OCR GCSE GATEWAY PHYSICS A · J249

PHYSICS



EXAM QUESTION PACK

P1.3 PRESSURE

SCORE	PERCENTAGE
/52	%

STEMUP

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Gateway Physics A (9-1)

Pressure

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:
Additional resources may be supplied with this paper.

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: Not set

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

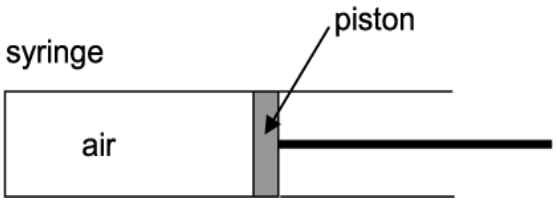
- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **52**.
- The total number of marks may take into account some 'either/or' question choices.

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1 A syringe contains air.



The piston is pushed inwards.

How do the pressure and volume of the air in the syringe change?

	Pressure	Volume
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

Your answer ☐

[1]

2 A sealed can contains gas.

The can is heated and the pressure of the gas increases.

How do the gas particles cause this increase in pressure?

A Their average distance apart increases.
B They expand.
C They hit each other more frequently.
D They hit the can more frequently.

Your answer ☐

[1]

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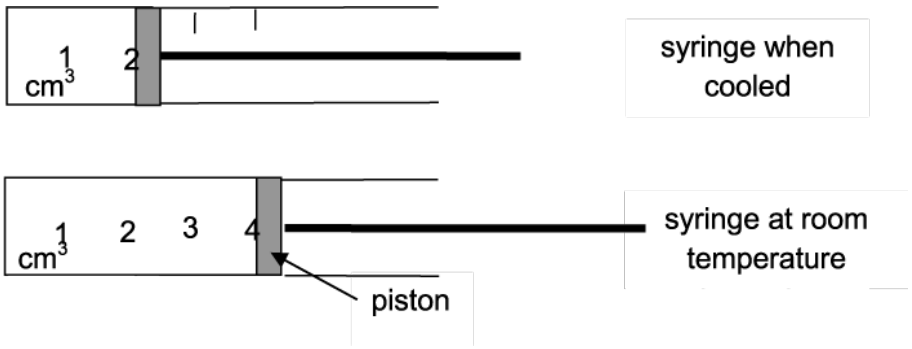
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3 A graduated syringe contains air.

It is put in a freezer to cool it down.

When it is removed from the freezer the piston has moved inwards.



The density of the air in the syringe when cooled is 2.4 kg/m^3.

What was the density of the air at room temperature?

A 0.6 kg/m^3
B 1.2 kg/m^3
C 2.4 kg/m^3
D 4.8 kg/m^3

Your answer ☐

[1]

4(a) A depth of 10 m of water exerts the same amount of pressure as the entire Earth's atmosphere which is ~ 120 km thick.

Suggest why.

---

[1]

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(b) A diver takes some pressure readings.

Their results are in the table below.

Depth of water (m)	Pressure (standard units)
0	1
10	2
20	3
30	4
40	5
50	6

Use the data to describe the relationship between the depth of water and pressure.

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[2]

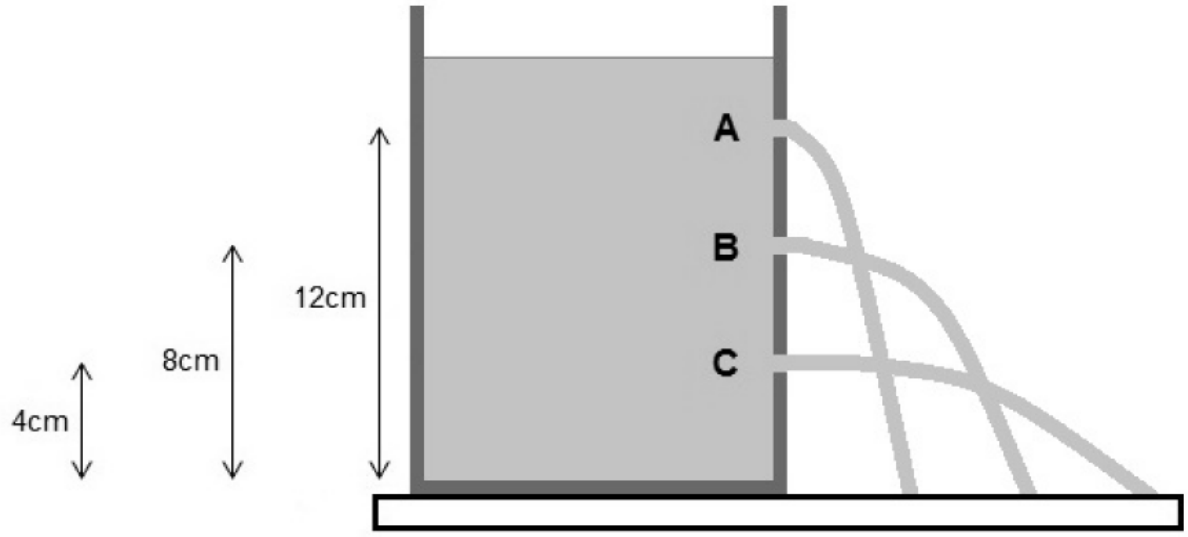
(c) Suggest why there is pressure at 0 metres.

---

[1]

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(d) A container of vegetable oil has 3 holes in it.



The vegetable oil has a density of 9.1×10^2 kg/m^3.

Calculate the change in pressure from **A** to **B**.

Show your working and give your answer to **2** significant figures.

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answer: _____ Pa

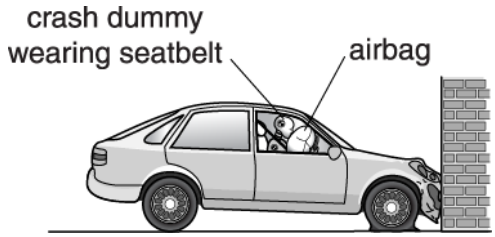
[4]

5 Scientists check the safety of cars by doing crash tests with crash dummies.

They use sensors to make measurements.

They put the sensors in the car and on the crash dummy.

Look at the diagram of a car crashing into a wall.



When the car hits the wall, a sensor triggers the fast release of a large amount of gas into the airbag.

The gas particles cause the airbag to inflate.

Explain, using ideas about momentum, how the gas particles create enough force to increase the pressure in the airbag.

--- [2]

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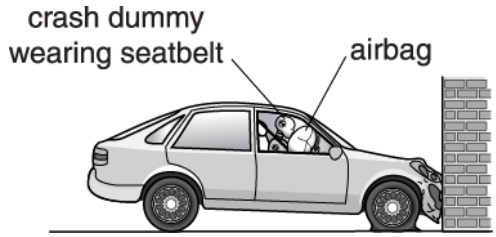
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6(a) Scientists check the safety of cars by doing crash tests with crash dummies.

They use sensors to make measurements.

They put the sensors in the car and on the crash dummy.

Look at the diagram of a car crashing into a wall.



The crash dummy wears a seatbelt.

Just after the crash the dummy moves forward. A force then acts on the dummy.

What produces this force and what does the force do to the dummy's motion?

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[1]

(b) On impact the airbag quickly inflates with gas.

Explain how the gas particles produce a pressure to inflate the airbag.

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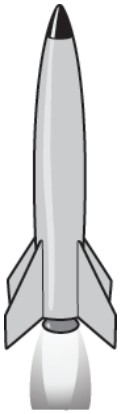
[2]

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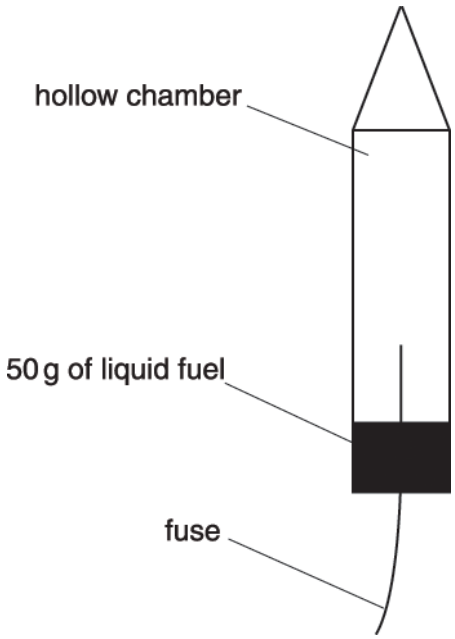
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7(a) Rockets use hot gases to make them move.



Look at the diagram of a simple rocket.



Denise lights the fuse of the rocket. The 50 g of fuel in the rocket ignites.

A very fast chemical reaction takes place which creates a large amount of hot gas.

The gas fills the hollow chamber.

The hot gas produces a high pressure inside the rocket.

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Explain how the particles in the hot gas produce a high pressure in the rocket, making it move.

---

[2]

(b) Denise re-launches the same rocket.

This time, the rocket contains 100 g of the same type of fuel.

The rocket lifts off and reaches a greater height than before.

Suggest why using more fuel produces a greater force and acceleration on the rocket.

---

[1]

8 These statements are about pressure and volume of a gas.

Which statement is correct?

A Volume doubles, pressure doubles

B Volume doubles, pressure halves

C Volume halves, pressure halves

D Volume halves, pressure stays constant

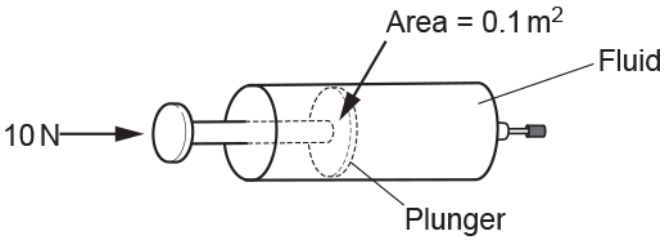
Your answer [ ] [1]

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9 A student tries to compress the fluid in a sealed syringe with a force of 10 N.



The area of the end of the syringe is 0.1 m^2.

(i) Calculate the pressure in the fluid.

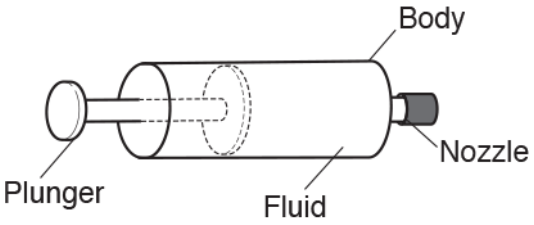
Answer = ... Pa **[3]**

(ii) Write down the direction of the force produced by the fluid on the plunger.

---------- **[1]**

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10 A fluid is compressed by pushing the plunger into the body of a sealed syringe.



Which of these statements is true?

A There is a net force towards the plunger.

B There is no force towards the nozzle.

C There is a force parallel to all points on the surface of the fluid.

D There is a force at 90° to all points on the surface of the fluid.

Your answer ☐ [1]

11 *The Earth contains a crust, mantle and core as shown in **Fig. 22.1**.

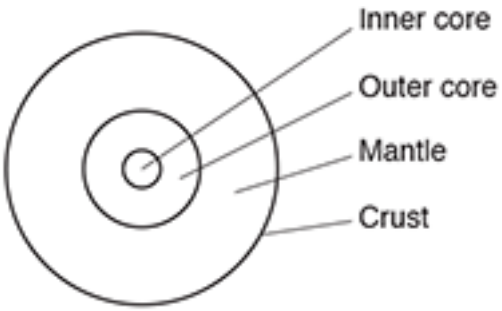


Fig. 22.1

Table 22.1 gives some data about seismic waves and the Earth.

	Density (g / cm^3)	P wave speed (km / s)	S wave speed (km / s)
Top of crust	2.2	5.55	3.25
Top of mantle	3.4	7.97	4.55
Top of outer core	9.9	8.10	-
Bottom of outer core	12.2	10.30	-

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Table 22.1

Describe what information the data in **Table 22.1** gives about the structure of the Earth.

In your answer you should explain any trends in the data in **Table 22.1**.

[6]

12 Which factor influences whether an object floats or sinks?

A Size of object

B Depth of water

C Distance from the shore

D Density of object

Your answer [ ] [1]

13(a) A student investigates four gases.

Look at her data.

Gas	Pressure (Pa)	Volume (m^3)
A	5	0.5
B	10	0.4
C	20	0.2
D	40	0.2

Two readings are for the same mass of the same gas at a constant temperature.

Which two readings are for the **same mass** of the **same gas** at a constant temperature?

Use calculations in your answer.

[3]

(b) The student investigates another gas at **constant volume.**

Explain, using ideas about particles, how temperature affects gas pressure.

[3]

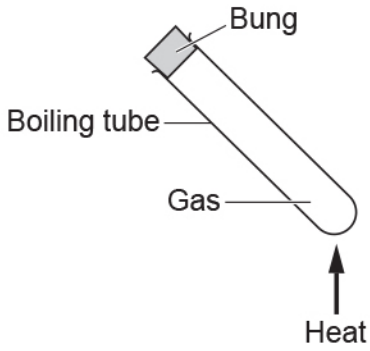
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(c) Calculate the pressure at the bottom of a 0.5 m tall measuring cylinder filled with a liquid.

Density of the liquid = 1100 kg / m^3.

Pressure = ... Pa **[3]**

14 A sealed boiling tube contains gas.



The boiling tube is heated.

What happens?

A The particles in the gas evaporate.

B The particles in the gas expand.

C The particles in the gas move faster.

D The particles in the gas move slower.

Your answer ☐ **[1]**

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15 A cylinder contains a gas.

The volume of the gas is halved and the temperature remains the same.

What happens to the pressure of the gas?

A It remains the same.

B It halves.

C It doubles.

D It quadruples.

Your answer [1]

16 Which statement explains why atmospheric pressure changes as you climb up a mountain?

A Number of air molecules above you decrease the further you move from the centre of the Earth.
B Density of air increases the further you move from the centre of the Earth.
C Gravity increases the further you move from the centre of the Earth.
D Temperature decreases the further you move from the centre of the Earth.

Your answer [1]

17 What is the change in pressure when a diver moves from a depth of 3.0 m to a depth of 8.0 m?

Assume gravitational field strength on Earth = 10 N / kg and water density = 1000 kg / m^3.

Use an equation from the data sheet to help you.

A 30 000 Pa
B 50 000 Pa
C 80 000 Pa
D 110 000 Pa

Your answer [1]

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18 A boat can be made out of concrete.
Explain why a concrete boat floats but a lump of concrete sinks.

---

[3]

19(a) Complete the sentences to explain how volume and pressure are related.

Use words from the list.

You can use each word once, more than once, or not at all.

doubled **halved** **the same**

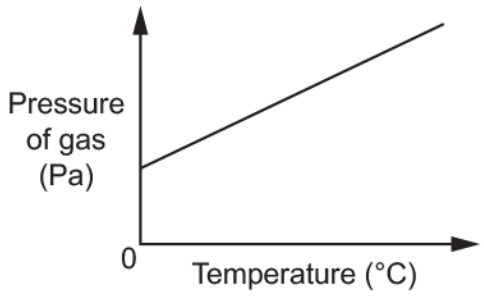
If the volume of a gas is halved, the number of collisions per second between the gas

particles and the container is ..... .

The pressure is ..... .

[2]

(b) A student investigates how temperature and pressure of a gas are linked. The student measures the pressure of a gas as its temperature increases. The results are plotted on a graph.



Explain how temperature and pressure are linked.

Use the graph to support your answer.

[2]

END OF QUESTION PAPER

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