CURVED MIRROR LAB

Purpose: To study the characteristics of images formed by curved mirrors, and to calculate the focal length of the given concave mirror

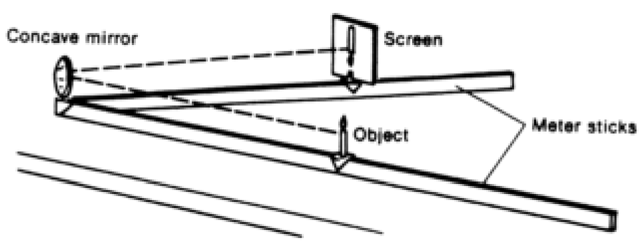
Materials: Index card, meter sticks, light bulb (s)

Directions:

Note: the letters in the Directions steps - a., b., c., etc. correspond to the letters a), b), c) etc. in the data table.

a. Determine the focal length of the concave mirror by projecting the image of the sun on a small screen (index card) and carefully measuring the distance from the mirror to the smallest, brightest dot you can form. If clouds obscure the sun, the sharply defined image of a distant light bulb will suffice. Set up a 150-watt light bulb in the hall and stand 10-20 m away. Focus the smallest, brightest image of the bulb. Each group member should find the focal length. These should be averaged in *a.*). Record the average value in the table as $f_{accepted}$.

b. Set up 2 meter-sticks in a V and hold the concave mirror at the apex.



Place a light bulb with 2 dark lines on it, beside one of the meter sticks so the lines point toward the mirror. Before turning it on, measure the distance between the two lines and enter this value as h_o in the data table for parts , b), c) and d). The nose of the bulb should be placed at the 50 cm mark, this is d_o and you should record it on line *b.* in the data table. Hold an index card on the other meter stick and stand books or folders between the meter sticks to place the card in shadow. Move the card back and forth until a sharp image of the lines on the light bulb is obtained. (It may be necessary to adjust the position of the mirror and to change the angle between the meter sticks in order to locate the image properly on the screen.) Measure the distance between the mirror and the image and record it as d_i. Measure the distance between the lines on the screen. This is h_i.

c. Move the nose of the light bulb up to where the card was in part b. and move the card back to focus a new image. Focus as carefully as possible. Measure and record d_o (light bulb to mirror), d_i (screen to mirror) and h_i (spacing of lines on card).

d. Find the position of the light bulb and card for which h_o and h_i are equal. Again record d_o, d_i, h_o and h_i.

e. Move the light bulb so that d_o is equal to the focal length of the mirror. Try to locate the image. What happens and why?

f. Position the bulb between the focal point and the mirror. Try to locate the image. Describe what you observe when you look into the mirror.

g. Convex Mirror. Turn the mirror around so that the convex surface faces the light bulb. Place the bulb at the far end of the meter stick and move it closer to the mirror. Record the corresponding changes in the image you see in the mirror.

DATA

a) Focal length of mirror:________________________________

Trial	d_o	d_i	h_o	h_i	$\frac{1}{d_o}$	$\frac{1}{d_i}$	f_{exp}	$f_{accepted}$	Percent Error
b)									
c)									
d)									

Sample Calculations: Compute the decimal value of $1/d_o$, $1/d_i$. Use the mirror equation to find the focal length, f_{exp}. Calculate the percent error.

Observations:

e)

f)

g)

Questions: Answers must be in complete sentences.

1. What is the relationship between d_o, and d_i data for parts b and c?
   What about h_o and h_i?

2. What is the relationship between the focal length of the mirror and the location of the object and image in part d?

3. List two different practical applications for concave mirrors and two different practical applications for convex mirrors.