Ch 33 Lenses and Optical Instruments

Drawing Ray Diagrams for Thin Lenses

Objective:

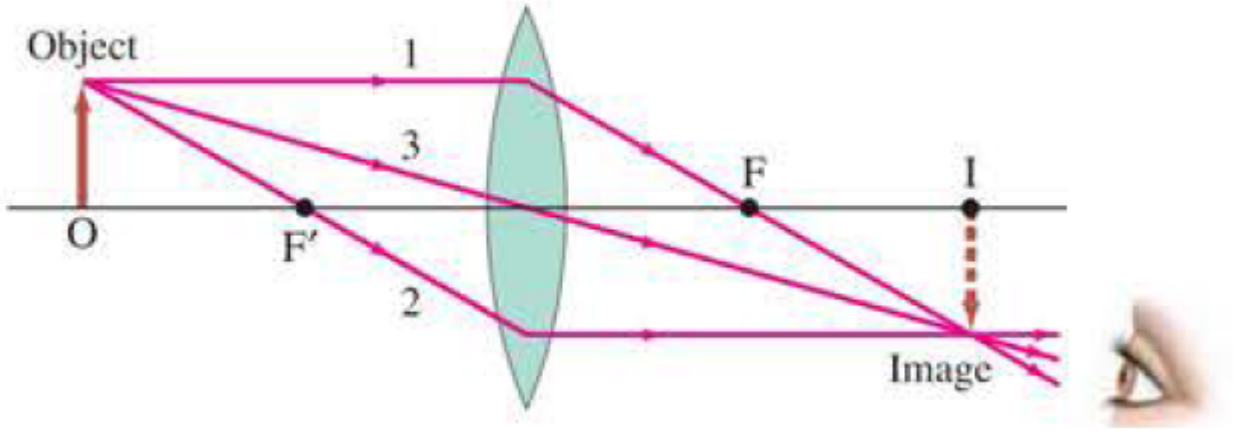
I. Visualize how lenses focus light by drawing ray diagrams

- By drawing the principal rays we can pinpoint the location of the image.

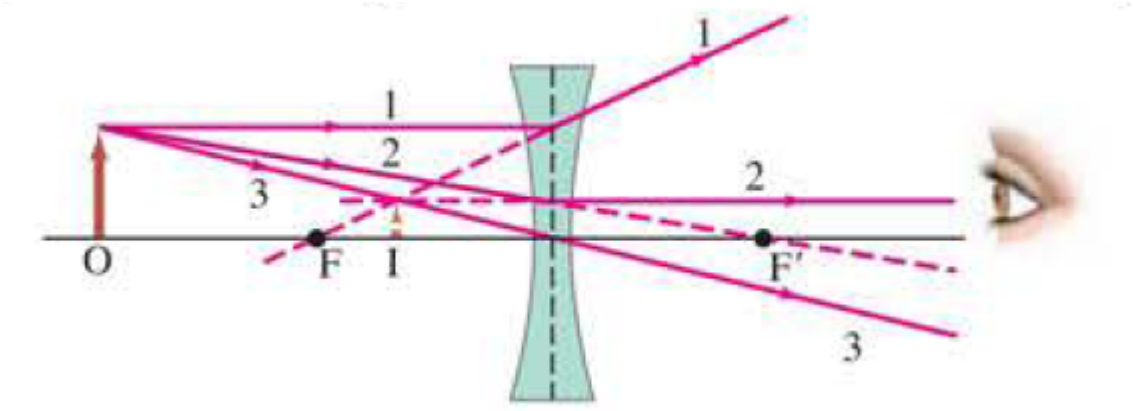
Content Review: [5mins]

- Unlike mirrors, **lenses do not reflect** incoming light rays, instead the **rays become refracted** (bent) as they go through the lens.

- Here is an example of a **Converging lens** refracting light, and creating a **real, inverted image**



- Here is an example of a **Diverging lens** refracting light, and creating a **virtual, upright image**



Guided Practice (leader - student) [10mins]

Thin Lenses

- Here is a link to the key to our Google Slides ray-drawing activity

  Feel free to make your own personal copy so you can edit it!

Quick Notes

Saturday, May 15, 2021 3:50 AM

How far apart are an object and an image formed by an 85 cm focal length converging lens if the image is 2.95x larger than the object and is real?

converging lens → $f > 0$

FIND $D = |d_o| + |d_i|$

$$m = -\frac{d_i}{d_o} = \frac{h_i}{h_o} = \ominus 2.95$$

→ INVERTED SINCE IMAGE IS REAL

$$-\frac{d_i}{d_o} = -2.95 \longrightarrow d_i = 2.95\, d_o$$

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f} \longrightarrow \frac{1}{d_o} + \frac{1}{2.95\, d_o} = \frac{1}{f}$$

$$\frac{1}{d_o}\left[1 + \frac{1}{2.95}\right] = \frac{1}{f}$$

$$d_o = f\left[1 + \frac{1}{2.95}\right]$$

$+85\text{ cm}$

$= 114\text{ cm}$

$+114\text{ cm}$

$d_i = 2.95\, d_o$

$= \oplus 336\text{ cm}$

→ REAL IMAGE ✓

$$\longrightarrow D = |d_o| + |d_i| = 450\text{ cm}$$

$|d_o| = +114\text{ cm}$

$|d_i| = +336\text{ cm}$