AQA GCSE Physics | 8463

SPECIFICATION POINT 4.5.5.1.1

Pressure in a fluid 1

Mark schemes and examiner comments

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

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.5.5.1.1 Pressure in a fluid 1

Answer 01 · Mark scheme

June 2013 | PH3HP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)	liquids are (virtually) incompressible		1
4(b)	84	allow **1** mark for correct substitution, ie $1.5 \times 10^{6} = \frac{F}{5.6 \times 10^{-5}}$ numbers may not be written in standard form, ie $1\,500\,000 = \frac{F}{0.000\,056}$ allow **1** mark for an answer 216	2
4(c)	it (the force on the slave pistons) is greater / larger	accept force (at slave piston) = 216 (N)	1
	the area (touching the liquid) of the slave piston is greater than the area of the master piston	accept it has a bigger area just quoting numbers, eg the master piston is 5×10^{-5} and the slave piston is 14.4×10^{-5} is insufficient	1
Total			**5**

4.5.5.1.1 Pressure in a fluid 1

Answer 01 · Mark scheme

June 2013 | PH3HP | Original Q4 | Legacy

PH3HP

4.5.5.1.1 Pressure in a fluid 1

Answer 02 · Mark scheme

June 2015 | PH3HP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. ref.
7(a)(i)	the line of action of the weight (of the bus) lies / acts outside of the base (of the bus) there is a resultant moment (acting on the bus)	allow line of action through the centre of mass lies / acts outside the base	1 1	AO1 P3.2.2f
7(a)(ii)	in normal use the centre of mass may be in a different position **or** passengers on the bus may affect the position of the centre of mass for safety, buses should always be tested beyond the normal operating conditions / parameters	for safety is insufficient accept in case something unexpected happens	1 1	AO3 P3.2.2
7(b)(i)	a liquid is (virtually) incompressible	accept a liquid cannot be squashed a liquid is difficult to compress is insufficient	1	AO1 P3.2.3a

Question 7 continues on the next page . . .

4.5.5.1.1 Pressure in a fluid 1

Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. ref.
7(b)(ii)	84000	award **2** marks for $\frac{F}{0.28}=\frac{360}{0.0012}$ **or** $\frac{F}{0.28}=300\,000$ **or** award **1** mark for $P=\frac{360}{0.0012}$ **or** 300 000 (Pa) seen anywhere	3	AO2 P3.2.3b, c
Total			8	

4.5.5.1.1 Pressure in a fluid 1

Answer 02 · Mark scheme

June 2015 | PH3HP | Original Q7 | Legacy



4.5.5.1.1 Pressure in a fluid 1

Answer 03 · Mark scheme

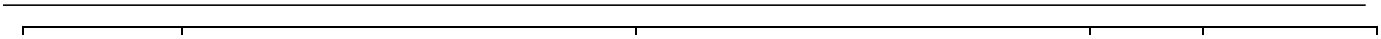
June 2017 | PH3HP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	(hydraulic fluid is) incompressible	accept virtually incompressible	1	AO1 3.2.3a
5(b)	2.1 × 10^5	accept 210 000 for **3** marks allow **1** mark for correct substitution ie 5.2 × 10^8 = F / 4.1 × 10^{-4} allow **2** marks for an answer of 213200 **or** one that rounds to 2.1 × 10^5	3	AO2 3.2.3c
5(c)	The force (at the tips) is less because the tips are further away (from the pivot than the piston)	 reason only scores if correct answer given	1 1	AO3 3.2.2e
5(d)	The moments are equal (in size) The moments are opposite (in direction)	 accept clockwise moment = anti-clockwise moment for **2** marks if no other mark gained allow **1** mark for the moments are balanced **or** there is no resultant moment	1 1	AO1 3.2.2c
Total			**8**	

4.5.5.1.1 Pressure in a fluid 1

Answer 03 · Mark scheme

June 2017 | PH3HP | Original Q5 | Legacy



4.5.5.1.1 Pressure in a fluid 1

Answer 04 · Mark scheme

November 2021 | 8463/2H | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO/ Spec. Ref
01.1	**Level 2:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.		3–4	AO1 4.5.6.3.3 4.5.6.3.4 4.1.1.2
	Level 1: Point are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.		1–2	
	No relevant content		0	
	Indicative content Factors • poor condition of tyres • poor road surface • wet or icy road • poor/worn brakes Explanation • because of decreased friction Factors • increased mass of car/passengers Explanation • increases kinetic energy of car • more work needs to be done to stop car • increases momentum of the car Factor • road slopes downhill Explanation • (a component of) gravity opposes the braking force • resultant (braking) force is reduced allow answers in terms of reducing braking distance throughout A single factor with no related explanation is insufficient to score a mark			

4.5.5.1.1 Pressure in a fluid 1

Answer 04 · Mark scheme

01.2	resultant force = mass × acceleration		1	AO1 4.5.6.2.2
01.3	7200 = 1600 × *a* $a = \frac{7200}{1600}$ *a* = 4.5 (m/s^2)	ignore negatives throughout	1 1 1	AO2 4.5.6.2.2
01.4	15 (m) 38 (m) = 53 (m)	two correct values identified allow the correct addition of a misread braking distance and /or a misread thinking distance taken from the graph	1 1	AO3 4.5.6.3.1
01.5	$p = \frac{F}{A}$		1	AO1 4.5.5.1.1
01.6	120 000 = $\frac{60}{A}$ $A = \frac{60}{120\,000}$ *A* = 0.0005 *A* = 5 (.0) × 10^{-4} m^2	allow an answer given to 2 sig figs from an incorrect calculation using the given data	1 1 1 1 1	AO2 AO2 AO2 AO2 AO1 4.5.5.1.1
Total			**16**	

4.5.5.1.1 Pressure in a fluid 1

Answer 05 · Mark scheme

June 2023 | 8463/2H | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	perpendicular		1	AO1 4.6.1.1

Question	Answers	Mark	AO / Spec. Ref.
01.2	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5-6	AO3
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3-4	AO1
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1-2	AO1
	No relevant content	0	
	Indicative content **Method:** • heat the water / kettle • add an equal volume of (hot) water to each flask • insert a thermometer into each flask • record the initial temperature from both flasks OR • place an IR detector near each flask • the distance between the IR detector and the flask should be the same each time • record initial reading from IR detectors • (and) start a stop clock • record the temperatures / readings after 10 minutes from both flasks • calculate the change in temperatures / readings during the 10 minutes • compare the results to test the hypothesis to access level 3 the method must allow the correct consideration of a temperature decrease for both flasks or the correct comparison of IR detected from both flasks		4.6.2.2

4.5.5.1.1 Pressure in a fluid 1

Answer 05 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	during the 1st minute there is the greatest temperature difference (between the hot water and the surroundings)	 allow highest temperature or hottest MP 2 dependent on scoring MP 1	1 1	AO2 AO1 4.6.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	the temperature (increase / change after 10 minutes)	allow the final temperature do not allow temperature decrease	1	AO1 4.6.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	black surfaces absorb more (infrared than white surfaces) matt surfaces absorb more (infrared) than shiny surfaces of the same colour	allow black surfaces have a greater temperature increase (than white surfaces) allow matt surfaces have a greater temperature increase than shiny surfaces of the same colour if no other marks scored, allow 1 mark for matt black surface is the best absorber and shiny white surface is the worst absorber if no other marks scored, allow 1 mark for matt black has the greatest temperature increase and shiny white has the smallest temperature increase	1 1	AO3 4.6.2.2 4.6.3.1

4.5.5.1.1 Pressure in a fluid 1

Answer 05 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	pressure = $\frac{\text{force}}{\text{area}}$		1	AO1 4.5.5.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	area of base = 0.0144 (m^2)	do not allow this or subsequent marks unless base area is used	1	AO2 4.5.5.1.1
	$1500 = \frac{F}{0.0144}$	this mark may be awarded if base area is incorrectly calculated	1	
	$F = 1500 \times 0.0144$	this mark may be awarded if base area is incorrectly calculated	1	
	$F = 21.6$ (N)	this mark may be awarded if base area is incorrectly calculated allow 22 (N)	1	

Total Question 1	**17**

4.5.5.1.1 Pressure in a fluid 1

Answer 06 · Mark scheme

June 2025 | 8463/2H | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	at right angles (to surfaces) **or** normal (to surfaces)		1	AO1 4.5.5.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	$774 = \frac{1.50}{A}$		1	AO2 4.5.5.1.1
	$A = \frac{1.50}{774}$		1	
	$A = 0.0019379\ldots$		1	
	0.00194 (m^2)	allow an answer calculated using all the data in the question given to three significant figures	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	pressure increases with depth	allow the vinegar has a greater density than the oil	1	AO3 4.5.5.1.2
	(so) the pressure on the bottom of the garlic (from the vinegar) is greater than the pressure on the top of the garlic (from the oil)		1	
	(therefore) the upwards force on the bottom is greater than the downwards force on the top		1	
	the resultant of these two forces is the upthrust	this mark is dependent on MP2 **or** MP3	1	

Total Question 8	9

4.5.5.1.1 Pressure in a fluid 1

Answer 04 · Examiner comments — November 2021 | 8463/2H | Original Q1

Question 1 (Common Question)
Part **01.1** asked students to explain factors and not simply list them. However, this is what many of the students did. Another common error was to explain factors affecting thinking distance rather than as asked, braking distance. The required equations were well known and the calculation required to answer **01.3** was often given correctly. Reading values from a graph proved difficult with only about half of the students answering **01.4** correctly.Less than 50% of the students scored full marks in part **01.6**. Generally only those students completing the calculation correctly scored the unit mark. However many of the students did score the mark for correctly giving a calculated incorrect numerical answer in standard form.

Answer 05 · Examiner comments — June 2023 | 8463/2H | Original Q1

01.1

72% scored a mark on this question. The most frequent incorrect response was ‘parallel’.

01.2

Most responses were levels 1 and 2. Many failed to gain marks because they did not think it was necessary to explain the need for additional equipment. Very few students explained the need to calculate the temperature change or to compare the readings on infrared detectors, which was a requirement to get into level 3. A number of students suggested using cold water, or even described a different practical. Students were not penalised for using tiny volumes of water, but it is clear that students have no concept of how much 50 ml is, for example. There was a lot of confusion relating to use of infra red detectors and what they measured.
Many students stated they would take readings every minute, and lots suggested repeating to get averages, or producing graphs. This was not required by the question.
There were some pleasing summaries referring to the evidence and the hypothesis.

01.3

80 % of students scored the first mark, but only 47% scored both marks. Some students simply reworded the stem. There was a small amount of confusion with radioactivity, because of the use of the word radiation, and a number who seemed to think a chemical reaction was taking place.

01.4

A majority of students gained this mark, but there seemed to be some confusion as to what is meant by the dependent variable.

01.5

The most common response related to the matt black surface and the shiny white surface. This was awarded 1 mark. Some did mention that black was the best absorber but failed to adequately describe the relative absorbance of matt versus shiny surfaces, as they did not explain this only applied for the same colour surface. In addition, some gave their response in terms of emission or reflection of IR radiation, both of which scored zero. Only 3% of students successfully gave both conclusions.

01.6

99% of students identified the equation for calculating pressure.

4.5.5.1.1 Pressure in a fluid 1

Answer 05 · Examiner comments June 2023 | 8463/2H | Original Q1

01.7

78% of students scored all 4 marks for this calculation. Some scored zero, as they calculated the total surface area, the volume or used the length of the cube.

Answer 06 · Examiner comments June 2025 | 8463/2H | Original Q8

8.1

Student responses for this question were poor. 'Outwards' was a very common and insufficient response to this question. Some students added arrows to the diagram to support their answer, but this was not seen regularly and was often done without care.

8.2

Overall, this question was well answered by about three quarters of the students. Many gave the correct answer to 3 significant figures. Some students did not write down their working or did not write down the value before they rounded it. Some students counted the zeros as significant figures or truncated their answer.

Answer 06 · Examiner comments June 2025 | 8463/2H | Original Q8

8.3

This question was aimed at the most able students and was challenging. This was reflected in the responses. Very few of the students scored all the available marks, but approximately 40 % scored at least one mark. Most were able to compare the densities of the two liquids. The biggest issue was that students tried to explain why the garlic was floating in terms of balanced forces, which didn't answer the question.