1. The image of an object in a flat plane mirror is always
   A) larger than the object.
   B) independent of the size of the object.
   C) smaller than the object.
   D) the same size as the object.

2. Which of the following best describes the image produced by a flat mirror?
   A) virtual, inverted, and magnification greater than one
   B) real, inverted, and magnification less than one
   C) virtual, upright, and magnification equal to one
   D) real, upright, and magnification equal to one



concave mirror

A       F   B
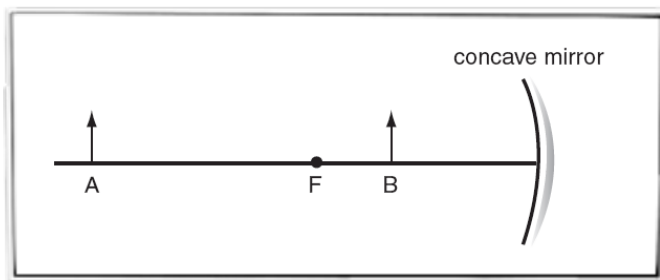
3. In the diagram above, the image created by object A would be
   A) virtual, enlarged, and inverted.
   B) virtual, smaller, and upright.
   C) real, the same size, and inverted.
   D) real, larger, and upright.

4. In the same diagram, the image created by object B would be
   A) real, reduced, and upright.
   B) virtual, enlarged, and upright.
   C) virtual, reduced, and inverted.
   D) virtual, reduced, and upright.

5. An object is placed 40.0 cm from a converging lens. If a virtual image forms at a distance of 50.0 cm from the lens on the same side as the object, what is the focal length of the lens?
   A) 22.0 cm
   B) 90.0 cm
   C) 5.0 cm
   D) 2.00 m

6. A converging mirror forms a real image at 25 cm from the mirror along the axis. If the object is located 10.0 cm from the mirror, what is the mirror's focal length?
   A) 1.4 cm
   B) 12 cm
   C) 17 cm
   D) 7.1 cm

7. What is the magnification of the image in question #6?
   A) 2.5
   B) -2.5
   C) 0.4
   D) -0.4

8. A diverging mirror with a focal length of -20.0 cm forms an image 12 cm behind the surface. Where is the object as measured from the surface?
   A) 7.5 cm
   B) 22 cm
   C) 15 cm
   D) 30 cm

9. If the object in question #8 was 5 cm tall, what is the height of the image?
   A) -2 cm
   B) 2 cm
   C) -12.5 cm
   D) 12.5 cm

10. An object that is 18 cm from a converging lens forms a real image 22.5 cm from the lens. What is the magnification of the image?
    A) −1.25
    B) −0.80
    C)  1.25
    D) 0.80



14. In the diagram above, the image formed by the converging lens would be _____.
    A) real, upright, and larger.
    B) real, inverted, and larger.
    C) virtual, upright, and smaller.
    D) virtual, inverted, and smaller.

11. An object is placed at a distance of 14.0 cm from a diverging lens. If a virtual image appears 10.0 cm from the lens on the same side as the object, what is the focal length of the lens?
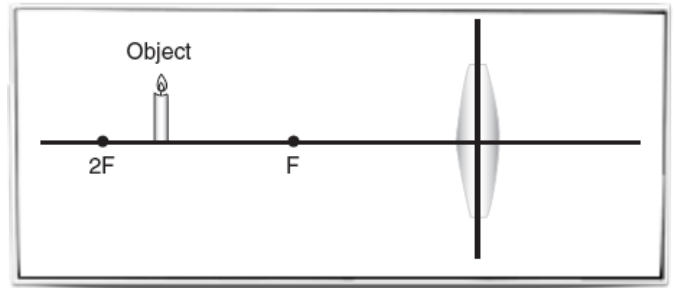    A) −50.0 cm
    B) −10.0 cm
    C) −35.0 cm
    D)  −8.0 cm

15. Which is an example of refraction?
    A) A parabolic mirror in a headlight focuses light into a beam.
    B) A fish appears closer to the surface of the water than it really is when observed from a riverbank.
    C) In a mirror, when you lift your right arm, the left arm of your image is raised.
    D) Light is bent slightly around corners.

12. What is the magnification for question #11?
    A) 0.7
    B) 1.4
    C) 3.5
    D) 5.0

13. Part of a pencil that is placed in a glass of water appears bent compared with the part of the pencil that extends out of the water. What is this phenomenon called?
    A) interference
    B) diffraction
    C) refraction
    D) reflection

16. The light from a very distant building (or pumpkin shaped lamp) passes through a converging lens and forms a real image 18 cm from the lens. If the same lens is used with a candle placed 25 cm from the lens, at what distance could one find a real image?
    A) 10.2 cm
    B) 25.5 cm
    C) 34.7 cm
    D) 64.3 cm

17. When a light ray moves from air (n = 1.00) into glass (n = 1.52) at an angle of 45°, its path within the glass is _____.
    A) closer to the normal.
    B) parallel to the normal.
    C) bent farther from the normal.
    D) straight in at the same 45° angle

18. A _____ indicates that an image produced by a concave mirror is upright.
    A) positive value for hi
    B) negative value for hi
    C) positive value for di
    D) negative value for do

19. A _____ indicates that an image produced by a concave mirror is virtual.
    A) positive value for ho
    B) positive value for di
    C) negative value for hi
    D) negative value for di

20. If a light ray reflects off a plane mirror at an angle of 30° to the normal, what is the angle of incidence of the ray?
    A) 150°
    B) 60°
    C) 30°
    D) 15°

21. What is the focal length of a converging mirror in which the image is located 10.0 cm in front of the mirror when the object is located 15.0 cm in front of the mirror?
    A) 6.00 cm
    B) 12.0 cm
    C) 15.0 cm
    D) 30.0 cm

22. If a converging mirror has a focal length of 8.00 cm, how far from the mirror is the image of an object that is located 40.0 cm in front of the mirror?
    A) 10.0 cm
    B) 6.67 cm
    C) 5.00 cm
    D) 1.50 cm

23. A candle is 30 cm from a converging spherical mirror. The mirror forms an image 15 cm from the mirror on the same side as the object. What is the magnification of the mirror?
    A) 2
    B) 0.5
    C) -2
    D) -0.5

24. If light passes from air into water at 40.0° to the normal, what is the angle of refraction? (The index of refraction for water is n = 1.33.)
    A) 28.9°
    B) 31.3°
    C) 58.7°
    D) 61.1°