

Refraction **Teacher Resource**

Grade Level **6-12**

Objectives

1. The student will explore the concept of refraction.
2. The student will employ simple equipment and tools to gather data.
3. The student will demonstrate the use of 21st century technology with a document camera.

National Standards

NS.5-8.1 ; NS.9-12.1	Science as Inquiry
NS.5-8.2 ; NS.9-12.2	Physical Science
NS.5-8.5 ; NS.9-12.5	Science & Technology
NT.K-12.1	Basic Operations and Concepts
NT.K-12.3	Technology Productivity Tools
NT.K-12.6	Technology Problem-Solving & Decision-Making Tools

Teacher Background Information

In this experiment, the students will investigate the concept of refraction. Refraction occurs when a wave is deflected as it travels through a substance, changing the path or angle of the wave. In this activity, the light is being refracted by the water, so our eyes see the pencil, for example, in two different mediums. Many daily events can be explained by diffraction: Why does a fish look larger in water? What causes a straw to look bent in water?

MATERIALS

Document Camera	Glass Test Tube
Personal Computer	Pencil
Interactive White Board/Projector	Water
1—500 ml Glass Beaker	Oil

PROCEDURE

1. Display the glass beaker on the interactive white board for the students to see.
2. Trial #1—Place the glass beaker on the demonstration table and fill with water, about 300 ml.
3. Place the empty glass test tube into the beaker of water.
4. Have students make observations.
5. Take a snapshot of the image to save for later viewing and review.
6. Trial #2—Place the glass beaker on the demonstration table and fill with water, about 300 ml.
7. Place the empty glass test tube into the beaker of water.
8. Fill the empty glass test tube with water.
9. Have students make observations.
10. Take a close-up snapshot of the image to save for later viewing and review.
11. Trial #3—Place the glass beaker on the demonstration table and fill with water, about 300 ml.
12. Place a pencil into the beaker of water.
13. Have students make observations.
14. Take a close-up snapshot of the image to save for later viewing and review.
15. Trial #4—Place the glass beaker on the demonstration table and fill with water, about 300 ml.
16. Place the empty glass tube into the beaker of water.
17. Fill the empty glass tube with oil.
18. Have students make observations.
19. Take a snapshot of the image for later reviewing.
20. Now, fill a glass beaker with oil.
21. Place the empty glass tube with oil.
22. Have students make observations.
23. Take a snapshot of the image for later reviewing.

QUESTIONS

1. In Trial 1, does an empty glass test tube show refraction in water?
2. In Trial 2, does a glass test tube filled with water show refraction when placed in water?
3. What does the glass test tube filled with water look like close up in Trial 2?
4. In Trial 3, does a pencil show refraction when placed in water?
5. In Trial 4, does a glass tube filled with oil show refraction in water?
6. In Trial 5, does a glass tube filled with oil show refraction in oil?
7. In Trial 5, the glass tube disappears optically. Can you explain this?

EXTENSION

- Add other liquids besides water and oil, such as liquid dish soap, juice, milk, etc.