82 Thin Lens

Purpose

To explore concave and convex lenses

Required Equipment/Supplies

convex lens
concave lens

Discussion

Lenses are not to read about, but to experiment with. Before studying Chapter 30 in the text, some hands-on experience is important for understanding lenses. This activity should help guide you to discover some of their interesting properties.

Procedure

Move an object to different distances from a convex lens and you will see an image form at different locations. At some locations, the image will appear upside-down; other times, it will appear right-side up, and in others it will disappear entirely.

Initially, locate the object at a distance 2*f* from the lens. Is the image larger or smaller than the object? Is the image *erect* (right-side up) or *inverted* (upside down)? Can the image be projected (a *real* image) or not (a *virtual* image)? Is there any position of the object for which no image is formed? Record your observations as to the nature of the image you observe in Data Table A and Data Table B for both kinds of lenses.

Analysis

1. When the image appears right-side up (erect) using a converging lens, how many focal lengths is the object from the lens?

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2. Under what circumstances is the image formed by a converging lens magnified? Under what circumstances is it reduced? When is it real? When is it virtual?

3. Can an object be located in a position where a converging lens forms no real image?

4. For a diverging lens, is the virtual image enlarged or reduced?

5. Can you form a real image with a diverging lens?

6. When the object is moved, does the image formed by a converging lens always move in the same direction? What about the image formed by a diverging lens?

Data Table A

Nature of Image Converging Lens			
Position of Object	Real or Virtual	Magnified or Reduced	Inverted or Erect
Beyond 2*f*			
At 2*f*			
At *f*			
Within *f*			

Data Table B

Nature of Image Diverging Lens			
Position of Object	Real or Virtual	Magnified or Reduced	Inverted or Erect
Beyond 2*f*			
At 2*f*			
At *f*			
Within *f*			