3 Waves – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	**中文**	**Write it 3 times** (English)		
wave	波			
energy	能量			
wavelength	波长			
amplitude	振幅			
frequency	频率			
hertz	赫兹			
transverse	横波			
longitudinal	纵波			
reflection	反射			
refraction	折射			
diffraction	衍射			

Recall

A **wave** 波 carries **energy** 能量 from place to place **without** carrying matter. A water wave makes a cork bob up and down, but the cork does not travel along with it.

- Waves are how light, sound and ripples carry energy.
- We describe every wave with the same few words.

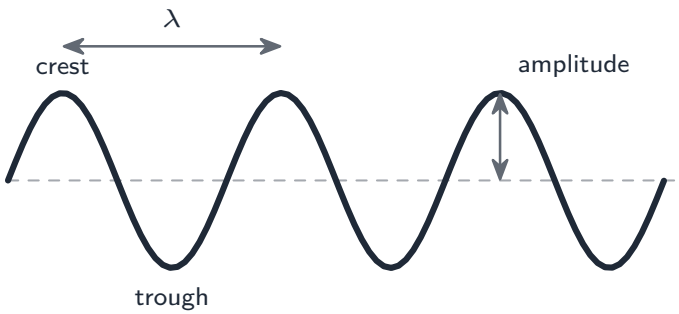
Nothing here is hard – it just adds the words and one equation.

New ideas

Read these first, then do the Practice.

1 Describing a wave

- **wavelength** 波长 (λ) – the distance of one full wave (e.g. crest to crest).
- **amplitude** 振幅 – the largest distance a point moves from its rest position.
- **frequency** 频率 (f) – the number of waves passing a point each second (in **hertz** 赫兹, Hz).

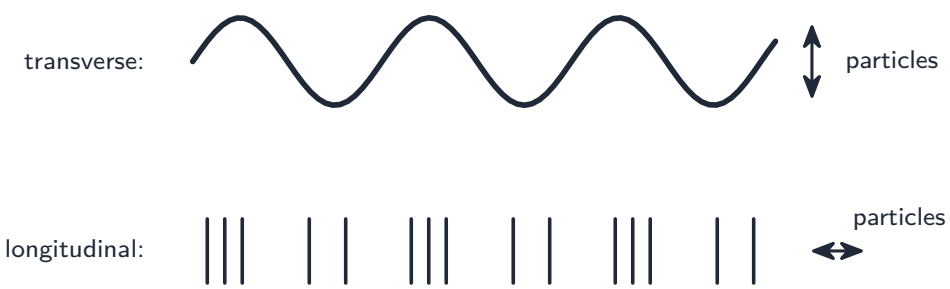


These link by the **wave equation**: $v = f\lambda$.

Worked example. A sound wave with $v = 340$ m/s and $f = 170$ Hz: $\lambda = v/f = 340/170 = 2.0$ m.

2 Two types of wave

- **transverse** 横波 – particles vibrate at **right angles** to the travel direction (light, water).
- **longitudinal** 纵波 – particles vibrate **along** the travel direction (sound).



■ **3 What waves do**

- **reflection** 反射 – bounces off a surface.
- **refraction** 折射 – changes speed (and bends) entering a new material.
- **diffraction** 衍射 – spreads out through a gap or round an edge.

Watch out: in $v = f\lambda$, frequency is waves per second (Hz) and wavelength is a distance (m) – keep the units apart. Amplitude is measured from the **rest** position to a crest, not from crest to trough.

Practice

Try these in order.

3.1 What does a wave carry from place to place, without carrying matter? [1]

3.2 Define the *wavelength* of a wave. [1]

3.3 Write the wave equation. [1]

3.4 A wave has frequency 50 Hz and wavelength 6 m. Calculate its speed. [2]

3.5 State whether each is transverse or longitudinal: (a) light, (b) sound. [2]

3.6 Name the wave behaviour where a wave spreads out after passing through a gap. [1]

3.7 Challenge. A water wave has a wavelength of 0.5 m and travels at 2 m/s. Calculate its frequency. [2]