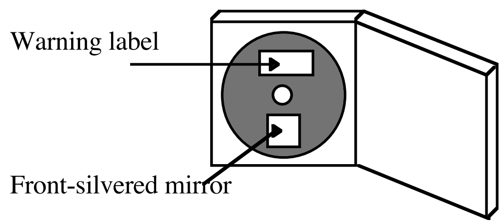
Teacher Notes: ΔΔΔ High School Version

Hint about Front-Silvered Mirrors

As the name implies, the reflective surface is actually placed on the front of the mirrors. **Do NOT touch the mirror surface!** One way to protect the mirror is to secure them in a CD case. You may wish to add a warning label to the case. The mirrors can also be attached to blocks of wood so that they will stand vertically. Attaching a binder clip to the side of the mirror may make it stable enough to stand on its own. Be careful when you store them. We do not recommend cleaning, but if you must, do so with a soft brush or cloth. Every wipe removes some of the reflective coating.



Light has many interesting aspects. An example is **reflection**. Reflection occurs when light bounces off a surface.

A guideline to working with mirrors is the **Law of Reflection:** The angle light hits a mirror will be the same angle light leaves the mirror.

You can use this principle to make a triangle. In this experiment you are going to use a laser and several mirrors to bounce the light around until it forms a triangle.

Materials

- Laser pointer
- Binder clips
- White paper (8.5 x 11 inch)
- Protractor
- Ruler
- 3 front-silvered mirrors

Procedure

1. Draw an equilateral triangle on the paper. Use a protractor to be sure the angles are all the same. Use a ruler to be sure all the sides are the same length.

2. Draw a laser-shaped space along one of the sides. It should point to one of the corners.

3. At each corner, draw where you think the mirror should go so that the laser light will complete the triangle. Keep in mind the following:
   - Use a protractor to measure the angle between the laser and mirror exactly
   - Remember that the incoming angle is the same as the outgoing angle.

4. Devise a way to position the mirrors vertically. Front-silvered mirrors are easily damaged. **Do not touch the front of the mirror**.

5. Line up the mirror exactly on the line you drew for it.

6. Turn the laser on. **Never look directly at the laser beam or allow it to shine in someone's eyes.** Use the binder clip to maintain the laser pointer in the ON position.

7. If you need help seeing the laser beam, try water mister, chalk dust, or baby powder.

8. If your angles were measured properly, you should be able to see the laser bounce off each mirror and end up back at the laser.

9. If you move any mirrors, were sure to draw where the new placement of the mirror was. Measure any new angles. Note the size of the error in your notebook.

Questions

1. What were the lengths of the triangle you drew?

Answers will vary, but they should all be the same for one triangle. Students may choose different lengths.

2. What were the angles of the triangle you drew?

Each angle was 60°.

3. What were the measurements of the angles for your first mirror?

The angles for the first mirror were 60° and 60°.

4. What were the measurements of the angles for your second mirror?

The angles for the second mirror were 60° and 60°.

5. What were the measurements of the angles for your third mirror?

The angles for the third mirror were 60° and 60°.

6. What pattern did you notice about all of the angles you measured?

They were all the same.

Conclusion

Does the incoming angle equal the outgoing angle? Use evidence from your lab to backup your claim.

Yes, the incoming angle equals the outgoing angle. All of the angles measured were 60°.