

## Reflecting Light Off a Plane Mirror

Name: \_\_\_\_\_

This worksheet has to be passed in individually. You can pass in one set of drawings per group.

In this activity you will be drawing ray diagrams to model reflection off a plane mirror. A plane mirror is a regular flat mirror. The word plane refers to a flat, two-dimensional surface.

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### Hypothesis

What do you think is the relationship between the angle of incidence and the angle of reflection? Write a hypothesis and then test it by completing the activity.

### Procedure

1. Set a blank sheet of white paper on your desk. \_\_\_\_
  - a) Set the mirror on one end of the white paper. \_\_\_\_
  - b) Aim a narrow ray of light from a ray box toward the mirror. \_\_\_\_
  - c) Move the ray box so the incident ray hits the mirror at the same point, but with different angles of incidence. (You are just moving the ray box in different places here, but making sure that the light is hitting the same place on the mirror). \_\_\_\_
  - d) Observe the reflected ray each time you move the ray box. \_\_\_\_

**Write your observations from (d) in the space below.**

2. Draw a straight line on the piece of paper, that is longer than the mirror. \_\_\_\_
  - a) Mark a point near the center of this line. This will be the point of incidence (label). \_\_\_\_
  - b) Place the plane mirror on the line. \_\_\_\_
  - c) Aim a light ray at the point of incidence. Move the ray box until the reflected ray is lined up with the incident ray. \_\_\_\_
  - d) Draw three small dots along the middle of the light ray. \_\_\_\_
  - e) Remove the ray box and the mirror and use a ruler to connect the dots to the point of incidence with a dashed line. \_\_\_\_

**What is this line? Label it on the piece of paper.**

3. Return the mirror and aim a ray of light toward the point of incidence. Make sure the angle of incidence is large. (This means the ray box should be on an angle to the mirror). \_\_\_\_
  - a) Mark small dots along the middle of the incident rays and reflected rays. \_\_\_\_
  - b) Remove the mirror and the ray box and use a ruler to join the dots of each ray to the point of incidence. \_\_\_\_
  - c) **Label** the rays and show their directions with arrows.
  - d) Use your protractor to **measure** the angle of incidence and the angle of reflection in your diagram. \_\_\_\_

**Record the sizes of the angles on the diagram.**

4. Repeat steps 2 and 3 **on new paper** and change the angle of incidence. Do this **four** times.

**Each diagram should be labeled with the following terms:** incident ray, reflected ray, point of incidence, the normal, as well as the angles that you measured.

## Analysis

1. Summarize your results in the following table.

	<b>Angle of Incidence</b>	<b>Angle of Reflection</b>
Diagram 1		
Diagram 2		
Diagram 3		
Diagram 4		
Diagram 5		

2. How accurate was your hypothesis?

3. Where is the reflected ray when the incident ray travels along the normal to a plane mirror? What are the angles of incidence and reflection in this case?

4. There are two laws used to describe how light reflects from a plane mirror. The first law of reflection compares the angle of incidence with the angle of reflection for light rays hitting a mirror. Based on your observations, what is the first law of reflection?

5. The second law of reflection states that the incident ray, the reflected ray, and the normal all lie in the same plane. Can you support this with your observations?