Names: $\qquad$
Group \# $\qquad$
Period \# $\qquad$

## Reflection

## OBJECTIVE

- Observe the reflection of an object from the surface of a mirror and carefully sketch the incident and reflected rays.
- Show that the angle of incidence is equal to the angle of reflection.


## MATERIALS

Mirror
Protractor
4 pins
A piece of letter sized (or larger) piece of cardboard
Blank printer paper with no lines on it
Tape
Thin dry erase marker

## INITIAL SETUP AND PROCEDURE

1. Tape the blank paper onto the piece of cardboard.
2. Place the mirror on the paper.
3. Use the marker to draw a thin vertical line on the mirror near its center.
4. Trace the base of the mirror along the paper and place a dot where the line that you previously drew on the mirror touches the paper.
5. Place a pin approximately 5 cm in front of the mirror and a few cm to the left of the line you drew on the mirror.
6. Look in such a way that the pin lines up with the vertical line. So, you could draw a line that passes through them. Now add a second pin that also lies on this line.
7. Now look from the other side and observe the two pins lining up with the vertical line. Add a third pin that is in line with the others.
8. Finally, add a fourth pin on the reflected side that is in line with all of them.
9. Remove the mirror from the paper and draw a line that is perpendicular to the line representing the surface of the mirror at the point where the vertical line was drawn on the mirror. You should already have a dot on the paper representing this point (see step 4above).
10. Use a ruler to draw a line on the left side of the mark connecting the dots where pins one and two were placed. The line should connect three points: pin 1, pin 2, and the dot where the line was drawn on the mirror. This line represents the incident ray.
11. Use a ruler to draw a line on the left side of the mark connecting the dots where pins one and two were placed. The line should connect three points: pin 1, pin 2, and the dot where the line was drawn on the mirror. This line represents the reflected ray.

## CALCULATIONS

1. Measure the angle between the incident ray and the normal line. This is the angle of incidence.
2. Measure the angle between the reflected ray and the normal line. This is the angle of reflection.
3. Calculate the percent error between the angle of incidence and angle of reflection.

## CONCLUSIONS

1. List two sources of error, which could help explain why the angle of incidence was not exactly equal to the angle of reflection.
2. Explain how the results of this experiment support the model of light being a stream of particles emanating from a source.
