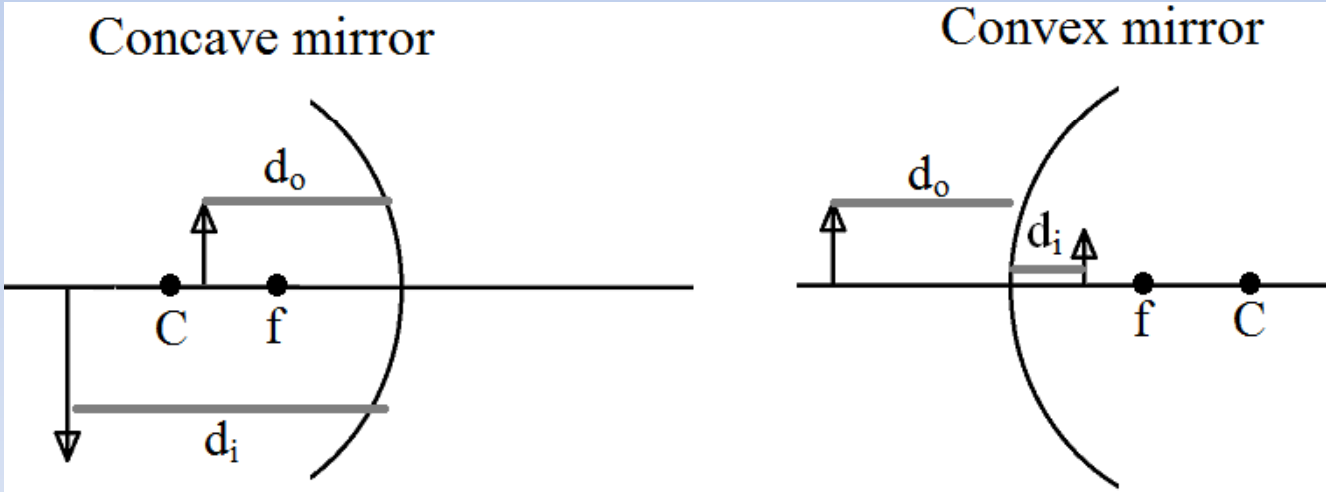
Traditional: 12-08

Mirror Equation, Magnification Equation, Light Intensity with Distance

Mirror Equation - symbols

- d = distance, h = height; i = image, o = object
- C = center pt., f = focal pt./focal length
- M = magnification
- d_o is always positive (distance object left of mirror)
- f and d_i – Rule to remember: *"Light should reflect back after striking a mirror, so f and* d_i *on the left side of the mirror is positive"*

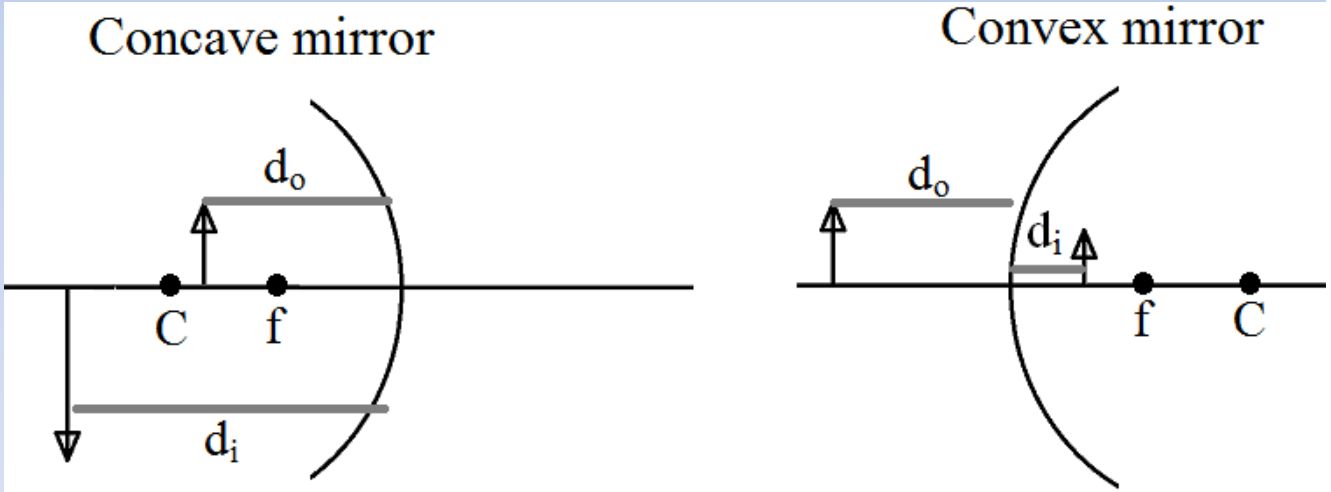


$$\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f}$$

$$M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

Mirror Equation – variable constraints

- d_o is always positive (distance object left of mirror)
- If d_i is negative, obj & image on opposite sides
- If d_i is positive, obj & image on same sides
- f is negative for convex mirrors, pos. for concave

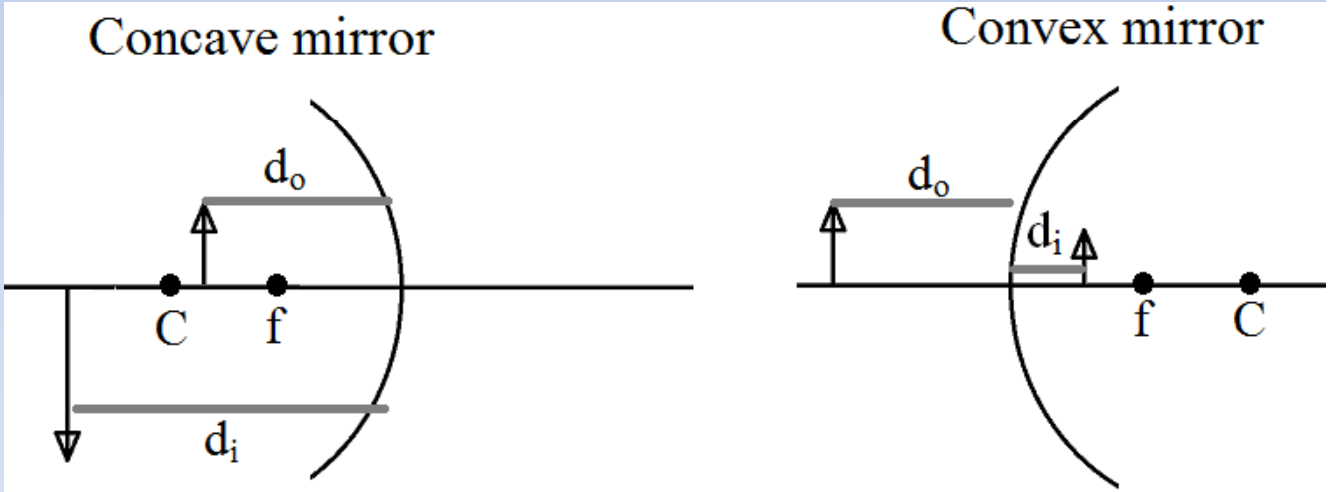


$$\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f}$$

$$M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

Mirror Equation – strategy for understanding

- These ARE NOT just a bunch of numbers
- These tell us what to expect for a mirror's image
  - Big M = Big image (enlarged)
  - Negative M = inverted & real image
  - Positive M = upright & virtual image

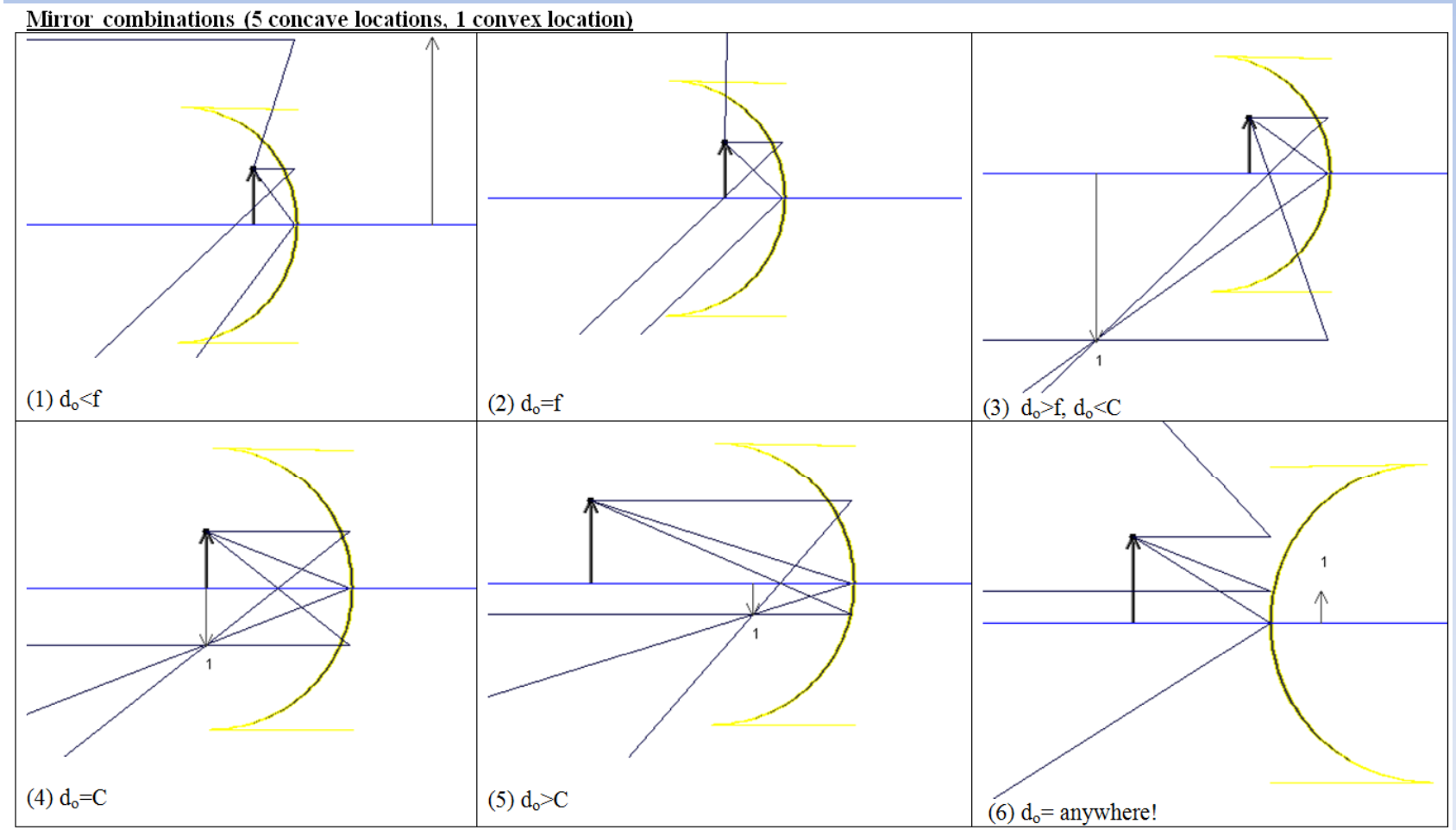


$$\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f}$$

$$M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

Mirror Equation – strategy for understanding

- For each below:
  - Comment on relative values of di, do, f **&** neg or pos
  - Three properties (e/r, v/r, u/i); would M be pos? neg?



Light intensity with distance

- Light intensity decreases according to the inverse square law, just like sound
- Light spreads out in all directions – just like sound!
- Light energy is diluted as it spreads out and the energy is spread into increasingly larger spheres