Lab 9 PreLab Exercise: Geometrical Optics

For all the questions below, draw the ray diagram clearly indicating the object, image, etc. Show your calculations.

1. A 1 cm tall object is placed on the optical axis of a thin lens, 30 cm from the lens, which has a focal length of +20 cm.

(a) How far is the image from the lens?

(b) How far is the image from the object?

(c) What is the size of the image?

(d) Is it a real or virtual image?

(e) Is the image upright or inverted?

2. Answer the same questions as in 1 for a lens with – 20 cm focal length.

(a) How far is the image from the lens?

(b) How far is the image from the object?

(c) What is the size of the image?

(d) Is it a real or virtual image?

(e) Is the image upright or inverted?

3. You have a setup as shown below.

![Diagram of a setup with an object and a lens]
The focal length of the convex lens is 10 cm and that of the concave lens is – 6 cm. The distance between the lens is 15 cm. An object of height 3cm is placed at a distance of 20 cm from the convex lens as shown.

(a) Where does the initial image due to the convex lens form?

(b) Is it upright? Inverted?

(c) What is the size of this image?

(d) This image acts as the object for the concave lens. Where does the final image due to the concave lens form?

(e) Is it upright? Inverted?

(f) What is the size of the final image?

(g) What happens to the image size if the focal length of the concave lens is changed to – 4 cm?

(h) Is the new final image real? virtual?