LAB 28, CURVED MIRRORS

Name _____ Period_____

*** Bring an Incandescent (not LED) Flashlight & Candle for this Lab! ***

A concave mirror causes incident rays of light parallel to its principal axis to converge on a point called its principal focus. Different types and sizes of images may be formed by these mirrors, depending on the distance of the object from the mirror. In this experiment we shall examine the parameters of the mirror object-image system.

A convex mirror causes incident rays of light parallel to its principal axis to diverge as though they emanated from its principal focus. Only one type of image is produced by these mirrors. Convex mirrors are sometimes added to rearview (plane) mirrors on vehicles to provide the drivers with a wide field of vision. However, they do give a misleading impression of distance.

OBJECTIVE:

After completing this experiment, you should be able to describe the image of an object formed by a curved mirror based on the focal length of the mirror and the size and position of the object.

PROCEDURE:

1. Concave mirror:

a. Determine the focal length, **f**, in cm of the concave mirror with parallel rays from a flashlight. Record the focal length in the data table.

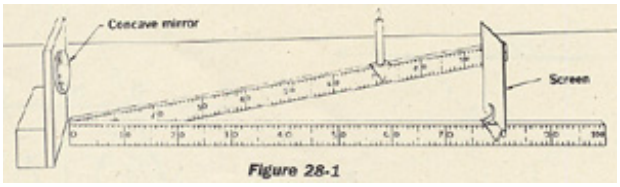

Figure 28-1

b. Set up the metersticks and concave mirror as shown in Figure 28-1. The apex of the **V** should be slightly below the center of the mirror. Mount the candle on one meterstick as far away from the mirror as possible.

Measure this distance and record it as $\mathbf{d_o}$. Mount the image screen on the other meterstick and move it back and forth until a sharp image of the candle is obtained. Measure the distance between the mirror and image screen and record it as $\mathbf{d_i}$.

Light the candle and measure the height of the **candle flame** as accurately as possible. Record it as $\mathbf{h_o}$. Measure the height of the **image of the flame** and record it as $\mathbf{h_i}$.

c. Interchange the candle flame and image screen. Make any necessary adjustments in the position of the image screen so as to obtain a sharply defined image.

Measure and record $\mathbf{d_o}$, $\mathbf{d_i}$, $\mathbf{h_o}$, and $\mathbf{h_i}$, in the data table.

d. Find the position of the candle and screen for which $\mathbf{h_o}$ and $\mathbf{h_i}$ are equal.

e. Move the candle so that $\mathbf{d_o}$ is equal to the focal length of the mirror. Try to locate the image. Record your observations. Observation.

f. Position the candle between the focal length and the mirror. Try to locate the image. What do you observe when you look into the mirror? Observation.

2. Convex mirror:

2. Formation of images. The candle flame is the Object.. Use Data Table Belos.

Case 1. Set or hold the mirror in the center of the meterstick. Place the object (the candle flame) beyond the **cc** of the mirror. By moving the screen back and forth, find the sharpest image on the screen placed on the opposite side of the mirror.
Measure and record in the data table the object distance, $\mathbf{d_o}$, from mirror to the object, the image distance, $\mathbf{d_i}$, from the screen to the mirror, the height of the object (the flame)**,** $\mathbf{h_o}$, and the height of the image, $\mathbf{h_i}$, on the screen.

Case 2. Place the object (candle) **on** the **cc** from the mirror. Move the screen back and forth until the sharpest image is obtained. Record in the data table the object distance, $\mathbf{d_o}$, from mirror to the object, the image distance, $\mathbf{d_i}$, from the screen to the mirror, the height of the object (the flame)**,** $\mathbf{h_o}$, and the height of the image, $\mathbf{h_i}$, on the screen.

Case 3. Locate the object (candle) between the **cc** and the **f**. Move the screen back and forth until the sharpest image is obtained. Record in the data table the object distance, $\mathbf{d_o}$, from mirror to the object, the image distance, $\mathbf{d_i}$, from the screen to the mirror, the height of the object (the flame)**,** $\mathbf{h_o}$, and the height of the image, $\mathbf{h_i}$, on the screen.

Case 4. Place the mirror so that it is exactly one focal length away from the object. Try to form an image on the screen.

Observation_____.

Look at the mirror at the object. Observation_____.

Estimate the size and distance of the ***virtual imag***e as seen **in** the mirror _____.

Case 5. Place the object between the **f** and the mirror. Try to form an image on the screen. Remove the screen and, placing your eye close to the lens, look **at** the mirror at the object. Estimate the size and distance of the ***virtual imag***e as seen through the mirror_____.

Replace the concave mirror with a convex mirror. Place the candle at the far end of one meterstick. Describe the image in the mirror. Move the candle closer to the mirror and record the corresponding changes in the image.

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Observation _____.

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..... Focal length for mirror (f) _____(cm)

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..... Data Table:

Case	d_o (cm)	d_i (cm)	h_o (cm)	h_i (cm)
1	.	.	.	.
2	.	.	.	.
3	.	.	.	.
4	.	.	.	.
5	.	.	.	.

QUESTIONS:

1. What is the relationship between the focal length of the mirror and the location of the image in Part d ?

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2. What type of image is formed in Part f ? Why is it possible to see the image when looking into the mirror, whereas it is not possible to form it on the screen?

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3. List a practical application for each part of this experiment.

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CRITIQUE: