

30. (a) A convex (converging) lens, since a real image is formed.  
(b) Since  $i = d - p$  and  $i/p = 1/2$ ,

$$p = \frac{2d}{3} = \frac{2(40.0 \text{ cm})}{3} = 26.7 \text{ cm} .$$

- (c) The focal length is

$$f = \left( \frac{1}{i} + \frac{1}{p} \right)^{-1} = \left( \frac{1}{d/3} + \frac{1}{2d/3} \right)^{-1} = \frac{2d}{9} = \frac{2(40.0 \text{ cm})}{9} = 8.89 \text{ cm} .$$