

Learning Target: I will be able to ask questions to compare and contrast the characteristics of electromagnetic and mechanical waves.

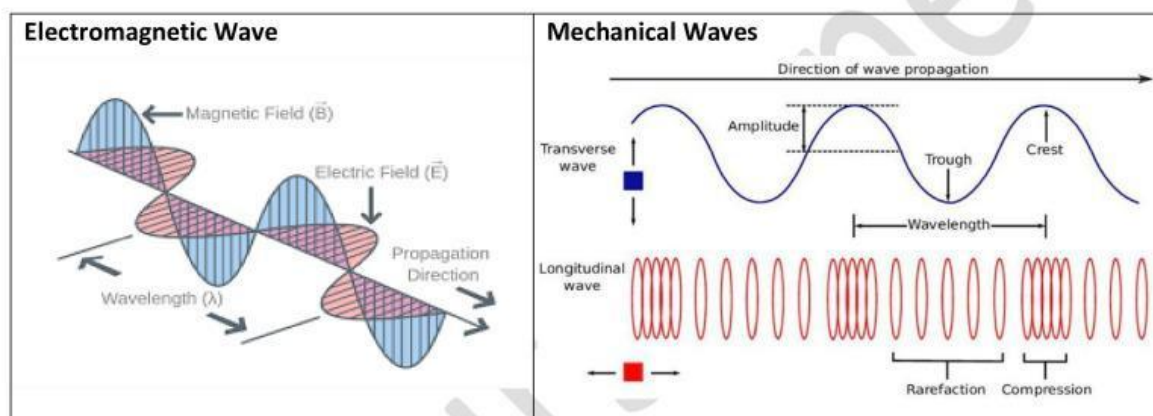
### Electromagnetic vs. Mechanical Waves Interactive Activity



#### Part 1: Comparing Electromagnetic and Mechanical Waves

**Instructions:** Complete the table below by identifying the differences and similarities between electromagnetic waves and mechanical waves. Use the diagrams provided for reference.

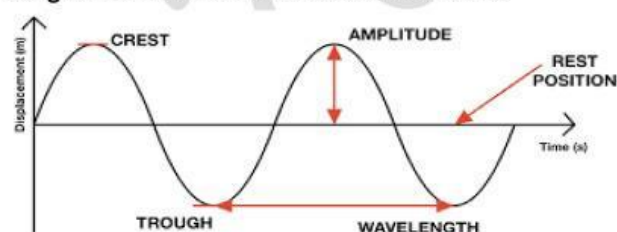
Characteristic	Electromagnetic Wave	Mechanical Wave
Requires a medium (Yes/No)		
Can travel through a vacuum		
Speed in a vacuum (fast/slow)		
Examples of wave types		



#### Part 2: Reading Wave Characteristics

**Instructions:** Examine the wave diagrams and answer the questions.

Diagram 3: Transverse Wave Characteristics

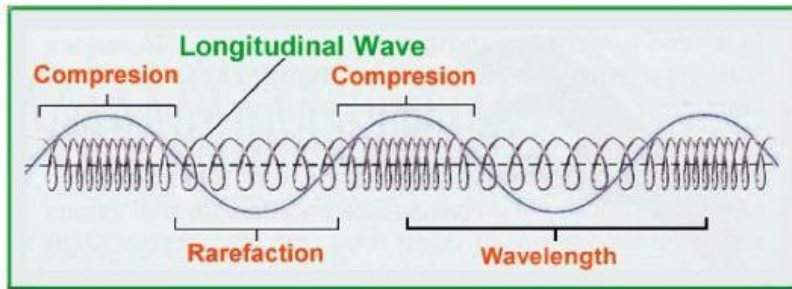


**Questions:**

- How do you find the wavelength of the wave shown in Diagram 3? \_\_\_\_\_
- How do you measure amplitude in a transverse wave? \_\_\_\_\_
- Identify the crest and trough of the wave. \_\_\_\_\_

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**Diagram 4: Longitudinal Wave Characteristics**



**Questions:**

1. What parts of the wave represent compression? \_\_\_\_\_  
rarefaction? \_\_\_\_\_
2. How is the wavelength measured in a longitudinal wave? \_\_\_\_\_  
\_\_\_\_\_
3. How would the wave change if the frequency increased? \_\_\_\_\_  
\_\_\_\_\_
4. How would the wave change if the frequency decreased? \_\_\_\_\_  
\_\_\_\_\_

**Part 3: Real-World Applications**

**Instructions:** Analyze the real-world applications below and categorize them as involving electromagnetic or mechanical waves. Justify your choice.

1. **Radio Broadcasting:** Signals are transmitted over long distances.
  - **Type of wave:** \_\_\_\_\_
  - **Reason:** \_\_\_\_\_
2. **Ocean Waves:** Waves move across the surface of the water.
  - **Type of wave:** \_\_\_\_\_
  - **Reason:** \_\_\_\_\_
3. **Ultrasound Imaging:** Used to view internal organs in medical settings.
  - **Type of wave:** \_\_\_\_\_
  - **Reason:** \_\_\_\_\_
4. **Microwave Ovens:** Heat food using electromagnetic radiation.
  - **Type of wave:** \_\_\_\_\_
  - **Reason:** \_\_\_\_\_

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**Part 4: Chart Interpretation Instructions:**

Study the chart comparing wave speeds in different mediums and answer the questions.

Medium	Mechanical Wave Speed (m/s)	Electromagnetic Wave Speed (m/s)
Vacuum	N/A	300,000,000
Air	340	300,000,000
Water	1,500	225,000,000
Steel	5,960	230,000,000

**Questions:**

1. Why can't mechanical waves travel through a vacuum? \_\_\_\_\_  
\_\_\_\_\_
2. Compare the speed of mechanical waves and electromagnetic waves in steel. Which is faster and why? \_\_\_\_\_  
\_\_\_\_\_
3. In which medium do electromagnetic waves slow down the most? \_\_\_\_\_  
\_\_\_\_\_

**Part 5: Creating Your Own Waves Activity:**

- Draw a diagram of a transverse wave and label its parts.
- Draw a diagram of a longitudinal wave and label its parts.
- Write two sentences explaining how these two wave types differ in the way they transfer energy.

Transverse Wave	Longitudinal Wave

**How do transverse waves and longitudinal waves differ in the way they transfer energy?**

Sentence 1: \_\_\_\_\_

Sentence 2: \_\_\_\_\_