

Name: \_\_\_\_\_

Period: \_\_\_\_\_

## Simple Lens Equation Problems

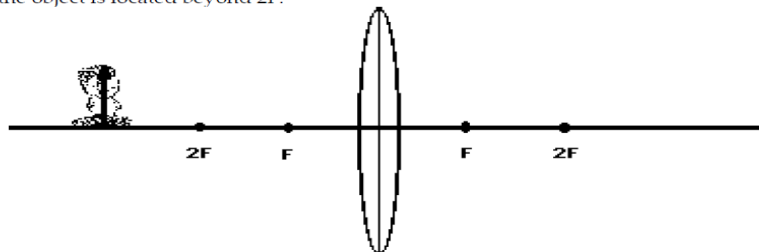
15

*The following examples can be done without a calculator, using common denominators. In preparation you need to know which devices are convergent and divergent and when the focal length is negative. Notes: "Optics Basics" and "Lens/Mirror Equations".*

1. A thin convergent lens has a focal length of 10 cm. An 8 cm object is placed 30 cm to the left of the lens. Calculate the distance to the image.
  
2. A 2 cm tall object is 4 cm in front of a concave mirror that has a focal length of 5 cm.
  - A. Calculate the distance to the image.
  
  - B. Describe the image (real, virtual, magnified, reduced).
  
3. A 4 cm object is 2 cm to the left of a divergent mirror. The image is seen 1.5 cm to the right of the mirror.
  - A. Before you calculate, describe the image.
  
  - B. Calculate the focal length of the mirror.
  
4. A concave mirror has an 8 cm focal length. A 20 cm real image is projected 40 cm to the left of the mirror.
  - A. Calculate the distance to the object.
  
  - B. Calculate the magnification of the mirror.
  
  - C. Calculate the height of the object.
  
5. A 4 cm object is 6 cm to the left of a concave lens. The image is 1.5 cm on the left side of the lens.
  - A. Calculate the focal length of the lens.
  
  - B. Calculate the height of the image.
  
6. A 0.08 m object is 0.12 m in front of a convergent mirror. The image focuses on a screen 0.24 m to the left of the mirror. Calculate the height of the image.
  
7. A 4 cm object is 10 cm in front of a convex lens. The image is found to be 6 cm tall and inverted. Calculate the focal length of the lens.

8. A convex mirror has a focal length of 4 cm. A 6 cm object is 12 cm to the left of the mirror. Calculate the distance to and height of the image.
  
9. A convex lens has a focal length of 4 cm. The 2 cm object is 3 cm to the left of the lens. Calculate the magnification of the lens.
  
10. A concave lens has a focal length of 3 cm. The object is 6 cm to the left of the lens and is 4 cm tall. Calculate the height of the image.
  
11. A 3 cm tall object is 8 cm from a concave mirror. The image is 9 cm tall and projected. Calculate the distance to the image and the focal length of the mirror.
  
12. An 0.03 m object is 0.20 m in front of a convergent mirror that has a 0.10 m focal length. Calculate the height and distance to the image.

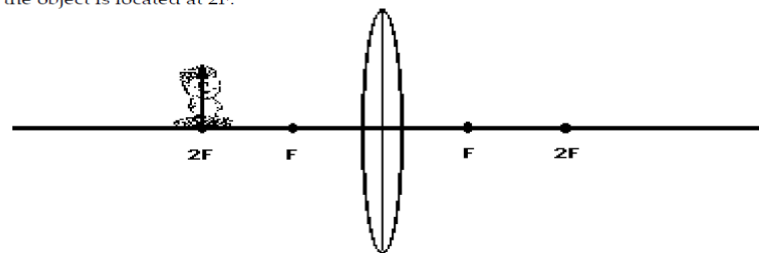
Case 1: If the object is located beyond 2F:



Description of Image:

Location: \_\_\_\_\_  
 O: Upright or Inverted      S: Magnified or Reduced      T: Real or Virtual

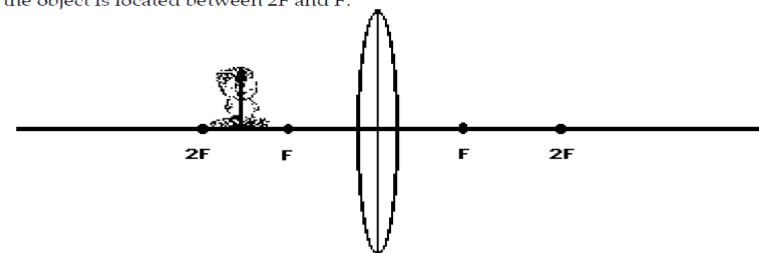
Case 2: If the object is located at 2F:



Description of Image:

Location: \_\_\_\_\_  
 O: Upright or Inverted      S: Magnified or Reduced      T: Real or Virtual

Case 3: If the object is located between 2F and F:



Description of Image:

Location: \_\_\_\_\_  
 O: Upright or Inverted      S: Magnified or Reduced      T: Real or Virtual