AQA GCSE Physics | 8463

SPECIFICATION POINT 4.5.5.1.2

Pressure in a fluid 2 (HT only)

Past-paper questions

Tier	**Higher**
Question groups	**9**
Available paper years	**2009–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

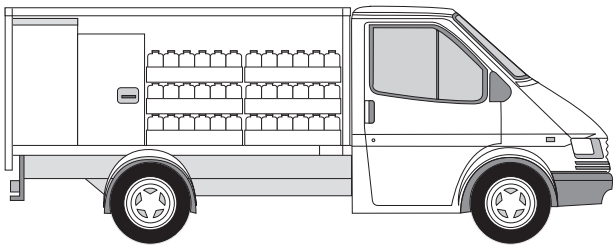
4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 01

June 2009 | PHY1AP | Original Q4 | Legacy

QUESTION FOUR

The diagram shows an electrically powered milk float.



In a milk float, batteries drive an electric motor.
A milk float travels 40 km a day.
The batteries are recharged overnight.

4A When the milk float is travelling along the road, the batteries transform . . .

1 electrical energy to kinetic energy.

2 kinetic energy to chemical energy.

3 chemical energy to electrical energy.

4 kinetic energy to electrical energy.

4B When charging the batteries, the battery charger transfers 1.5 kW of power for 5 hours.

energy transferred (kilowatt-hour, kWh)	=	power (kilowatt, kW)	×	time (hour, h)

The energy transferred to the batteries is . . .

1 0.3 kWh

2 3.3 kWh

3 7.5 kWh

4 75 kWh

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 01 · continued

4C During a day, the electric motor usefully transfers 1600 kJ. The energy supplied to the electric motor is 4000 kJ.

What is the efficiency of the motor?

$$\text{efficiency} = \frac{\text{useful energy transferred by the device}}{\text{total energy supplied to the device}}$$

1 0.4

2 2.5

3 2400

4 5600

4D The milk float is said to be more 'environmentally friendly' than a petrol-driven vehicle.

This is because . . .

1 the batteries store energy.

2 it produces no harmful waste gases.

3 the batteries can be recharged many times.

4 the top speed is only 20 km/h.

4.5.5.1.2 Pressure in a fluid 2 (HT only)

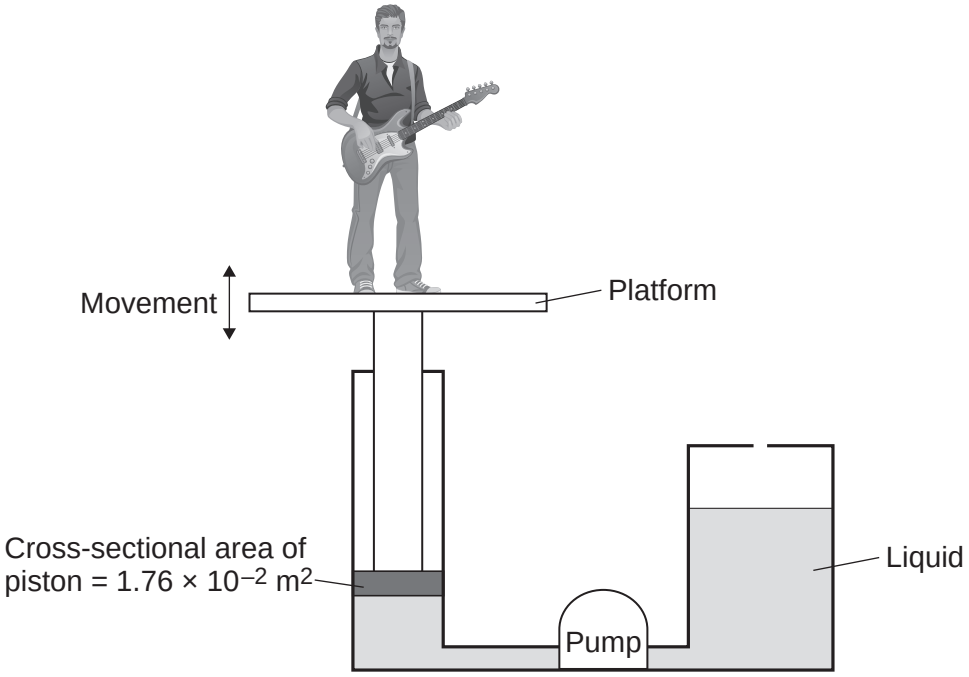
Question 02

June 2014 | PH3HP | Original Q8 | Legacy

8 Musicians sometimes perform on a moving platform.

Figure 13 shows the parts of the lifting machine used to move the platform up and down.

Figure 13



8 (a) What type of system uses a liquid to transmit a force?

[1 mark]

.....

8 (b) The pump creates a pressure in the liquid of 8.75 x 10^4 Pa to move the platform upwards.

Calculate the force that the liquid applies to the piston.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

.....

.....

.....

Force = ... N

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 02 · continued

8 (c) The liquid usually used in the machine is made by processing oil from underground wells. A new development is to use plant oil as the liquid.

Extracting plant oil requires less energy than extracting oil from underground wells.

Suggest an environmental advantage of using plant oil.

[1 mark]

.....

.....

.....

Question 8 continues on the next page

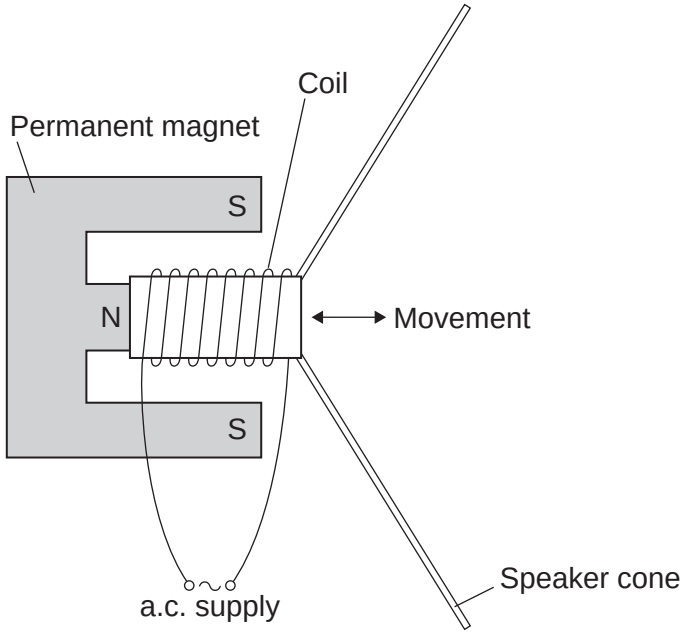
4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 02 · continued

8 (d) Musicians often use loudspeakers.

Figure 14 shows how a loudspeaker is constructed.

Figure 14



The loudspeaker cone vibrates when an alternating current flows through the coil.

Explain why.

[4 marks]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

8

4.5.5.1.2 Pressure in a fluid 2 (HT only)

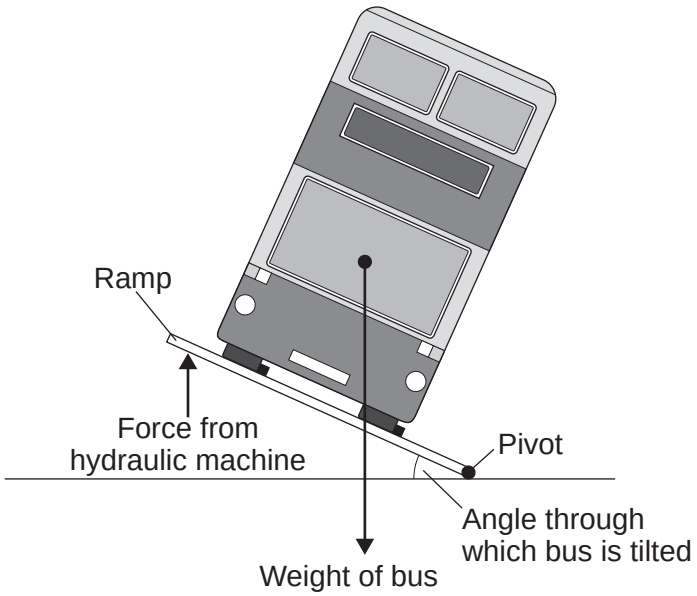
Question 03

June 2015 | PH3HP | Original Q7 | Legacy

7 Before a new bus can be used on the roads, it must pass a stability test.
Figure 13 shows how the bus is tested.

Figure 13

Front view



7 (a) (i) The bus will topple over if the ramp is tilted at too great an angle.

Explain why.

[2 marks]

.....

.....

.....

.....

7 (a) (ii) The bus is tested to angles of tilt far greater than it would experience in normal use.

Suggest **two** reasons why.

[2 marks]

1 .....

.....

2 .....

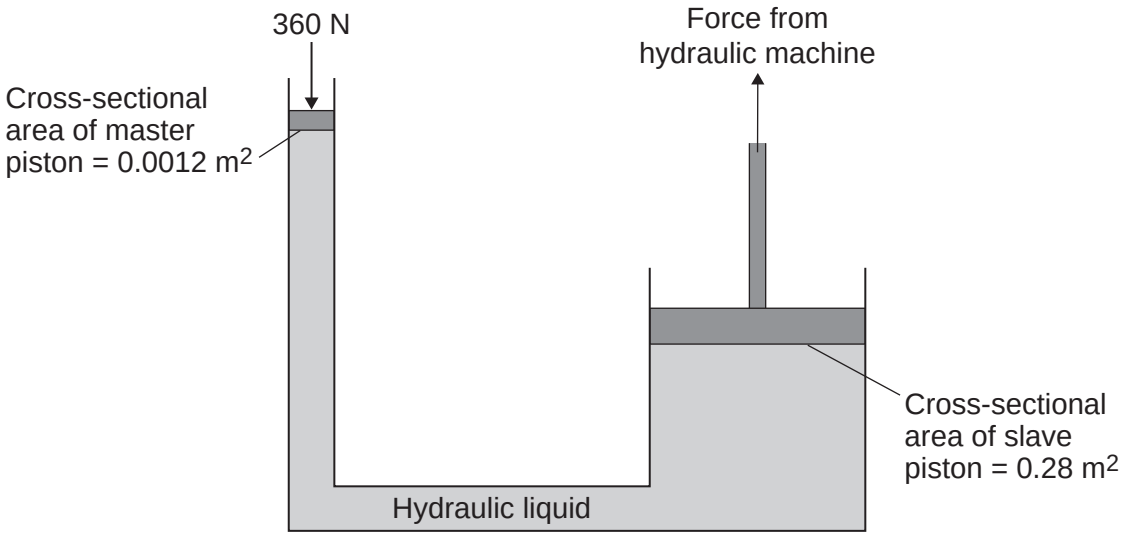
.....

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 03 · continued

7 (b) **Figure 14** shows the hydraulic machine that is used to make the ramp tilt.

Figure 14



The pressure applied to the hydraulic liquid at the master piston is the same as the pressure applied by the hydraulic liquid to the slave piston.

7 (b) (i) State the property of the liquid that keeps the pressure at both pistons the same.

[1 mark]

.....

7 (b) (ii) A 360 N force acts on the master piston.

Use information from **Figure 14** to calculate the force applied by the hydraulic liquid to the slave piston.

Use the correct equation from the Physics Equations Sheet.

[3 marks]

.....

.....

.....

.....

Force = ... N

8

4.5.5.1.2 Pressure in a fluid 2 (HT only)

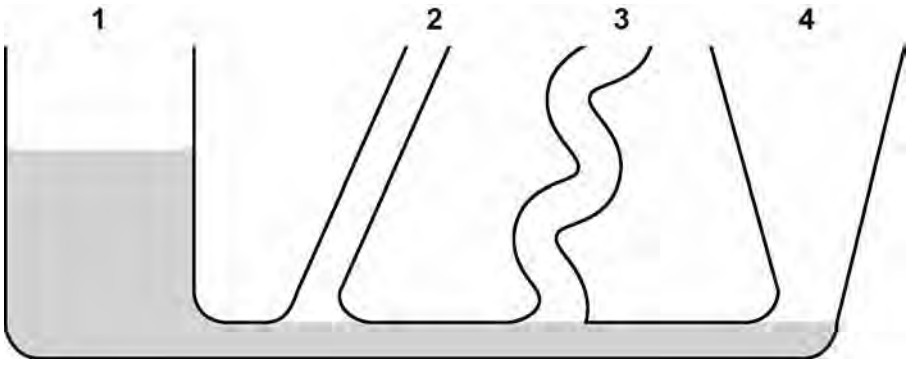
Question 04

June 2018 | 8463/2H | Original Q4

0 4 **Figure 6** shows an unusually shaped container.

The container has four vertical tubes of different shape and size.

Figure 6



Water is poured into the container up to the level shown in tube **1**.

0 4 . 1 Complete **Figure 6** to show the height of the water in tubes **2**, **3** and **4**.

[1 mark]

0 4 . 2 The further a swimmer dives below the surface of the sea, the greater the pressure on the swimmer.

Explain why.

[2 marks]

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 04 · continued

0 4 . 3 A person swims from a depth of 0.50 m to a depth of 1.70 m below the surface of the sea.

density of the sea water = 1030 kg/m^3

gravitational field strength = 9.8 N/kg

Calculate the increase in pressure on the swimmer.

Give the unit.

Use an equation from the Physics Equation Sheet.

[4 marks]

Increase in pressure = _____ Unit _____

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 05

June 2018 | 8463/2H | Original Q6

0 6 **Figure 8** shows a boat floating on the sea. The boat is stationary.

Figure 8



0 6 . 1 **Figure 9** shows part of the free body diagram for the boat.

Complete the free body diagram for the boat.

[2 marks]

Figure 9



4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 05 · continued

0 6 . 2 Calculate the mass of the boat.

Use the information given in **Figure 9**.

gravitational field strength = 9.8 N/kg

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

[4 marks]

Mass = _____ kg

0 6 . 3 When the boat propeller pushes water backwards, the boat moves forwards.
The force on the water causes an equal and opposite force to act on the boat.

Which law is this an example of?

[1 mark]

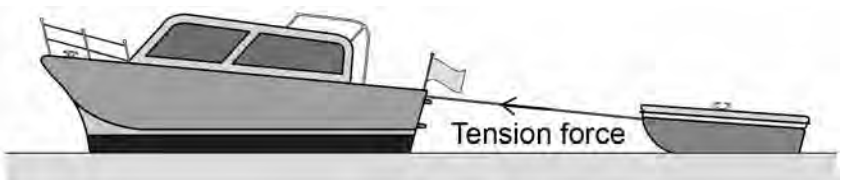
Question 6 continues on the next page

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 05 · continued

0 6 . 4 **Figure 10** shows the boat towing a small dinghy.

Figure 10



The tension force in the tow rope causes a horizontal force forwards and a vertical force upwards on the dinghy.

horizontal force forwards = 150 N
vertical force upwards = 50 N

4.5.5.1.2 Pressure in a fluid 2 (HT only)

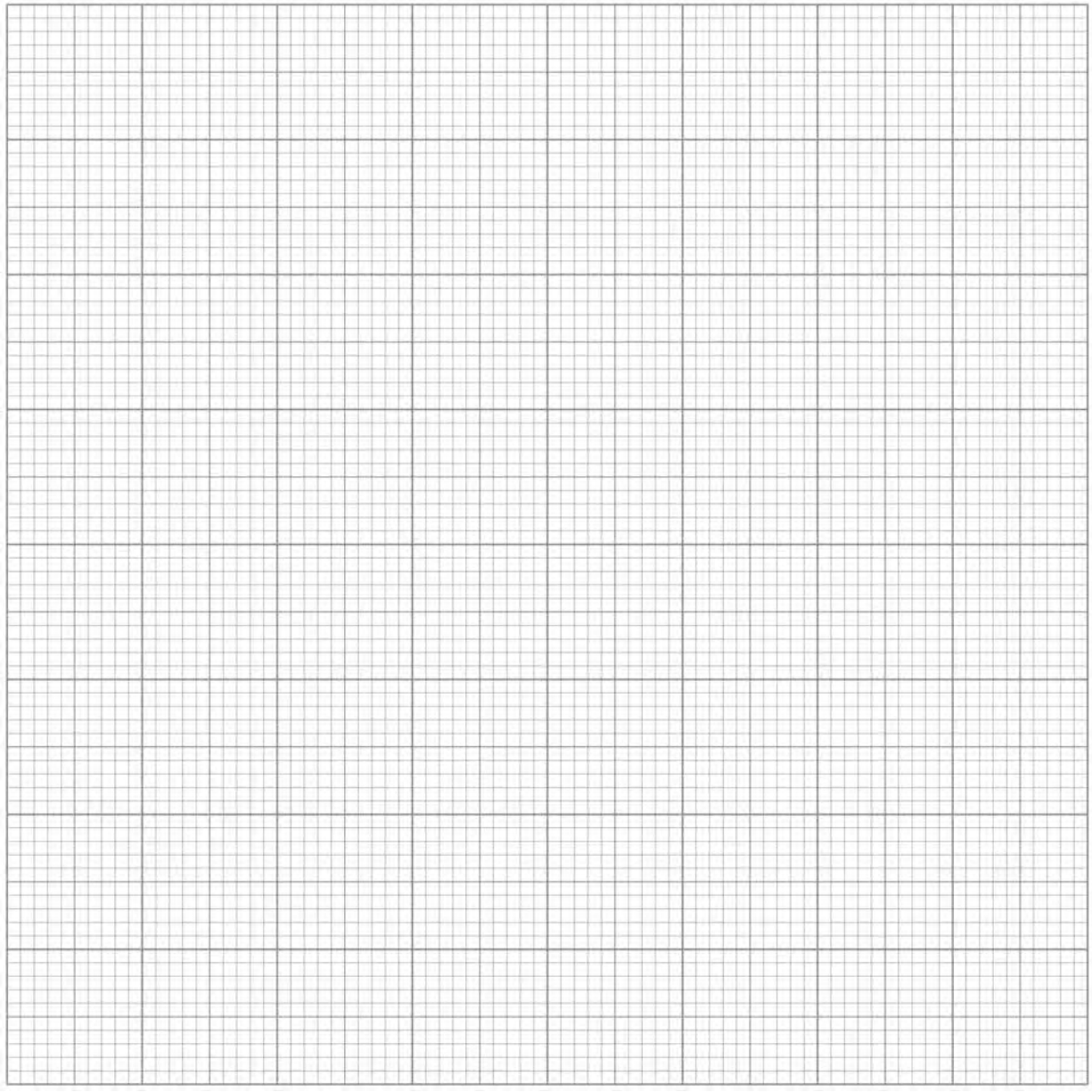
Question 05 · continued

Figure 11 shows a grid.

Draw a vector diagram to determine the magnitude of the tension force in the tow rope and the direction of the force this causes on the dinghy.

[4 marks]

Figure 11



Magnitude of the tension force in the tow rope = _____ N

Direction of the force on the dinghy caused by the tension force in the tow rope = _____

11

4.5.5.1.2 Pressure in a fluid 2 (HT only)

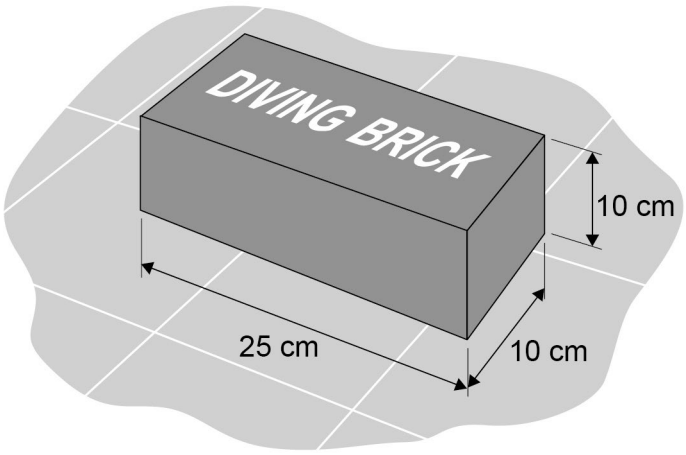
Question 06

June 2022 | 8463/2HR | Original Q8

0 8 Diving bricks sink to the bottom of a swimming pool.

Figure 14 shows a diving brick.

Figure 14



Swimmers practise diving to the bottom of the swimming pool to pick up the diving brick.

0 8 . 1 Explain why the forces on the brick at the bottom of the pool cause the brick to be stationary.

[3 marks]

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 06 · continued

0 8 . 2 When the brick from **Figure 14** is at the bottom of the pool, the top surface of the brick is 2.50 m below the surface of the water.

The force acting on the top surface of the brick due to the weight of the water is 637 N.

gravitational field strength = 9.8 N/kg

Calculate the density of the water in the swimming pool.

Use the Physics Equations Sheet.

[6 marks]

Density of water = _____ kg/m^3

Question 8 continues on the next page

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 06 · continued

0 8 . 3 Professional divers are trained in a very deep swimming pool.

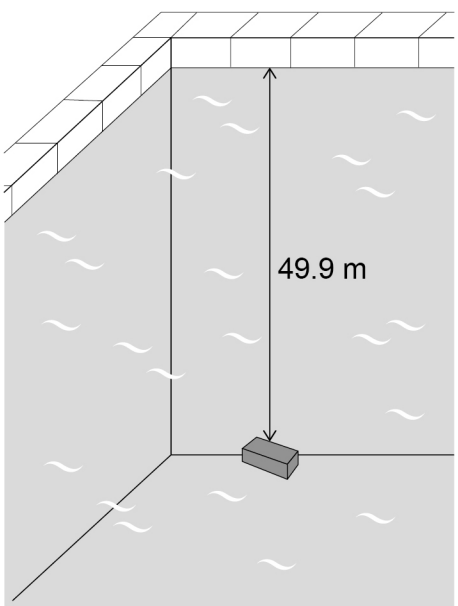
The density of the water in this pool is **not** the same as the density of the water in Question **08.2**

The diving brick was dropped into the very deep swimming pool.

When the brick was at a depth of 2.50 m, the force due to the weight of the water on the top surface of the brick was 618 N.

Figure 15 shows the diving brick at the bottom of the very deep swimming pool.

Figure 15



4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 06 · continued June 2022 | 8463/2HR | Original Q8

Determine the force due to the weight of the water on the top surface of the brick in **Figure 15**.

Use the Physics Equations Sheet.

Give your answer to 3 significant figures.

[3 marks]

Force (3 significant figures) = _____ N

12

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 07

June 2023 | 8463/2H | Original Q1

0 1 Infrared waves are transverse waves.

0 1 . 1 Complete the sentence.

[1 mark]

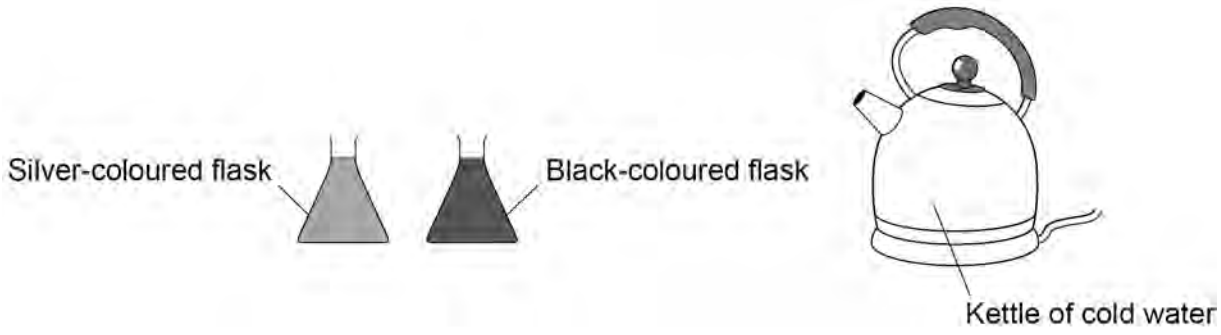
In a transverse wave, the direction of oscillation is _____

to the direction of energy transfer by the wave.

A student investigated how the colour of a surface affects the rate at which the surface emits infrared radiation.

Figure 1 shows some of the equipment used.

Figure 1



4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 07 · continued

0 1 . 2 The student wrote the following hypothesis:

‘The black-coloured flask will emit more infrared radiation than the silver-coloured flask during 10 minutes of cooling.’

Describe a method to test this hypothesis.

[6 marks]

Question 1 continues on the next page

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 07 · continued

0 1 . 3 When will the flasks emit infrared radiation at the greatest rate?

Give a reason for your answer.

[2 marks]

Tick (✓) **one** box.

During the 1st minute ☐

During the 5th minute ☐

During the 9th minute ☐

Reason _____

_____

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 07 · continued

Another student investigated the absorption of infrared radiation by different surface colours.

The student filled four hollow metal cubes with cold water.

Each cube was the same size but had a different surface colour.

The cubes were then placed the same distance from an infrared heater.

After 10 minutes, the student measured the temperature increase of the water inside each cube.

0 1 . 4 What was the dependent variable in this investigation?

[1 mark]

0 1 . 5 **Table 1** shows the results.

Table 1

Surface colour of the cube	Temperature increase after 10 minutes in °C
Matt white	3.0
Shiny white	2.0
Matt black	6.5
Shiny black	4.0

Give **two** conclusions that can be made from the results in **Table 1**.

[2 marks]

1

2

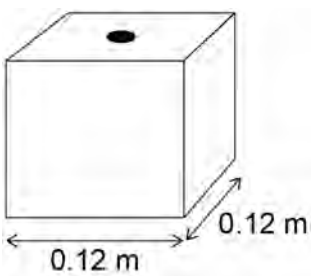
4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 07 · continued

Figure 2 shows one of the cubes. The cube is filled with water.

The weight of the water exerts a pressure on the bottom of the cube.

Figure 2



Use the Physics Equations Sheet to answer questions **01.6** and **01.7**.

0 1 . 6 Which equation correctly links area, force and pressure?

[1 mark]

Tick (✓) **one** box.

pressure = force × area^2 ☐

pressure = force × area ☐

pressure = $\frac{\text{force}}{\text{area}}$ ☐

pressure = $\frac{\text{area}}{\text{force}}$ ☐

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 07 · continued

0 1 . 7 The water pressure at the bottom of the cube is 1500 Pa.

Calculate the force of the water on the bottom of the cube.

[4 marks]

Force = _____ N

17

Turn over for the next question

4.5.5.1.2 Pressure in a fluid 2 (HT only)

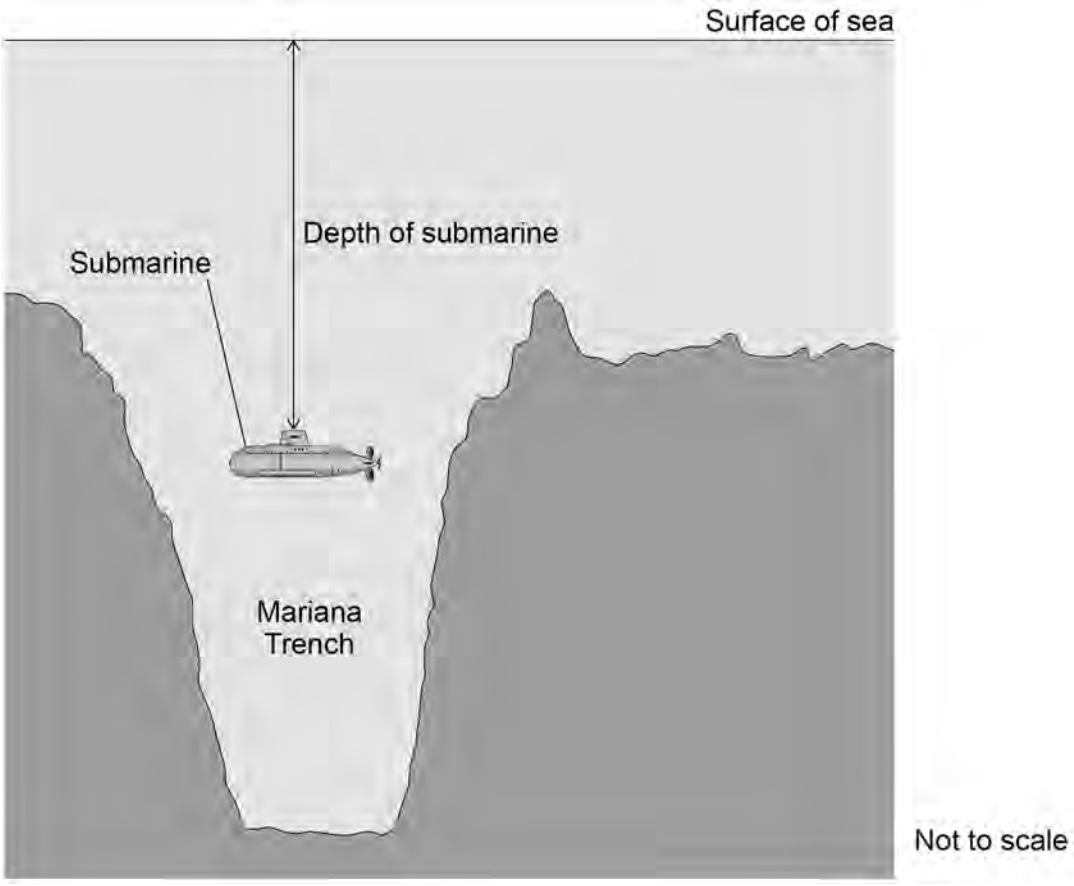
Question 08

June 2024 | 8463/2H | Original Q4

0 4 The Mariana Trench is the deepest part of the Pacific Ocean.

Figure 8 shows a submarine going to the bottom of the Mariana Trench.

Figure 8



0 4 . 1 The depth of the submarine increases.

Explain what happens to the pressure on the submarine.

[2 marks]

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 08 · continued

0 4 . 2 The submarine moved from the surface of the water to the bottom of the Mariana Trench.

The change in pressure was 110 000 kPa.

mean density of sea water = 1026 kg/m^3

gravitational field strength = 9.8 N/kg

Calculate the depth of the Mariana Trench.

Use the Physics Equations Sheet.

[4 marks]

Depth = _____ m

Question 4 continues on the next page

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 08 · continued

Earthquakes often occur at the Mariana Trench.

P-waves and S-waves are produced by earthquakes.

0 4 . 3 Which statement describes P-waves and S-waves?

[1 mark]

Tick (✓) **one** box.

- Both P-waves and S-waves are longitudinal. ☐
- Both P-waves and S-waves are transverse. ☐
- P-waves are longitudinal and S-waves are transverse. ☐
- P-waves are transverse and S-waves are longitudinal. ☐

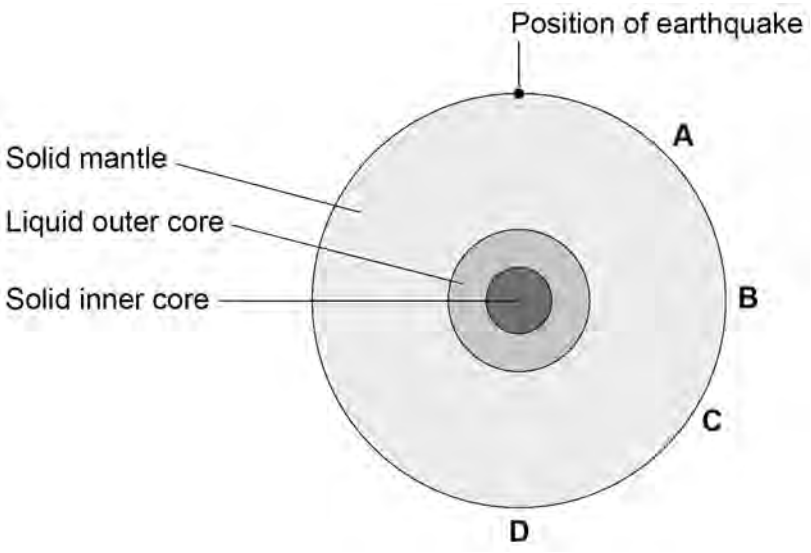
4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 08 · continued

0 4 . 4 **Figure 9** shows the layers inside the Earth.

An earthquake occurs at the position shown.

Figure 9



Which letter shows the position where **only** P-waves will be detected?

Give a reason for your answer.

[2 marks]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Reason _____

_____

Question 4 continues on the next page

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 08 · continued

0 4 . 5 An S-wave has a frequency of 3.6 Hz.

The S-wave has a speed of 4.5 km/s.

Calculate the wavelength of this S-wave.

Use the Physics Equations Sheet.

[3 marks]

Wavelength = _____ m

0 4 . 6 A seismometer is a device that detects earthquakes.

P-waves travel at a known speed between an earthquake and a seismometer.

S-waves travel at a slower speed than P-waves.

A P-wave and an S-wave from the earthquake arrive at the seismometer at different times.

Describe the relationship between the distance from the earthquake to the seismometer and the time between the P-wave and the S-wave arriving.

[2 marks]

14

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 09

0 8 **Figure 9** shows a jar containing some liquid.

Figure 9



0 8 . 1 The pressure in the liquid causes a force on the inside walls of the jar.

What direction is the force acting on the inside walls of the jar?

[1 mark]

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 09 · continued

0 8 . 2 The liquid in the jar has a weight of 1.50 N.

The liquid exerts a pressure of 774 N/m^2 on the base of the jar.

Calculate the area of the base of the jar.

Use the Physics Equations Sheet.

Give your answer to 3 significant figures.

[4 marks]

Area (3 significant figures) = _____ m^2

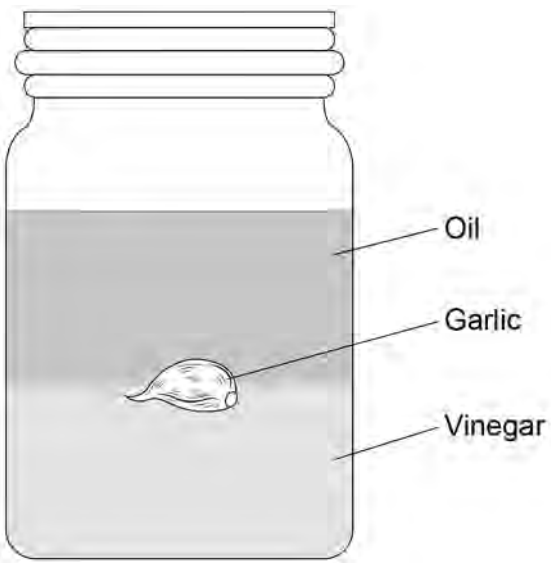
Question 8 continues on the next page

4.5.5.1.2 Pressure in a fluid 2 (HT only)

Question 09 · continued

0 8 . 3 **Figure 10** shows a jar containing oil, vinegar and a piece of garlic.

Figure 10



The garlic in **Figure 10** is floating at the boundary between the two liquids.

Explain why there is an upthrust on the garlic.

[4 marks]

9