Reflection

Reflection of Light With Two Plane Mirrors—Double Mirrors Placed at a Number of Angles

Objective

The student will experiment with reflections of two plane mirrors placed at different angles.

Science and Mathematics Standards

Science Standards

- ☑ Science as Inquiry
- ☑ Physical Science

Mathematics Standards

- ☑ Problem Solving
- ☑ Communication
- ☐ Connection
- ☑ Computation/Estimation
- ☑ Measurement

Theory

As the angle between two mirrors is increased and decreased, the number of reflected images increases and decreases. At some angles, you will see all complete images. At other angles, you will see some complete images and some parts of images. There is also a relationship between the size of the angles and the number of edges of the mirrors that are visible. Placement of the images in the mirrors depends on the distance from the surfaces of the two mirrors.

Materials

- 1 protractor
- 2 plane mirror tiles 12 inches square (These mirrors should be backed with heavy cardboard and sealed around the edges with thick tape. The mirrors should then be taped together to form two to four hinges. You now have framed mirrors that can stand alone.)
- cardboard
- tape

Procedures

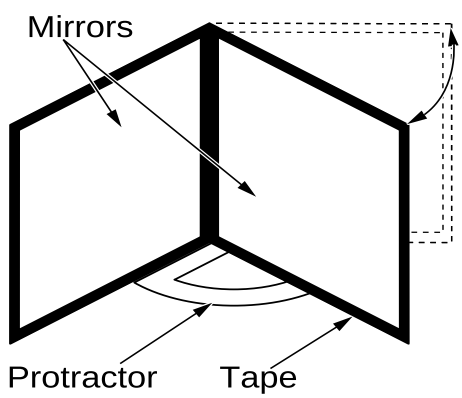
1. Place the protractor on a table and stand the two mirrors on top of it at a 90-degree angle. The mirrors should be placed so that you can readily measure the angle as you open and close the mirrors.

2. Place the mirrors at a 90-degree angle. How many mirrors do you see? How many complete images do you see? How many parts of images do you see? Record your observations in the chart on page 21.

3. Change the mirrors to a 10-degree angle and count the whole images and the parts of images that you see. Repeat step 2.

4. Continue to change the degrees of the angle from 0 through 180 degrees and repeat step 2.

   HINT: When you look into the mirrors, place your face between the two mirrors or as close to the edges as possible. Keep your face perpendicular to the space or hinge between the two mirrors.



Observations, Data, and Conclusions

1. Make your observations as you complete the table on the following page. (Refer to question No. 4 below.)

2. At what degrees or angles do you seem to see whole images and no partial images?

3. How does the number of degrees seem to be related to the number of mirrors that you count?

4. Using the following formula, compute each angle measured and compare your answers to what you see in the mirror. Because you are using simple materials, your observations may differ slightly with the computations.

   Number of images observed in mirror equals 360 degrees divided by angle indicated on the protractor.

   Example: $360° \div 90° = 4$ images

   Perform the math computations and complete the table in question No. 1 above.

5. Are the number of observed images and the computed math answers the same? Why or why not?

Angle	Number of Mirrors Observed	Number of Images Observed	Computations
10°			
20°			
30°			
40°			
50°			
60°			
70°			
80°			
90°			
100°			
110°			
120°			
130°			
140°			
150°			
160°			
170°			
180°			

Math Computations: