AQA GCSE Physics | 8463

SPECIFICATION POINT 4.5.5.1.1

Pressure in a fluid 1

Past-paper questions

Tier	**Higher**
Question groups	**6**
Available paper years	**2013–2025**

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.

4.5.5.1.1 Pressure in a fluid 1

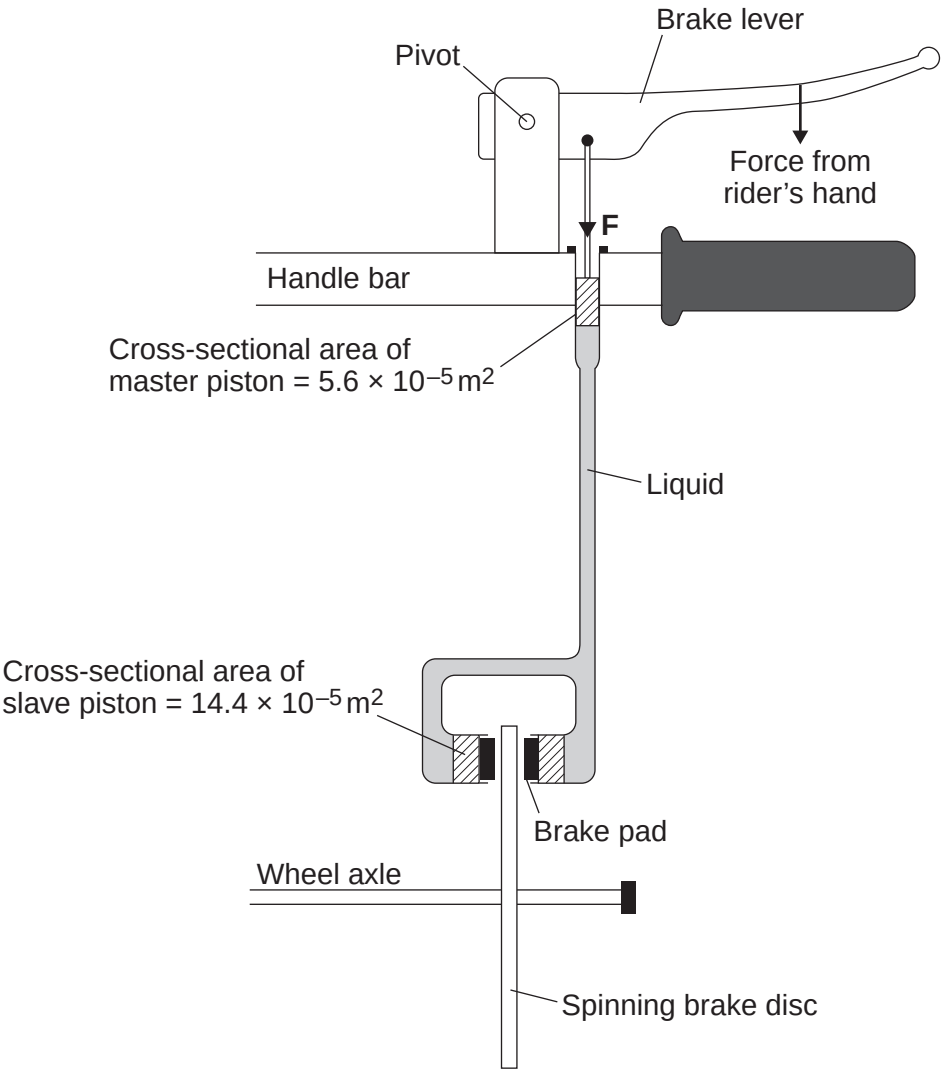
Question 01

June 2013 | PH3HP | Original Q4 | Legacy

4 Mountain bike riders use brakes to slow down.



Some mountain bikes have hydraulic brakes.



4.5.5.1.1 Pressure in a fluid 1

Question 01 · continued

4 (a) What property of a liquid enables a hydraulic brake system to work?

.....

(1 mark)

4 (b) When the rider's hand pulls on the brake lever, the master piston applies a pressure of 1.5×10^6 pascals to the liquid.

Using information from the diagram, calculate the force **F** exerted on the liquid by the master piston.

Use the correct equation from the Physics Equations Sheet.

.....

.....

.....

.....

Force **F** = ... N

(2 marks)

4 (c) The pressure in the liquid applies a force to move each slave piston.

How does the size of this force compare to the force **F** applied by the master piston?

.....

.....

Give a reason for your answer.

.....

.....

(2 marks)

5

4.5.5.1.1 Pressure in a fluid 1

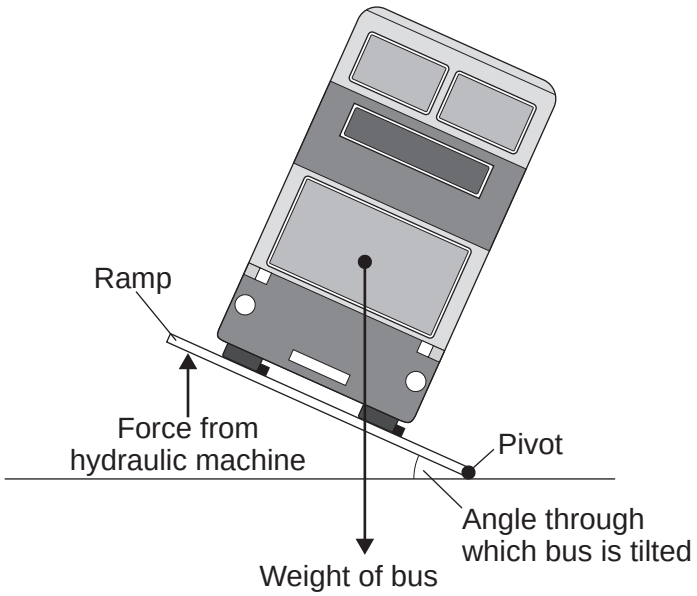
Question 02

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 .....

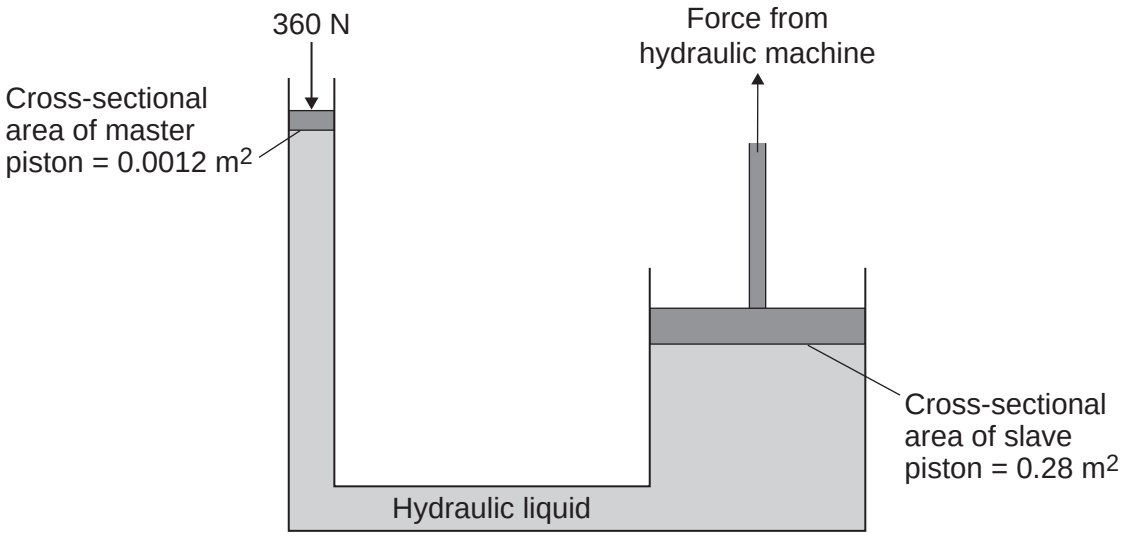
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4.5.5.1.1 Pressure in a fluid 1

Question 02 · 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

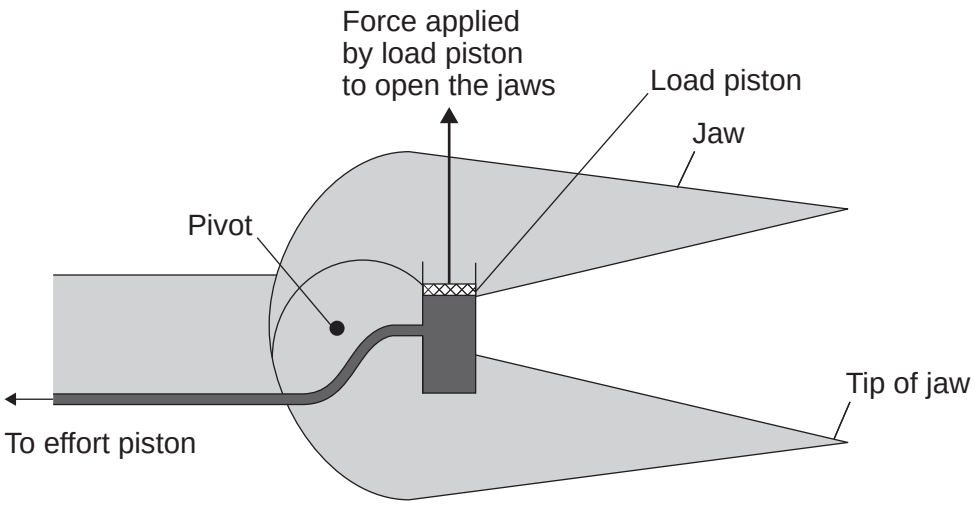
4.5.5.1.1 Pressure in a fluid 1

Question 03

June 2017 | PH3HP | Original Q5 | Legacy

5 **Figure 4** shows some jaws used by the fire service. The jaws are opened and closed by a hydraulic system.

Figure 4



5 (a) The force applied at the effort piston is transmitted throughout the hydraulic system.

State the property of the liquid in the hydraulic system that allows this to happen.

[1 mark]

_____

5 (b) The pressure in the liquid in the hydraulic system in the jaws is 5.2×10^8 Pa
The cross-sectional area of the load piston in the jaws is 4.1×10^{-4} m^2

Calculate the force at the load piston.

Use the correct equation from the Physics Equations Sheet.

Give your answer to two significant figures.

[3 marks]

_____

_____

_____

_____

Force = _____ newtons

4.5.5.1.1 Pressure in a fluid 1

Question 03 · continued

5 (c) How does the maximum force that the tip of the jaws can apply compare to the maximum force the load piston can apply?

Give a reason for your answer.

[2 marks]

5 (d) In **Figure 4** the moments of the forces on the jaws are in equilibrium.

Explain what is meant by the statement 'the moments of the forces on the jaws are in equilibrium'.

[2 marks]

8

4.5.5.1.1 Pressure in a fluid 1

Question 04

November 2021 | 8463/2H | Original Q1

0 1 The thinking distance and braking distance for a car vary with the speed of the car.

0 1 . 1 Explain the effect of **two** other factors on the **braking** distance of a car.

Do **not** refer to speed in your answer.

[4 marks]

Question 1 continues on the next page

4.5.5.1.1 Pressure in a fluid 1

Question 04 · continued

0 1 . 2 Which equation links acceleration (a), mass (m) and resultant force (F).

[1 mark]

Tick (✓) **one** box.

resultant force = mass × acceleration ☐

resultant force = mass × acceleration^2 ☐

resultant force = $\frac{\text{mass}}{\text{acceleration}^2}$ ☐

resultant force = $\frac{\text{mass}}{\text{acceleration}}$ ☐

0 1 . 3 The mean braking force on a car is 7200 N.

The car has a mass of 1600 kg.

Calculate the deceleration of the car.

[3 marks]

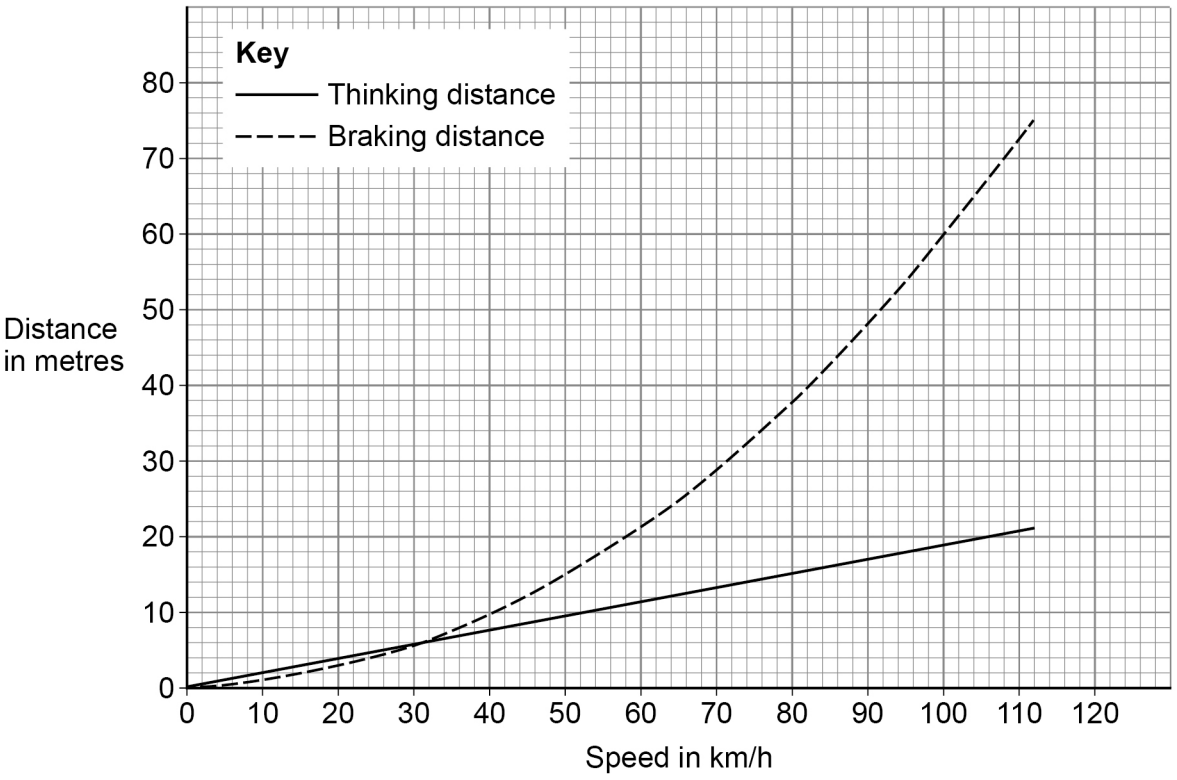
Deceleration = _____ m/s^2

4.5.5.1.1 Pressure in a fluid 1

Question 04 · continued

0 1 . 4 **Figure 1** shows how the thinking distance and braking distance for a car vary with the speed of the car.

Figure 1



Determine the stopping distance when the car is travelling at 80 km/h.

[2 marks]

Stopping distance = _____ m

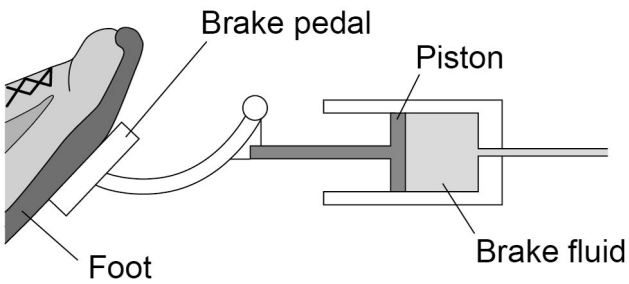
Question 1 continues on the next page

4.5.5.1.1 Pressure in a fluid 1

Question 04 · continued

Figure 2 shows part of the braking system for a car.

Figure 2



0 1 . 5 Which equation links area of a surface (A), the force normal to that surface (F) and pressure (p).

[1 mark]

Tick (✓) **one** box.

$p = F \times A$ ☐

$p = F \times A^2$ ☐

$p = \frac{F}{A}$ ☐

$p = \frac{A}{F}$ ☐

4.5.5.1.1 Pressure in a fluid 1

Question 04 · continued

0 1 . 6 When the brake pedal is pressed, a force of 60 N is applied to the piston.

The pressure in the brake fluid is 120 000 Pa.

Calculate the surface area of the piston.

Give your answer in standard form.

Give the unit.

[5 marks]

Surface area (in standard form) = _____ Unit _____

16

4.5.5.1.1 Pressure in a fluid 1

Question 05

June 2023 | 8463/2H | Original Q1

0 1 Infrared waves are transverse waves.

0 1 . 1 Complete the sentence.

[1 mark]

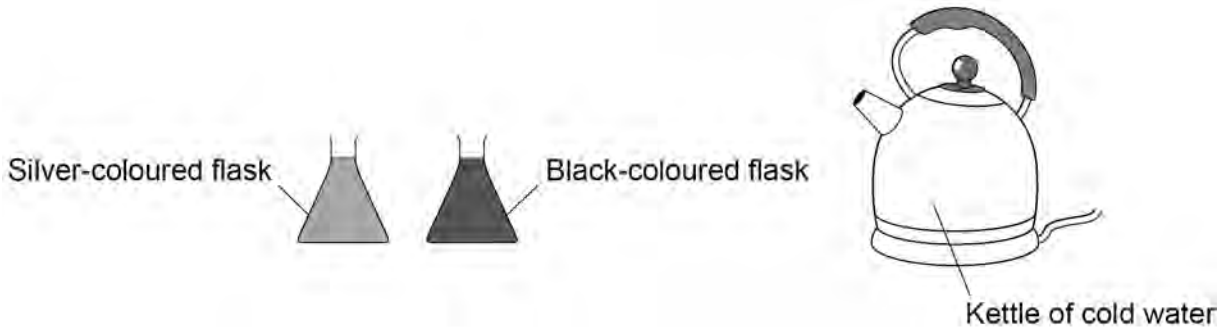
In a transverse wave, the direction of oscillation is _____

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



4.5.5.1.1 Pressure in a fluid 1

Question 05 · 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

4.5.5.1.1 Pressure in a fluid 1

Question 05 · 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 _____

_____

4.5.5.1.1 Pressure in a fluid 1

Question 05 · 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

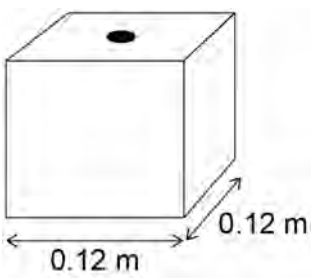
4.5.5.1.1 Pressure in a fluid 1

Question 05 · 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 = $\frac{\text{area}}{\text{force}}$ ☐

4.5.5.1.1 Pressure in a fluid 1

Question 05 · 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

4.5.5.1.1 Pressure in a fluid 1

Question 06

June 2025 | 8463/2H | Original Q8

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]

4.5.5.1.1 Pressure in a fluid 1

Question 06 · 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

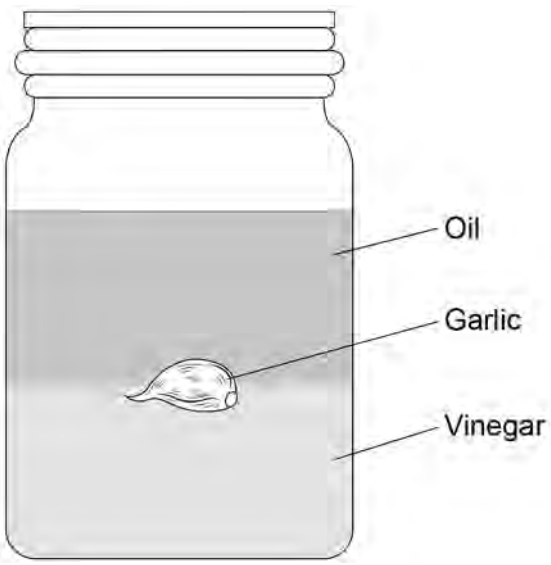
Question 8 continues on the next page

4.5.5.1.1 Pressure in a fluid 1

Question 06 · 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