

Problems

Mechanical Waves- self study section

Use the internet: <http://www.physicsclassroom.com/class/sound> Answer the questions fully.

1. Compare a mechanical wave with an electromagnetic wave giving definitions, differences, similarities and examples. Use a table for this.
2. Mechanical waves can be drawn in 2 different types of graphs. Draw a displacement vs time and a displacement vs distance graph and explain the difference between the two.
3. Define the wave terminology giving the symbol and units for:
 - a. Amplitude
 - b. Frequency
 - c. Wavelength
 - d. Period
 - e. Speed

Draw a labelled diagram to support your answer.

4. Compare transverse and longitudinal waves. Draw a labelled diagram of each with a definition and examples.
5. Research three types of seismic waves: their properties, characteristics and effects.
6. Carry out the practical with a slinky to represent transverse and longitudinal waves.
7. Speed of waves. From $v = s/t$ derive $v = f \times \lambda$ $f = 1/T$. Define each symbol.
8. What is the relationship between the frequency and the period of a wave?
9. Where would you find the maximum displacement of the turns in a slinky spring that has a transverse wave passing through it?
10. What effect does the distance the vibrating particles making up a wave are moved from their mean position have on the amplitude of a wave?
11. A boy 1.2 km from a firing range hears the report of a gunshot. How long did it take the sound to travel from the range to the boy? The speed of sound in air is 340 ms^{-1} .
12. A concert pianist plays a single note of frequency 310 Hz. The wavelength is 1.07 m. What is the speed of sound in the air at that time?
13. Classify the following examples as mechanical or electromagnetic, and as transverse or longitudinal waves.
 - a. A pulse transmitted along a string stretched the string at right angles to the direction of motion of the pulse.
 - b. The wave produced by dropping a stone into a calm pond.
 - c. Sound waves produced by a radio.
 - d. Visible light from a spotlight.
 - e. Waves produced in the air by vibrating vocal cords.

Sound waves

14. What type of wave is a sound wave?
15. How are sound waves represented?
16. Draw a sound wave below in different colours and a key draw in :
 - a) Same pitch but softer sound.
 - b) Higher pitch with same volume.
 - c) Lower pitch and louder.
17. Referring to a) a guitar b) trombone, how can the pitch be altered?