

Grade 8 Science

Week #3 - April 22-28

Learning Intentions:

To explore the concept of refraction through simple do-it-at-home experiments

Assignment Instructions:

1. **Read** the Purpose, Background Information and Introduction below.
2. **Complete** the following three experiments on Refraction.
3. **Demonstrate** your learning by completing the conclusion questions for each of your 3 experiments.

Purpose: How does light interact with transparent objects?

Background information:

Refraction – when light is ‘bent’ or changes direction as it moves from one medium (such as air, water, glass) to another.

<https://kids.kiddle.co/Refraction>

Introduction:

Have you looked through a window today? For that matter, did you observe your hands while washing them this morning? Did you look at your juice through the side of a glass during breakfast? If you did, you observed light passing from one transparent material to another. What happens when light strikes a transparent object or materials like a window or the surface of water? You may already have some ideas.

Here are a few questions to think about:

- Does all light that strikes a transparent object enter it?
- Does light entering a transparent object travel in a straight line all the way through it?
- Does the light entering a transparent object leave it?
- Does the composition or shape of a transparent object affect the behavior of light?

Experiment #1: Rising Coin

Procedures:

1. Put a coin in a bowl (make sure the bowl is not transparent) and place the bowl on a table.
2. Move backwards until you cannot see the coin in the bowl. You may need to crouch down near the bowl. Remain in this position. You should not be able to see the coin.
3. Have someone slowly pour water into the bowl until you are able to see the coin.

Observations and Conclusions:

- a. Why were you able to see the coin once the water was added to the bowl? Explain using your understanding of refraction. You may use words, diagrams, drawings or pictures to answer.

Experiment #2: Bending Pencil

Procedures:

1. Place a pen or pencil in a clear, smooth glass.
2. Look at the glass at eye level. Observe.
3. Fill the glass with water.
4. Look at the glass at eye level. Observe.

Observations and Conclusions:

- a. Describe what you see when you are looking at the glass without water (at eye level). You may use words, pictures or drawings to answer.

- b. Describe what you see when you are looking at the glass with water (at eye level). You may use words, pictures or drawings to answer

Experiment #3: Turning Arrow

Procedures:

1. Use an index card (or piece of paper) with an arrow drawn on it.
2. Place the card directly behind a glass filled with water (very close to the glass). Hint* the type of glass you use will give you different results.
3. Move to eye level with the arrow. Observe.
4. Move the arrow back slowly from the glass of water. Observe.
5. Try placing the other objects very close to the glass.

Observations and Conclusions:

Describe what you observed using words, pictures and/or drawings.

Extension:

Try to observe other examples of refraction taking place in our world. List them here using words/pictures/drawings.

Criteria:

Refer to marking rubric

Reference:

Reading about why it works: Experiment #1

We see that when the bowl is empty, the edge of the bowl stops you seeing the coin. When the bowl is full, the light bends over the edge, so you can see the coin. We notice that things at the bottom of a pool or river always look closer to the surface than they really are. This is because of the way light is bent through water and is an effect of refracted light.

Reading about why it works: Experiment #2

Straight or bent: What happens when you look at the pencil through the side of the glass? Light plays tricks on your eyes. The pencil looks bent. This is because light travels slower through water than through air. As the light enters the glass of water it slows down (and changes direction) and as it leaves the glass it speeds up again – therefore making the pencil look bent!

Reading about why it works: Experiment #3

Just as with the pencil bending, the light is playing tricks on your eyes. The arrow looks as though it has turned because the light is passing twice through the different mediums (air to glass, back to air, back to glass to air to your eye). This is because light travels slower through water than through air. As the light enters the glass of water it slows down (and changes direction) and as it leaves the glass it speeds up again – therefore making the arrow look as though it has turned.