Magnetic Force of Fruit

Objective: Students will apply their knowledge of ferromagnetic, paramagnetic, and diamagnetic materials to attract and repel objects using a neodymium magnet.

Procedure

1. Ask: Did you know that water has magnetic properties? Knowing this, can you think of anything that contains water that could be used as a magnet?

2. Invite students to list ideas on the board (water balloons, fruit, water bottles, etc). Explain that today students will learn about the different types of magnets and how to turn everyday objects into magnets.

3. Watch Impossible Science video: The Magnetic Force of Fruit.

4. Review the vocabulary with students and have them take notes.

Materials:

- Neodymium magnets- the strongest magnet you can buy; made from neodymium, iron, and boron.
- Torsion pendulum
- Grapes or other water-heavy fruit
- Ice
- Aluminum foil
- Legos
- Paperclips
- Fishing wire
- Thin thread
- A wooden skewer
- A variety of water heavy fruits and vegetables (cucumbers, grapes, watermelon cubes, strawberries, apples, oranges, etc.)

Vocabulary

Ferromagnetic material: Magnetic materials that have some magnetic properties on their own; the most common type of magnetic material. Ferromagnetic materials are attracted to magnets with a pretty strong pull compared with the weak force of paramagnetic or diamagnetic materials.

Paramagnetic materials: always attracted to a magnet. Examples include aluminum, platinum, and manganese.

Diamagnetic materials: always repelled from a magnet. Examples include gold, copper, silver, zinc, and water.

5. Break students into small groups and ask them to brainstorm how to turn everyday objects into magnets based on their knowledge of different types of magnets.

6. Hand out legos, magnets, tape, string, and paperclips to each group.

7. Tell students to build a bridge with the legos (two vertical sides with a horizontal bridge connecting the top of each column).

8. Tell students to tape their magnets to the underside of the horizontal lego bridge.

9. Tell students to tie a paperclip to the string or fishing wire.

10. Slowly lift the paperclip from the table toward the magnet until it starts to be pulled up by the magnet.

11. Let go of the paperclip, and tape the other end of the string to the table. The paperclip should appear to levitate or float in midair as it is drawn toward the magnet.

12. Ask: Based on your observations, what type of material is the paperclip? How can you tell? Answer: Ferromagnetic- the iron in the steel wire is attracted to the magnet with a pretty strong force.

13. Ask: How close did the paperclip have to get in order to float without you holding it? Can you think of other items that might stay up on their own with the pull of the magnet? Turn and talk.

14. Share a few responses and have students record observations in their journals.

15. Hand out torsion pendulums to each group.

16. Tell each group to make a prediction about which type of fruit or vegetable would have the strongest magnetic force.

17. Each group should try using the magnet to repel a variety of fruits and vegetables on the torsion pendulum, recording observations and measuring how far the items moved and how close the magnet had to be to create movement.

Assessment:

Students will record which fruit or vegetable moved the most, and write down a conclusion about why. Students should experiment with other ferromagnetic, diamagnetic, and paramagnetic materials to see which have the most force. Students should create a bar graph showing which objects have the most force and present to the class.

Safety Note:

Adult Supervision Recommended

Watch the companion video here:

YouTube

Lesson Plan by Whitney Gallagher based on the "Impossible Science" series.
Find more at impossiblescience.com