

Chapter 12: Wave properties

Knowledge organiser

Waves in air, fluids, and solids

Waves transfer energy from one place to another without transferring matter. Waves may be _____ or _____.

For waves in _____ and _____, it is the wave and not the substance that moves.

- When a light object is dropped into still water, it produces _____ (waves) on the water which _____, but neither the object nor the water moves with the ripples.
- When you speak, your voice has _____ making sound waves travel through the _____. The air itself does not travel away from your throat, otherwise a _____ would be created.



Mechanical waves require a _____ (a medium) to travel through.

Examples of mechanical waves include _____ waves, _____ waves, waves on _____ and ropes, and _____ waves produced by earthquakes.

When waves travel through a substance, the particles in the substance _____ (vibrate) and pass energy on to neighbouring particles.

Transverse waves

The oscillations of a transverse wave are _____ (at right angles) to the direction in which the waves transfer energy.

_____ are an example of transverse waves.



Longitudinal waves

The oscillations of a longitudinal wave are _____ to the direction in which the waves transfer energy.

Longitudinal waves cause particles in a substance to be _____ close together and _____ further apart, producing areas of _____ and _____ in the substance.

_____ in air are an example of longitudinal waves.



Wave motion is described by a number of properties.

Property	Description	Unit
amplitude A		
frequency f		
period T		
wavelength λ		
wave speed v		



Key terms

Make sure you can write a definition for these key terms.

direction amplitude compression frequency incidence longitudinal mechanical wave oscillate period ray diagram reflection refraction transmission transverse wavelength wave speed

Properties of waves

Frequency and period are related by the equation:

$$\text{period (s)} = \frac{1}{\text{frequency (Hz)}} \quad T = \frac{1}{f}$$

Label the diagram.



All waves obey the wave equation:

$$\text{wave speed (m/s)} = \text{frequency (Hz)} \times \text{wavelength (m)} \quad v = f\lambda$$

When waves travel from one medium to another, their speed and wavelength may change but the frequency stays the same.



The speed of ripples on water can be slow enough to measure using a stopwatch and ruler, and applying the equation:

$$\text{speed (m/s)} = \frac{\text{distance (m)}}{\text{time (s)}}$$

The speed of sound in air can be measured by using a _____ to measure the time taken for a sound to travel a known distance, and applying the same equation.

Reflection of waves

When waves arrive at the boundary between two different substances, one or more of the following things can happen:

- _____ - the energy of the waves is transferred to the energy stores of the substance they travel into (for example, when food is heated in a microwave)
- _____ - the waves bounce back
- _____ - the waves change speed and direction as they cross the boundary
- _____ - the waves carry on moving once they've crossed the boundary, but may be reflected

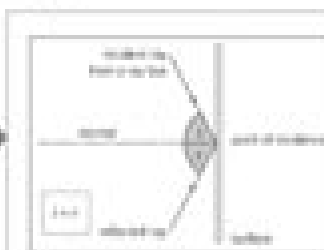
_____ can be used to show what happens when a wave is reflected at a surface.

To correctly draw a ray diagram for reflection:

1. use a _____ to draw all lines for the rays.
2. draw a single _____ on the rays to show the direction the wave is travelling.
3. draw a dashed line at _____ to the surface at the point of _____ (this line is normal to the surface).
4. label the normal, angle of incidence (____), and angle of reflection (____).

When reflection happens at a surface, the angle of incidence is always equal _____.

$$i = r$$



Murray Chapter Waves 12 Answers

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