

4 - Bending light, Refraction

- Level 4 - Describe how light is refracted at plane surfaces
- Level 5 - Describe how light bends towards the normal (inwards) when travelling from a less dense to a more dense medium, and vice versa
- Level 6 - Make predictions about image formation using the patterns of behaviour from refraction

Bell Task

Refraction is the bending of light.
When do you see this in real life?

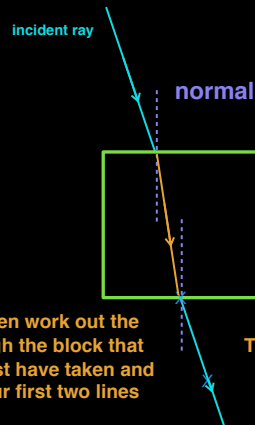
CLUE: Whenever you see light come through something transparent but it isn't exactly what is on the other side you are probably seeing refraction.

Starter

Why does the pencil appear bent in the water?



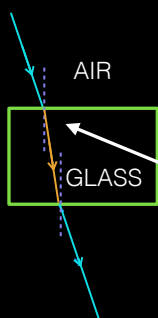
Main - How to draw refraction diagrams



You can then work out the path through the block that the light must have taken and join up your first two lines

Then draw a normal where the line leaves the block.

Main - Law of Refraction

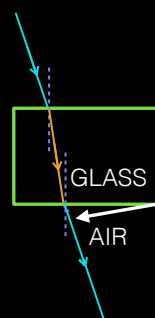


We can predict which way light will refract.

When light moves from a less dense medium to a more dense medium it bends towards the normal. Like here

This happens because the air is less dense than the glass.

Main - Law of Refraction

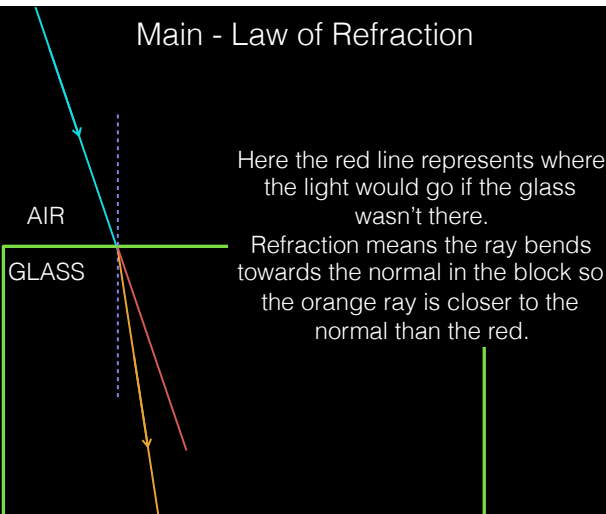


We can predict which way light will refract.

When light moves from a MORE dense medium to a LESS dense medium it bends away from the normal. Like here

This happens because the air is less dense than the glass.

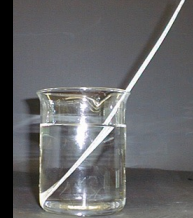
Main - Law of Refraction



Plenary

Many visual effects are caused by refraction.

This ruler appears bent because the light from one end of the ruler has been diffracted, but light from the other end has travelled in a straight line.

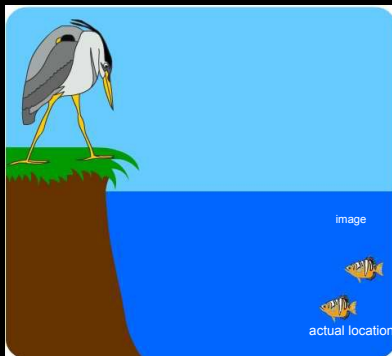


Would the ruler appear more or less bent if the water was replaced with glass?

Extension Questions

Fishing animals have to be aware of refraction because the image of the fish is not actually where the fish is.

Add rays to this diagram to show how the image of the fish appears above the real fish.



Answer A, B, C or D

Refraction is what happens when light:

A hits an opaque object

B bounces off a mirror

C is scattered unevenly by a rough surface

D changes direction as it goes from one substance into another

Answer A, B, C or D

2) Refraction occurs because:

A light speeds up when it goes from air to glass or water

B light slows down when it goes from air to glass or water

C light stops when it goes from air to glass or water

D light reflects inside transparent materials

Answer A, B, C or D

3) Why does a lens change the path of light?

A Light changes direction when it goes into the glass and when it comes out of it

B Light changes direction in the centre of the lens

C Light is reflected by the surface of the lens

D Light travels faster in glass than it does in air