

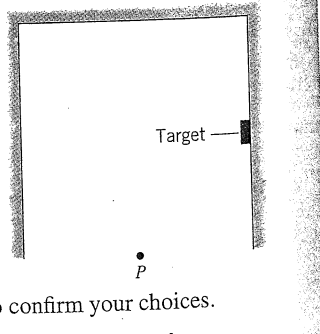
9. **ssm** The human eye is most sensitive to light having a frequency of about 5.5×10^{14} Hz, which is in the yellow-green region of the electromagnetic spectrum. How many wavelengths of this light can fit across the width of your thumb, a distance of about 2.0 cm?

12. Two radio waves are used in the operation of a cellular telephone. To receive a call, the phone detects the wave emitted at one frequency by the transmitter station or base unit. To send your message to the base unit, your phone emits its own wave at a

different frequency. The difference between these two frequencies is fixed for all channels of cell phone operation. Suppose the wavelength of the wave emitted by the base unit is 0.34339 m and the wavelength of the wave emitted by the phone is 0.36205 m. Using a value of 2.9979×10^8 m/s for the speed of light, determine the difference between the two frequencies used in the operation of a cell phone.

3. A person stands 3.6 m in front of a wall that is covered floor-to-ceiling with a plane mirror. His eyes are 1.8 m above the floor. He holds a flashlight between his feet and manages to point it at the mirror. At what angle of incidence must the light strike the mirror so the light will reach his eyes?

*7. The drawing shows a top view of a square room. One wall is missing, and the other three are each mirrors. From point P in the center of the open side, a laser is fired, with the intent of hitting a small target located at the center of one wall. Identify six directions in which the laser can be fired and score a hit, assuming that the light does not strike any mirror more than once. Draw the rays to confirm your choices.



10. **Concept Simulation 25.2** at www.wiley.com/college/cutnell illustrates the concepts pertinent to this problem. A 2.0-cm-high object is situated 15.0 cm in front of a concave mirror that has a radius of curvature of 10.0 cm. Using a ray diagram drawn to scale, measure (a) the location and (b) the height of the image. The mirror must be drawn to scale.

13. **ssm** Repeat problem 10 for a convex mirror with a radius of curvature of 1.00×10^2 cm, an object distance of 25.0 cm, and a 10.0-cm-high object.