

14 C - Convex Mirror problems

4. As you turn the knob of a faucet to draw bath water, you see your reflection in the water spout. The focal length of the spout is -33 cm. How far away from the spout are you if your image appears to be 16.1 cm behind the spout? What is the magnification of the image?

5. You see your reflection in your friend's mirrored sunglasses. If each lens has a focal length of -12 cm, and your image appears 9.0 cm behind the sunglasses, how far from your friend are you standing? What is the magnification of the image?

6. To supervise customers, many stores install spherical convex mirrors in strategic locations. Suppose one store has a spherical convex mirror with a magnification of 0.11 . Suppose you are 1.75 m tall.
 - A) How tall is the image?
 - B) How far in front of the mirror are you when the image appears 42 cm behind the mirror?

15A - Refraction problems

7. The Chinese skillfully carve figurines made of a translucent greenish material called serpentine. A ray of light traveling in air strikes the flat surface of a serpentine figurine ($n = 1.555$). If the ray in the serpentine makes an angle of 33° with the normal, what is the angle of incidence?

8. When light in air enters an opal mounted on a ring, it travels at a speed of 2.07×10^8 m/s. What is opal's index of refraction?

9. Amber is a fossil resin of trees that lived tens of millions of years ago. Sometimes insects were trapped by the resin and fossilized inside. Suppose a ray of light traveling in air strikes a 2 mm thick clear amber pendant ($n = 1.54$) at an angle of 17° with the normal. Find the angle of refraction into the Amber.

15C Critical angle problems

10. The critical angle for light traveling from an aquamarine gemstone into air is 39.18° . What is the index of refraction for aquamarine?

11. Find the critical angle for light traveling from a ruby ($n = 1.766$) into air.

12. Find the critical angle for light traveling from an emerald ($n = 1.576$) into water ($n = 1.33$)

