1) The reflecting surfaces of two plane mirrors form an angle of 120°. If a ray of light strikes mirror 1 with an angle of 55°, find the angle of reflection when the light leaves mirror 2.

![Diagram of two plane mirrors with an angle of 120° and a ray of light striking at 55°](image)

2) Sunlight reflects from a concave piece of broken glass, converging to a point 15 cm from the glass. What is the radius of curvature of the glass?

3) An object with a height of 42 cm is placed 2.0 m in front of a convex mirror with a focal length of -0.5 m. Find the location and size of the resulting image. Is this image real, or is it virtual?

4) A magician wishes to create the illusion of a 2.74 m tall elephant. He plans to do this by forming a virtual image of a 50 cm tall model elephant with the help of a spherical mirror.

   a) Should the mirror be concave or convex?
   b) If the model must be placed 3.0 m from the mirror, what radius of curvature is needed?
   c) How far from the mirror will the image be formed?
5) To a person swimming 0.8m below the surface of the water in a pool, the diving board directly overhead appears to be a height of 5.2m above the swimmer. What is the actual height of the diving board above the surface of the water?

6) A lens produces a real image that is twice as large as the object and is located 15cm from the lens. Find the focal length of the lens and the object distance. Draw a ray diagram.

7) An arrow 2cm long is located 75cm from a lens with focal length f=30cm.
   a) If the arrow is vertical, what is the magnification of the image?
   b) If the arrow is placed horizontally, so that its tip is 74cm from the lens and its tail is 76cm from the lens, what is the magnification of the image (i.e. how long does the image of the arrow appear to be from tip to tail)?

8) Repeat problem 7 for the case of a lens with focal length f=-30cm.