

# 6.1 Waves in Air, Fluids & Solids

## Question Paper

|            |                                   |
|------------|-----------------------------------|
| Course     | AQA GCSE Physics                  |
| Section    | 6. Waves                          |
| Topic      | 6.1 Waves in Air, Fluids & Solids |
| Difficulty | Medium                            |

**Time allowed:** 50  
**Score:** /40  
**Percentage:** /100

**Question 1a**

(a) Waves can either be transverse or longitudinal

Describe the difference between transverse and longitudinal waves.

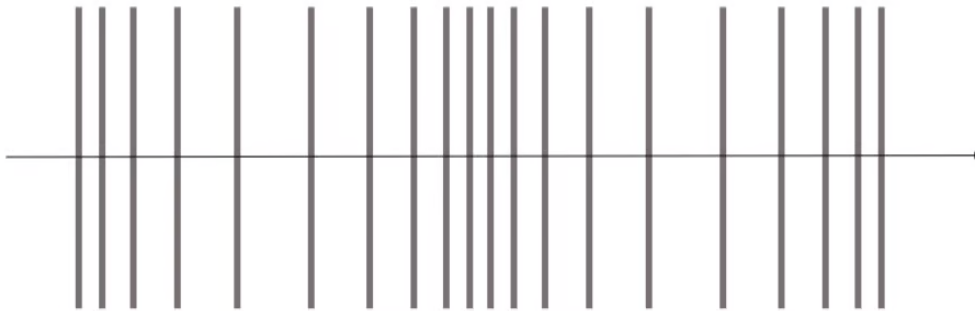
**[3 marks]**

[3 marks]

**Question 1b**

(b) **Figure 1** shows a longitudinal wave.

**Figure 1**



Add labels to **Figure 1**, showing clearly what is meant by the terms:

**Compression**

**Rarefaction**

**[2 marks]**

[2 marks]

**Question 1c**

(c) **Figure 2** below shows a duck floating on the surface of a pond.

**Figure 2**



As waves pass beneath the duck, they cause the duck to move.

Add arrows to **Figure 2** showing the direction in which the duck will move.

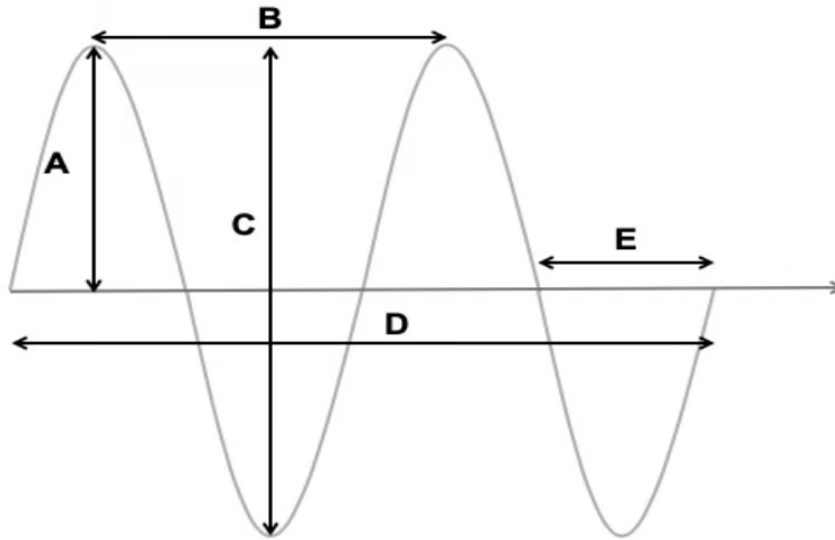
**[1 mark]**

[1 mark]

Question 2a

(a) **Figure 3** shows a transverse wave.

**Figure 3**



Which of the arrows shown in **Figure 3** correspond to the waves:

Amplitude \_\_\_\_\_

Wavelength \_\_\_\_\_

**[2 marks]**

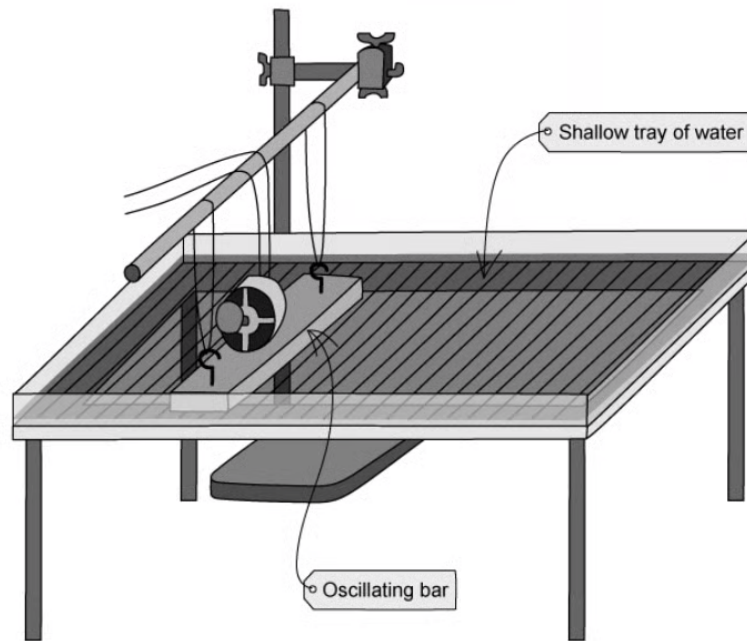
[2 marks]

**Question 2b**

(b) Some students plan to investigate the properties of water waves.

**Figure 4** shows the apparatus that they decide to use.

**Figure 4**



Describe a method that they could use to measure the speed, frequency and wavelength of the waves.

**[6 marks]**

[6 marks]

**Question 2c**

(c) The ripple tank produces waves with a time period of 24 milliseconds.

Calculate the frequency of the waves.

Give your unit

Give your answer to **3** significant figures.

**[3 marks]**

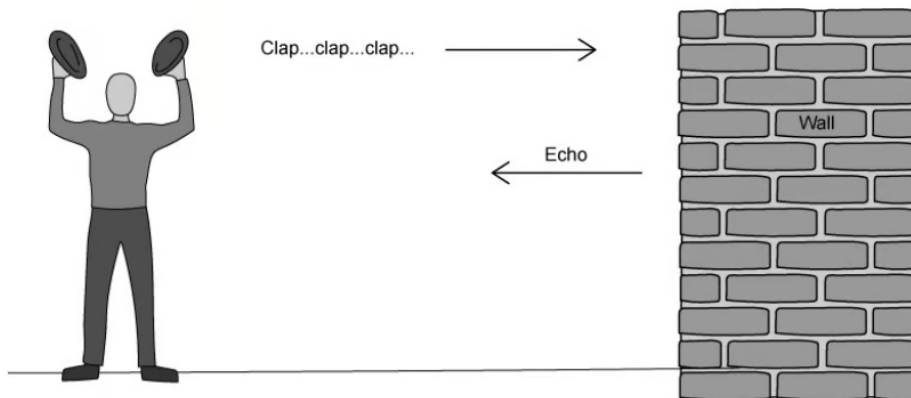
[3 marks]

**Question 3a**

- (a) Two girls stand some distance away from a wall and clap two wooden blocks together. The sound from the blocks reflects from the wall, producing an echo. They then continue to clap the blocks together, timing each clap so it is in time with each echo.

This is shown in **Figure 5** below:

**Figure 5**



Describe how they can use the above method to determine the speed of sound, stating clearly what measurements they must take.

**[4 marks]**

[4 marks]



**Question 3b**

(b) The girls estimate the speed of sound to be 340 m/s.

The sounds they produce have an average frequency of 1020 Hz.

Calculate the wavelength of the sound waves.

**[3 marks]**

[3 marks]

**Question 4a**

(a) When sound waves enter the human ear, they encounter the eardrum and cause it to vibrate.

Describe the process by which the sound waves cause the eardrum to vibrate.

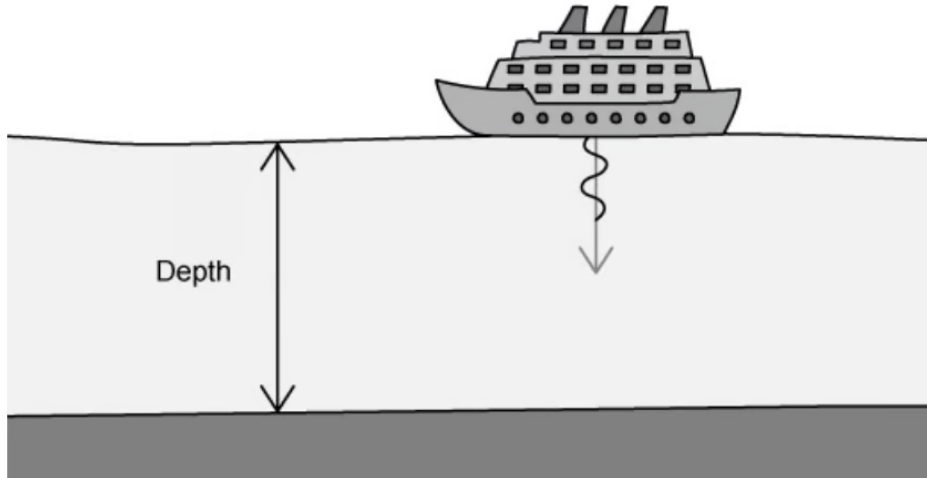
**[2 marks]**

[2 marks]

**Question 4b**

(b) **Figure 7** below shows a ship using an echo sounder to measure the depth of the water.

**Figure 7**



The echo sounder produces short bursts of ultrasound.

What is ultrasound?

**[2 marks]**

**[2 marks]**

### Question 4c

(c) The ultrasound pulse travels through the water at a speed of 1500 m/s.

A period of 320 milliseconds passes between a pulse being emitted and received by the echo sounder.

Calculate the depth of the water.

**[3 marks]**

[3 marks]

### Question 4d

(d) Ultrasound is also used in medicine to scan prenatal babies.

X-rays can also be used to image the body, but are not used to scan prenatal babies.

Explain why.

**[2 marks]**

[2 marks]

### Question 5a

(a) Earthquakes produce two different types of seismic waves: P-waves and S-waves.

Circle the relevant words below to indicate the nature of both P-waves and S-waves.

**P-waves:**                      Transverse                      Longitudinal

**S-waves:**                      Transverse                      Longitudinal

**[1 mark]**

[1 mark]

### Question 5b

(b) P-waves travel with an average speed of about 7000 m/s.

Some P-waves are produced by a minor earthquake and detected a short while later by a seismometer 3000 km away.

Calculate how long it will take the P-waves to reach the seismometer.

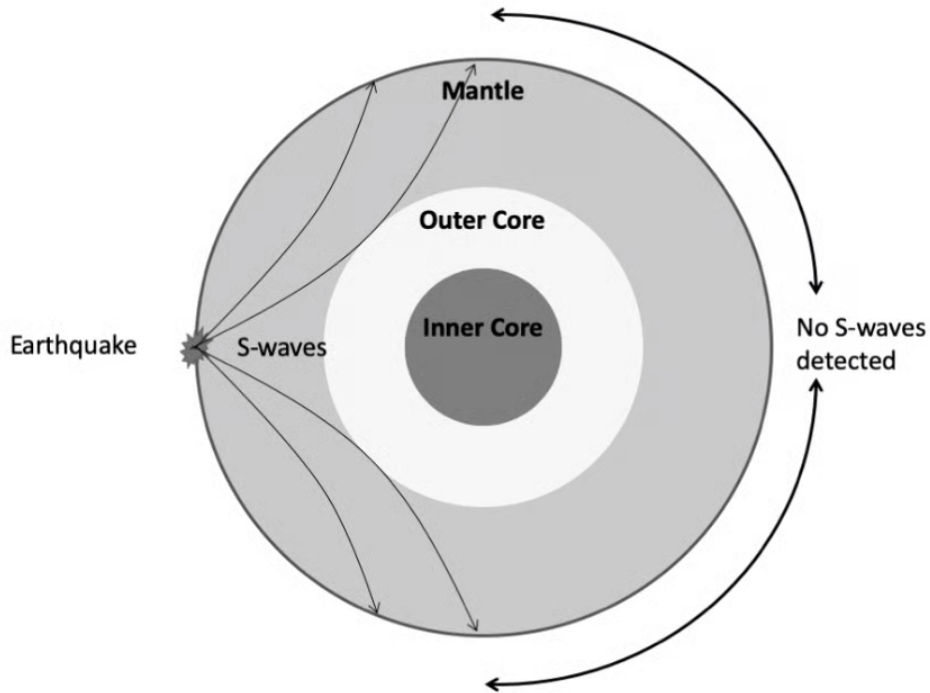
**[3 marks]**

[3 marks]

**Question 5c**

(c) **Figure 7** below shows S-waves passing through the internal structure of the Earth.

**Figure 7**



Whilst S-waves can be detected on the side of the Earth nearest to an earthquake, they cannot be detected on the opposite side.

Explain why, and describe what this tells us about the internal structure of the Earth.

**[3 marks]**

[3 marks]



Head to [savemyexams.co.uk](https://www.savemyexams.co.uk) for more awesome resources