

Your Name:

Class Period:

Team Members' Names:

Experiment #1: Light Refraction Arrow Experiment

Materials:

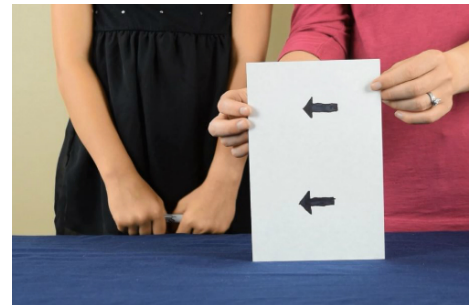
- Piece of Paper
- Marker
- Beaker
- Water

SAFETY:

Please be extremely careful handling the beaker – remember it will break. If a beaker breaks, please let Mrs. Smith know immediately.
DO NOT ATTEMPT TO PICK UP BROKEN GLASS!

Instructions:

1. Get a sheet of paper, and draw two large, thick arrows on it. (See photo below) One arrow near the top and one arrow near the bottom. Make the arrows point in the same direction.
2. Fill a beaker with water.
3. **Make a prediction** – What will you see when you put the paper behind the beaker of water?
4. Slowly lower the piece of paper behind the glass of water.
5. Look through the beaker of water and watch what happens.
6. **Observation** – What did you see? Was your prediction correct? Explain what happened using the science terms that you have learned so far...



Experiment #2: REFRACTION EXPERIMENT

Materials:

- 1 opaque cup
- 1 penny
- 1 pencil
- 1 4 cm piece of tape
- 1 beaker filled with 400 mL of water
- 1 marker
- 1 graduated cylinder
- meter stick

SAFETY: Meter sticks are for measuring only!!!!

Instructions:

1. Determine which one of you is student A, which one is student B, and which one is student C.

Student A

2. Use the piece of tape to attach the penny in the middle of the inside bottom of the opaque cup.
3. Label one side of the cup with your name, and the other side with Student A's name.
4. Place the cup with the attached penny on the table.

Student B

5. Stand directly in front of the cup near the table.
6. Take as many steps back as necessary until you do not see the penny at the bottom of the cup. Have student A record the distance from the cup to student B in meters.

Student C

7. Instruct Student B to inform you when the whole penny becomes visible. Then slowly add water to the cup until Student B tells you they can see the whole penny.
8. Mark the water level on Student B's side of the cup.
9. Student A: Pour water from cup into graduated cylinder, and record volume in mL. Pour water back into the beaker after measurement is recorded.
10. Students switch roles and repeat steps 5-9.
11. Once you have your data for all three students answer the questions 1-4 using complete, well-written sentences.

Data Table - Penny

Student	Distance from cup (meters)	Volume of water (mL)
B		
C		
A		

12. Now repeat the same experiment using a pencil. Use the same process found in steps 5-10. Collect Data in the data table below.

Data Table - Pencil

Student	Distance from cup (meters)	Volume of water (mL)
B		
C		
A		

Questions to Answer

1. What observations about the penny did you make as the water was being added to the cup?

2. Did the penny actually move during this experiment? How was it possible for it to come into your view?

3. How does your distance away from the cup, and the volume of water required for you to see the penny compare to your partners?

4. If your data was different, explain what you think caused the variance in data.

5. When comparing the data from the Penny and from the Pencil, what did you find? Explain any difference in the data. (Hint: Think about everything you've learned about mass and waves)

BEFORE ANSWERING Q6, LOOK IN OUR TEXTBOOK FOR REFRACTION IN THE GLOSSARY and INDEX, READ THE INFORMATION. Once you feel like you understand REFRACTION, think about what you have seen and then answer Q6.

6. Using straight lines only, complete the diagram to show how light travels between your eye and the penny. Draw arrows to show the direction light travels.

