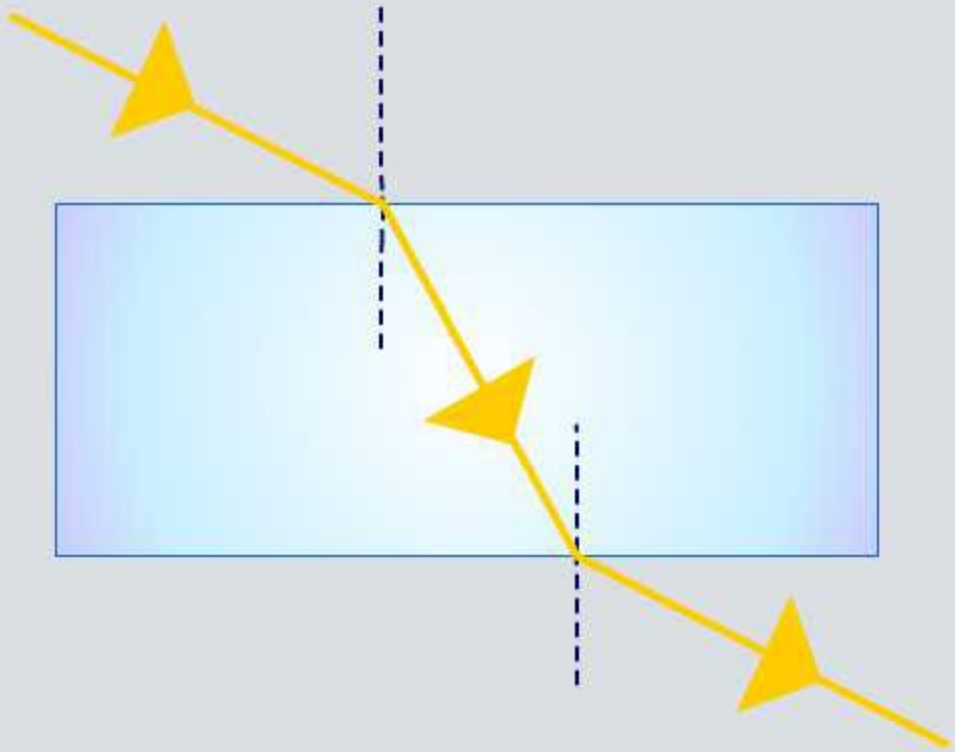
Refraction



Refraction at an air-glass boundary

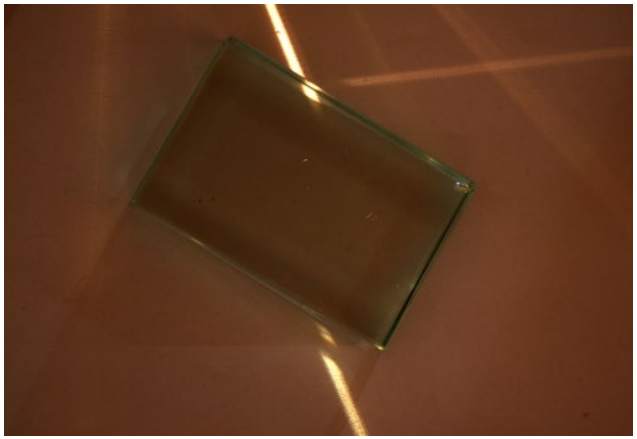
What happens when light travels from air into glass?

Refraction investigation

Place a rectangular glass block on a sheet of paper and draw around it. Draw a normal at 90° to the top surface of the block.

Shine light rays, with angles of incidence [i] of 30°, 60° and 0°, into the block where the normal meets the glass surface.

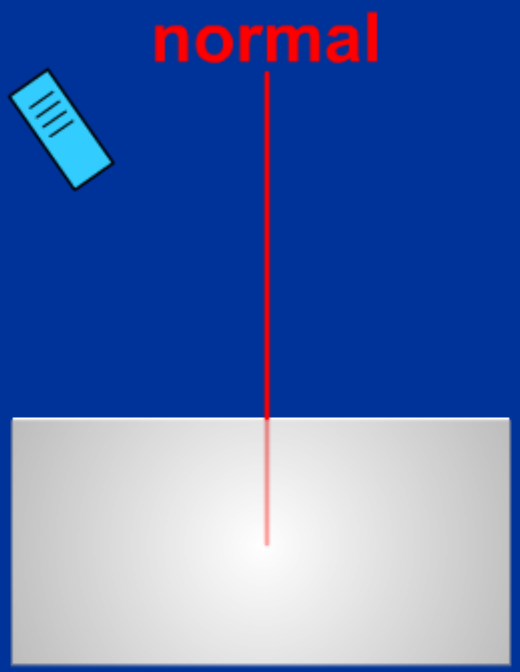
Record the angle of refraction [r^1] and the angle of the rays leaving the glass block [r^2].



angle of incidence [i]	angle of refraction [r^1]	angle of refraction [r^2]
60 °		
30 °		
0 °		

Refraction in a glass block

What happens when light travels through a glass block?



Ray box control

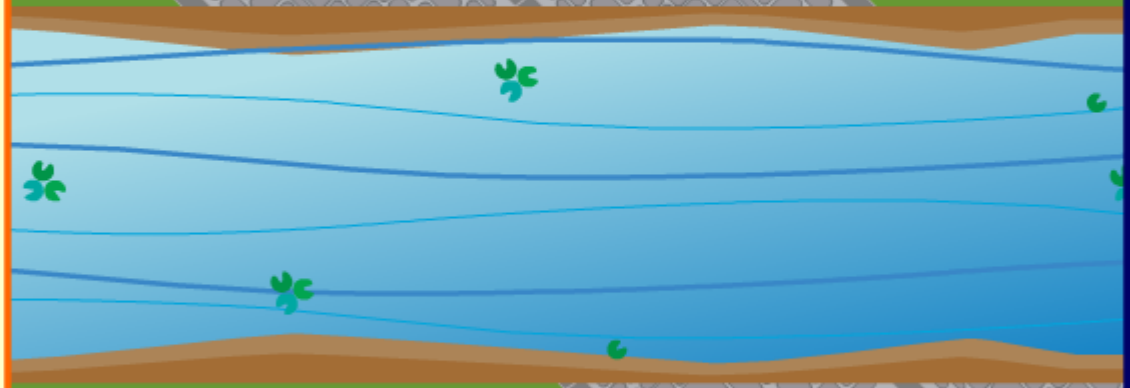
- off
- on

Explaining refraction

Why does light bend at the air-glass boundary?

How can the behavior of light as it strikes a glass block be modeled using Roman soldiers and a muddy stream?

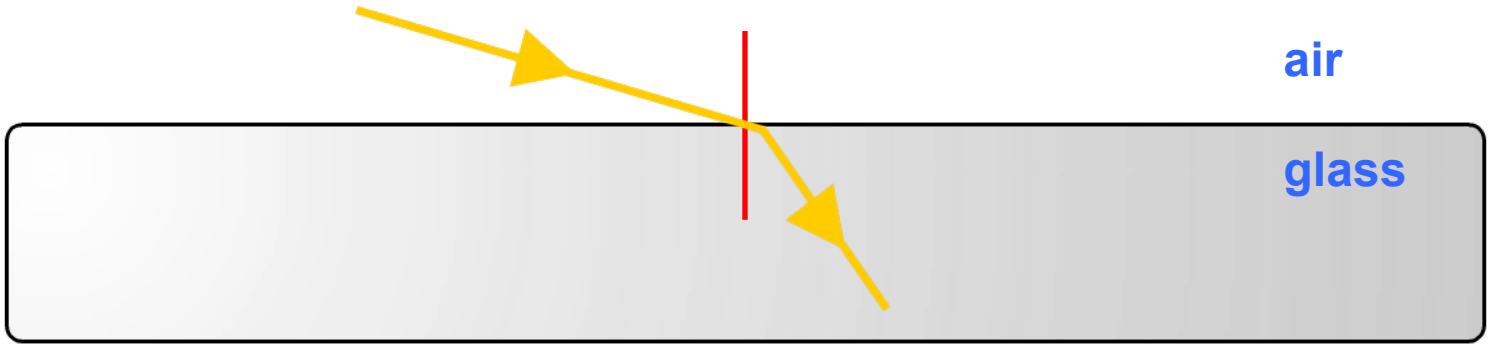
Click "**play**" to find out more.



Why is light refracted?

The speed of light depends on the material through which the light is traveling. When light enters a different material (e.g. when moving from air into glass), the speed of light changes.

This causes the light to bend or **refract**.

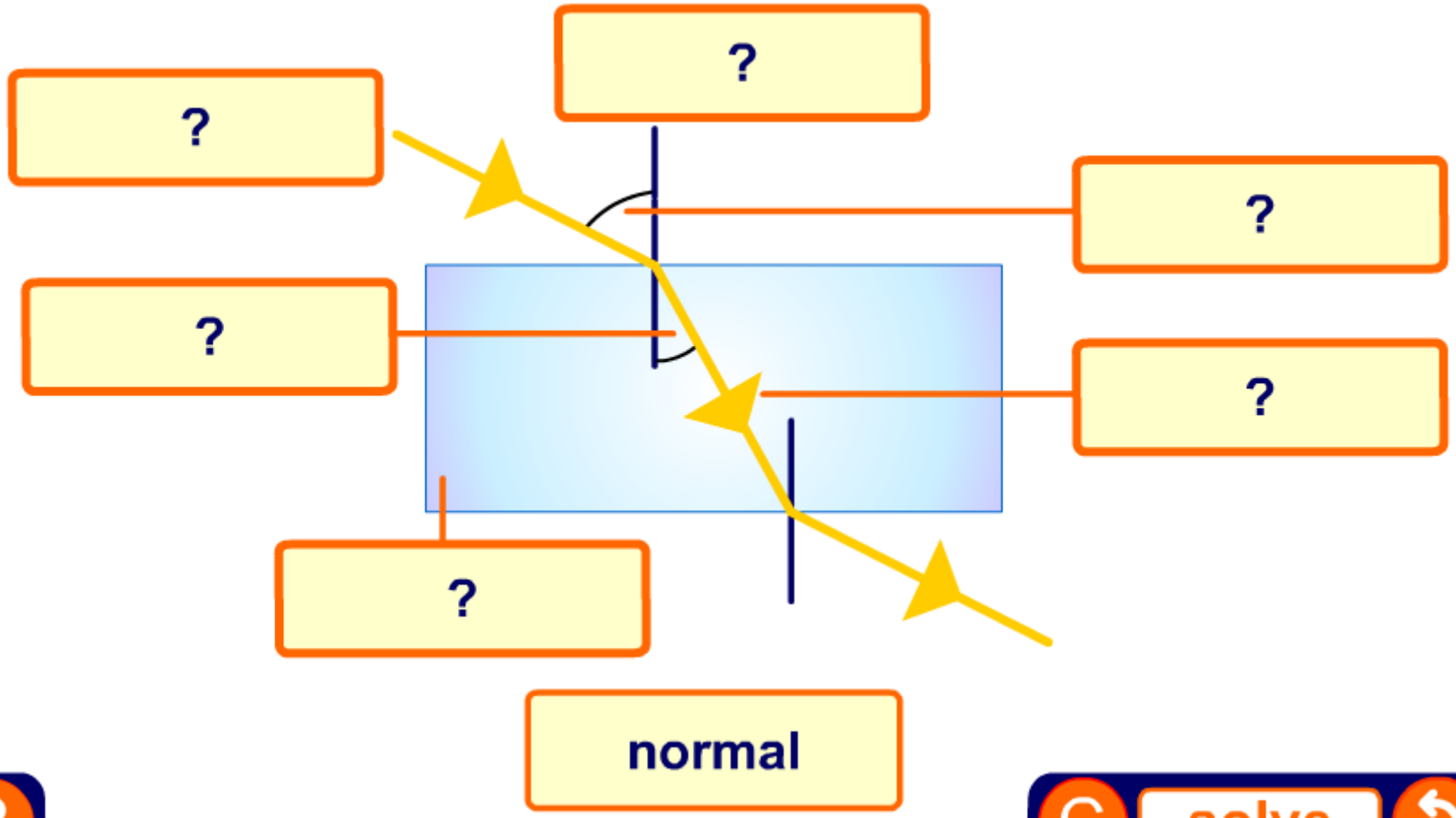


The speed of light is affected by the density of the material through which it is traveling.

When light enters a more dense medium, its speed decreases and this is why refraction occurs.

Refraction ray diagram

What are the labels for this refraction ray diagram?

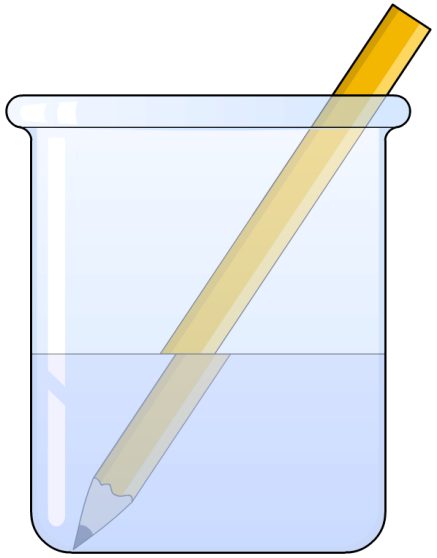


solve

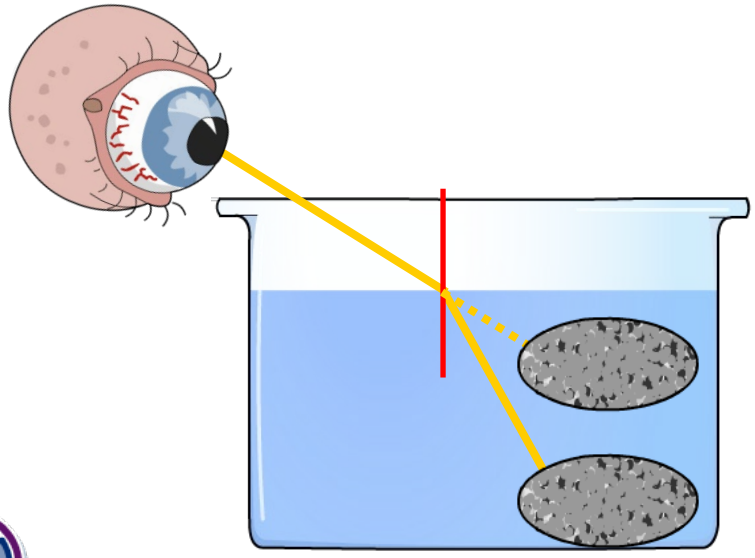
What happens during refraction?

Effects of refraction

Light from the part of the pencil in the water is refracted as it travels from the water into the air, making it appear bent.



How does refraction make this stone look closer to the surface of the water than it really is?



Light rays from the stone are refracted as they leave the water.

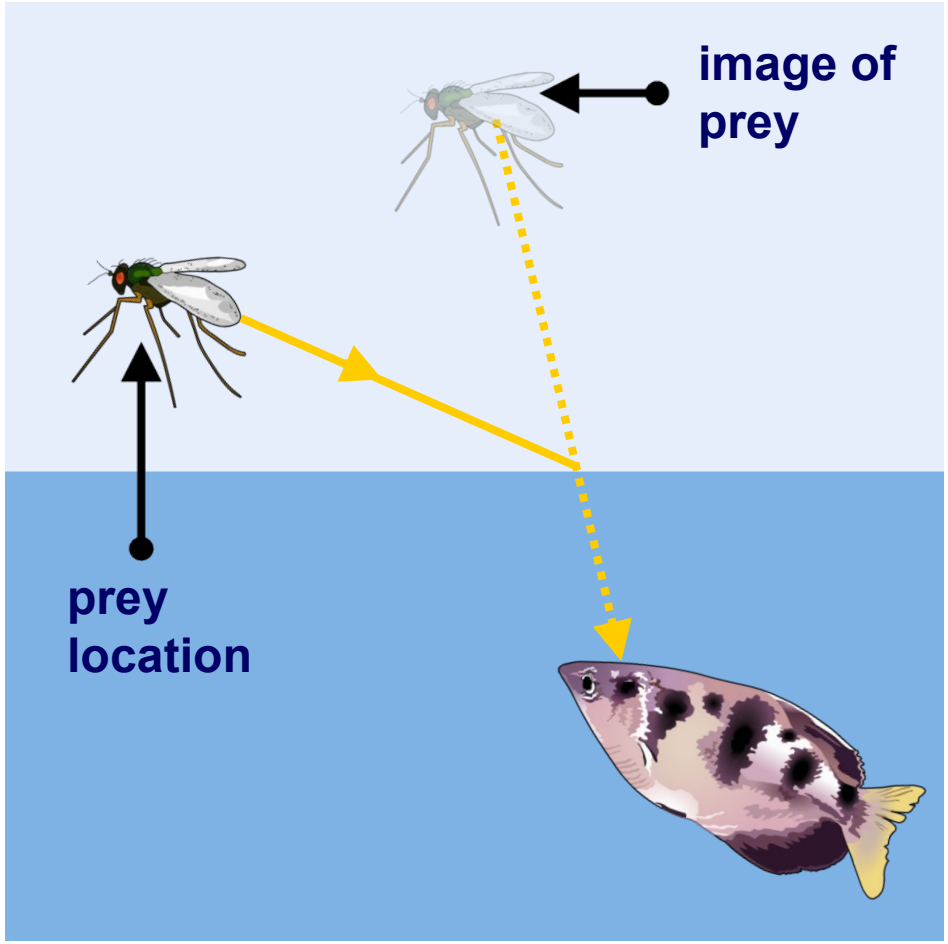
The brain assumes the rays have traveled in straight lines, and is fooled into forming an image where it thinks the light rays came from.

Effects of refraction – the archerfish

The archerfish is a predator that shoots jets of water at insects near the surface of the water.

The archerfish allows for the refraction of light at the surface of the water when aiming at its prey.

The fish does not aim at the refracted image it sees but at a location where it knows the prey to be.



Refraction – true or false?