1. An object 6 centimeters high is placed 30 centimeters from a concave mirror of focal length 10 centimeters as shown above.

   (a) On the diagram above, locate the image by tracing two rays that begin at point P and pass through the focal point F. Is the image real or virtual? Is it located to the left or to the right of the mirror?

   (b) Calculate the position of the image.

   (c) Calculate the size of the image.

   (d) Indicate on the diagram above how the ray from point P to point Q is reflected, if aberrations(inconsistencies) are negligible.

2. An object is 60 cm from a concave mirror whose focal length is 20 cm. The distance of its image from the mirror is:

      a) 30 cm behind the mirror surface
      b) 30 cm in front of the mirror surface
      c) 60 cm behind the mirror surface
      d) 60m in front of the mirror surface

3. An object in the question above is 10 cm tall. As it moves toward the concave mirror until it reaches the focus of the mirror, size of the image:

      a) decreases until it becomes a point
      b) decreases until it is exactly 10 cm tall
      c) increases until it is 20 cm tall
      d) increases indefinitely

4. A concave mirror having a focal length, F, produces a real image that is smaller than the object, when the distance of the object from the mirror is:

      a) less than F
      b) between F and 2F
      c) exactly 2F
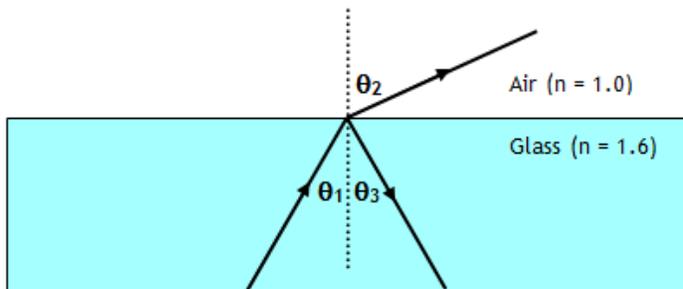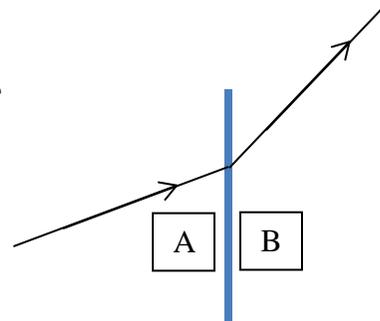   d) greater than 2F

5. The speed of light in crown glass is 2×10^8 m/s. The index of crown glass is:

   a) 1.0   b) 1.5   c) 2.0   d) 3.0

6. A ray of light passes from air into medium A at an angle of 45°. The angle of refraction is 30°. The index of refraction of medium A is:

   a) 0.5/0.71   b) 0.71/0.50   c) 30/45   d) 45/30

7. Which medium has the larger index of refraction? A or B or same

8. Light strikes a glass/air boundary at an angle of incidence Θ_1. The ray is partially reflected and partially refracted at the boundary, as shown above. The index of refraction of this glass is 1.6 for light of this frequency.

   a) Determine the value of Θ_3 if $\Theta_1 = 30°$.

   b) Determine the value of Θ_2 if $\Theta_1 = 30°$.

   c) Determine the speed of this light in the glass.

   d) What is the largest value Θ_1 that will result in a refracted ray?