

Unit 6A
The Nature of Waves
Note-Taking Guide TEACHER

➤ Main Ideas, Key Points, Questions:

After watching the video segment, write down key points, main ideas, and big questions.

➤ Objective(s):

- *Determine the wavelength, amplitude, period, and frequency of waves from graphs and/or data.*
- *Recognize the characteristics of a wave that allow it to be classified as mechanical or electromagnetic, and as longitudinal or transverse.*
- *Relate wave motion to the simple harmonic motion of a pendulum and a spring.*

➤ Notes:

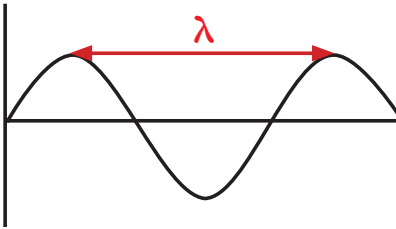
During the video segment, use words, phrases, or drawings to take notes.

➤ Summary:

After watching the video segment, write at least three sentences explaining what you learned. You may ask yourself: "If I was going to explain this to someone else, what would I say?"

Answer the following.

1. Label one wavelength on the diagram below:



2. How is the frequency of a wave determined?

The frequency is determined by dividing the number of waves passing a given point by the total amount of time during which the waves are passing.

$$f = \frac{\text{number of wavelengths}}{\text{total time}}$$

The unit of frequency, measuring waves per second, is the hertz (Hz).

3. What is the period of a wave?

The period is the amount of time it takes one wave to pass a given point, measured in seconds.

4. How are the frequency and period of a wave related to each other?

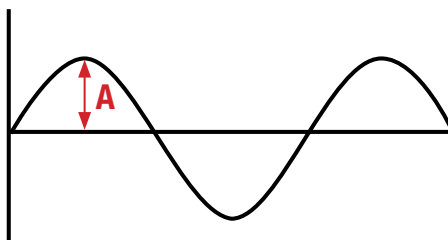
The frequency and period of a wave are inversely related. Frequency is the number of wavelengths that pass a given point in one second, and period is the time it takes for one wavelength to pass the point.

$$f = \frac{1}{T} \quad T = \frac{1}{f}$$

5. The period of oscillation of a pendulum depends upon which two variables?

A pendulum's period of oscillation depends upon the length of the pendulum and its acceleration due to gravity.

6. Label the amplitude of the wave on the diagram below:



questions continued on next page

Unit 6A_Notes and Questions TEACHER

Answer the following.

7. What does a mechanical wave require in order to transfer energy?

Mechanical waves require a medium through which to travel.

8. Which type of wave does not require a medium through which to travel?

An electromagnetic wave can travel through empty space, known as a vacuum.

9. The speed of a mechanical wave depends upon the medium through which it travels.

10. How does the direction of vibration of a longitudinal wave compare to its direction of motion?

A longitudinal wave vibrates and travels in the same direction.

11. How does the direction of vibration of a transverse wave compare to its direction of motion?

A transverse wave vibrates perpendicularly to its direction of motion.

12. What quantity relates to the stiffness of a spring?

The spring constant indicates stiffness.

13. How is the force required to stretch a spring related to the spring constant and the distance the spring is stretched?

The force required to stretch a spring is directly related to both the spring constant and the distance the spring is stretched. As the spring constant increases, the force required to stretch the spring also increases.

$$F_s = -kx$$

14. What is the equation for the potential energy stored in a spring when it is stretched or compressed?

$$PE_s = \frac{1}{2}kx^2$$