

16 Light (Read pages 430 - 447)

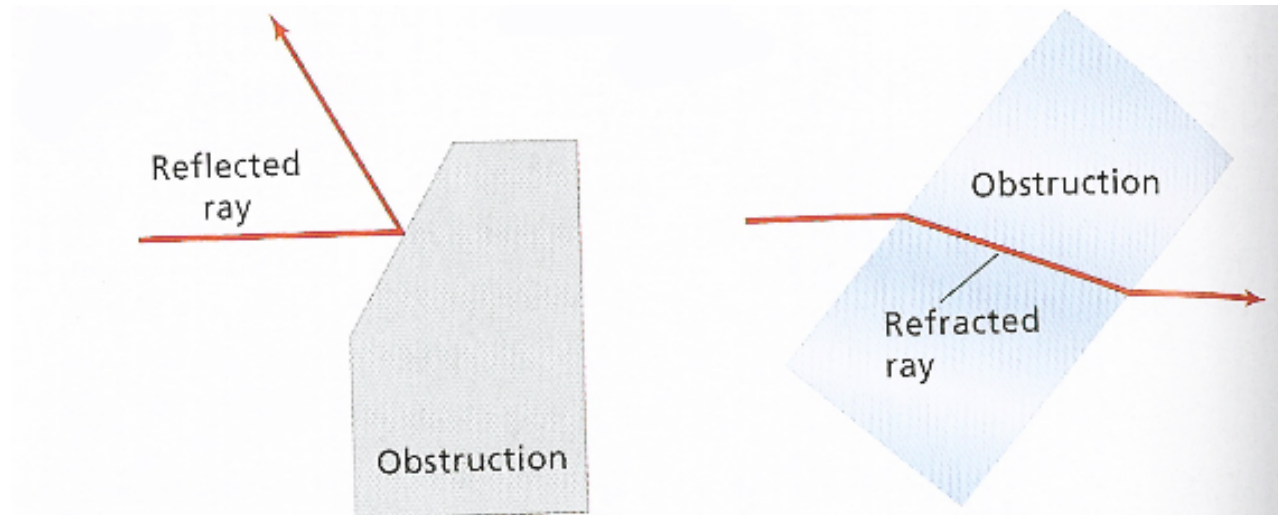
Visible light is only a tiny segment of what is called the Electromagnetic Spectrum

<http://ionaphysics.org/classroom/lessons/Illustrations/spectrum.htm>

Illumination Intensity falls off as you move away from the source.

If it is a point source the relationship is $1/r^2$

Light travels in straight lines except:
When it is reflected, refracted, diffracted



Diffraction: The bending of a wave as it passes around a small barrier or through a small opening. (Small compared to the λ).

<http://webphysics.ph.msstate.edu/javamirror/ipmj/java/slitdiffr/index.html>

Reflection: Angle of incidence = Angle of reflection

$$\text{Refraction: } n_1 \sin \theta_1 = n_2 \sin \theta_2$$

Example:

Light strikes a mirror at an angle of 32° to the surface. What is the angle of reflection?

Example:

A beam of light in air strikes enters a piece of flint glass at an angle of incidence of 40 degrees.

Find the angle of refraction to the nearest degree.

Table 18-1	
Indices of Refraction for Yellow Light ($\lambda = 589 \text{ nm}$ in vacuum)	
Medium	n
Vacuum	1.00
Air	1.0003
Water	1.33
Ethanol	1.36
Crown glass	1.52
Quartz	1.54
Flint glass	1.62
Diamond	2.42

The speed of light in any substance depends upon the Index of Refraction of the substance.

$$N1*v1 = N2*v2$$

What is the speed of light in flint glass?

What is the speed of light in diamond?

Colors: Different colors correspond to different λ 's

White: addition of all colors.

Black: absence of radiation.

<http://www.ionaphysics.org/ntnujava/image/rgbColor.html>

http://www.ionaphysics.org/ntnujava/color/color_e.html

Dispersion: Breaking down of light into its component colors. Because different frequencies travel at different speeds in a dispersive medium (glass for example) they bend by different amounts, and therefore travel in different directions.

<http://webphysics.ph.msstate.edu/javamirror/ipmj/java/dispprizm/index.html>

Chromatic aberration - distortion of colors (of an image) due to dispersion.