

STUDENT WORKSHEET:

WAVES

Educational Institution : SMA Unggul Garuda
Subject : Physics
Grade : Secondary 4 (grade 10)
Topic : Waves
Time Allocation : 10 Minutes

I. CORE COMPETENCIES & OBJECTIVES

- **Basic Competency:** Analyze the fundamental characteristics of waves.
- **Learning Objectives:**
 1. Students shall be capable of identifying various properties of waves.
 2. Students shall be capable of identifying the type of waves
 3. Students shall discern the relationships between frequency, wavelength and wave speed.

Group Name

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A. Stimulation (Observing)

Watch the video carefully.

Guiding Questions:

1. What happens to people in a stadium wave? Do they move forward or just up and down?
2. What does the video suggest about how waves transfer energy?
3. Can waves move without transferring matter?

Write your initial ideas (Hypothesis):

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B. Problem Identification

Based on the video, answer:

1. What are the main characteristics (properties) of waves?

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2. Are all waves the same? What types exist?

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3. How can we calculate the speed of a wave?

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C. Data Collection (Exploration)

1. Properties of Waves

Complete the table:

Property	Meaning	Symbol	Unit
Amplitude		A	
Wavelength		λ	
Frequency		f	
Period		T	

2. Types of Waves

Match the description:

Type of Wave	Description	Example
Transverse		
Longitudinal		

3. Wave Equation

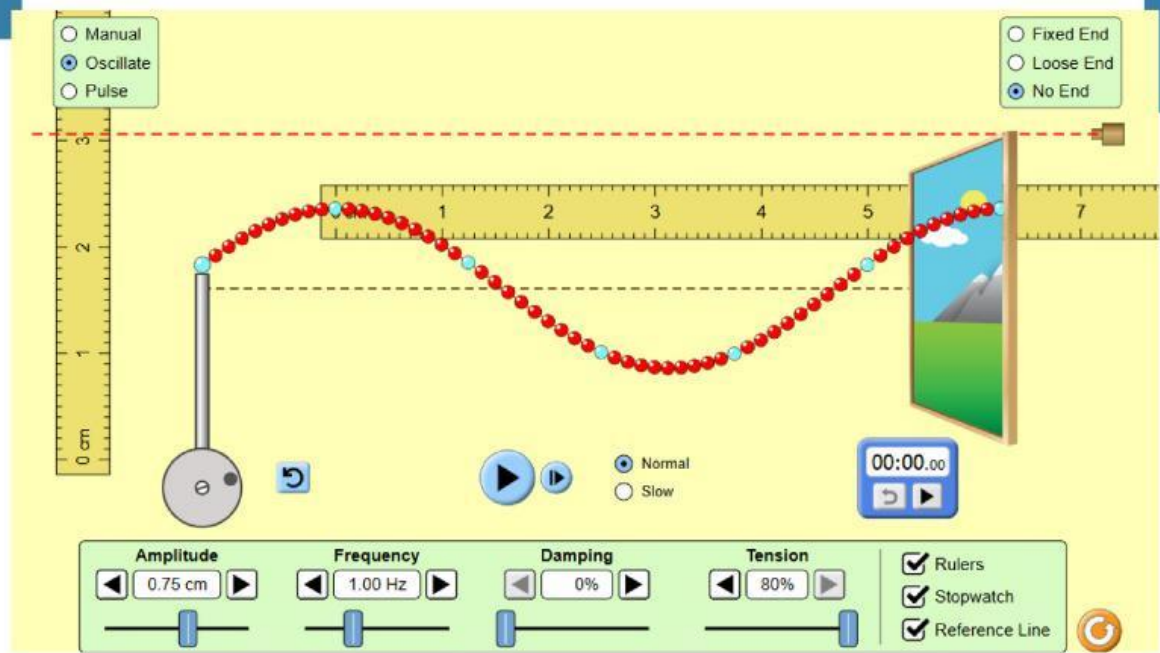
Fill in the blanks:

- Wave speed = _____ \div _____
- Therefore:

$$v = \lambda \times f$$

Task 2: Virtual Simulation Use the [PhET Wave on a String](#) simulation.

- Set Damping to “None”.
- Keep Tension constant.
- Measure the Wavelength for three different Frequencies (e.g., 1.0 Hz, 1.5 Hz, 2.0 Hz).



Fill the table below

Frequency (f)	Wavelength (λ)	$f \times \lambda$ (Wave Speed)
1.0 Hz		
1.5 Hz		
2.0 Hz		

D. Data Processing (Analysis)

Solve the problem:

1. A wave has wavelength 2 m and frequency 5 Hz.
Calculate the wave speed.

Answer:

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2. If frequency increases, what happens to wavelength (assuming speed constant)?

Answer:

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E. Verification (Discussion)

Discuss with your group:

- Why do louder sounds have larger amplitude?
- Why don't particles travel with the wave?

Conclusion:

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F. Generalization (Conclusion)

Complete the summary:

1. A wave is _____
2. Waves transfer _____
3. Two main types of waves are _____
4. Wave speed formula: _____