

Characteristics of Waves • Guided Reading and Study

Properties of Waves (pp. 515–519)

This section describes the basic properties of waves. It also explains how a wave's speed is related to its wavelength and frequency.

Use Target Reading Skills

As you read about the properties of waves, make an outline using the red headings for the main ideas and the blue headings for the supporting ideas.

Properties of waves
<p>I. Amplitude</p> <p style="margin-left: 20px;">A. Amplitude of Transverse Waves</p> <p style="margin-left: 20px;">B. Amplitude of Longitudinal Waves.</p>
<p>II. Wavelength</p>
<p>III. Frequency</p>
<p>IV. Speed</p>

Introduction (p. 515)

1. What are four basic properties of waves?

Amplitude / Wavelength / Frequency / Speed

Amplitude (p. 516)

2. The maximum distance the particles of the medium carrying a wave move away from their rest position is called the wave's

Amplitude

3. Explain what the amplitude of a water wave is.

It is the maximum distance a water particle moves above or below the surface level of calm H₂O.

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4. The amplitude of a wave is a direct measure of its

energy.

5. What is the amplitude of a longitudinal wave?

Amplitude is the measure of how compressed or rarefied the medium becomes.

6. Circle the letter of each phrase that correctly defines the amplitude of a transverse wave.

a. The distance from the bottom of a trough to the top of a crest

b. The maximum distance the particles of the medium move up or down from their rest position

c. The maximum distance from one point on the rest position to another point on the rest position.

d. The distance from the rest position to a crest or to a trough

7. Suppose a longitudinal wave has crowded compressions and loose rarefactions. Does it have a large or a small amplitude?

Large

Wavelength (p. 517)

8. The distance between two corresponding parts of a wave is its

wavelength.

9. How can you find the wavelength of a transverse wave?

You can measure the distance between one crest or trough and the next.

10. How can you find the wavelength of a longitudinal wave?

You can measure the distance between one compression to the next compression, or from one rarefaction to the next rarefaction.

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Properties of Waves (continued)

Frequency (p. 517)

11. The number of complete waves that pass a given point in a certain amount of time is called the wave's frequency.
12. If you make a wave in a rope so that one wave passes every second, what is its frequency?
1 wave/second or 1 Hz
13. Circle the letter of the unit used to measure frequency.

- a. watt
b. seconds
c. joule
d. hertz

Speed (pp. 518–519)

14. The speed of a wave is how far the wave travels in one unit of time.

Complete the following formulas.

15. Speed = Wavelength x Frequency

16. Frequency = Speed/Wavelength

17. Wavelength = Speed/Frequency

18. Circle the letter of each sentence that is true about the speed of waves.
- a. Speed increases as a wavelength increases.
- b. In a given medium and under the same conditions, the speed of a wave is constant.
- c. If the temperature and pressure of air change, the speed of sound waves traveling through the air will change.
- d. The same wave may travel at different speeds in different mediums.
19. If you increase the frequency of a wave, the wavelength must decrease