**Waves**

**Lesson #1:** **What Are Waves?**

**Time Frame:** 60 minutes

*Please write the vocabulary on the board before each lesson.*

**Vocabulary**

**Wave** - A disturbance in a medium that transfers energy from place to place

**Medium** - A substance – solid, liquid, or gas – through which something can travel

**Learning Standards:**

*Science*

Waves and their Applications in Technologies for Information Transfer

1. Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.

Science and Engineering Practices

1. Science findings are based on recognizing patterns.

Crosscutting Concepts

1. Cause and effect relationships are routinely identified.

**Student will be able to:**

1. Investigate the motions of waves to identify patterns.
2. Experiment showing the movement of waves in liquids, solids, and gases.

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| Science Journals |  |
| Bin (to fill with water) | 1 (in bin) |
| Ball | 1 (in bin) |
| Sound box (includes speakers) with rice | 1 set (in bin) |
| Large cloth (or parachute) | 1 (in bin or ask classroom teacher at least 1 week before about parachute) |

**Focus Activity:** Have the students answer the following questions in their science journals: *At the beach, we see ocean waves. How do these waves move? Can you think of any other types of waves?*

**Introduction:** Review definitions for wave and medium. You can explain waves, mediums, and energy using the analogy of students as energy, school buses as waves, and roads as the medium through which waves travel. Tell students that they will be investigating the movement of waves through several different types of mediums. Mediums that waves travel through include gases (such as air), liquids (such as water), and solids (such as a parachute).

**Activity:** *Move through these stations as a class and have students record their observations on the worksheet.*

1. Fill the bin with water before class and set up the sound box. You can use an iPod or iPhone to play music if you have one with you, or use one of the iPads.
2. **Station 1 -** **Waves in Liquids** (preferably outside)
   1. Place a ball on one side of the bin.
   2. Demonstrate wave formation by disturbing the water on the other side of the bin.
   3. Have students record their observations: *What do the waves look like when they pass through water? Does the ball move or stay where it is?*
   4. Explain to students that when waves travel through water, they don’t carry the water or the ball with them, only the energy.
3. **Station 2 - Waves in Solids**
   1. Have students each hold an edge of the cloth.
   2. Go around in a circle and have students take turns sending waves across the cloth. Let each student have a turn.
   3. Have students record their observations: *What did waves look like when they passed through cloth? How were these waves different from the waves made in water? How were they the same?*
4. **Station 3- Waves in Gases**
   1. Put rice on top of the sound box. Turn on loud music inside the sound box.
   2. Watch the vibrations caused by sound waves make the rice bounce up and down.
   3. The rice moves without being touched by anything visible. Ask students to record their observations and make a hypothesis about why this might be happening: *What do you think is making the rice move? Does the rice look like anything else you’ve seen today? What does the sound box tell you about sound waves?* Have students brainstorm in pairs and record their hypotheses and observations in their science journals.

**Closure:** Discuss the following ideas and questions as a class, drawing on the three stations to come up with answers: What did the waves we observed have in common? How are they different? What produced the waves? What do waves carry? What do they travel through?

**Challenge Question:** (to be written in science journals) How is a wave like a telephone?

**Assessment:** Science notebook observations about wave stations, participation in the stations and class discussions.

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Waves Lesson #1: What Are Waves?**

**Station 1:**

Does the ball move or stay where it is?

What do the waves look like?

**Station 2:**

What did the waves look like?

How were they different from the waves in the water?

How were they the same?

**Station 3:**

What do you think is making the rice move?

Does the rice look like anything else you’ve seen today?

What does the sound box tell you about sound waves?