

CHAPTER 6

1

Describe the motion of molecules of water as a ripple moves across the surface of water in a ripple tank.

2

Draw a diagram to show what is meant by the amplitude of a wave.

3

If 10 waves occupy 15 cm, what is their wavelength?

4

- a If 100 sound waves reach your ear each second, what is their frequency?
- b What is their period?

5

Are sound waves transverse or longitudinal?

6

If 10 waves pass a point each second and their wavelength is 30 m, what is their speed?

7

All sound waves travel with the same speed in air. Which has the higher frequency, a sound wave of wavelength 2 m or one with wavelength 1 m?

8

Which have the longer wavelength, radio waves of frequency 90 MHz or 100 MHz?

9

Sound takes about 3 ms (3 milliseconds) to travel 1 m.

- a How long will it take to travel from the centre of a cricket pitch to the spectators, 200 m away?
- b What fraction of a second is this?

10

What happens to the pitch of a sound if its frequency increases?

11

What happens to the loudness of a sound if its amplitude decreases?

12

- a What is the approximate frequency range of human hearing?
- b How does this change with age?

13

Sound A has a period of 0.010 s; sound B has a period of 0.020 s.

- a Which has the greater frequency?
- b Which will sound more high-pitched?

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What is meant by **ultrasound**?

15

Sound A has a period of 0.010 s; sound B has a period of 0.020 s.

- a Which has the greater frequency?
- b Which will sound more high-pitched?

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Why is it impossible for sounds to travel through a vacuum?

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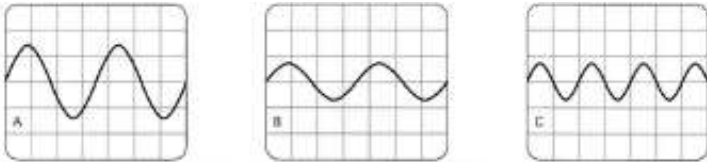
Sounds are produced by vibrating objects.

- a When a wind instrument such as a trumpet produces a sound, what is it that is made to vibrate by the player?
- b When a stringed instrument such as a violin is played, what is it that is made to vibrate by the player?
- c Describe how the sound from the instrument travels through the air to the listener's ears.

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The vibrations of a sound can be detected using a microphone and then displayed on an oscilloscope screen. Figure 12.12 shows three such traces.

- Which trace shows the loudest sound? Explain your answer.
- Which trace shows the sound with the highest pitch? Explain your answer.



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- In which material does a sound travel faster, a solid or a gas?
- Give **one** piece of evidence that shows that sound can travel through solid materials.

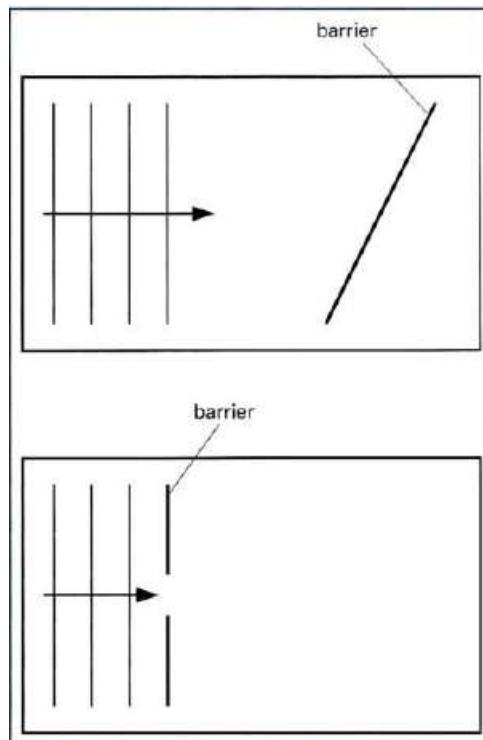
To measure the length of a long metal rod, engineers send a pulse of sound into one end of it. The sound travels to the other end and is reflected back. The engineers detect this echo, and determine the time taken for the sound to travel from one end of the rod to the other.

- When making measurements on a steel rod of length 400 m, they find that the echo returns 0.16 s after the initial pulse. What is the speed of sound in steel?

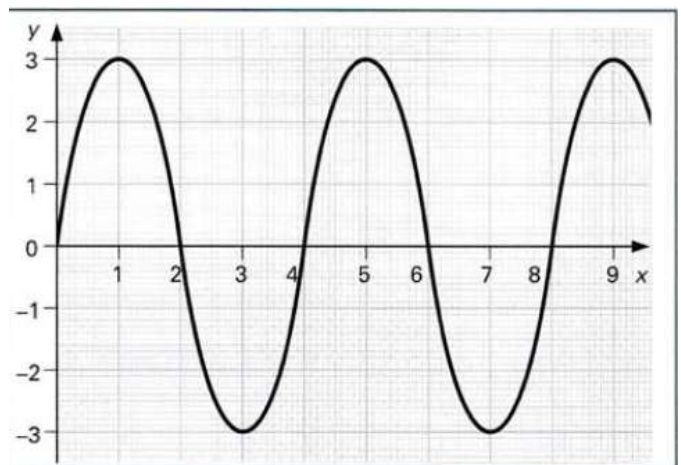
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Copy and complete the diagrams show how the following effects appear in a ripple tank.

- Plane waves are reflected by a straight barrier.
- Plane waves are diffracted as they pass through a narrow gap.



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- What is its wavelength?
- What is its amplitude?
- If this wave is moving at a speed of 10 cm/s, what is its frequency?
- On graph paper, with the same labelled and numbered axes as here, sketch a wave having **half** this amplitude and **twice** this wavelength.