# Sound

## Question Paper

| | |
|---|---|
| Course | CIE IGCSE Physics |
| Section | 3. Waves |
| Topic | Sound |
| Difficulty | Easy |

**Time Allowed** 60

**Score** /49

**Percentage** /100

## Question 1a

A healthy human ear can hear a range of frequencies.

Three frequency ranges are shown.

Draw a ring around the range for a healthy human ear.

0 Hz – 20 Hz 10 Hz – 10 000 Hz 20 Hz – 20 000 Hz

**[1 mark]**

## Question 1b

Explain the meaning of the term *ultrasound*.

**[2 marks]**

## Question 1c

A student listens to two different sounds, P and Q.

The two different sounds are represented on a computer screen on the same scale.

Fig. 8.1 shows the screens.

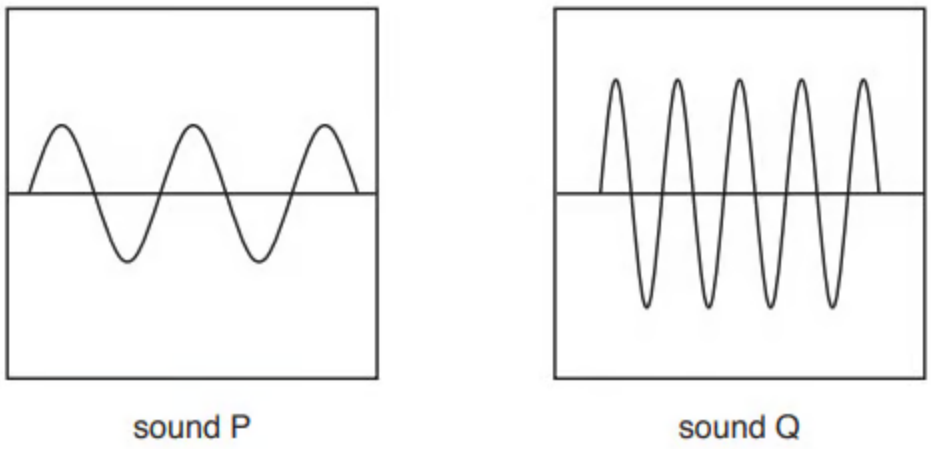


**Fig. 8.1**

State and explain how sound P is different from sound Q.

**[3 marks]**

## Question 2a

The boxes contain words about waves.

Complete each sentence. Choose a term from each box.

(i)

| an electromagnetic | a longitudinal | a transverse |
|---|---|---|

Sound travels as ..... wave.

[1]

(ii)

| amplitude | pitch | speed | wavelength |
|---|---|---|---|

A loud sound has a large ..... .

[1]

(iii)

| amplitude | pitch | speed | wavelength |
|---|---|---|---|

A student listens to two sounds. The sound with the higher frequency has a higher ..... .

[1]

**[3 marks]**

## Question 2b

Explain what is meant by the term ultrasound.

**[2 marks]**

## Question 3a

Sound travels as a wave.

Complete each sentence.

Sound is produced when an object ..... .

An echo is produced when sound is ..... from a hard surface.

Compared with a quiet sound, a loud sound always has a greater ..... .

Compared with a high pitched sound, a low pitched sound always has a smaller ..... .

Waves transfer energy without transferring ..... .

**[5 marks]**

## Question 3b

State the meaning of the term ultrasound.

**[1 mark]**

## Question 4a

Fig. 6.1 shows crests of a sound wave after reflection from a solid surface.

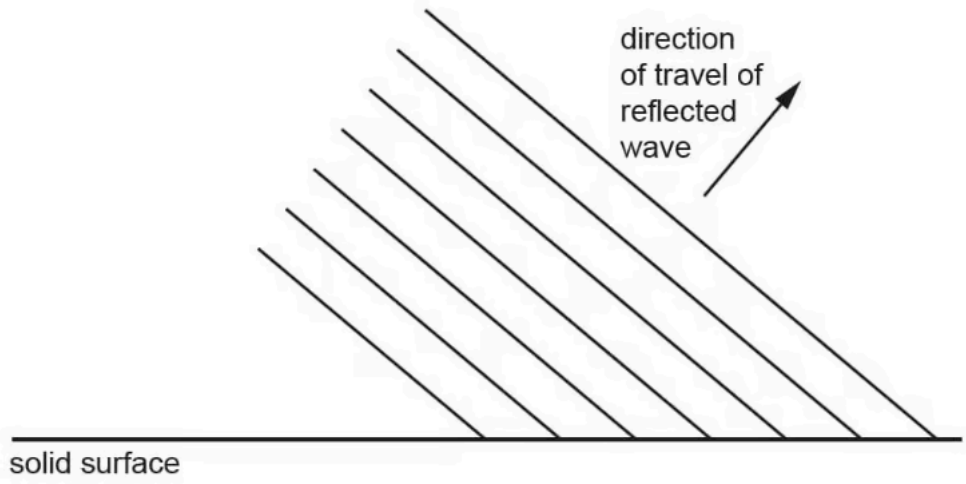


**Fig 6.1**

In Fig. 6.1, draw three crests of the incident wave.

**[3 marks]**

## Question 4b

Tick four statements in the list below that are false for a sound wave that is audible to a healthy human ear.

The wave is longitudinal. ☐

The wave is transverse. ☐

The frequency of the wave is 1 Hz. ☐

The frequency of the wave is 1 kHz. ☐

The frequency of the wave is 1 MHz. ☐

The wave travels in a vacuum. ☐

The wave could travel in aluminium. ☐

**[3 marks]**

## Question 4c

State a typical value for the speed of a sound wave in water.

**[1 mark]**

## Question 5a

The speed of sound waves can be measured in different ways.

State a reasonable value for the speed of sound in air which the calculations resulting from any experimental method should find.

**[2 marks]**

## Question 5b

One method to find the speed of sound in air involves two people who stand a distance apart and then measure the time a sound takes to travel between them, as shown in Fig. 1.


**Fig. 1**

(i) For this investigation, complete the sentences describing the method.

1. Two people stand a distance of at least _____ apart.
2. The distance between them is measured using a _____
3. One person has two wooden blocks, which they bang together above their head.
4. The second person has a _____ which they start when they see the first person banging the blocks together and stops when they hear the sound.
5. This is then _____ several times and an _____ is taken for the time.

[5]

(ii) State the equation used to calculate the speed of sound following this investigation.

[1]

**[6 marks]**

## Question 5c

Another method to find the speed of sound in air uses echoes as shown in Fig. 2.

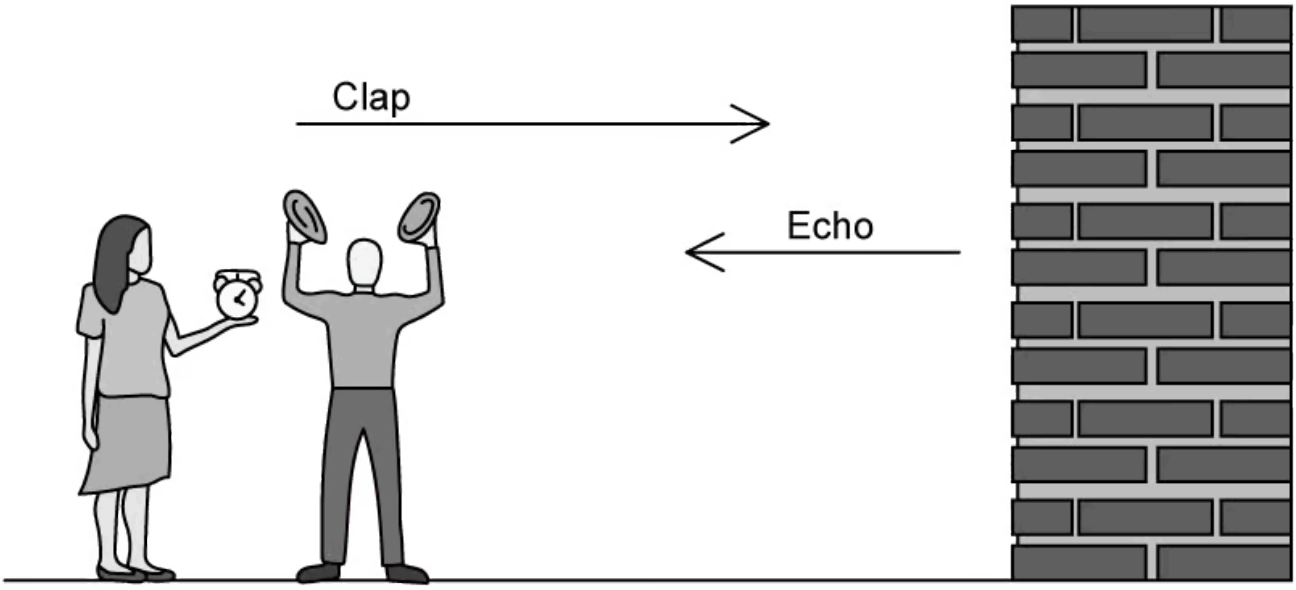


**Fig. 2**

(i) For this investigation, complete the sentences describing the method.

1. A person stands at least _____ away from a wall
2. The distance is measured using a _____
3. The person claps two wooden blocks together and listens for the echo.
4. A second person has a stopwatch and starts timing when they hear the _____ and stops timing when they hear the _____
5. This is then _____ several times and an _____ is taken for the time.

[6]

(ii) State the equation used to calculate the speed of sound following this investigation.

[1]

**[7 marks]**

## Question 5d

A third method to find the speed of sound in air uses as oscilloscope, as shown in Fig. 3.

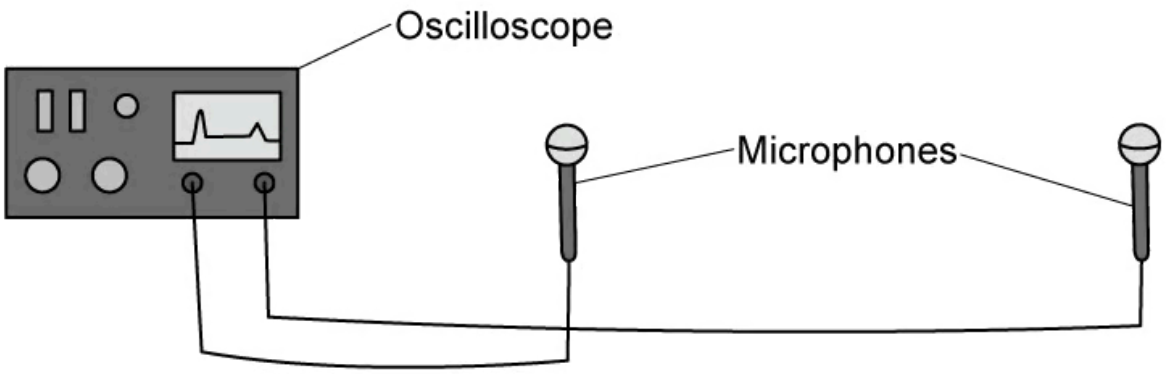


**Fig. 3**

(i) For this investigation, complete the sentences describing the method.

1. Two _____ are connected to an oscilloscope and placed about _____ apart
2. A _____ is used to measure the distance
3. The oscilloscope is set up so that it triggers when the _____ microphone detects a sound
4. The time base is adjusted so that the sound arriving at both microphones can be seen on the screen
5. Two wooden blocks are used to make a large clap next to the _____ microphone
6. The oscilloscope is then used to determine the _____ between the sound arriving at each microphone
7. This is _____ several times and an _____ time difference calculated

[8]

(ii) Complete the equation used to calculate the speed of sound following this investigation.

$$speed\ of\ sound = \frac{\text{.....}}{\text{.....}}$$

[2]

**[10 marks]**