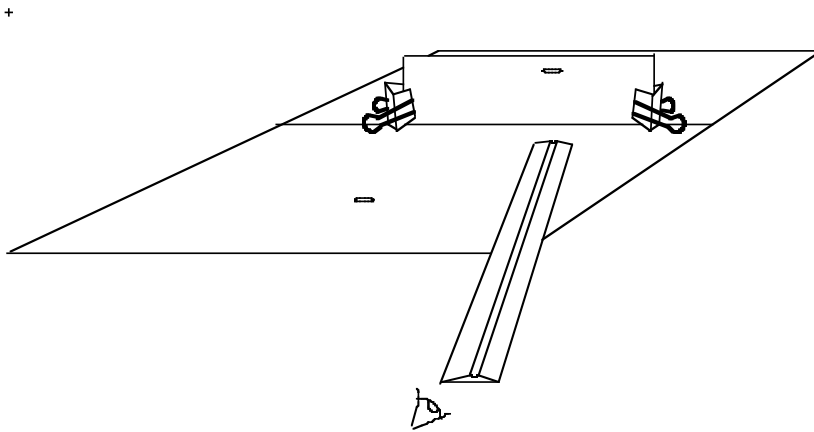


## Plane Surface Reflection lab experiment

This describes a simple experiment to help students understand the law of reflection and to test the object and image distance relationship in a plane mirror.

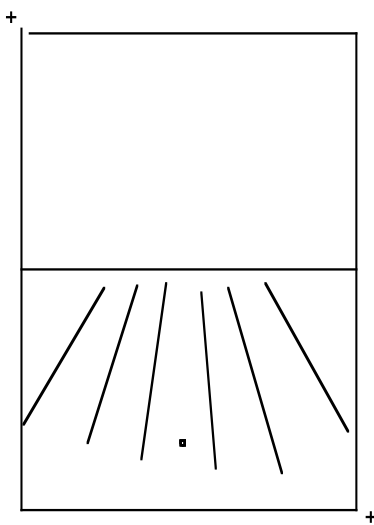
**Apparatus:** Small plane mirror (150mmX40 mm Cenco WL350 or equivalent), Two small binder clips, ruler, protractor, pencil and sheet of paper.

**Procedure:** Place a piece of paper flat on a table surface, draw a line in the center of the paper, and support the mirror on this line as illustrated using the binder clips. (Let the students decide if the front or back surface, or ?? should be placed on the line.) One student will do the sighting and the other will make sure the mirror does not move during the sightings.

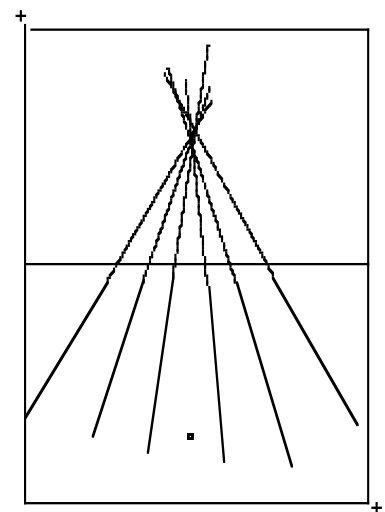


An object dot will be placed in front of the mirror and its image will be seen some distance behind the mirror as illustrated. One student will position the ruler so that by sighting down one edge of the ruler it will be pointing directly at the image dot. A line will be drawn at the edge of the ruler recording the sighting line. This sighting at the image will be repeated

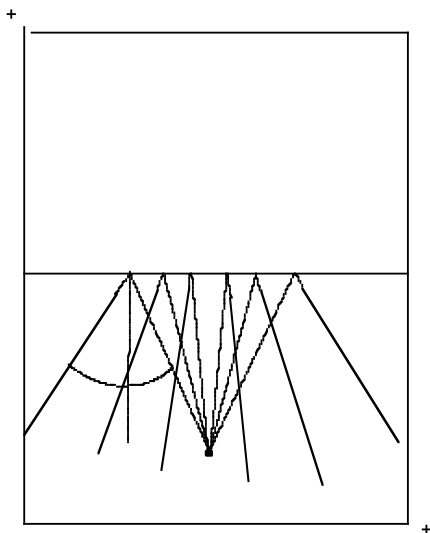
several times obtaining a record on the paper somewhat like that shown on the left below:



If these sighting lines were carefully made and are extended as shown on the right, they should very nearly meet in a point where the image dot appeared to be. Any small movements of the mirror or ruler during the sightings will lead to errors that can be easily identified and discussed by the students in their analysis. Measurement of the object and image dot distance from the mirror can lead to a discussion of object and image distance

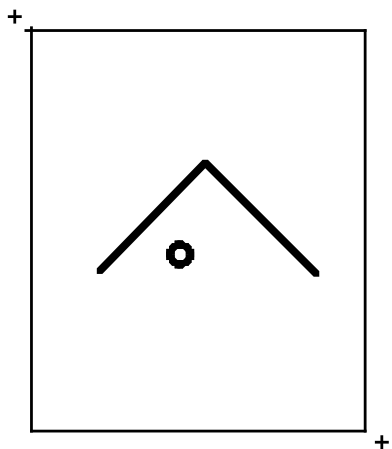


As well as establishing that the virtual image in a plane mirror is nearly equal to the object distance from the mirror, this experiment can verify the law of reflection. It should be recognized that light coming from the object dot actually strikes the mirror and reflects back along the sighting line as shown below:



The angle of incidence and angle of reflection are indicated for the rays on the left of the illustration. Probably the protractor should be used to draw the normal to the line for each pair of rays so students will appreciate that these angles are always referenced to the normal to the surface rather than the surface itself. Of course the angle with the surface can be measured and the complement used.

**Alternate activities that could be done during this experiment:**



Place two mirrors at right angles to one another as shown on the left. If they are exactly at right angles, observe how your image in this pair of mirrors is reversed right to left, or is it?? Plane mirrors do not invert images but they do “pervert” them. Two mirrors at right angles will image a viewer as others see him/her. Locate a dot as illustrated and note how many images of this dot are formed. Attempt to trace the rays from the dot to the mirror and back to an observer location and account for the number of images that are seen.

Experiment with placing two mirrors together at one end and changing the angle between them as shown on the right. How many images are formed when the two mirrors make an angle of  $60^\circ$  with each other? Develop a formula that can predict the number of images that will be formed with two mirrors at a specific angle, as a function of the angle between the mirrors.

