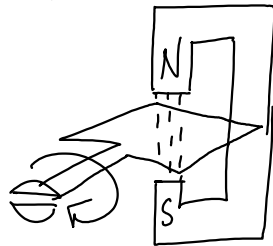
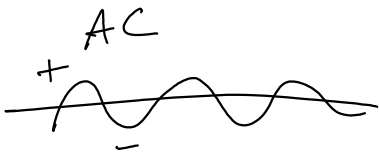


Draw a generator



← produces Alternating current



use a commutator



What are the units of

$$IR = \text{Voltage} = \text{Volts} = \frac{\text{kg} \cdot \text{m}^2}{\text{s}^3 \cdot \text{A}}$$

$$\frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \cdot \frac{\text{C}}{\text{m}} = \frac{\text{N} \cdot \text{m}}{\text{C}}$$

(energy / charge)

$$I = \frac{V}{R} = \frac{C}{s}$$

$$\text{Current} = \frac{\text{Coulombs}}{\text{second}} = \left( \frac{C}{s} \right)$$

$$\text{Resistance} = \text{ohms} = R = \frac{V}{I} = \frac{\text{N} \cdot \text{m} \cdot \text{s}}{\text{C} \cdot \text{C}} = \frac{\text{N} \cdot \text{m} \cdot \text{s}}{\text{C}^2}$$

... the speed of light

Radio waves travel at the speed of light.  
 \* not sound

$$v_{\text{light}} = \frac{c}{n} \leftarrow \text{index of refraction}$$

→ find the speed of light in water.

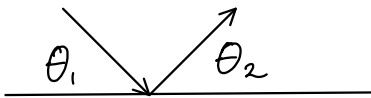
( $n = 1.4$ )

$$v = \frac{3 \cdot 10^8}{1.4} \approx 2.14 \cdot 10^8 \frac{\text{m}}{\text{s}}$$

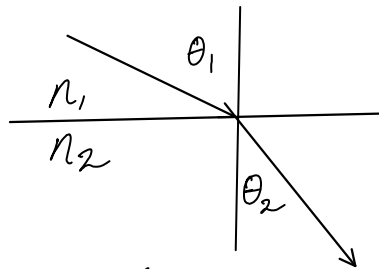
$n = 2.4$  (diamond)

Reflection

$$\theta_1 = \theta_2$$



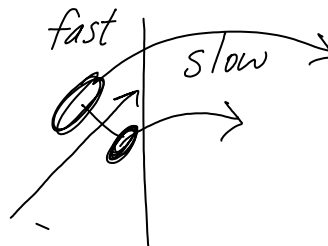
Refraction



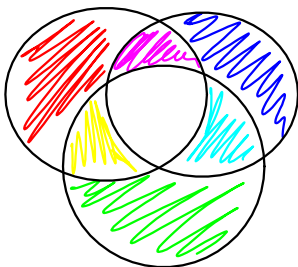
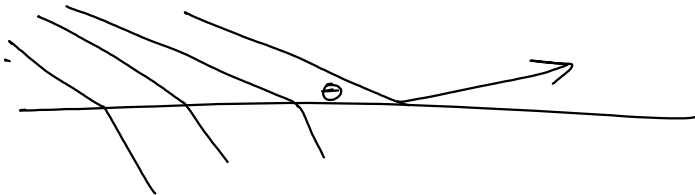
$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$\theta_1 = 50^\circ$   
 $\theta_2 = 40^\circ$  find  $n_2$ .  
 $n_1 = 1$

$$1 \cdot 1 = n_2 = \frac{n_1 \sin \theta_1}{\sin \theta_2} = \frac{1 \cdot \sin 50}{\sin 40}$$



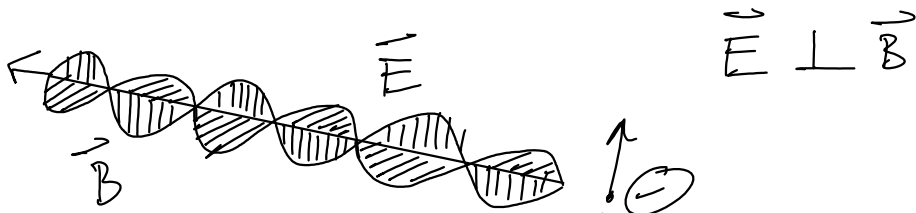
Total internal reflection (when angle is too shallow)



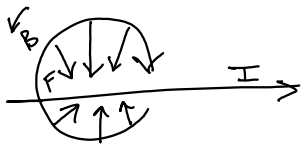
Primary

Secondary

Draw an Electro magnetic wave

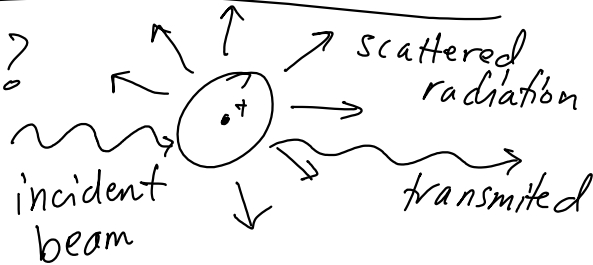


→ moving charge creates a magnetic field



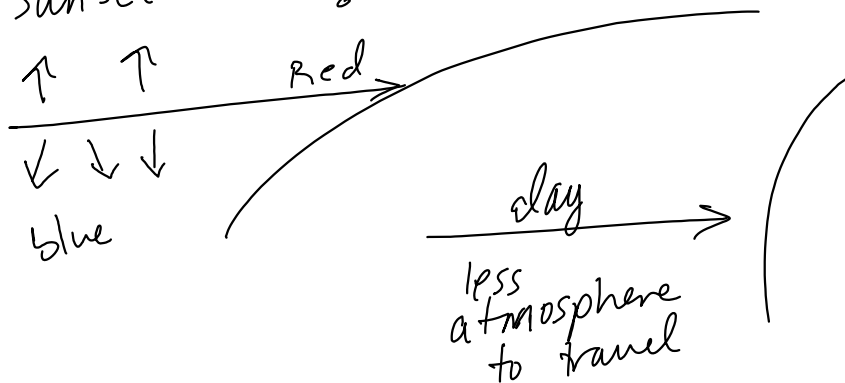
Why is the sky blue?

will emit higher frequencies



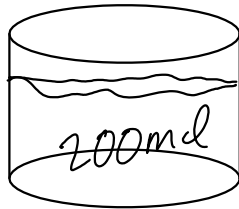
In this order, colors are scattered by atr...  
V, B, G, Y, O, R

Why is sunset red? night → more atmosphere



Why are clouds white?

larger particles scatter red light which combines w/ blue & green to give white light.

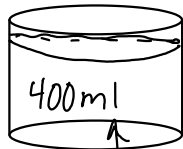


add 100J

$$Q = mc\Delta T$$

$\Delta T$  of water?  $c = 4.184 \text{ J/g}^\circ\text{C}$

$$\Delta T = \frac{Q}{mc} = \frac{100\text{J}}{(200\text{g})(4.184)} = .119^\circ\text{C}$$



@  $20^\circ\text{C}$

iron block



@  $30^\circ\text{C}$

$m = 200\text{g}$

find  $T_f$  of both water & iron (same)

$$C_{\text{water}} = 4.18$$

$$C_{\text{iron}} = .45$$

$$\Delta Q_{\text{water}} = \Delta Q_{\text{iron}}$$

$$mc_w \Delta T_w = mc_i \Delta T_i$$

$$T_{fw} = T_{fi}$$

$$T_{fi} = T_i - \Delta T_i$$

$$T_{fw} = T_w + \Delta T_w$$

$$\Delta T_i = T_i - T_{fi}$$

$$\Delta T_w = T_{fw} - T_w$$

$$mc_w (T_f - T_w) = mc_i (T_i - T_f)$$

$$mc_w T_f - mc_w T_w = mc_i T_i - mc_i T_f$$

$$T_f (mc_w + mc_i) = \frac{mc_i T_i + mc_w T_w}{mc_w + mc_i}$$

$$\checkmark 20.5^\circ = \frac{400(4.18)(20) + 200(.45)(30)}{400 \cdot 4.18 + 200(.45)}$$

