

# What are Mirrors?

## Worksheet

The mirror equation  $1/f = 1/d_o + 1/d_i$  relates a mirror's focal length to the object and image distances; concave mirrors have positive  $f$ , convex mirrors negative  $f$ .

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

## Questions

- Which mirror always forms a virtual, reduced image?  
A) Concave mirror  
B) Convex mirror  
C) Plane mirror  
D) Both concave and convex
- For a concave mirror with  $f=15$  cm and  $d_o=45$  cm, what is  $d_i$ ?  
A) 10 cm  
B) 22.5 cm  
C) 30 cm  
D) 22.5 cm
- Placing an object inside a concave mirror's focal length produces  
A) A real, inverted image  
B) A virtual, magnified, upright image  
C) No image  
D) A reduced real image
- How does focal length relate to radius of curvature  $R$ ?  
A)  $f = R$   
B)  $f = R/2$   
C)  $f = 2R$   
D)  $f = R$
- A concave mirror has  $f = 15$  cm; an object sits 45 cm away. Find the image distance.
- The same concave mirror ( $f = 15$  cm) has an object 10 cm away, inside the focal length.
- A convex mirror has  $f = 25$  cm (car side mirror); an object is 40 cm away. Find the image distance.
- Define: Concave vs convex mirror?
- Define: What is the mirror equation?
- Define: Focal length and radius of curvature?

## Answer Key

1. B) Convex mirror - Convex mirrors diverge light and always form virtual, upright, reduced images.
2. B) 22.5 cm -  $d_i = (1545)/(4515) = 22.5$  cm.
3. B) A virtual, magnified, upright image - Inside  $f$ , a concave mirror acts as a magnifier - virtual, upright, enlarged.
4. B)  $f = R/2$  -  $f = R/2$  for spherical mirrors.
5.  $d_i = f d_o / (d_o - f)$   $d_i = (1545)/(4515) = 675/30$   $d_i = 22.5$  cm (real, inverted image)
6.  $d_i = (1510)/(1015) = 150/5$   $d_i = 30$  cm virtual, upright, magnified image (shaving/makeup mirror)
7.  $d_i = (2540)/(40(25)) = 1000/65$   $d_i = 15.4$  cm virtual, upright, reduced image
8. A concave mirror curves inward and converges light; a convex mirror curves outward and diverges light.
9.  $1/f = 1/d_o + 1/d_i$ , linking focal length, object distance and image distance.
10.  $f = R/2$  - the focal length is half the mirror's radius of curvature.

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