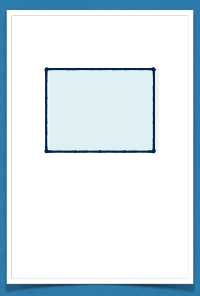
Snell's Law Lab

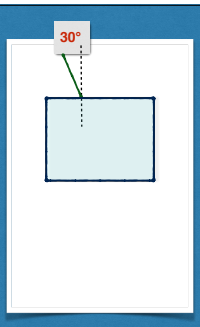
Questions?

Set Up

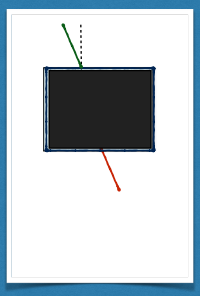
you'll need…
(get from the front table)
paper,
glass,
a ruler,
and a protractor



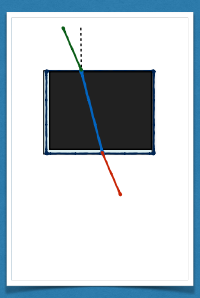
Angle of Incidence



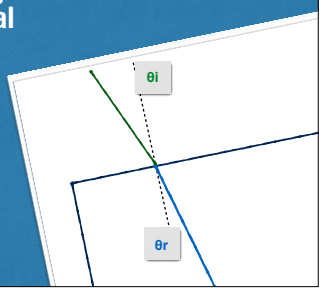
Find the image



Angle of Refraction



Observe
The smaller angle is in the material that is more optically dense

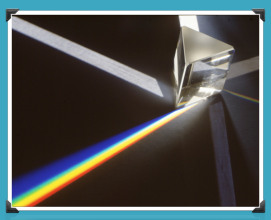


Data/ Calculations

θi	θr	$\sin\theta_i / \sin\theta_r$
30°		
40°		
50°		

Index of Refraction

Questions?



Willebrord Snell
1591-1626

Snell's Law

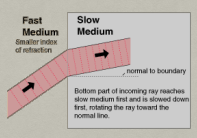
Index of Refraction:
a ratio of the speed of light in a vacuum to the speed of light in a medium

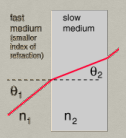
$$n = c / v$$

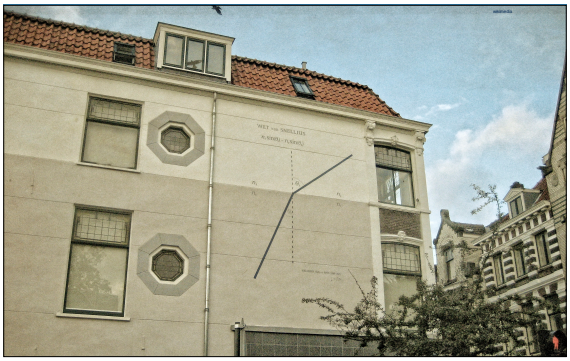
vacuum	n = 1.0
air	n = 1.0003
water	n = 1.33
glass	n = 1.5

Where the waves bend

$$n_i \sin\theta_i = n_r \sin\theta_r$$
$$n_g \sin\theta_g = n_a \sin\theta_a$$



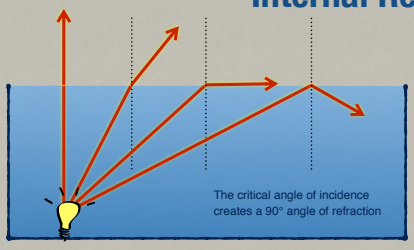




How do you skip a rock?

Think about it

Internal Reflection



Internal Reflection

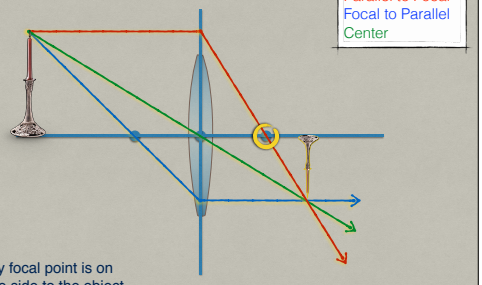
Only occurs when light passes from a more dense into a less dense medium.

Occurs when the angle of incidence is greater than the critical angle

Thin Lenses

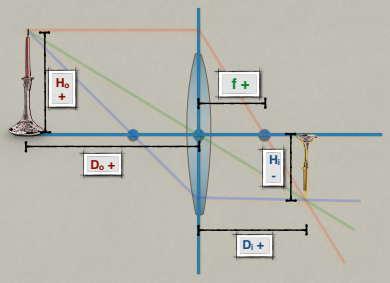
Ray Diagrams

Ray Diagram: Converging Lens

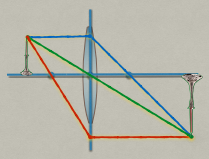


The primary focal point is on the opposite side to the object

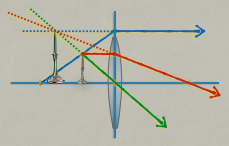
Measurements: Converging Lens



Still to Come..



If the object is inside two focal lengths, the reverse occurs and thee magnification increases the size of the image



If the object is inside one focal length, a virtual image is formed and the magnification is positive

Equations

$$\frac{1}{f} = \frac{1}{D_i} + \frac{1}{D_o}$$

$$M = \frac{H_i}{H_o} = -\frac{D_i}{D_o}$$

Equations

A 5 cm tall candle is placed 6 cm from a converging lens with a focal length of 30 cm.

Where is the image formed?

What is the height of the image?

Equations

A 5 cm tall candle is placed 6 cm from a converging lens with a focal length of 30 cm.

Ho = 5 cm

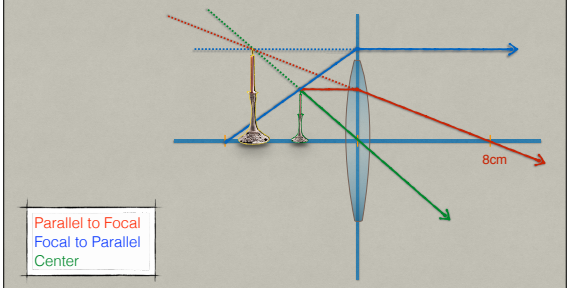
Do = 6 cm

f = (+) 30 cm

$$\frac{1}{30} = \frac{1}{D_i} + \frac{1}{6}$$

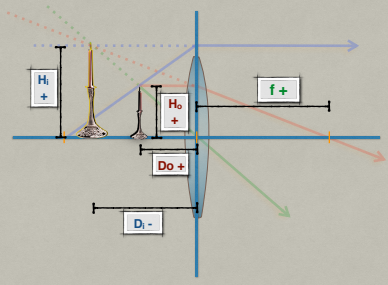
$$M = \frac{H_i}{5} = -\frac{-7.5}{6}$$

Ray Diagram: Converging Lens

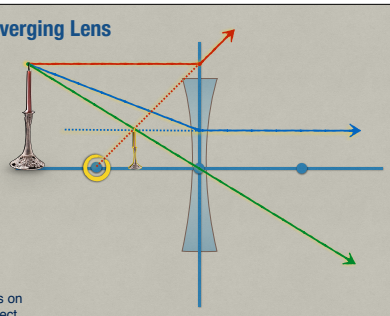


Parallel to Focal
Focal to Parallel
Center

Measurements: Converging Lens



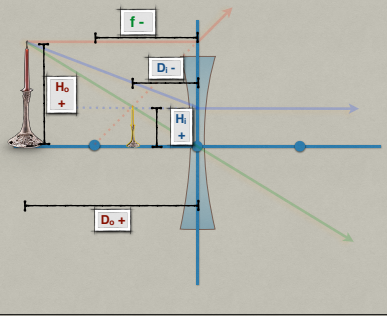
Ray Diagrams: Diverging Lens



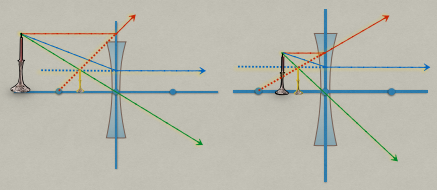
Parallel to Focal
Focal to Parallel
Center

The primary focal point is on the same side as the object

Measurements: Diverging Lens



Ray Diagrams: Diverging Lens



the image is similar with the object on either side of the focal point