

V-7 DON'T SHATTER MY IMAGE

Concept Development

Problem

How does the size of the angle at which a ray of light hits a plane mirror compare to the size of the angle at which the light is reflected?

Materials

Cardboard sheet (about 30 x 40 cm), plane mirror (about 20 x 20 cm), curved mirrors, mirror supports or clay straight pins, protractor, meter stick or ruler. **You may work in groups but each person must turn in his/her own set of 5 papers with pin holes and angle tables.**

Procedure

1. Put an unlined paper on the cardboard sheet. Put your mirror across the width of the paper at the center point and trace it with a pencil. You can call this the mirror line. Set up the back of the mirror along this line. Mark the position of the mirror on the paper so when you remove the mirror you can replace it in the same position.
2. Push a straight pin into the paper in front of the mirror about 10 cm from the mirror. See P on the diagram below.
3. Lay a ruler on the paper at some other point (A, B & C in the diagram below) and “aim” the ruler so that it points at the image of P in the mirror.



4. Mark a line along the ruler between the mirror and label the end away from the mirror as point A. Remove the mirror and continue the line as a solid line up to the mirror and then a dotted line past the mirror to indicate the virtual light path. Call the point where the line touches the mirror point a.
5. Draw a line from P to the mirror line where line Aa touches the mirror line.
6. Construct a perpendicular (normal) line from the mirror line where line Aa touches it. Measure the two angles between this perpendicular and the lines from A to the mirror to P. **Record these in a data table.**
7. Set the mirror back on the paper and follow the same procedure for points B and C as indicated in the diagram above. Notice where the dotted lines cross, this the virtual image position (if solid reflected lines cross this is the real image position).
8. Measure the distance from P to the mirror. **Record this in your data table on your paper.** Measure the distance from the mirror to where the dotted lines cross. **Record this in your on your paper.**

Summing Up

How do the angles in each pair compare to one another?

Describe relationships you notice between points and lines on your paper.

Based on your results, how does the angle size at which a ray of light hits a mirror (angle of incidence) compare to the angle at which the ray of light is reflects (angle of reflection)?