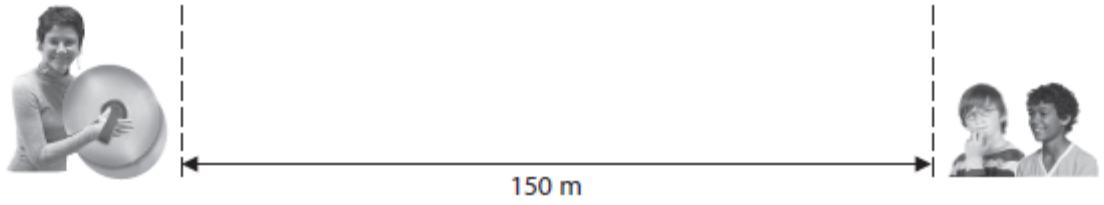
# Sound Waves

## Problems by Topic

**Edexcel International GCSE**

**7** A teacher and two students are measuring the speed of sound.




The teacher makes a loud sound by hitting two cymbals together.

Each student starts a stopwatch when they see the teacher hit the cymbals. They each stop their stopwatch when they hear the sound.

(a) Describe how a sound wave moves through the air.

**(3)**

(b) The students repeat the experiment and record their readings in a table.

| Student | Time in s |
|---|---|
| Andrew | 0.44, 0.46, 0.44, 0.48, 0.43 |
| Kefe | 0.5, 0.6, 0.4, 0.4, 0.6 |

(i) State the precision of Andrew's readings.

**(1)**

(ii) State the equation linking speed, distance travelled and time taken.

**(1)**

(iii) The teacher was standing 150 m from the students.

Use the experimental data recorded by each student to complete the table below.

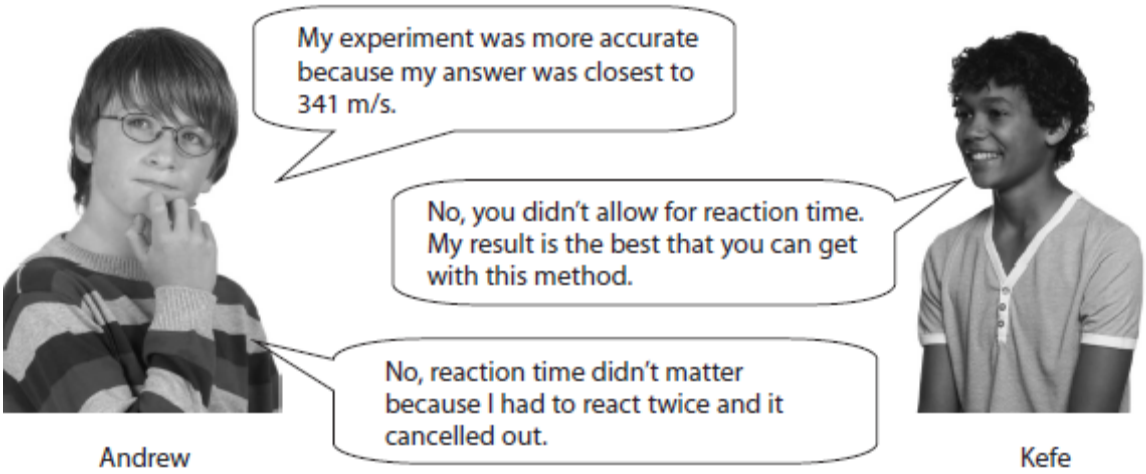
Give your answers to an appropriate number of significant figures.

**(3)**

| Student | Mean (average) time in s | Speed of sound in m/s |
|---|---|---|
| Andrew | | |
| Kefe | | |

(c) The students look in a data book and find that the speed of sound in air is given as 341 m/s.

The students discuss their results.



Evaluate these conclusions.

(5)

**January 2012**

**6** Echo sounding is used to detect fish in the sea.

Sound waves are emitted from a fishing boat. Some of the sound waves are reflected by fish and detected back at the boat.

(a) The shortest time between the sound waves being emitted and detected is 0.26 s.

The speed of sound in water is 1.5 km/s.

Calculate the distance between the boat and the nearest fish.

**(4)**

distance = ..... m

(b) Each sound wave is emitted for a very short time.

The reflected sound wave received at the boat lasts for a longer time.

Suggest a reason for this difference in time.

**(2)**

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.....

**(Total for Question 6 = 6 marks)**

**January 2014**

**3** (a) Which statement about sound waves is correct?

**(1)**

☐ **A** sound waves cannot be reflected

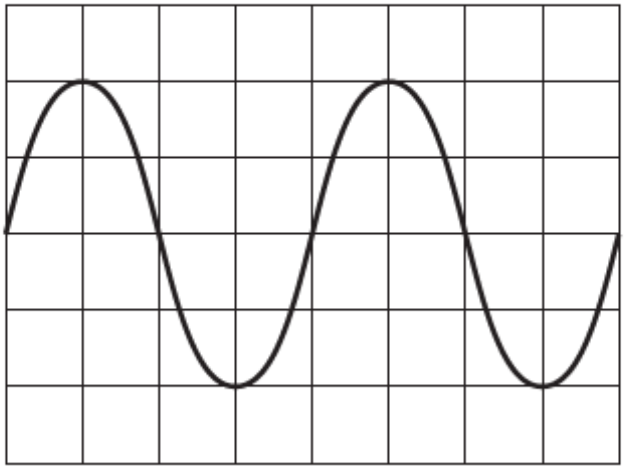
☐ **B** sound waves are electromagnetic

☐ **C** sound waves are longitudinal

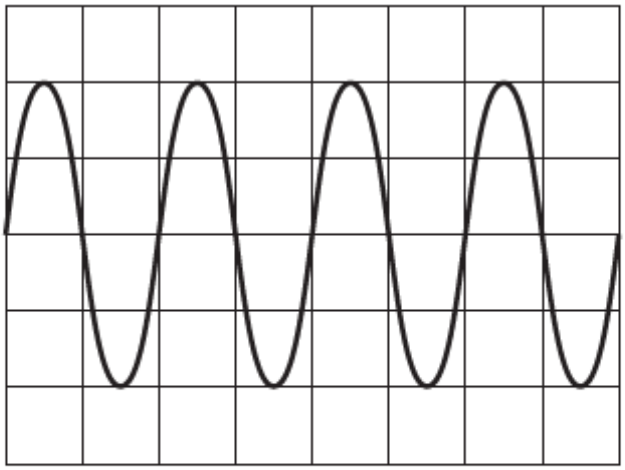
☐ **D** sound waves are transverse

(b) A microphone is connected to a data logger, which displays each sound wave as a graph.

The diagrams show the graphs for two different sound waves.



Sound wave P



Sound wave Q

The graphs have the same scales.

In the horizontal direction: 1 square = 0.001 s

(i) The amplitude of sound wave Q is

(1)

☒ **A** larger than the amplitude of sound wave P

☒ **B** smaller than the amplitude of sound wave P

☒ **C** the same as the amplitude of sound wave P

☒ **D** zero

(ii) The frequency of sound wave P is 250 Hz.

Find the time period of sound wave P.

**(1)**

time period = ..... s

(iii) Find the frequency of sound wave Q.

**(1)**

frequency = ..... Hz

**(Total for Question 3 = 4 marks)**

**January 2015**