

**Snells Law**  $\sin(\text{incident angle}) \cdot n_i = \sin(\text{refracted angle}) \cdot n_r$

**Lens/Mirror Formula**  $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

**Magnification**  $M = \frac{-v}{u} = \frac{H_i}{H_o}$  if M is positive image is upright and virtual, and if it is negative image is upside down and real.

**Relative n**  $n = \frac{n_i}{n_r}$

**Critical angle**  $\sin(\theta_c) \cdot n_i = n_r$  or

$$\theta_c = \sin^{-1}\left(\frac{n_r}{n_i}\right)$$

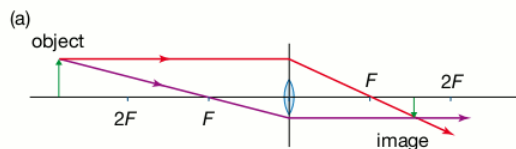
**Wave Equation**

$$\text{Speed} = \text{frequency} \times \text{wavelength} = \frac{\text{wavelength}}{\text{period}}$$

**Frequency**  $\text{Frequency} = \frac{1}{\text{period}}$

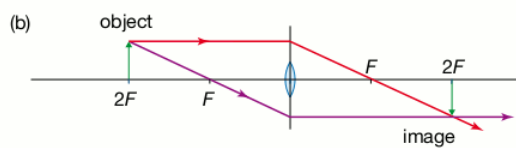
**Refraction** Slow down = light moves towards normal

**f** focal length  
**F** focal point  
**P** pole or centre of mirror  
**R** radius of circle  
**C** centre of circle

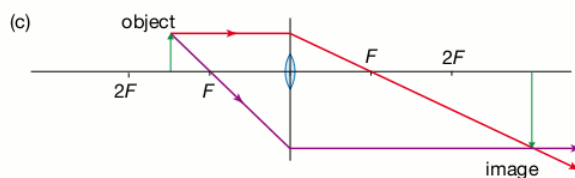


Description of image

real  
inverted  
diminished



real  
inverted  
same size



real  
inverted  
enlarged

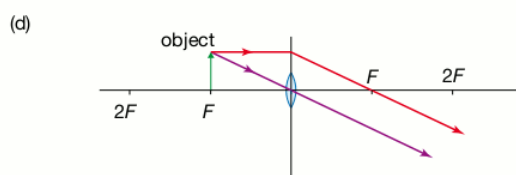
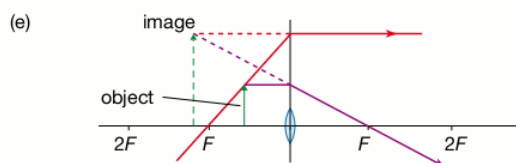


image  
at infinity



virtual  
upright  
enlarged

