

Reflecting Light Off a Plane Mirror

Plane mirrors are all around you. The mirror that you look into when brushing your teeth, the rear-view mirror in a car, and the mirror that the dentist uses to look inside your mouth are all plane mirrors. In this activity, you will examine how light rays behave when they are reflected by a plane mirror.

SKILLS MENU

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

Purpose



To compare the angle of incidence with the angle of reflection in a plane mirror.

Equipment and Materials

- ray box
- plane mirror and mirror supports
- pencil and ruler
- protractor
- sheet of paper



When unplugging the ray box, do not pull the electric cord. Pull the plug itself.

Procedure



1. Draw a dashed line across the centre of a sheet of paper. Place a mirror on this line. The back of the mirror should be on the line, not the glass part of the mirror. This is because the back or silvered part of the mirror is the reflective part.
2. Place a slit mask on the ray box so that only one ray of light comes out. Aim the incident ray at the mirror.
3. Draw a normal to the mirror (that is, perpendicular to the point where the incident ray strikes the mirror). Label this line “normal” (Figure 1).
4. Place several dots on the page with your pencil showing the path of the incident ray. Then place several dots on the path of the reflected ray.
5. Remove the ray box and the mirror. Use your ruler to draw a straight line through the dots until the line hits the top part of the T (where the normal meets the mirror). Label the incident ray as “I1.” Repeat this process for the reflected ray. Label the reflected ray as “R1.”
6. Use your protractor to measure the angle of incidence and the angle of reflection for trial 1. Remember to measure these angles with respect to the normal. Record your measurements in the “Trial number 1” row in a table similar to Table 1.

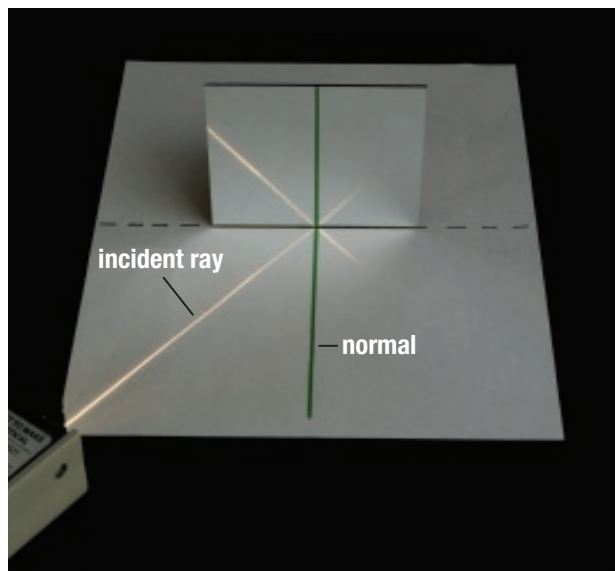


Figure 1

Table 1 Observations

Trial number	Angle of incidence	Angle of reflection
1		
2		
3		
4		
5		

7. Repeat steps 1 to 6 three more times, labelling the new incident rays as “I2,” “I3,” and “I4” and the new reflected rays as “R2,” “R3,” and “R4.” Make sure that the ray box is at a different angle for all of these trials. It must always be pointed at the same intersection of the mirror and the normal. Complete your table for trials 2 to 4.
8. Do a fifth trial, but this time aim the incident ray directly along the normal. Complete your table for trial 5.

Analyze and Evaluate

- (a) How did the angle of incidence compare with the angle of reflection? **T/I**
- (b) In trial 5, you aimed the incident ray directly along the normal. Describe the path of the incident and reflected rays for this special case. **T/I**
- (c) Where might errors occur in this activity? **T/I**
- (d) How would these errors affect your conclusion? **T/I**

Apply and Extend

- (e) Billiards is a game that makes use of reflection (Figure 2). How could the results of this activity help you in such a game? **T/I** **A**

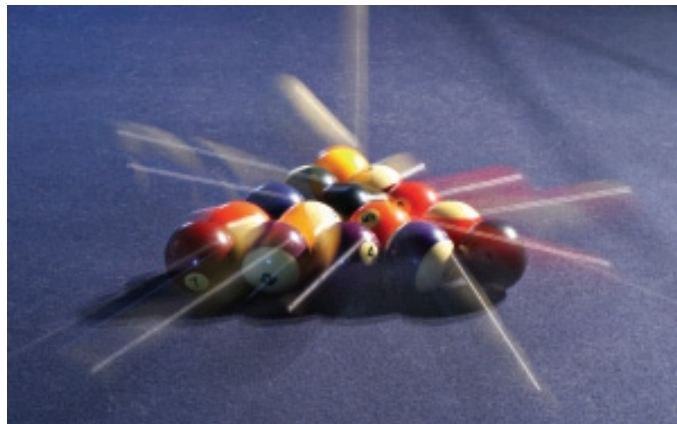


Figure 2

- (f) What other sports or activities make use of the reflection rule that you discovered in this activity? **A**