

Refraction

Which medium is more dense?

Which way does the light bend?

What happens to the speed of the light?

The diagram illustrates the refraction of a light ray passing through a rectangular block. A yellow ray enters from the top left, hits the top surface at an angle i to the normal (a vertical red line). The ray bends towards the normal as it enters the block, forming an angle r with the normal. The ray travels through the block and exits the bottom surface, bending away from the normal. A second vertical red line is drawn at the exit point. A dashed semi-circular arc is drawn above the block, and a protractor is positioned above it to measure the angles. The word "Refraction" is written in yellow text to the right of the diagram.

Refraction

$i =$
 $r =$
 $\frac{\sin i}{\sin r} =$

Add labels to the diagram

air
glass

incident ray
refracted ray
normal
angle of incidence
angle of refraction

Rays of light travelling from air into glass are bent or refracted **towards** the normal.

Rays of light travelling from glass into air are refracted **away from** the normal.

What determines the amount of bending?

$$n = \frac{v_1}{v_2} \quad \text{and} \quad n = \frac{\sin \angle i}{\sin \angle r}$$

If the first medium is air we can write...

$$n = \frac{c}{v}$$

$c \rightarrow$ speed of light
in vacuum or air
 3×10^8 m/s


Snell's Law

$$\frac{\sin i}{\sin r} = n$$

$$(n_{\text{air}} = 1.00)$$

so... $n_1 \sin \theta_1 = n_2 \sin \theta_2$

$$n = \frac{v_1}{v_2}$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$


see de handbook

Ex 1 A ray of light enters plexiglass at an angle of 42 degrees. The angle of refraction is 26 degrees. What is the index of refraction for plexiglass?

Ex.2 Glycerin has a refractive index of 1.47. If a ray of light has an angle of refraction of 32° inside glycerin, what was the angle of incidence?






Ex.3. A block of glass ($n = 1.50$) is sitting in water ($n = 1.33$). A ray of light enters the glass at 34° . What will be the angle of refraction?

Ex.4 The speed of light in glass is 1.97×10^8 m/s. What is the index of refraction for this piece of glass?

Ex. 5 The index of refraction of benzene is 1.50. What is the speed of light in benzene?

Ex. 6 What is the index of refraction for light passing from benzene into glass?

Attachments

-  [Ray Optics Animations](#)
-  [Investigating a curved mirror](#)
-  [BBC Bitesize: Waves](#)
-  [Crocodile Physics](#)
-  [Skool: Waves](#)

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