

Physics 202, Lecture 25

Today's Topics

- Lenses
 - Reminder
 - Cameras
 - The Human Eye, Lenses and Magnifiers
 - Combination of Lenses
 - Microscopes
 - Telescopes

Ray Diagrams

- If image can be formed, only two rays are necessary to determine an image point.
- Useful rays:
 - Object ray pointing to the center (C)
 - image ray inline with the object ray
 - Object ray parallel to principal axis
 - image ray “pointing to” a focal point (F)
 - Object ray passing through a focal point
 - image ray parallel to principal axis.

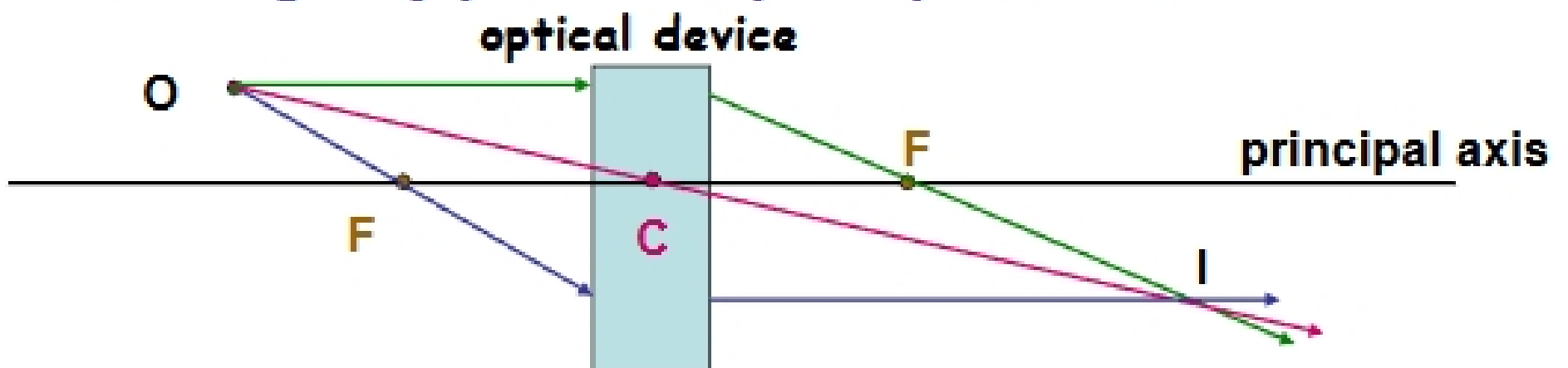


Image Formation Equation and Magnification

Mirrors and Thin Lenses

Parameters

p: object distance
q: image distance
h: object height
h': image height
M: magnification
f: focal length

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$$

$$q = \frac{fp}{p - f}$$

$$M = \frac{h'}{h} = -\frac{q}{p} = \frac{f}{f - p}$$

If $|M| < 1 \rightarrow$ Image $<$ Object

If $|M| > 1 \rightarrow$ Image $>$ Object

If $M < 0 \rightarrow$ Image $\downarrow \uparrow$ Object

If $M > 0 \rightarrow$ Image $\uparrow \uparrow$ Object