

Physics 10
Curved Mirror Problems

1. If an object is placed outside of the focal length of a concave mirror, what type of image will be formed?

REAL $(1/d_i = 1/f - 1/d_o, \quad \text{If } d_o > f, \text{ then } 1/d_i > 0)$

2. If an object is placed inside the focal length of a concave mirror, what type of image will be formed?

Virtual $(1/d_i = 1/f - 1/d_o, \quad \text{If } d_o < f, \text{ then } 1/d_i < 0)$

3. Where does a ray of light that is parallel to the principal axis of a concave mirror go after it is reflected from the surface of the mirror?

Through the focal point

4. What test could you perform to decide whether an image is real or virtual?

Try to project the image on a screen, only a real image can be projected.

5. A concave mirror has a radius of curvature of 25.0 cm. For each of the following cases, determine whether the image is real/virtual, upright/inverted, larger/reduced. Determine the image distance and the magnification.

a. an upright pencil placed 45.0 cm from the mirror.

$d_i = 17.3 \text{ cm}$ $m = -0.38$ real, inverted, reduced

b. an upright pencil placed 25.0 cm from the mirror.

$d_i = 25 \text{ cm}$ $m = -1$ real, inverted, same size

c. an upright pencil placed 5.0 cm from the mirror.

$d_i = -8.33 \text{ cm}$ $m = 1.67$ virtual, upright, enlarged

6. The real image of a tree is magnified -0.085 times by a telescope's primary mirror. If the tree's image forms 35 cm in front of the mirror, what is the distance between the mirror and the tree? What is the mirror's radius of curvature? What is the mirror's focal length? Describe the image using three terms.

$d_o = 412 \text{ cm}$ $r_c = 64.5 \text{ cm}$ $f = 32.3 \text{ cm}$ real, inverted, reduced

7. A child holds a candy bar 15.5 cm from a side-view mirror on his mother's car. The image that forms is upright and $\frac{1}{2}$ the size of the object. What type of mirror is this? What is the focal length and radius of curvature of the mirror?

$d_o = 15.5 \text{ cm}$ $m = +0.5$ $d_i = -7.75 \text{ cm}$ $f = -15.5 \text{ cm}$ $r_c = -31 \text{ cm}$ convex mirror