

PHYS 102 LENS Name: _____

A. Purpose: Investigate the difference between a convex lens and a concave lens in forming real images.

Apparatus: Optical bench and accessories, convex lens ($f = 5 \text{ cm}$), and concave lens.

Procedure: Set the object & light bulb at the 0 cm end of the bench. Put the convex lens in the lens holder and place it in the optical bench so that the object distance is 10 cm. Move the screen and see whether you get a real image on the screen. Repeat the above procedure for other object distances and the concave lens.

Data:

Object Distance (cm)	For convex lens, Real image YES/NO	For concave lens, Real image YES/NO
10	-	-
20	-	-
30	-	-
40	-	-
50	-	-
60	-	-
70	-	-
80	-	-
90	-	-
100	-	-

Conclusion for A:

B. Purpose: For convex lenses, investigate and find out the range of object distances for which there are real images, and predict a correlation between the focal length and object distances for real images.

Apparatus: Optical bench and accessories, convex lenses: $f = 10$ cm, 15 cm, 20 cm, and 30 cm.

Data:

Object Distance(cm)	$f = 10$ cm, Real image YES/NO	$f = 15$ cm, Real image YES/NO	$f = 20$ cm, Real image YES/NO	$f = 30$ cm, Real image YES/NO
5	-	-	-	-
10	-	-	-	-
15	-	-	-	-
20	-	-	-	-
25	-	-	-	-
30	-	-	-	-
35	-	-	-	-
40	-	-	-	-
45	-	-	-	-
50	-	-	-	-

Conclusion for B: _____

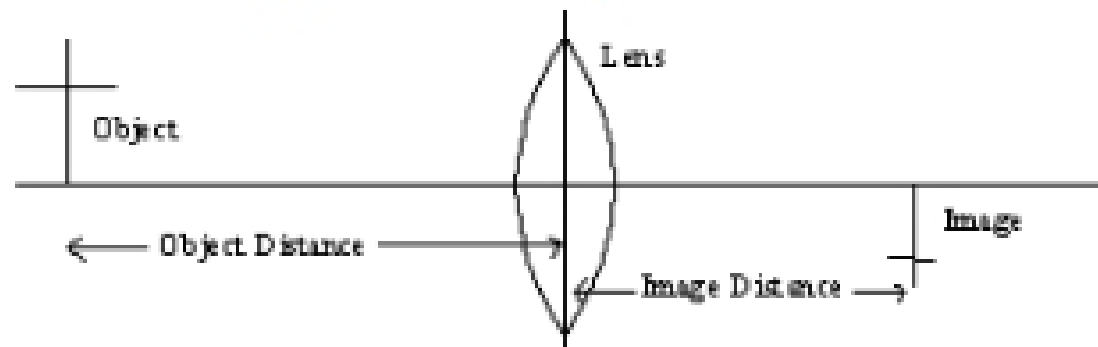
C. Purpose: To investigate the magnifications of real images formed by a convex lens and determine the focal length.

Apparatus: Convex lenses ($f = 20$ cm), optical bench & accessories, and foot ruler.

Theory: For a thin lens focal length, f is given by ($d_o =$ object distance, $d_i =$ image distance);

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

Magnification, m is given by the following equations; ($S_i =$ image size, $S_o =$ object size). $|m| = \frac{d_i}{d_o}$ $|m| = \frac{S_i}{S_o}$



Procedure: Measure the object size. Place the 20-cm lens in the lens holder and set up the lens holder at 30 cm from the object. Move the screen and obtain a sharp image. Measure the image distance and the image size. Repeat the measurements for other object distances and complete the data table.

DATA: Object size = $s_o =$ _____

Object distance, d_o (cm)	Image distance, d_i	Image size, s_i
30		
35		
40		
45		
50		
55		
60		

DATA ANALYSIS: Enter the above data in Excel and create three more columns: one for focal length and the other two for magnifications. Attach your data table and then write a conclusion.