

Wave Behaviour

Q1.(2018)

A transverse wave and a longitudinal wave travel in the direction shown by the arrow.



The table shows how the particles in these waves vibrate as the waves travel.

	Transverse wave	Longitudinal wave
A		
B		
C		
D		

Which row of the table is correct?

Your answer

[1]

Q2.(2018)

What is the speed of sound in air?

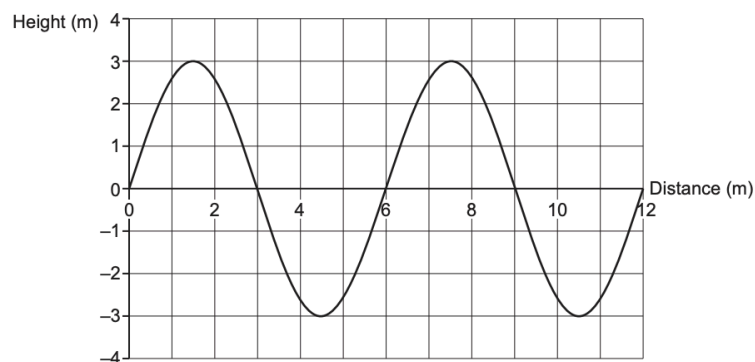
- A 30 m/s
- B 100 m/s
- C 340 m/s
- D 300 000 000 m/s

Your answer

[1]

Q3.a(2018)

The graph shows how the height of a water wave changes with distance.



- (a) The water wave has a wavelength of 6 m.

Describe how the graph shows this.

.....
..... [1]

Q3.b(2018)

The frequency of the water wave is 0.5 Hz.

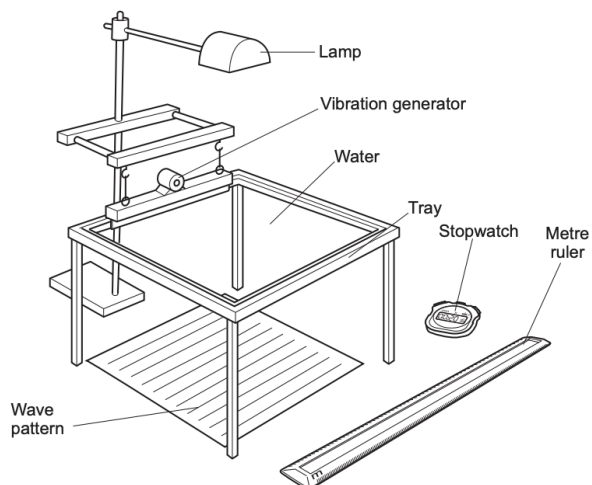
Calculate the speed of this water wave.

Answer = m/s [3]

Q4.(2018)

A group of students use a ripple tank, a metre ruler and a stopwatch.

They draw a diagram of this equipment.



Explain how this equipment is used to measure the frequency of water waves.

.....

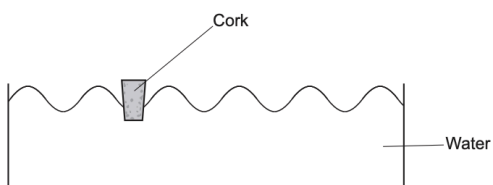
.....

.....

..... [2]

Q5.(2020)

A student makes transverse waves in a tray of water. He places a cork on the surface of the water.



Which row in the table describes the experiment correctly?

	How does the cork vibrate during the experiment?	Where is the water after the experiment?
A	↑ ↓	The water stays in its original position.
B	← →	The water moves to one side of the tray.
C	↑ ↓	The water moves to one side of the tray.
D	← →	The water stays in its original position.

Your answer

☐

[1]

Q6.(2020)

A student wants to work out the speed of water waves in a ripple tank. **Fig. 13.1** shows the apparatus the student uses.

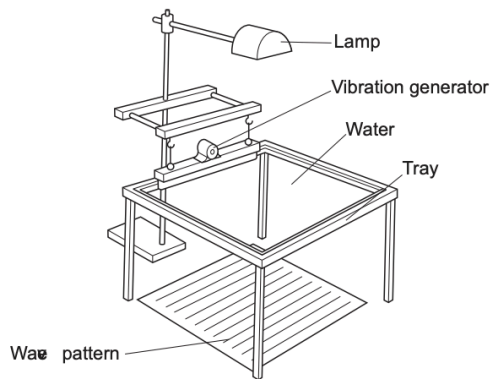


Fig. 13.1

Name the **two** extra pieces of apparatus she will need to work out the speed of the waves.

1

2

[2]

Q7.(2020)

Fig. 15.1 shows how the height of a water wave changes with distance.

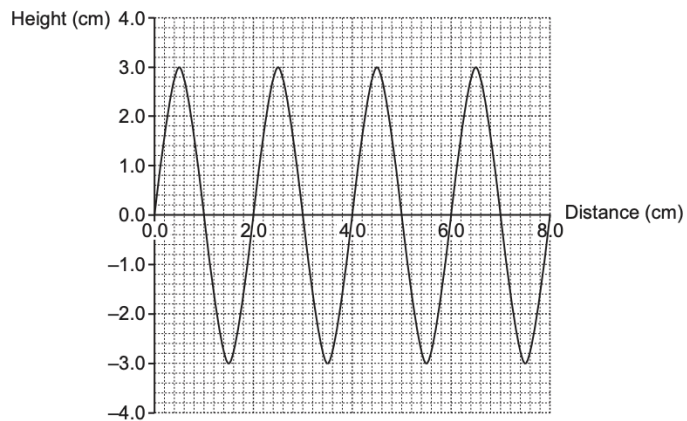


Fig. 15.1

Fig. 15.2 shows how the height of the **same** wave changes with time.

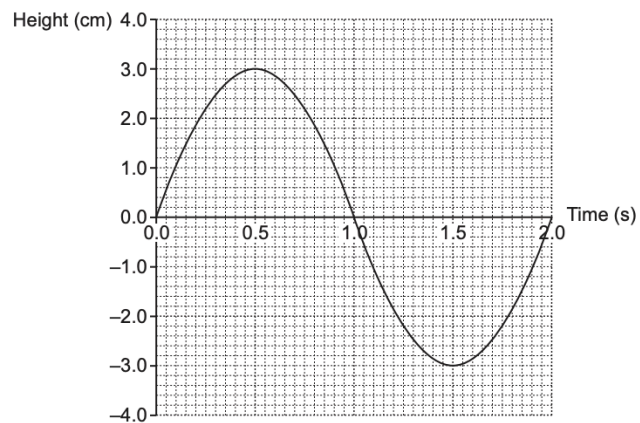


Fig. 15.2

- amplitude
- wavelength
- frequency
- wave speed.

Use calculations and definitions in your answer.

[6]

A student drops a ball from a height of 1 m. They measure the bounce height.



Attempt	1	2	3	4
Bounce height (cm)	54	56	52	38

A 38 cm
B 52 cm
C 54 cm
D 56 cm

7

[1]

Q9.a(2021)

This question is about waves.

- (a) Two students are watching a tap dripping water into a bowl. As the water drips, it makes waves in the bowl, as shown in Fig 13.1.



Fig. 13.1

- (i) The students want to calculate the frequency of the waves in the bowl.

Define frequency.

.....

..... [1]

Q9.b(2021)

In 10 seconds, 10 waves are made in the bowl.

State the frequency of the waves.

Frequency = Hz [1]

Q9.c(2021)

The students want to measure the wavelength of the water's waves.

Describe a way for them to do this **accurately**.

.....

.....

.....

..... [2]

Q10.(2021)

Sound is a longitudinal wave.

Fig. 13.2 shows one particle in a sound wave travelling in air.

Show how the air particle moves by adding **two** arrows to **Fig. 13.2**.



Fig. 13.2

[1]

Q11.a(2021)

Storms can produce thunder and lightning.

- (i) The speed of light is 3×10^8 m/s.

Estimate how many times **greater** the speed of light is than the speed of sound.

.....

..... [1]

Q11.b(2021)

A storm is 1340 m away.

A student sees the lightning and then hears the thunder 4 s later.

Calculate the speed of sound.

Use the equation: distance travelled = speed $\times$ time

Speed of sound = m/s [3]

Q12.(2021)

The speed of sound can be worked out using two different methods.

Method 1: Clapping your hands and timing the echo from a wall.

Method 2: Measuring the time to hear the thunder after seeing the lightning.

Which method is better?

Explain your answer.

.....
.....
.....
..... [2]

Q13.(2022)

The wavelength of a water wave is 10 cm. The frequency of the wave is 5 Hz.

What is the **speed** of the water wave?

Use the equation: wave speed = frequency $\times$ wavelength

- A 0.5 cm/s
- B 2.0 cm/s
- C 10 cm/s
- D 50 cm/s

Your answer

☐

[1]

Q14.(2022)

In an experiment, 80 waves are produced in 20 s.

What is the frequency of the waves?

- A 0.25 Hz
- B 4 Hz
- C 16 Hz
- D 1600 Hz

Your answer

☐

[1]

Q15.(2022)

A student stands near a wall and claps their hands.

The sound echo takes 0.2 s to return to the student. The speed of sound is 330 m/s.

What is the **distance** between the student and the wall?

Use the equation: distance travelled = speed $\times$ time

- A 33 m
- B 66 m
- C 1650 m
- D 3300 m

Your answer

[1]

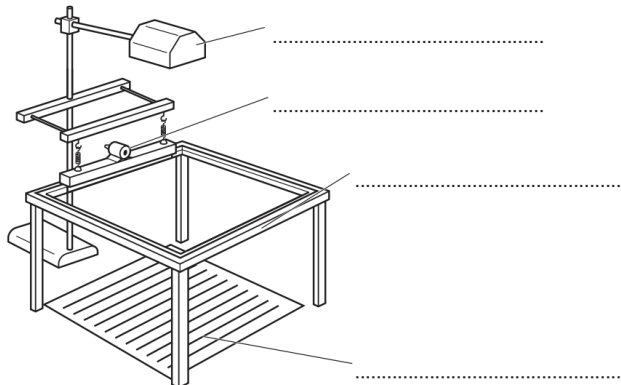
Q16.a(2022)

A teacher uses the ripple tank in **Fig. 13.1** to show refraction of water waves.

Label **Fig. 13.1** using words from the list.

Lamp	Pattern of waves	Tray of water	Vibration generator
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Fig. 13.1

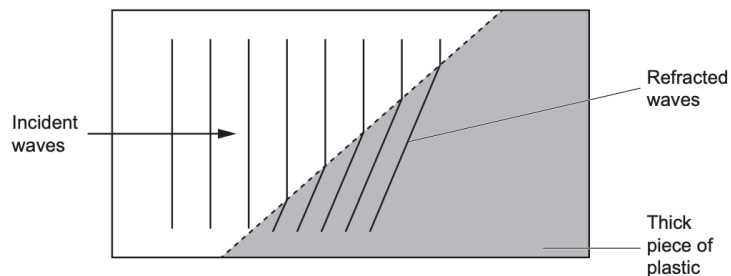


[2]

Q16.b(2022)

Fig. 13.2 shows the pattern of the water waves when the teacher places a thick piece of plastic into the ripple tank.

Fig. 13.2



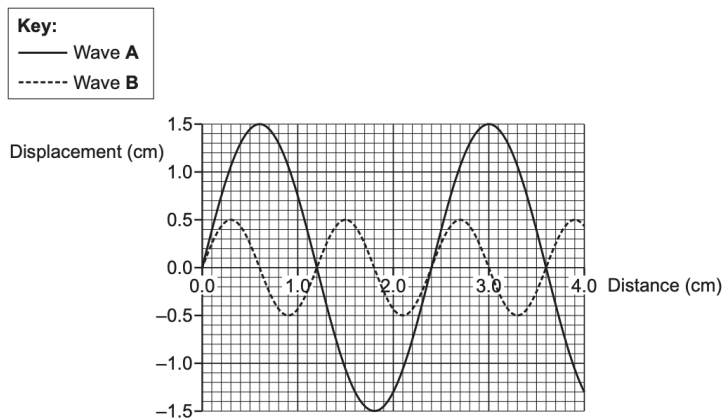
Explain why placing the plastic into the ripple tank causes refraction.

.....
..... [1]

Q16.c(2022)

Fig. 13.3 shows two water waves.

Fig. 13.3



(i) The amplitude of wave A is bigger than the amplitude of wave B.

Calculate how many times bigger.

Answer = [2]

Q16.d(2022)

A student says, 'A wave with a high frequency has a long wavelength.'

Explain why the student is **incorrect**.

Use **Fig. 13.3** to explain your answer.

.....

.....

.....

..... [2]

Q17.(2023)

In an experiment, three students work out values for the speed of sound.

Student	Speed of sound (m/s)
1	313
2	330
3	320

What is the **range** of values for the speed of sound?

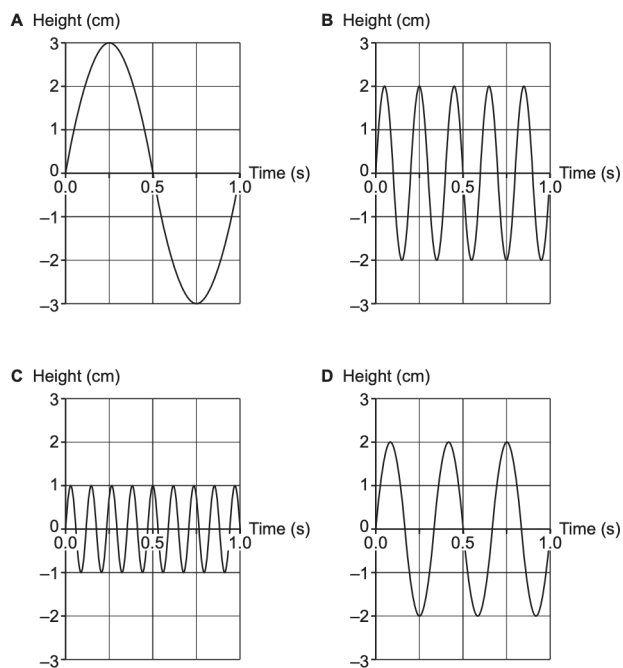
- A** 313 m/s – 320 m/s
- B** 313 m/s – 330 m/s
- C** 320 m/s – 330 m/s
- D** 321 m/s – 330 m/s

Your answer

[1]

Q18.(2023)

Which wave has the **highest** frequency?

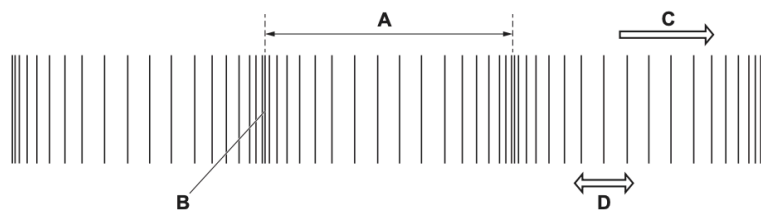


Your answer

[1]

Q19.a(2023)

The diagram shows a sound wave.



(i) Write the letter **B**, **C** or **D** in the correct boxes to label the diagram.

One has been done for you.

Direction of wave travel

Direction of particle vibration

Compression

Wavelength

A

[2]

Q19.b(2023)

Which type of wave is a sound wave?
Tick (✓) **one** box.

- | | |
|-------------------|--------------------------|
| Amplitude wave | ☐ |
| Longitudinal wave | ☐ |
| Transverse wave | ☐ |
| Water wave | ☐ |

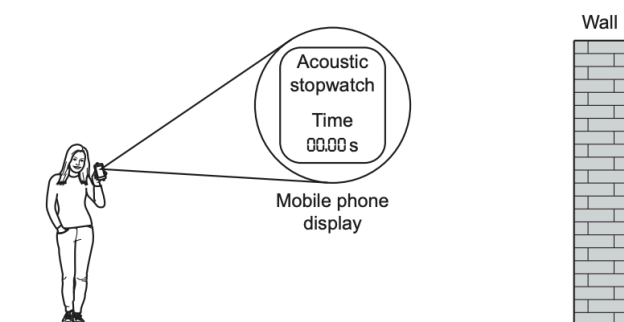
[1]

Q20.a(2023)

A student downloads a physics app to their mobile phone.
The app contains an 'acoustic stopwatch'.

The app works like this:

- When the microphone detects a loud sound, the acoustic stopwatch starts.
- When the microphone detects the next loud sound, the acoustic stopwatch stops.



- (i) Describe how the student can use the app to measure the speed of sound.
Include the names of **other** equipment that the student will need to use.

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.....

.....

..... [3]

Q20.b(2023)

Another student suggests using this stopwatch.



Suggest why the 'acoustic stopwatch' on the mobile phone app is an improvement on using this stopwatch.

.....
..... [1]

Q20.c(2023)

The wavelength of a sound wave is 0.55 m.

The speed of sound in air is 330 m/s.

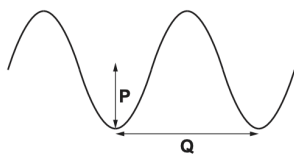
Calculate the frequency of the sound wave.

Use the Equation Sheet.

Frequency = Hz [3]

Q21.(2024)

The diagram shows a picture of a water wave in a ripple tank.



Which row shows the correct labels for the diagram?

	P	Q
A	amplitude	frequency
B	amplitude	wavelength
C	wavelength	amplitude
D	wavelength	frequency

Your answer

☐

[1]

Q22.(2024)



Water

Plastic tray



Ruler



Stopwatch

Describe how the student can use this equipment to measure the speed of a water wave.

- the measurements they should take
- the variables they need to keep constant
- any precautions they should take to obtain accurate and precise results.

[6]