

Exploring Images in Lenses

SKILLS MENU

- ▶ Questioning
- ▶ Hypothesizing
- ▶ Predicting
- ▶ Planning
- ▶ Controlling Variables
- ▶ Performing
- ▶ Observing
- ▶ Analyzing
- ▶ Evaluating
- ▶ Communicating

An image has four characteristics: size, attitude, location, and type. These characteristics determine which lenses are best for which optical devices.



Purpose

To explore the characteristics of images produced by converging and diverging lenses

Procedure

Part A

1. Copy **Table 1** into your notebook.

Table 1 Image Characteristics in Lenses

Object location	Size of image	Attitude of image	Location of image	Type of image
beyond $2 \times F$				
at $2 \times F$				
between $2 \times F$ and F				
at F				
in front of F				

Equipment and Materials



converging lens with support



diverging lens with support



metre stick with two supports



chalk



candle with holder



paper screen and holder



metal jar lid

- Place the converging lens at the 50 cm mark of the metre stick (**Figure 1**).
- With the lights off, aim the assembly at a distant object, such as a window frame.
- Move the paper screen until you see a sharp image of the object on the screen. Using chalk, mark this location on the metre stick as F . Mark twice this distance from the lens as $2 \times F$.
- Mark F and $2 \times F$ on the other side of the lens.

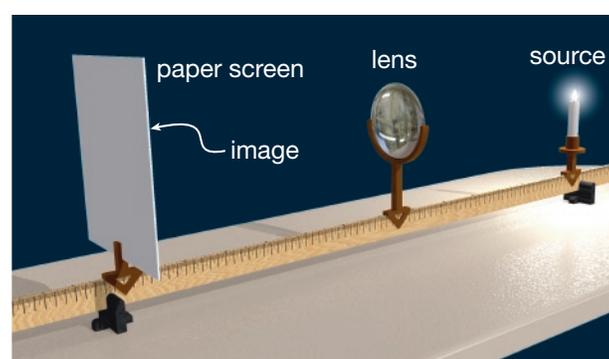


Figure 1 Equipment set-up

Part B

- Place the candle in its holder on the metre stick at the first location in **Table 1** (**Figure 1**). Your teacher will light it for you. 
- Move the paper screen back and forth until you locate an image. Record your observations. Blow out the candle.
- Move the candle to the remaining locations in **Table 1**, and then repeat Steps 6 and 7. (You may need your teacher's help.)

Part C

- Switch the lens to a diverging lens.
- Repeat Steps 6 to 8. At each location, look into the lens from both sides to locate the image. Record your observations.

CAUTION

Candles

When using a candle, tie back long hair and be careful of loose clothing. Place a metal lid under the candle to catch any wax that drips.

Analyze and Evaluate

- Where was the candle located when the converging lens produced a real image? 
- What happened to the size of the real image as you moved the candle toward the lens? 
- At what location did the converging lens *not* produce an image? 
- Where was the candle located when the converging lens produced a virtual image? 
- Why were you unable to see an image on the screen with the diverging lens? 

Apply and Extend

- What function could a converging lens perform in an optical device? Suggest a device that uses a converging lens. 