Teacher Notes: Mirror Mirror

Introduction

Light has many interesting aspects. An example is **reflection**. Reflection occurs when light bounces off a surface. Think about what happens when you look in a mirror. Whether you realize it or not, you are reflecting light. This light travels to the mirror, then bounces back to your eyes. This is how you see your reflection.

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.

In this lab you will investigate the Law of Reflection.

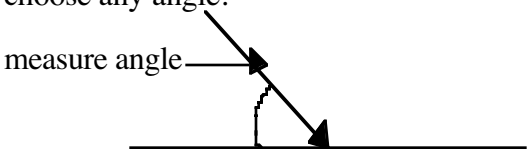
Materials

laser pointer
binder clip
flat mirror
white paper (8.5X11")
protractor
front-silvered mirror

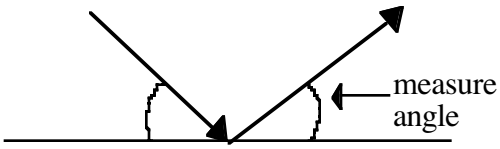
Procedure

1. Draw a straight line on your paper.

2. Using the protractor, draw an incoming angle to your straight line. You may choose any angle.

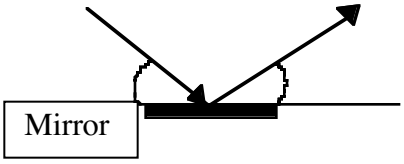


3. Draw the same angle leaving the straight line.

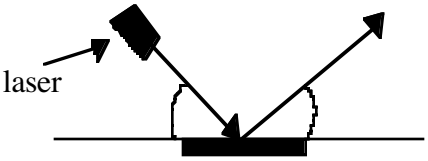


angles should match

4. Place the flat mirror so the front of the mirror is along the straight line.



5. 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.



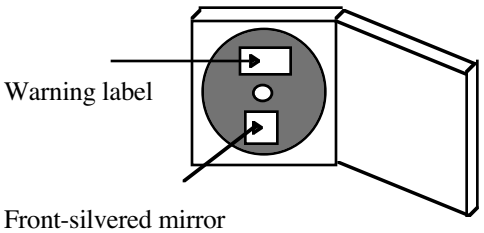
mirror

6. If you need help seeing the laser beam, ask your teacher for assistance. Some methods of making the laser beam show up include a water spray bottle, dry ice (to make this really work put a small chunk of dry ice into hot water), or a commercial fogger. Baby powder or chalk dust will work too, but be careful if you have students with asthma or other respiratory problems and they add dust to the mirrors.

Check to see if the laser beam is along the line you drew for the angle leaving the straight line. In a Data Table, record your observations. Have students construct Data Tables in your preferred format.
Turn the laser off.

7. Now place the front-silvered mirror so the front of the mirror is along the straight line. Ask your teacher how to correctly position the mirror vertically. Front-silvered mirrors are easily damaged. As the name "front-surfaced" 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 about not touching the front of the mirror. The mirrors can also be attached to blocks of wood so that they will stand vertically. 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.



8. Turn the laser on. Place the laser pointer along the incoming angle line.

9. Check to see if the laser beam is along the line you drew for the angle leaving the straight line. In a Data Table, record your observations. Have students construct Data Tables in your preferred format.

Questions

1. Was the law of reflection shown with the flat mirror? Explain.
Answer: When students measure from the front of the flat mirror, the angles did not exactly match.

2. Was the law of reflection shown with the front-silvered mirror? Explain.
Answer: When the students measure from the front of the front-silvered mirror, the angles do match up.

3. How could you set up the mirrors to obtain identical results?
Answer: *Since the flat mirror has the reflective surface on the back, the laser beam has to pass through the glass first before it can reflect. The front-silvered mirror has the reflective coating on the front, so the laser beam does not have to pass through any glass. Set the flat mirror up so that its back aligns with the line on the paper.*

4. Why would choosing one type of mirror or the other be important?
Answer: If you need accurate reflection, as in a telescope, you need front-silvered mirrors. Any imperfections in the glass might cause problems.

Conclusion

Do all mirrors comply with the Law of Reflection? Use evidence from your lab to backup your claim.

As long as you make sure that you are measuring the angles to the reflective surface of the mirror, all mirrors will obey the Law of Reflection.