Optics:
Mirror Equations

Concave Mirrors

f = focal length = (+)
p = object location = (+)
q = image location
M = magnification

q = (+) real, inverted; light rays actually intersect
q = (-) virtual, upright; light rays do not actually intersect – image only exists in our minds.

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

$$M = \left|\frac{q}{p}\right|$$

$$R = 2|f|$$

$$H_{image} = M * H_{object}$$

Calculate the image distance, magnification, and image height for the problems below.

- A concave mirror has a radius of curvature of 40 cm. A 5 cm high object is placed 60 cm in front of the mirror.

- An object 5 cm tall is placed 10 cm in front of a concave mirror of focal length 20 cm.

Convex Mirrors

f = focal length = (-)
p = object location = (+)
q = image location = (-)
M = magnification

Diverging mirrors only make virtual, upright images.

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

$$M = \left|\frac{q}{p}\right|$$

$$R = 2|f|$$

$$H_{image} = M * H_{object}$$

- A convex mirror has a radius of curvature of 2 m. A 3 m high object is placed 6 m from the mirror. Find the image distance, magnification, and image height.