

# Lab reports due today

- Due at 5 pm.
- Turn in your notebook with your report.
- Bring to my office (119).
- Hand to me or leave in yellow box outside office.

# Spherical Mirrors

- A reflective “portion of a sphere”.
- If the mirror is a small enough portion, all light rays parallel to the principal axis (which passes through center  $C$  and the middle of the mirror  $A$ ), will converge on a single focal point  $F$ .
- The focal length  $f$  (distance from mirror to  $F$ ) is half the radius of the sphere  $r$ .

$$f = \frac{r}{2}$$

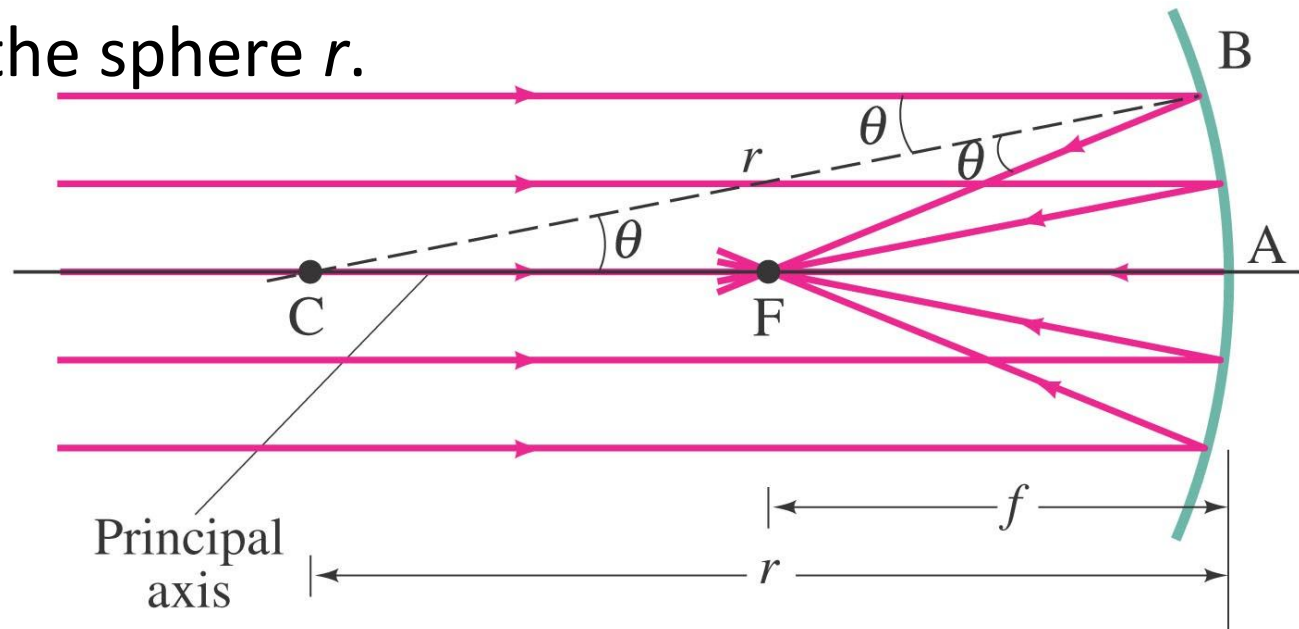


Figure 32.14

# Object and Image distances

- $d_o$  = “object distance” = distance of object from mirror .
- $d_i$  = “image distance” = distance of image from mirror .
- $f$  = “focal length” = distance of F from mirror .
  
- $d_o$  is positive if the object is on the same side of the mirror as the incident rays.
- $d_i$  is positive if the image is on the same side of the mirror as the reflected rays.
  - $d_i$  positive means image is “real and inverted”.
  - $d_i$  negative means image is “virtual and upright”.
- $f$  is positive if incident rays parallel to the optic axis actually converge at F.
  - if F is on the side of the mirror where the reflected rays actually go.

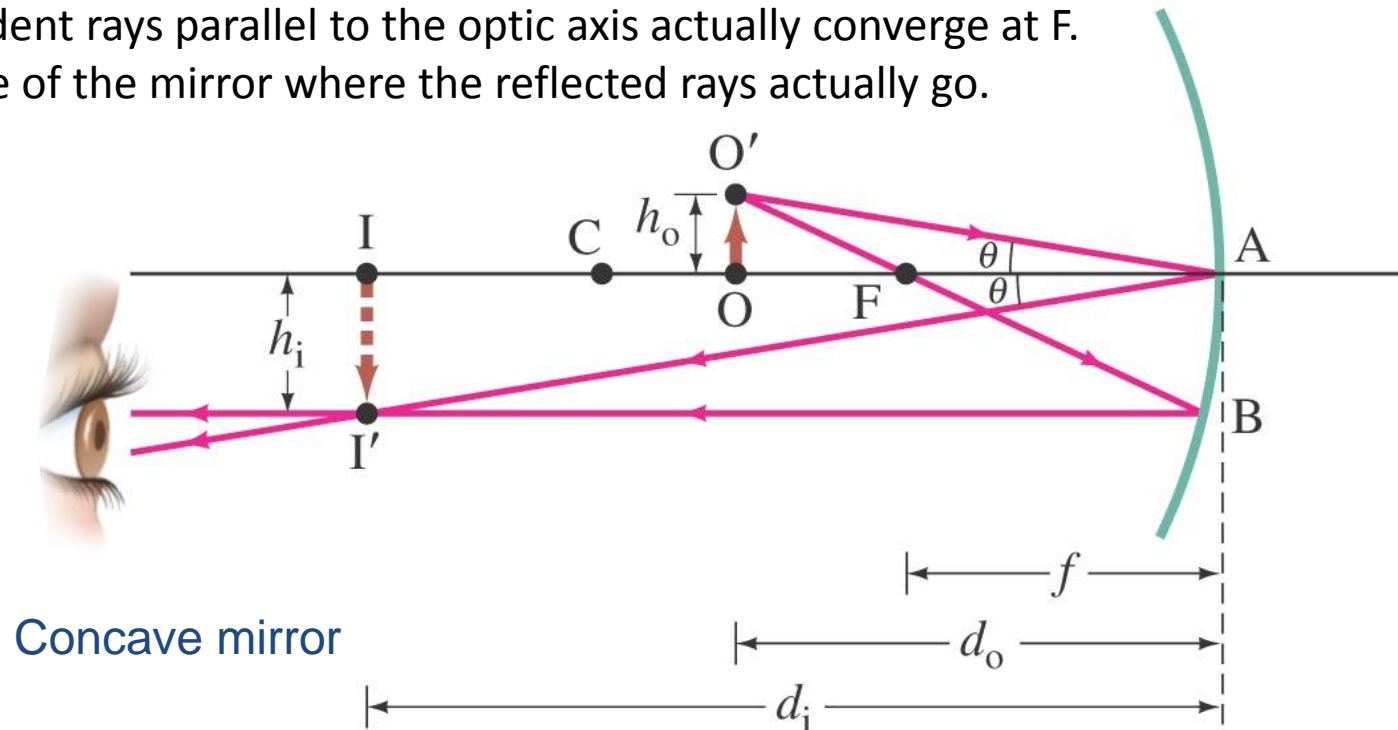
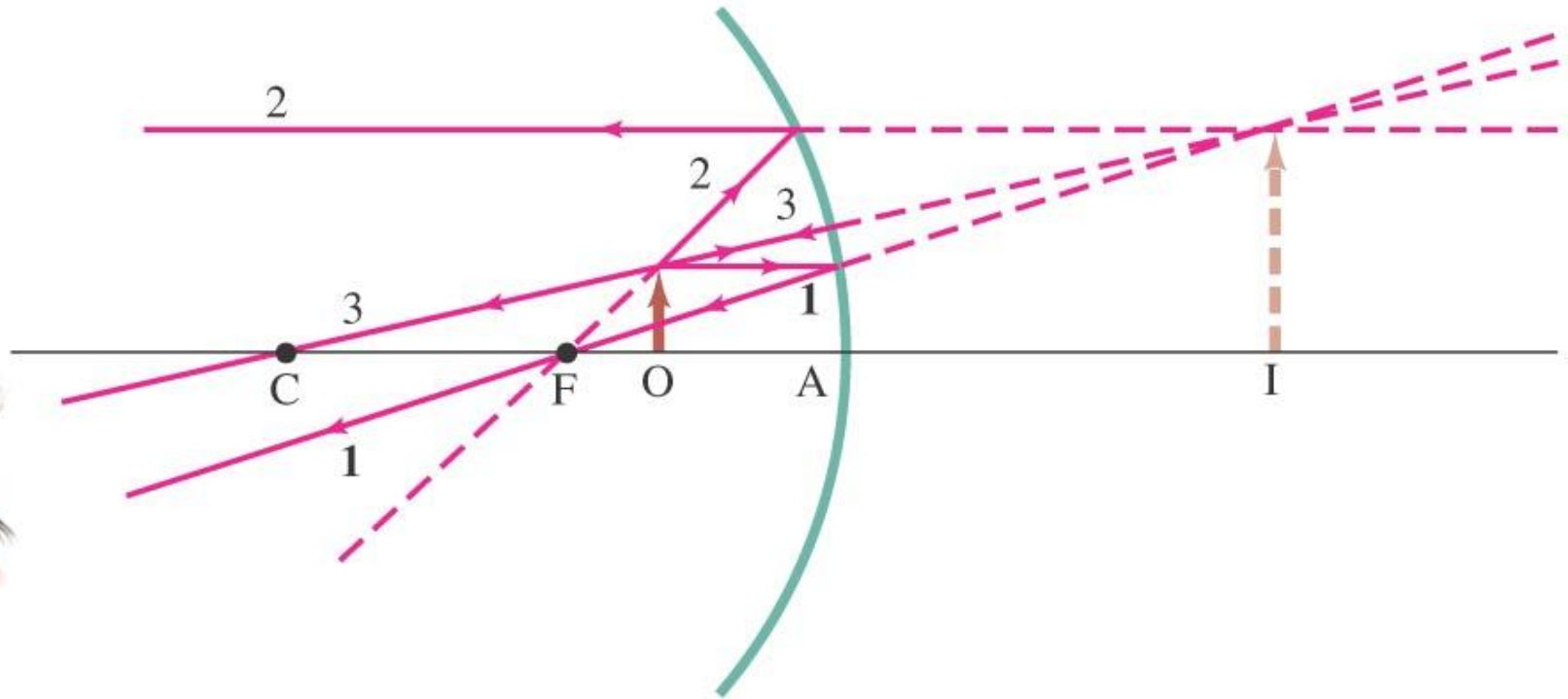


Figure 32.16

- Three rays leave one point on an “object”:
  - 1) A ray parallel to the principal axis (aka optic axis), will pass through the focal point F.
  - 2) A ray that passes through F, will end up parallel to the principal axis.
  - 3) A ray that passes through C, will reflect back upon itself.
- Where these three rays converge (or seem to converge), is the corresponding point on the image.



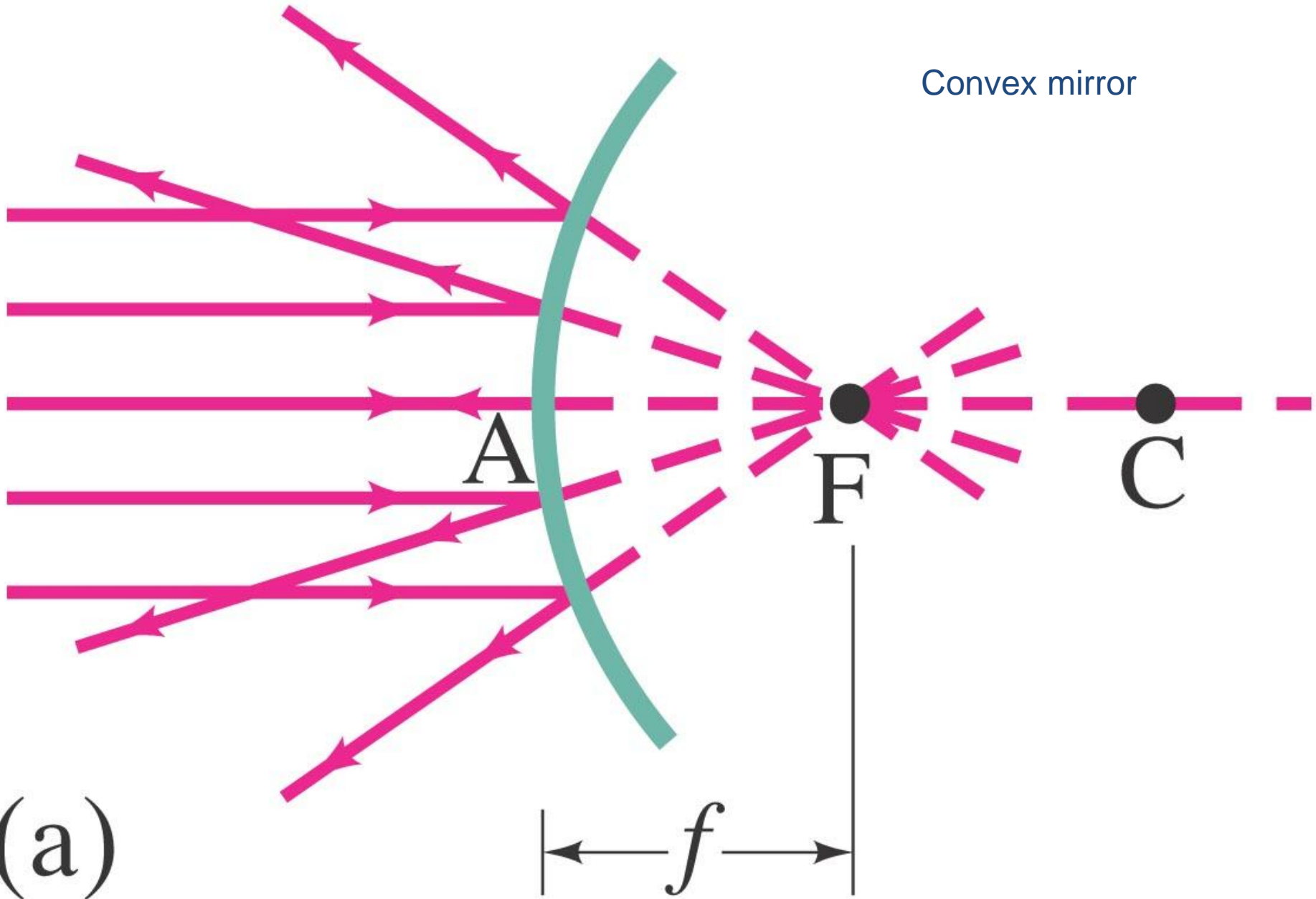
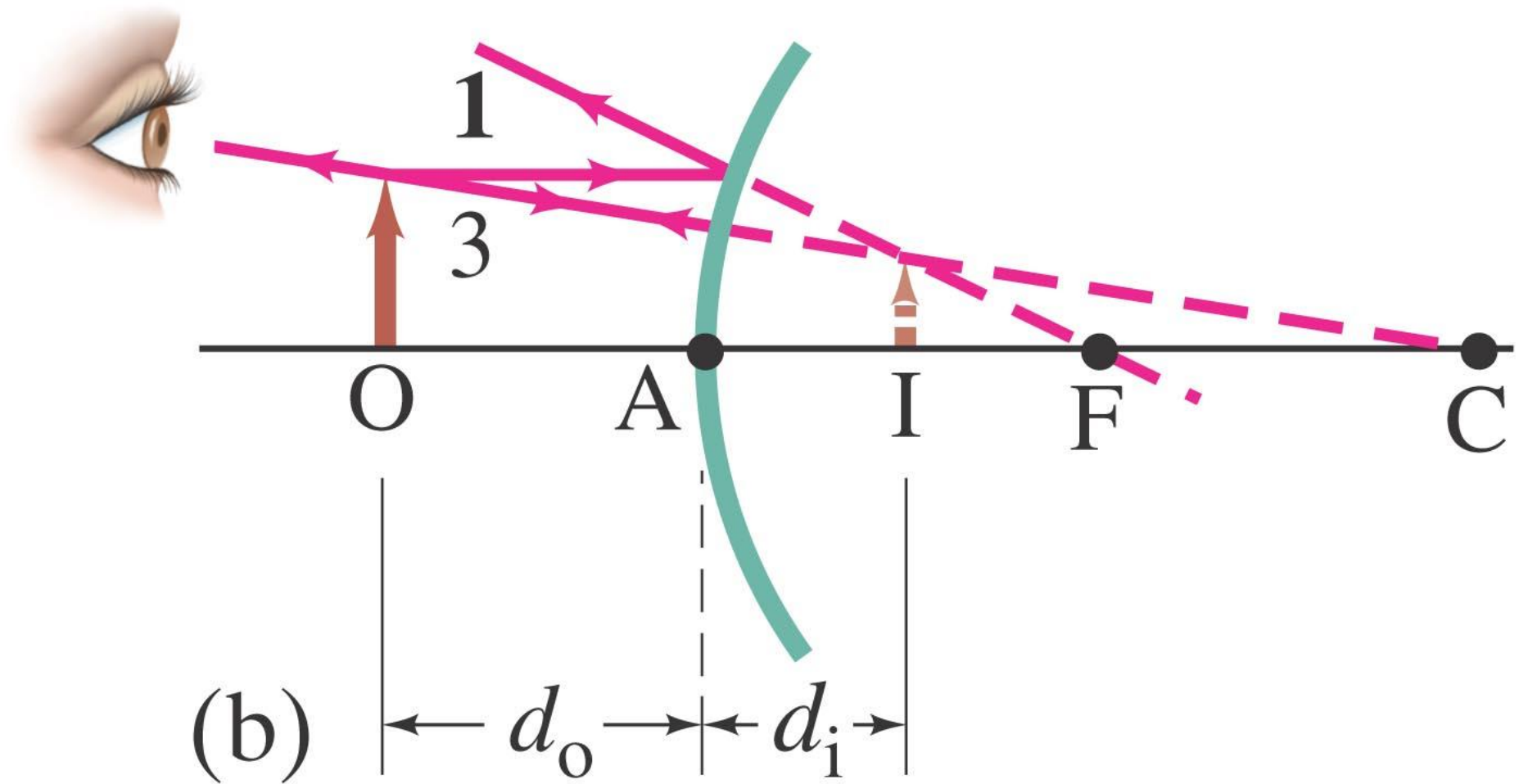


Figure 32.19a



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Figure 32.19b

# Object and Image distances

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    - if F is on the side of the mirror where the reflected rays actually go.

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

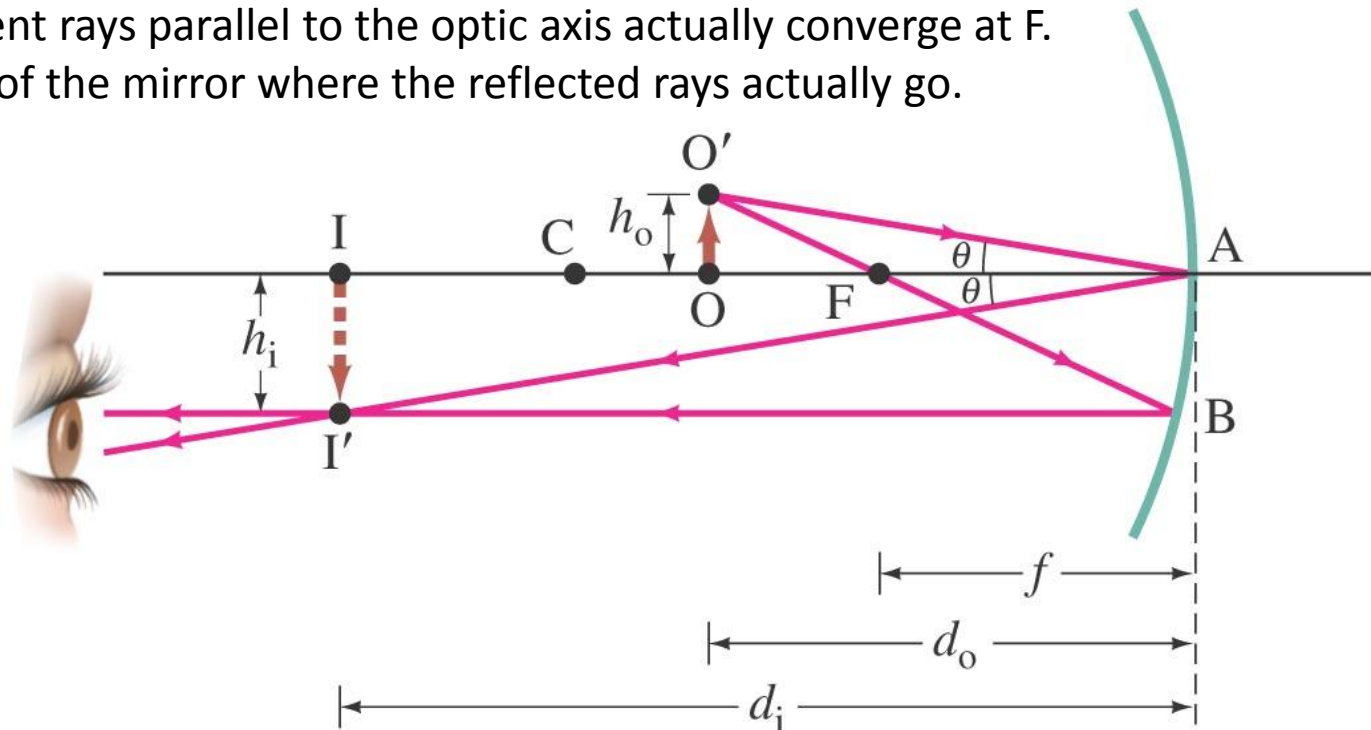


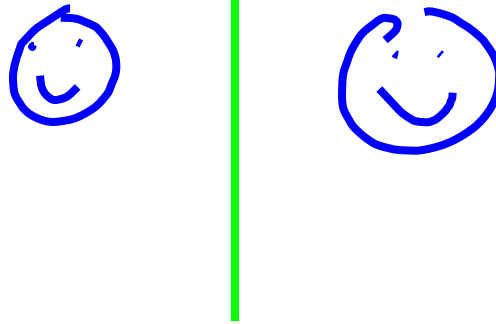
Figure 32.16

What is the radius of curvature of a plane mirror?

1) zero

2) infinity

3) it is equal to the length of the mirror



$$f = \frac{r}{2}$$

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f} = 0 \quad d_i = -d_o$$

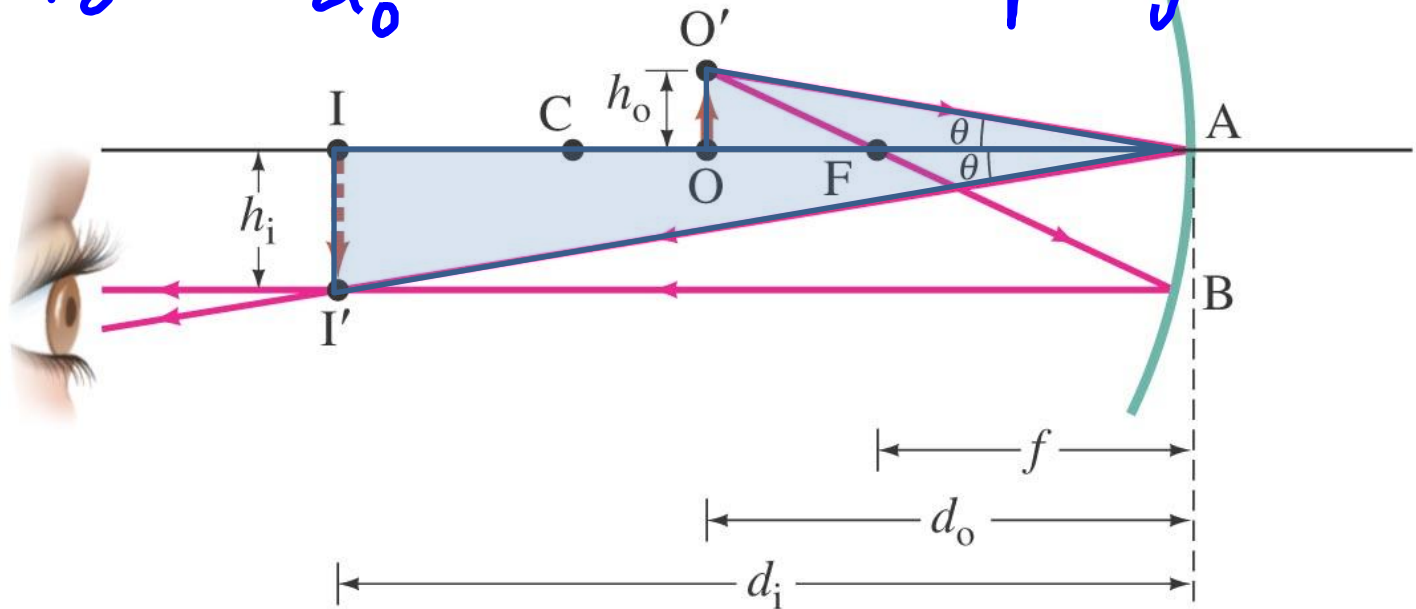


# Magnification

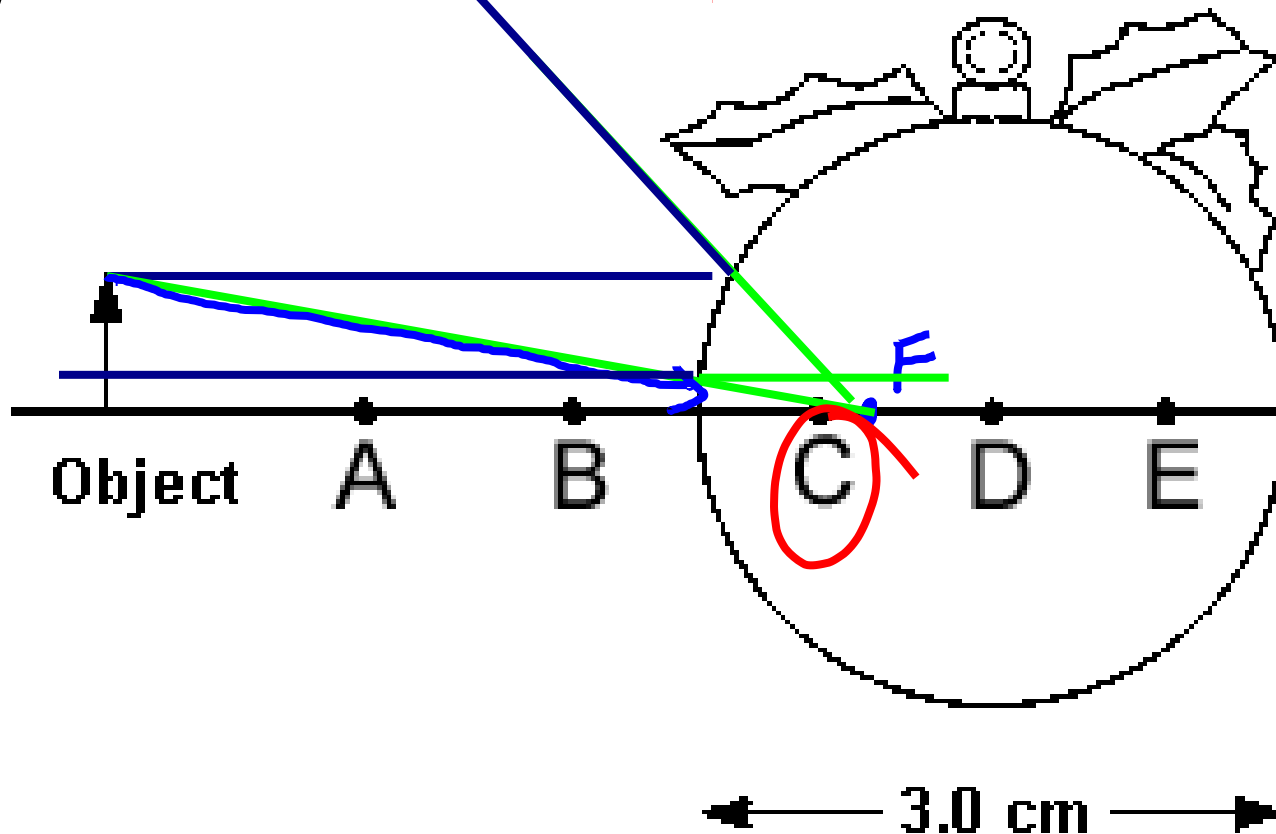
- Ratio of image height to object height.

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

$m < 0$  inverted  
 $> 0$  upright



An object is located 3 cm from the surface of a silvered spherical glass ball that is 3 cm in diameter. The image forms at which labeled point?



When an object is closer to a concave mirror than the mirror's focal point, the

1) magnification is less than one.

2) image distance is negative.

3) image is inverted.

4) All of these are correct.