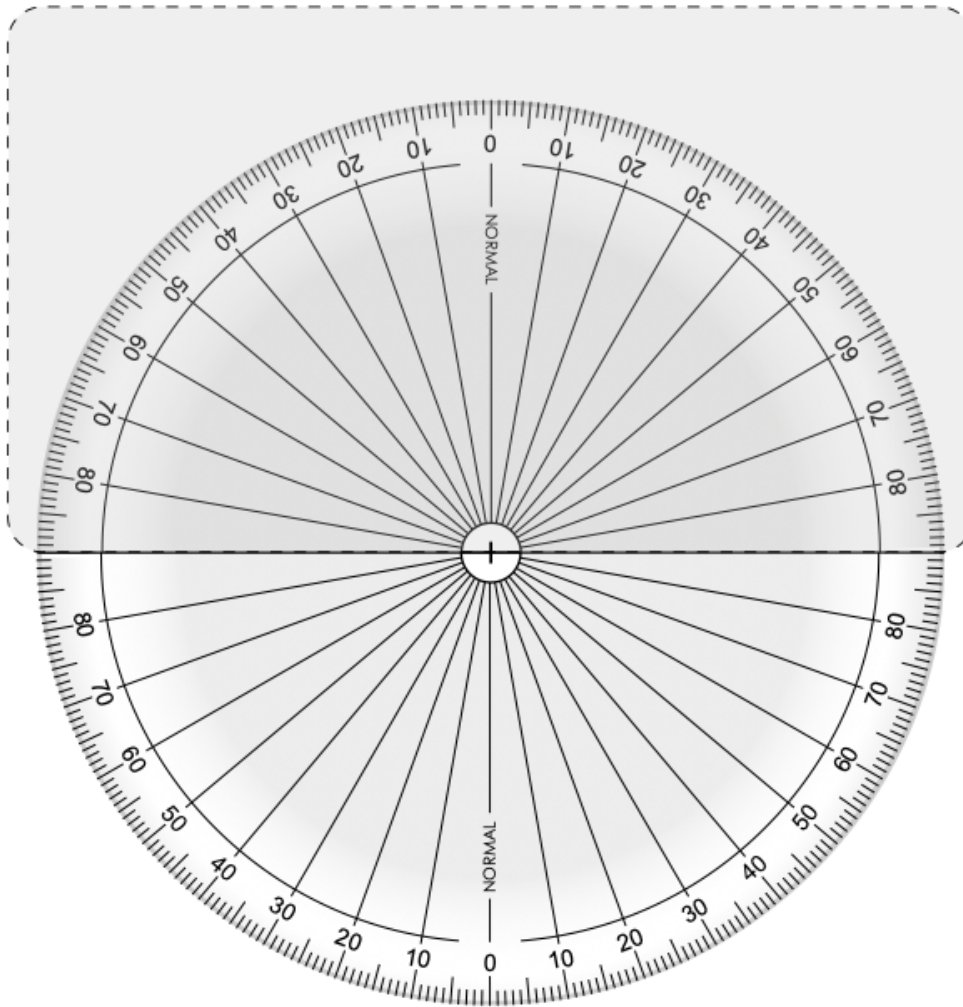
- Place your ray box at the top of the page and shine the beam so it travels along the 10° line to the centre of the protractor (this is your angle of incidence, i°).
- Read the angle the light leaves the glass block at (this is your angle of refraction r°).
- Continue the investigation so you can complete the table opposite.

Results:

Angle of Incidence (i°)	Angle of Refraction (r°)
10°	
20°	
30°	
40°	

Part B: Going from Glass to Air

1. Place the glass block in the shaded area below.



2. Place the ray box at the top of the page and shine the beam so it travels along the 10° line to the centre of the protractor (this is your angle of incidence, i).
3. Read the angle the light leaves the glass block at (this is your angle of refraction r).
4. Continue the investigation so you can complete the table below.

Results:

Angle of Incidence (i°)	Angle of Refraction (r°)
10°	
20°	
30°	
40°	

Conclusion: Complete the following sentences using the word list provided.

towards speeds up away slows down

When light travelling through air and passes into a glass block it _____ and bends inwards, _____ normal. When light travelling through a glass block exits that block and enters air, it _____ and bends outwards, _____ from normal.

Questions on Refraction

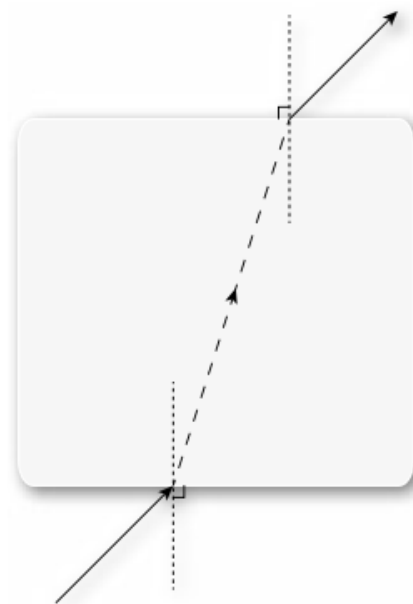
1. This diagram shows a ray of light passing through a glass block. When light passes through the glass block it changes direction.

(a) This effect is known as _____

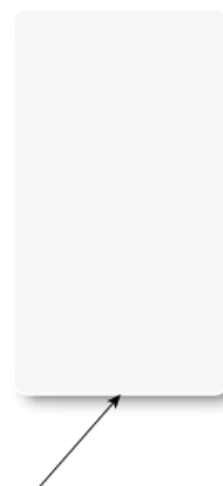
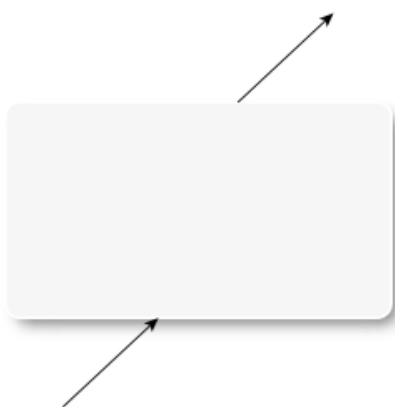
(b) In terms of the speed of light, outline why the light bends when it enters the glass block. _____

(c) Label the two normal lines shown on the diagram.

(d) When light leaves the glass block and enters air, does the light ray bend towards or away from normal? _____



2. Complete the following diagrams by drawing in the missing rays of light.



3. (a) Light travels at different speeds in different mediums. Define the term *medium*.

(b) Give two examples of a *medium*.

(i) _____

(ii) _____