Focal Length of a Concave Mirror Lab - Guided

PSI Physics

Name:_____

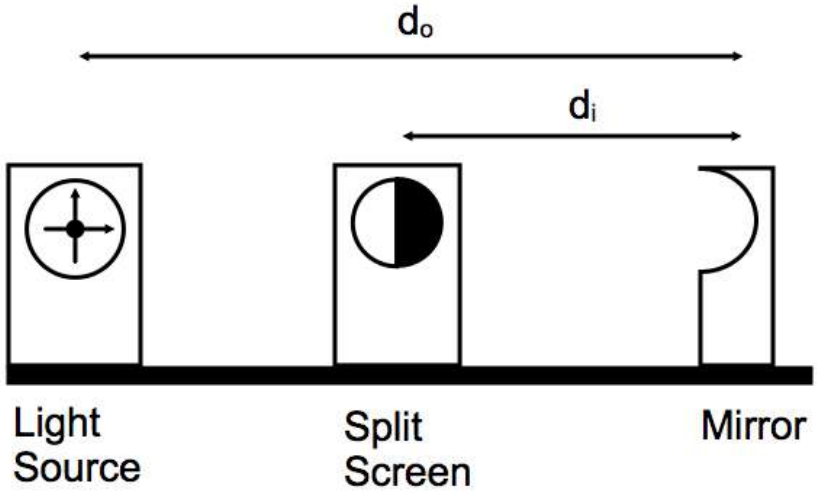
Date:_____ Period:_____

Purpose

Concave mirrors produce both real images and virtual images. Light rays actually pass through real images and these images can be viewed upon a screen. Virtual images cannot be seen upon a screen. Students will investigate the size, position and orientation of an image formed by a concave mirror. They will measure image and object distances to calculate the focal length of the mirror.

Materials

- Optics light source
- Concave mirror
- Split screen
- Track
- Mounting brackets
- Meter stick



Procedure

1. Using the diagram as a guide, set up your light source, split screen and mirror on the track. Make sure the split screen is between the light source and mirror and that the mirror is curved in the correct direction (concave).

2. Adjust the distance between the source, screen and mirror so that a real image of the light source is see on the split screen.

3. Make the following measurements and record them in the data table:
   - Measure the object distance d_o (from the mirror to the source).
   - Measure the image distance d_i (from the mirror to the screen).
   - Measure the height of the object (on the light source – does not change).
   - Measure the height of the image (on the split screen).

4. Determine whether the image is real or virtual, upright or inverted and magnified or demagnified and indicate in the data table.

5. Repeat steps 2- two more times. Try to find at least one magnified and one demagnified image.

Calculations

1. For each trial, calculate the focal length and enter into data table using the equation:

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

2. For each trial, calculate the lateral magnification two different ways and enter into data table:

$$\mathrm{m} = \frac{d_i}{d_o} = \frac{h_i}{h_o}$$

Analysis

1. If a concave mirror produces a real image, is the image necessarily inverted?

2. What is the focal length of a plane mirror? What is the magnification of a plane mirror?

3. Look at your values for magnification. Explain why your results may have been different when using the distances and heights.

4. Make the conclusion about your major results (include characteristics of a concave mirror).

Data Table

Trial	Object Distance **d_o (cm)**	Image Distance **d_i (cm)**	Focal Length **f (cm)**	Object Height **h_o (cm)**	Image Height **h_i (cm)**	Real or Virtual	Upright or Inverted	Magnified or Demagnified	Magnification $\boldsymbol{m = \frac{d_i}{d_o}}$	Magnification $\boldsymbol{m = \frac{h_i}{h_o}}$
1										
2										
3										