Chapter 1: Waves

Section 1: What are Waves

<u>SWBAT:</u> Explain the relationship among waves, energy and matter

Science Starter

1. Name 3-5 types of waves.

2. What do you think creates waves on the ocean?

What does a wave look and feel like?

- When you are relaxing on an air mattress in a pool and someone does a cannonball dive off the diving board, you suddenly find yourself bobbing up and down.

- The up-and-down motion was caused by the peaks and valleys of the ripple that moved from where the splash occurred.

- These peaks and valleys make up water waves.

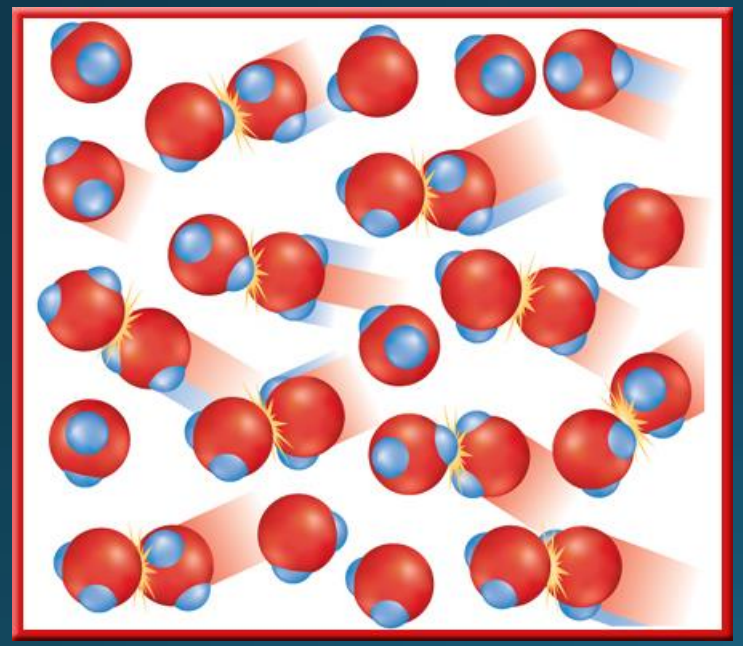
What are waves?

- Rhythmic disturbances that carry energy without carrying matter are called **waves.**

- You can **see** the energy of the wave from a speedboat traveling outward, but the water only moves up and down.

A Model for Waves

- Think about the ripples on the surface of a pond. The energy carried by the ripples travels through the water.



- In a water wave, water molecules bump each other and pass energy from molecule to molecule.

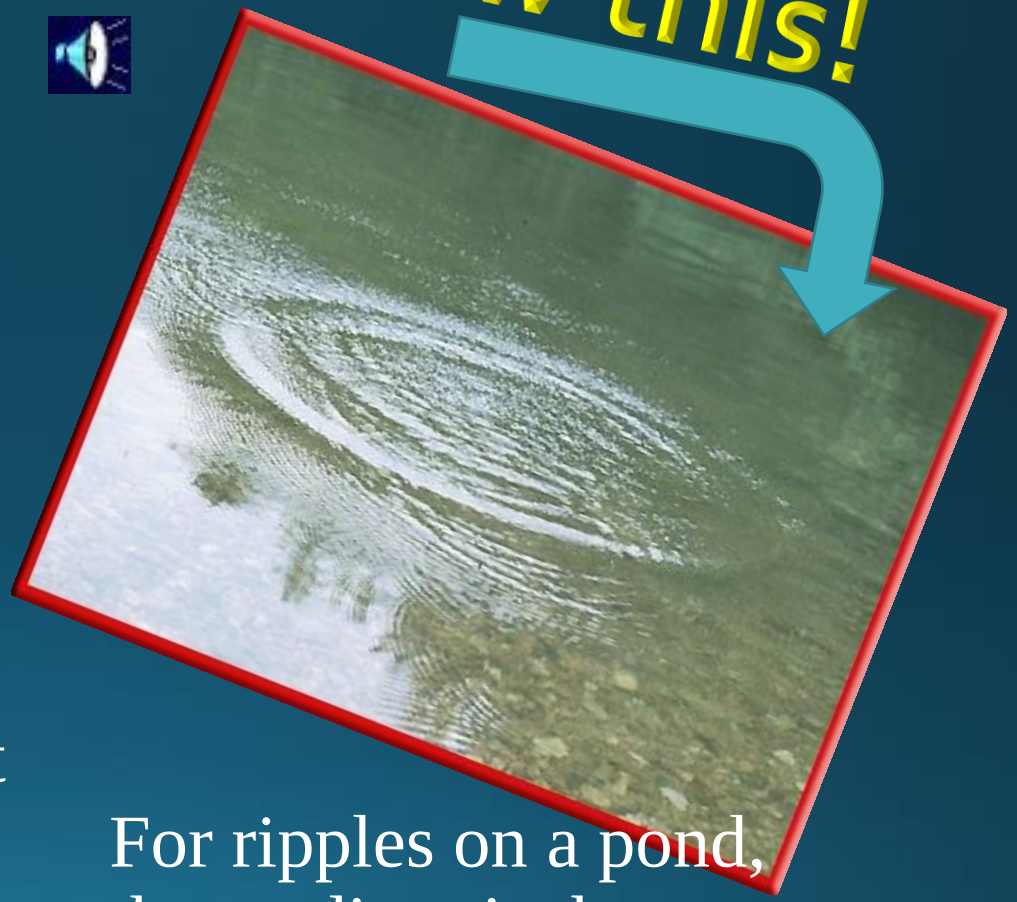
- All waves transfer energy.

Type of Wave- Mechanical Waves

- Waves, which use matter to transfer energy, are called **mechanical waves**.
- A mechanical wave travels as energy is transferred from particle to particle in the medium.
- The matter through which a mechanical wave travels is called a medium.

- Example: a sound wave is a mechanical wave it can travel through air, solids, liquids, and other gases.

Draw this!



For ripples on a pond, the medium is the water.

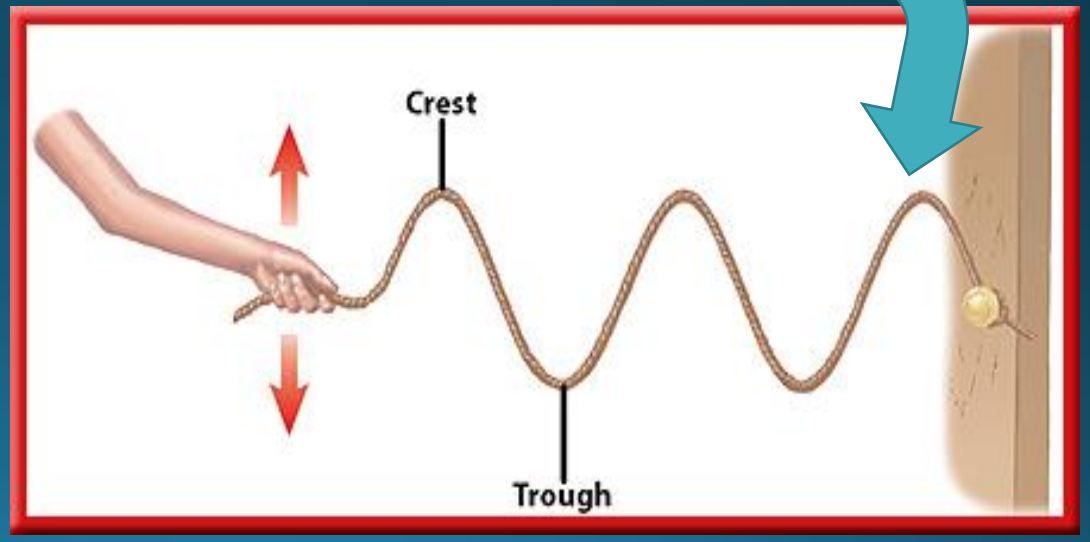
Type of wave- Transverse Waves

- In a mechanical **transverse wave**, the wave energy causes the matter in the medium to move up and down or back and forth at right angles to the direction the wave travels.
- The high points on the waves are called **crests** and the low points are called **troughs**.

Draw this!

Try this…

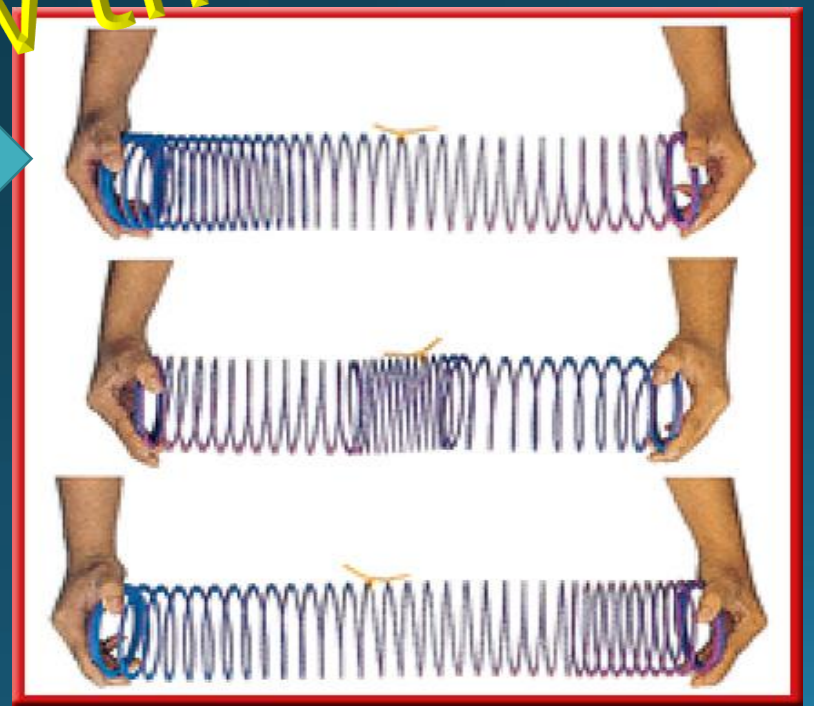
Stretch a long rope out on the ground. hold one end in your hand. Now shake the end in you hand back and forth.



Type of Wave- Compressional Wave

- Mechanical waves can be either transverse or compressional.
- **Compressional (longitudinal) wave**-matter in the medium moves forward and backward along the same direction that the wave travels.

Draw this!

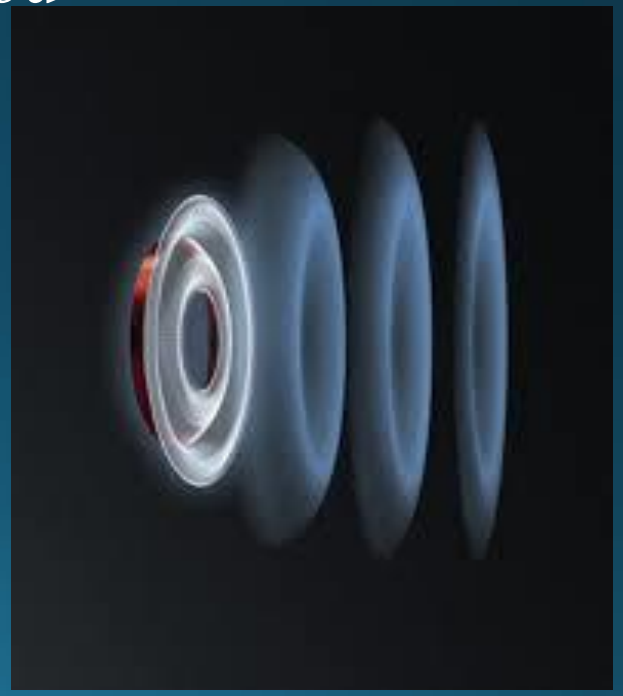


Try this…

- You can make a compressional wave by squeezing together and releasing several coils of a coiled spring toy.

Example of Compressional Wave= Sound Waves

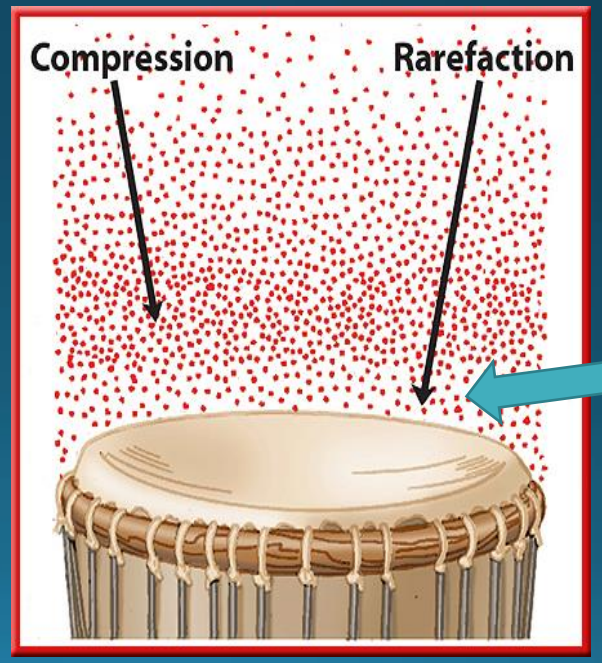
- Sound waves are compressional waves.
- If you touch a stereo speaker while it's playing, you can feel it vibrating.
- All waves are produced by something that is vibrating.



Making Sound Waves

- When you hit the drumhead it starts vibrating up and down.
- As the drumhead moves upward, the molecules next to it are pushed closer together.
- When the drumhead moves downward, the molecules near it have more room and can spread farther apart.
- As the drumhead vibrates up and down, it forms a series of compressions and rarefactions that move away and spread out in all directions.

- Series of compressions and rarefactions is a **sound wave**.
- Group of molecules that are closer together is a **compression**.



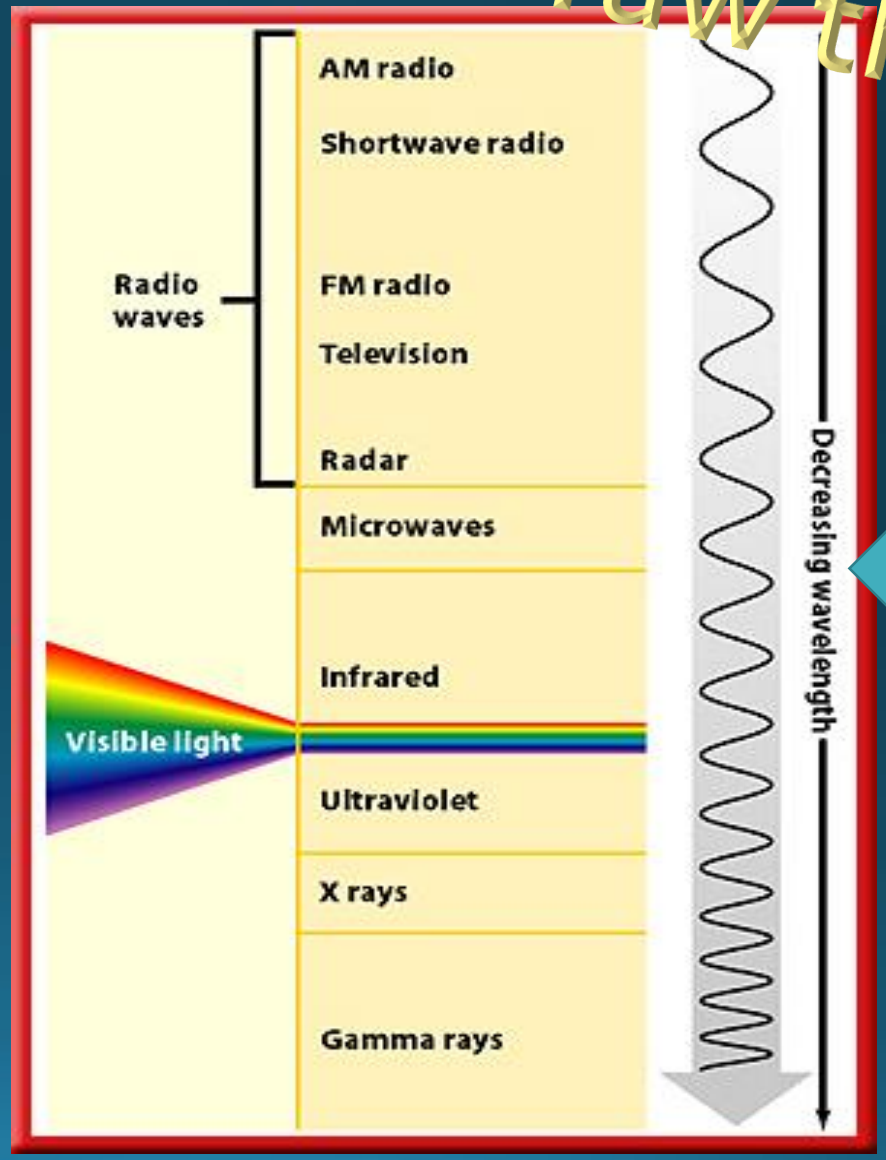
- Group of molecules that are farther apart is a **rarefaction**.

Electromagnetic Waves

- **electromagnetic waves-** waves that can travel through space where there is no matter are
- Can travel in matter or in space.

  - Examples of electromagnetic waves are:
    - radio waves
    - infrared waves
    - visible light waves
    - ultraviolet waves
    - x rays
    - gamma rays.

Draw this!



Exit Slip- What is the relationship among waves, energy and matter?

Get started on your homework…

Make vocabulary cards for new vocab words…

- Waves
-Mechanical waves
-Transverse waves
-Crests
-Trough
-Compressional wave
-Compression
-Rarefaction
-Sound wave
-Electromagnetic waves