

1. (15) Working for the cosmetics industry, you need to design a mirror that magnifies a user's face by +4.0 times when held 12.0 cm away from it.

a) (5) The image will be

a. magnified & upright. b. magnified & inverted. c. diminished & upright. d. diminished & inverted.

b) (5) When someone is using the mirror, where is the image? Be specific.

c) (5) Calculate the focal length of the mirror in centimeters (and be sure to check the sign).

2. (5) A converging lens with a 3.50 m focal length is used to form an image of the sun focused on a screen. The sun is at a distance of 1.50×10^{11} m, and its diameter is 1.39×10^9 m. What is the diameter of the sun's image, in cm?

3. (5) A concave spherical mirror has radius of curvature of 80.0 cm. After finding the focal length, calculate the power of the mirror in diopters.

4. (5) A coin is at the bottom of a pool filled with water ($n_w=1.33$). A ray of light emerges as shown, 4.00 m from the pool's edge, at angle $\alpha = 37.0$ degrees. Use Snell's Law to find angle θ and then determine the depth of the pool, in meters.

