ST MARY'S SCIENCE DEPARTMENT:

PHYSICS

F

GCSE PHYSICS **HOMEWORK BOOK**
TOPIC 4: PARTICLE MODEL OF MATTER
STUDENT BOOK

YOU MUST ANSWER ALL THREE SECTIONS IN EACH PART OF THE HOMEWORK TASKS

NAME	
CLASS	
TEACHER	
FORM	

TASK	MARK	GRADE
1		
2		
3		
4		
OVERALL		

GCSE PHYSICS

YEAR 10

TOPIC 1

HOMEWORK SCHEDULE

Please use the following table to ensure each homework task is completed and submitted on time.

Carrying out these homework tasks can only increase your ability to gain a high grade in the GCSE examinations.

Failure to hand in work on time will lead to sanctions to complete this work.

Task	Submission Date	Completed?	On Time?
Task 1 Density			
Task 2 Internal Energy			
Task 3 Latent Heat			
Task 4 Gases			

SCIENCE DEPARTMENT MARKING CODE

ID = Insufficient detail in answer
W = Wrong understanding of science.
IR = Irrelevant information given.
V = This is too vague to get a mark.
AQ = Answer the question asked
R = Read the question/information
M = Maths mistake
BOD = Benefit of the doubt given.
E = Explain the answer further please.
U = Wrong units used.
SF = Wrong significant figures used.
SP = Wrong spelling of a technical term
SR = Same reason given twice.
A circle means this lost you marks
An underline means this gained you marks

IMPORTANT NOTE

All sections in each task must be **FULLY ATTEMPTED.**

If students fail to achieve an acceptable mark on each task, they will be made to carry out supervised intervention the following week.

Each week, intervention sessions will be provided to help assist with answering the questions in the homework booklet if students are struggling with the difficulty of the problems.

PLEASE READ

This homework booklet has made with custom selected examination questions and activities to assess your understanding in the concepts covered in class. This will increase your familiarity with the style of examination questions.

Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

Thank you for your hard work in completing this book, and good luck.

Mr. Turnbull

TASK 1: DENSITY

SPEC CHECK

Content	Achieved?
The density of a material is defined by the equation: density = mass / volume ρ = m/ V density, ρ, in kilograms per metre cubed, kg/m^3 mass, m, in kilograms, kg volume, V, in metres cubed, m^3	
The particle model can be used to explain • The different states of matter. • Differences in density.	
You should be able to recall and apply this equation to changes where mass is conserved.	
You should be able to recognise/draw simple diagrams to model the difference between solids, liquids and gases.	
You should be able to explain the differences in density between the different states of matter in terms of the arrangement of atoms or molecules.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

SECTION A

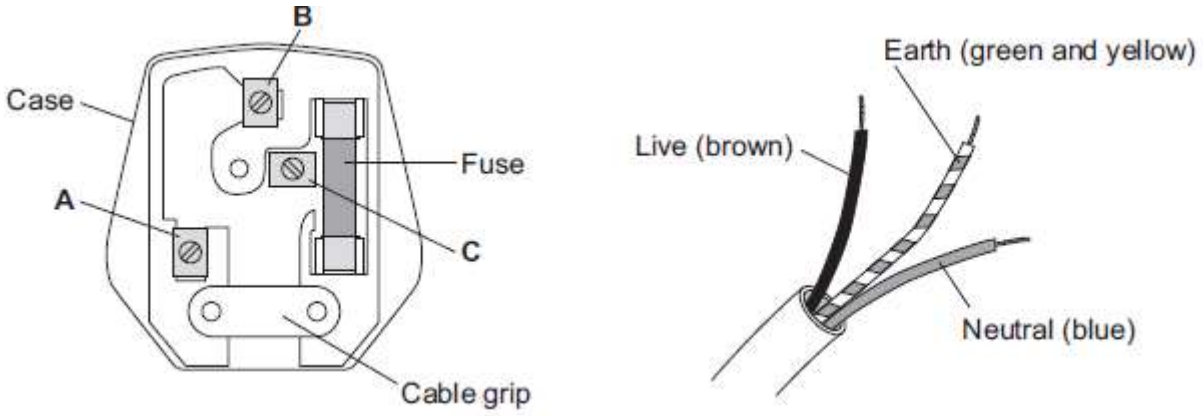
This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Figure 1 shows the inside of a three-pin plug and a length of three-core cable.

The cable is to be connected to the plug.

Figure 1



1.1 Complete **Table 1** to show which plug terminal, **A**, **B** or **C**, connects to each of the wires inside the cable.

[2 marks]

Table 1

Wire	**Plug terminal**
Live	
Neutral	
Earth	

1.2 Name a material that could be used to make the case of the plug.

[1 mark]

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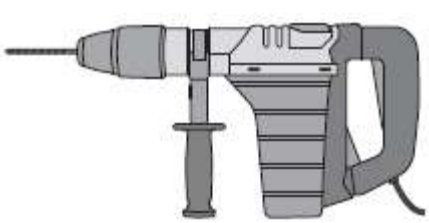
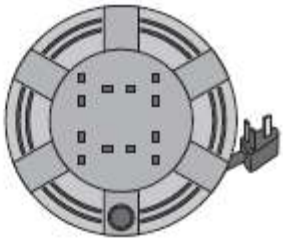
Figure 2 shows an electric drill and an extension lead. The drill is used with the extension lead.

Figure 2



Electric drill



Extension lead

1.3 The drill is used for 50 seconds.

In this time, 30 000 joules of energy are transferred from the mains electricity supply to the drill.

Calculate the power of the drill.

[2 marks]

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Power = _____ W

1.4 A second drill is used with the extension lead. The power of this drill is 1200 W.

The instructions for using the extension lead include the following information.

When in use the lead may get hot:

DO NOT go over the maximum power
- lead wound inside the case: 820 watts
- lead fully unwound outside the case: 3100 watts

It would **not** be safe to use this drill with the extension lead if the lead was left wound inside the plastic case.

Explain why.

[3 marks]

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1.5 Table 2 gives information about three different electric drills.

Table 2

Drill	Power input in watts	Power output in watts
X	640	500
Y	710	500
Z	800	500

A person is going to buy **one** of the drills, **X**, **Y** or **Z**. The drills cost the same to buy.

Use only the information in the table to decide which **one** of the drills, **X**, **Y** or **Z**, the person should buy.

Write your answer in the box. ☐

Give a reason for your answer.

[1 mark]

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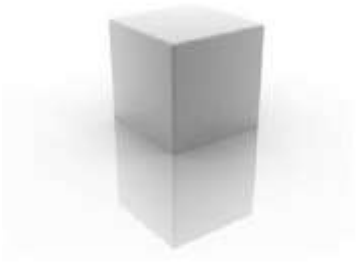
SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1.1 A student wants to calculate the density of the two objects shown in the figure below.



Metal cube

Small statue

Describe the methods that the student should use to calculate the densities of the two objects.

[6 marks]

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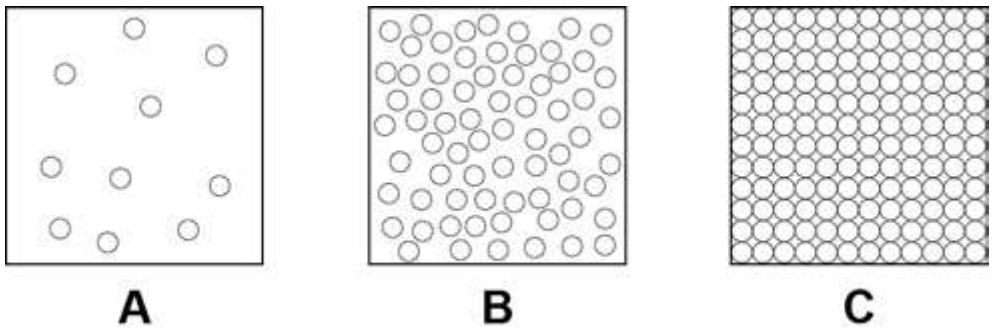
SECTION C
This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. Figure 6 shows a simple model of the three states of matter.

Figure 6



1.1 What is the correct equation to work out the density of a material?

[1 mark]

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1.2 A student explains density to his teacher using the particle model in **Figure 6.**

His teacher says there are limitations to the model.

Give two limitations of the particle model in **Figure 6.**

[2 marks]

Limitation **1**

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Limitation **2**

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1.3 When the gas in a container with a fixed volume is heated, the pressure increases as the temperature increases.

Explain why the pressure increases.

Use the model in **Figure 6** to help you.

[4 marks]

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FEEDBACK SHEET

Overall Mark:	**/22**	**GRADE ACHIEVED:**	
Section A :	/9	**5** ☐	**1** ☐
Section B :	/6	**4** ☐	**U** ☐
Section C :	/7	**3** ☐	
		2 ☐	

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision. ☐ Complete outstanding work. ☐ Make corrections as indicated by the teacher. ☐ Attend intervention for this topic ☐ Include more information in responses. ☐ Include more key words in responses. ☐ Attend departmental revision sessions. ☐ Read the questions carefully. ☐ Explain your answers in more detail. ☐ Carry out revision on Seneca Learning.	☐ Revise the equations. ☐ Check the units on answers. ☐ Check the correct amount of sig figs on answers. ☐ Check to convert values correctly. ☐ Show your full working out. ☐ Check your calculations. ☐ Revise the science investigative skills. ☐ Revise the key concepts of the topics. ☐ Thoroughly check your work for mistakes. Other:

Student response

TASK 2: INTERNAL ENERGY

SPEC CHECK

Content	Achieved?
Students should be able to describe how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved.	
Changes of state are physical changes which differ from chemical changes because the material recovers its original properties if the change is reversed.	
Energy is stored inside a system by the particles (atoms and molecules) that make up the system. This is called internal energy.	
Internal energy is the total kinetic energy and potential energy of all the particles (atoms and molecules) that make up a system.	
Heating changes the energy stored within the system by increasing the energy of the particles that make up the system. This either raises the temperature of the system or produces a change of state.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

SECTION A

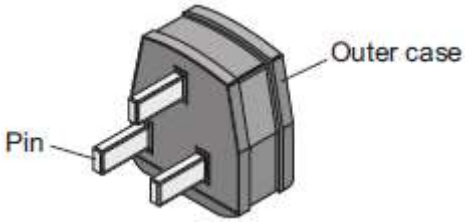
This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. A washing machine is connected to the mains electricity supply using a cable and three-pin plug.

Figure 1 shows a three-pin plug.

Figure 1



1.1 Name the materials used in the structure of a plug. Give the reason why each material is used.

[1 mark]

Pin

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.....

Outer case

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The three-pin plug contains a fuse. The fuse is connected to one of the wires inside the cable.

1.2 Which **one** of the wires inside the cable is the fuse connected to?

[1 mark]

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1.3 The fuse is a thin wire inside a closed glass tube. The wire acts as a resistor.

What effect does a current through a wire have on the wire?

[1 mark]

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1.4 The power of the washing machine varies between 0.7 kW and 2 kW depending on which part of the wash cycle is operating.

Calculate the maximum current drawn from the mains electricity supply by the washing machine.

The mains electricity supply is at a potential difference of 230 V.

[2 marks]

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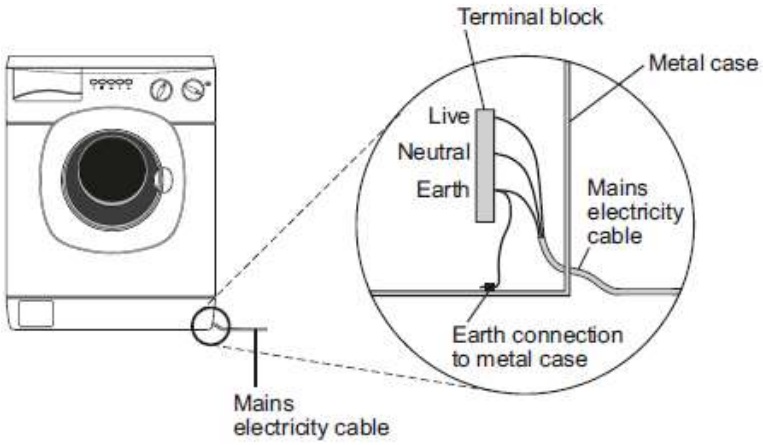
Current = _____ A

1.5 Figure 2 shows how the mains electricity cable is connected to the washing machine.

The earth wire is connected to the metal case of the washing machine.

Figure 2



If a fault makes the metal case live, the earth wire and fuse inside the plug prevent the mains cable from overheating and causing a fire.

Explain how.

[2 marks]

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1.6 New research has shown that many people underestimate the hazards of using mains electricity.

It is important that people do understand the hazards of using mains electricity.

Suggest why.

[1 mark]

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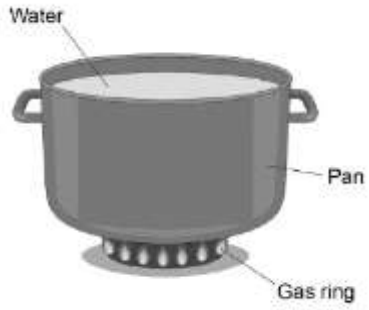
SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Figure 5 shows a pan of water on a gas ring.

Figure 5



1.1 What is meant by the internal energy of the water?

[1 mark]

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1.2 The water is heated until it boils.

The temperature remains constant at boiling point.

Explain the effect on:

The internal energy of the water

The movement of water molecules.

[3 marks]

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1.3 The energy transferred to the water is 302.4 kJ.

The temperature of the water increased from 20 °C to 100 °C.

Specific heat capacity of water = 4 200 J/kg °C.

Calculate the mass of the water in the pan.

Use the correct equation from the Physics Equation sheet.

[3 marks]

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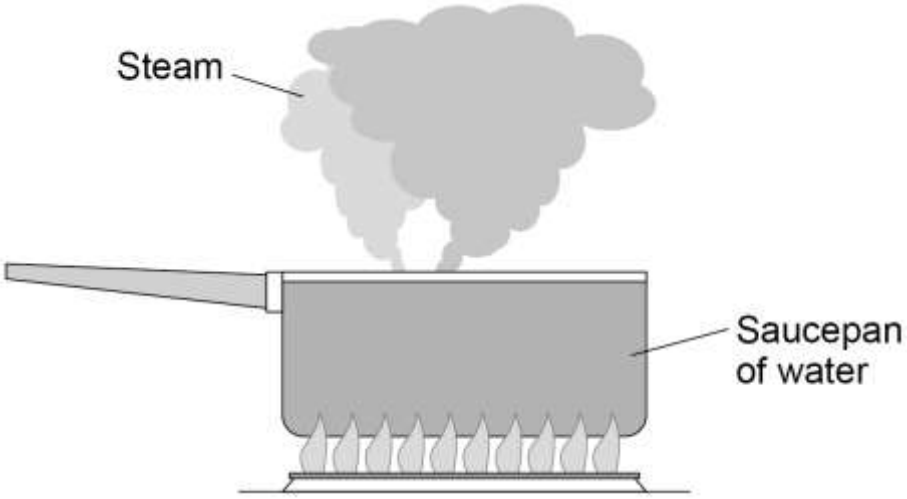
Mass = ... kg

SECTION C
This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. Figure 1 shows water being heated. Eventually the water changed into steam.

Figure 1



1.1 Complete the sentences.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

[2 marks]

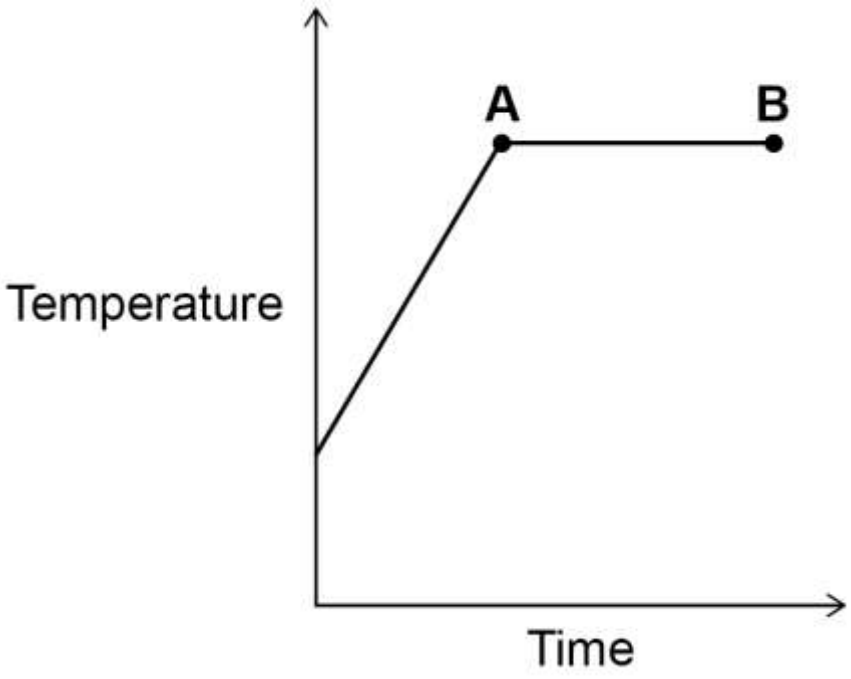
greater than	**less than**	**the same as**

The distance between the particles in steam is …… the distance between the particles in liquid water.

The density of steam is …… the density of liquid water.

Figure 2 shows how the temperature of the water varied with time.

Figure 2



1.2 What is the name of the process that is taking place between points **A** and **B**?

Give a reason for your answer.

[2 marks]

Process .....

Reason

.....

.....

1.3 A mass of 0.063 kg of water was turned into steam.

The specific latent heat of vaporisation of water is 2 260 000 J/kg

Calculate the thermal energy transferred to the water to turn it into steam.

Use the equation:

thermal energy for a change of state = mass × specific latent heat

[2 marks]

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Energy = ... J

1.4 The mass of the steam was 0.063 kg

The volume of the steam was 0.105 m3

Calculate the density of steam.

Use the equation:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Choose the unit from the box.

[3 marks]

kg	**m^3 / kg**	**kg / m^3**

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Density = ... Unit = ...

FEEDBACK SHEET

Overall Mark:	**/25**	**GRADE ACHIEVED:**	
Section A :	/9	**5** ☐	**1** ☐
Section B :	/7	**4** ☐	**U** ☐
Section C :	/9	**3** ☐	
		2 ☐	

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

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Student response

TASK 3: LATENT HEAT

SPEC CHECK

Content	Achieved?
The specific latent heat of a substance is the amount of energy required to change the state of one kilogram of the substance with no change in temperature.	
energy for a change of state = mass × specific latent heat E = m L energy, E, in joules, J mass, m, in kilograms, kg specific latent heat, L, in joules per kilogram, J/kg	
Specific latent heat of fusion – change of state from solid to liquid Specific latent heat of vaporisation – change of state from liquid to vapour	
Students should be able to perform an experiment to measure the latent heat of fusion of water.	
Students should be able to interpret heating and cooling graphs that include changes of state.	
Students should be able to distinguish between specific heat capacity and specific latent heat.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

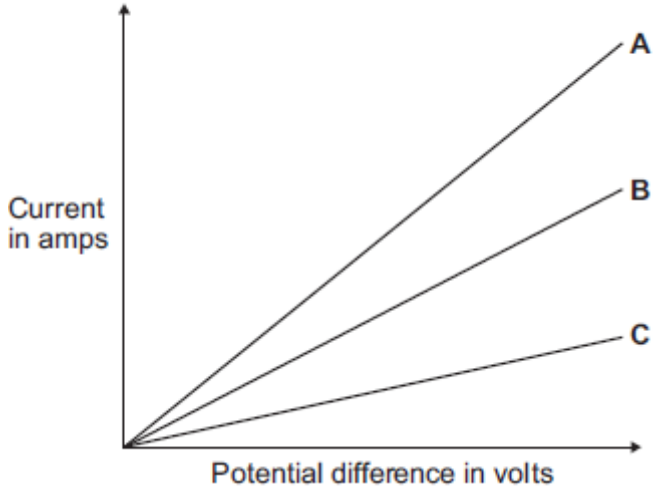
SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Figure 1 shows the current–potential difference graph for three wires, **A**, **B** and **C**.

Figure 1



1.1 Using **Figure 1**, how can you tell that the temperature of each wire is constant?

[1 mark]

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1.2 Which **one** of the wires, **A**, **B** or **C**, has the greatest resistance?

Write the correct answer in the box. ☐

Give a reason for your answer.

[2 marks]

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A student measured the resistance of four wires.

The table below shows the resistance of, and other data about, each of the four wires, **J**, **K**, **L** and **M**.

Wire	Type of metal	Length in cm	Diameter in mm	Resistance in .....
J	copper	50	0.17	0.36
K	copper	50	0.30	0.12
L	copper	100	0.30	0.24
M	constantan	100	0.30	7.00

1.3 The last column of the table should include the unit of resistance.

What is the unit of resistance?

[1 mark]

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.....

1.4 The resistance of a wire depends on many factors.

Look at the table. Which **two** wires from **J**, **K**, **L** and **M** show that the resistance of a wire depends on the **length** of the wire?

Wire ☐ and wire ☐

Give a reason for your answer.

[2 marks]

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1.5 A student looked at the data in the table and wrote this conclusion:

'The resistance of a wire depends on the type of metal from which the wire is made.'

The student could **not** be certain that her conclusion is true for **all** types of metal.

Suggest what extra data is needed for the student to be more certain that the conclusion is correct

[1 mark]

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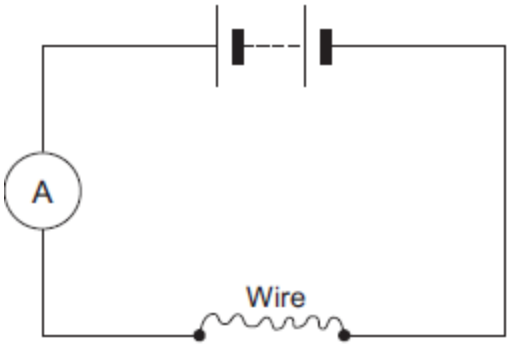
The resistance of a wire can be calculated using the readings from an ammeter and a voltmeter.

1.6 Complete **Figure 2** by drawing a voltmeter in the correct position in the circuit. Use the correct circuit symbol for a voltmeter.

[1 mark]

Figure 2



1.7 In a circuit diagram, a wire can be represented by the symbol for a resistor.

In the box below, draw the circuit symbol for a resistor.

[1 mark]

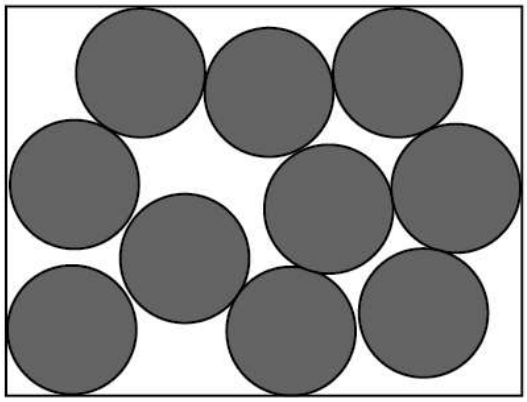
SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Figure 3 shows a model of the particles in a liquid.

Figure 3



1.1 Give **one** similarity and **one** difference you would see in **Figure 3** if it showed the same substance as a gas.

[2 marks]

Similarity

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Difference

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1.2 Describe **two** limitations of the model shown in **Figure 3**.

[2 marks]

Limitation **1**

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Limitation **2**

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1.3 Explain why substances have different melting points.

[2 marks]

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1.4 Some fire extinguishers contain liquid carbon dioxide.

Suggest how carbon dioxide gas can be changed to liquid carbon dioxide without reducing its temperature.

[1 mark]

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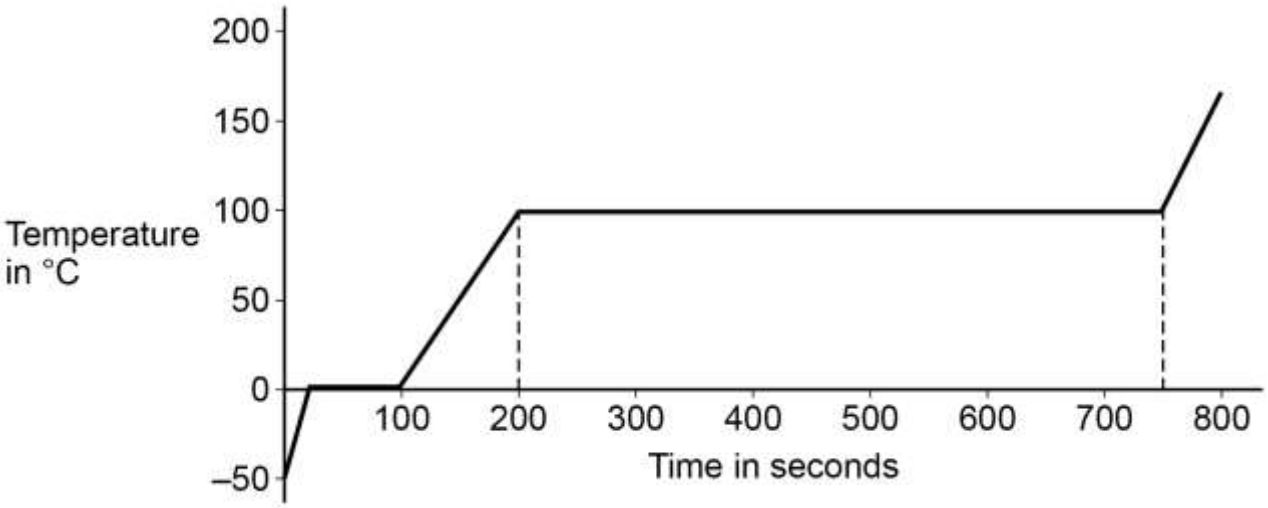
Ice was heated at a constant rate.

Eventually all the ice changed to a gas.

Figure 4 shows how the temperature changed over 800 seconds.

Figure 4



1.5 What change of state occurs between 200 seconds and 750 seconds?

[1 mark]

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1.6 Explain how **Figure 4** shows that the specific latent heat of vaporisation is greater than the specific latent heat of fusion.

Use data from **Figure 4**.

[2 marks]

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1.7 1695 kJ of energy is transferred to water at 100 °C

The specific latent heat of vaporisation of water is 2.260×10^6 J / kg

Calculate the mass of water changed into a gas at 100 °C

Use the Physics Equations Sheet.

[3 marks]

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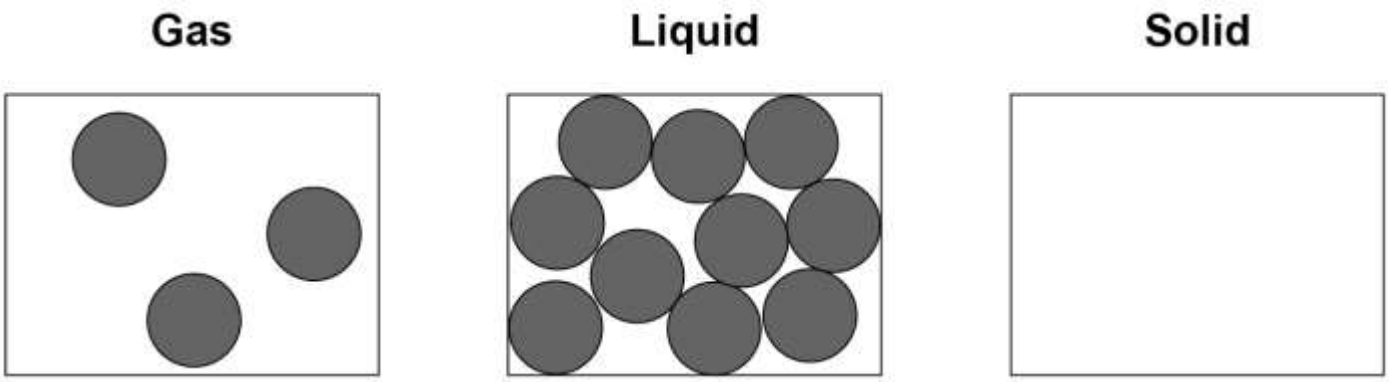
Mass of Water = ... kg

SECTION C
This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. Figure 4 shows a model of the particles in a gas and in a liquid.

Figure 4



1.1 Complete **Figure 4** to show the arrangement of particles of the same substance as a solid.

[2 marks]

1.2 What is the name of the process when a substance changes from a gas to a liquid?

[1 mark]

Tick **one** box.

- Condensing ☐
- Evaporating ☐
- Freezing ☐
- Melting ☐

1.3 The substance in **Figure 4** has a:

Melting point of 98 °C

Boiling point of 883 °C

What is the state of the substance at 20 °C?

[1 mark]

Tick **one** box.

- Gas ☐
- Liquid ☐
- Solid ☐

1.4 What type of change is a change of state?

[1 mark]

Tick **one** box.

- Chemical ☐
- Kinetic ☐
- Permanent ☐
- Physical ☐

1.5 Which two statements are correct about the particles when a liquid turns into a gas?

[2 marks]

Tick **two** boxes.

- Particles are bigger ☐
- Particles are lighter ☐
- Particles have more chemical energy ☐
- Particles have more kinetic energy ☐
- Particles move faster ☐

1.6 Which two quantities are needed to calculate the energy required to turn a liquid into a gas with no change in temperature?

You may use the Physics Equations Sheet.

[2 marks]

Tick **two** boxes.

- Mass of the liquid ☐
- Specific heat capacity of the gas ☐
- Specific latent heat of vaporisation ☐
- Time the liquid is heated ☐

1.7 A mass of 2.0 kg of water is heated.

The temperature increase of the water is 80 °C

The specific heat capacity of water is 4200 J / kg °C

Calculate the change in thermal energy when the water is heated.

Use the equation:

change in thermal energy = mass x specific heat capacity x temperature change

[2 marks]

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Change in Thermal Energy = ... J

FEEDBACK SHEET

Overall Mark:	**/33**	**GRADE ACHIEVED:**	
Section A :	/9	**5** ☐	**1** ☐
Section B :	/13	**4** ☐	**U** ☐
Section C :	/11	**3** ☐	
		2 ☐	

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Applications of Concepts ☐ Quality of Written Communication ☐ Mathematical Skills ☐ Working Scientifically ☐ Experimental Technique ☐ Answering Examination Questions ☐ Previous Topics ☐ Analytical Skills ☐ Problem Solving **Others** (Topic Specific)
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Applications of Concepts ☐ Quality of Written Communication ☐ Mathematical Skills ☐ Working Scientifically ☐ Experimental Technique ☐ Answering Examination Questions ☐ Previous Topics ☐ Analytical Skills ☐ Problem Solving **Others** (Topic Specific)

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 4: GASES

SPEC CHECK

Content	Achieved?
The molecules of a gas are in constant random motion. The temperature of the gas is related to the average kinetic energy of the molecules.	
Changing the temperature of a gas, held at constant volume, changes the pressure exerted by the gas.	
Students should be able to: • Explain how the motion of the molecules in a gas is related to both its temperature and its pressure	
Students should be able to: • Explain qualitatively the relation between the temperature of a gas and its pressure at constant volume.	
A gas can be compressed or expanded by pressure changes. The pressure produces a net force at right angles to the wall of the gas container (or any surface).	
Students should be able to use the particle model to explain how increasing the volume in which a gas is contained, at constant temperature, can lead to a decrease in pressure	
For a fixed mass of gas held at a constant temperature: pressure × volume = constant p V = constant pressure, p, in pascals, Pa volume, V, in metres cubed, m^3	
Students should be able to calculate the change in the pressure of a gas or the volume of a gas (a fixed mass held at constant temperature) when either the pressure or volume is increased or decreased.	
Work is the transfer of energy by a force.	
Doing work on a gas increases the internal energy of the gas and can cause an increase in the temperature of the gas.	
Students should be able to explain how, in a given situation e.g. a bicycle pump, doing work on an enclosed gas leads to an increase in the temperature of the gas.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

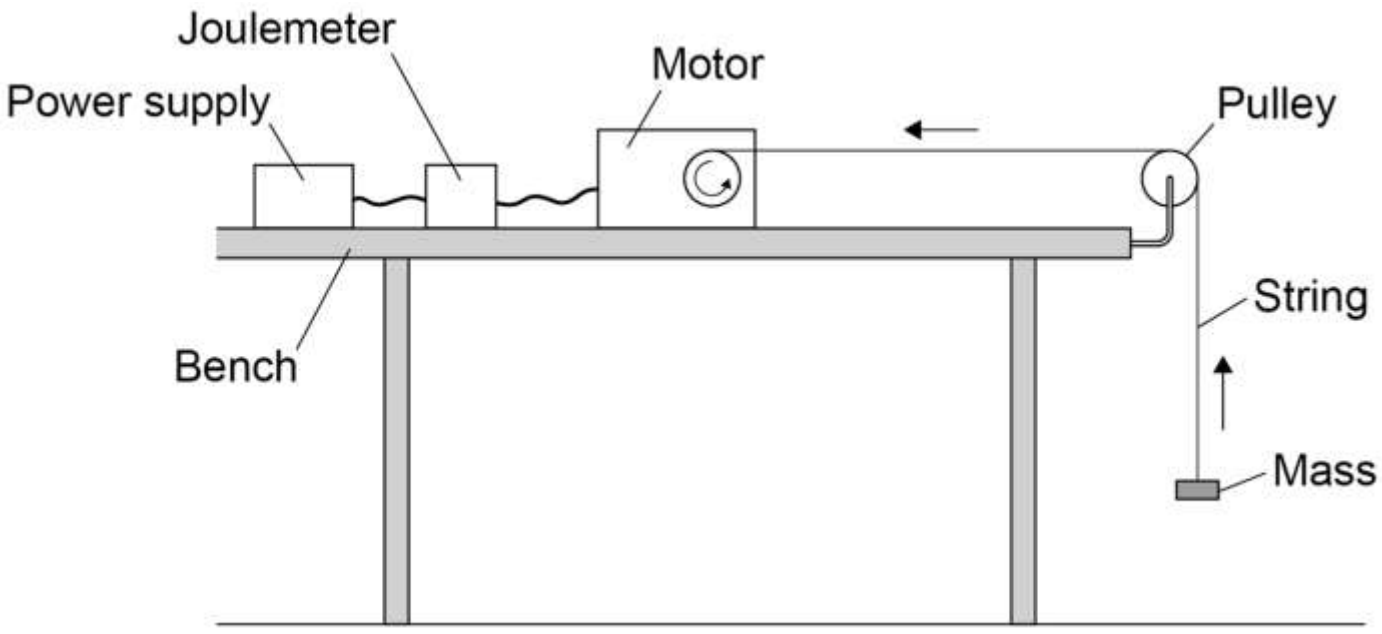
This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. A student investigated how the mass lifted by a motor affected the efficiency of the motor.

Figure 4 shows the apparatus used.

Figure 4



This is the method used.

1. Attach the mass to the string.

2. Switch on the power supply so that the motor lifts the mass through a height of 1 m.

3. Record the input energy from the joulemeter.

4. Calculate the useful output energy.

5. Repeat steps **1 to 4** with different masses.

1.1 What is the independent variable in the investigation?

Tick **one** box.

[1 mark]

- Efficiency of the motor ☐
- Length of the string ☐
- Mass added to the string ☐
- Power of the motor ☐

Table 1 shows the data from the investigation.

Table 1

Mass lifted in kilograms	Input energy in joules	Useful output energy in joules	Efficiency
0.10	16	1.0	**X**
0.20	25	2.0	0.08
0.30	31	3.0	0.10
0.40	36	4.0	0.11
0.50	41	5.0	0.12
0.60	46	6.0	0.13
0.70	53	7.0	0.13

1.2 Calculate **X**, the efficiency of the motor when it is lifting a 0.10 kg mass.

Use the Physics Equations Sheet.

[2 marks]

.....

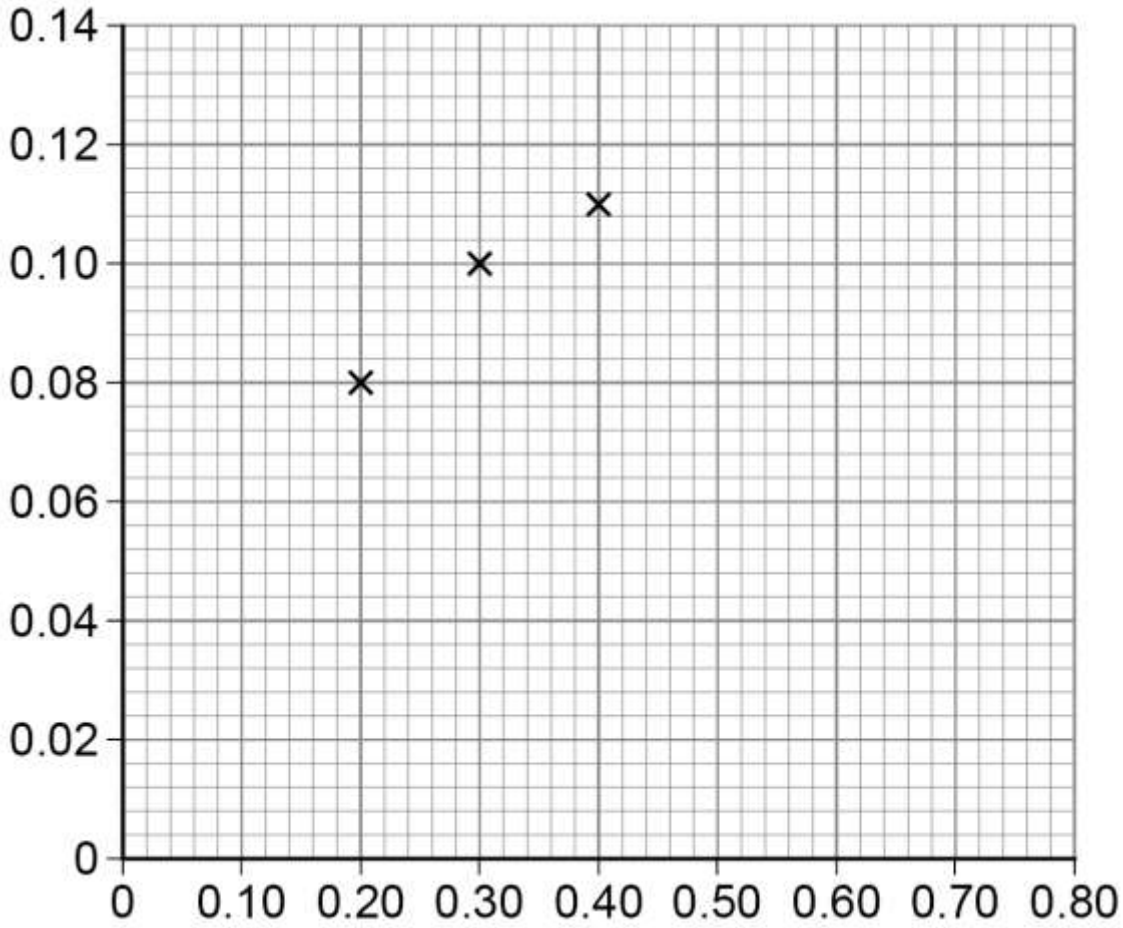
.....

Efficiency = ...

1.3 The student plotted a graph of mass lifted against efficiency.

Three of the results are plotted on **Figure 5.**

Figure 5



Complete **Figure 5.**

You should:

- Label the x-axis and the y-axis
- Plot the missing points
- Draw a line of best fit.

[4 marks]

1.4 Give **two** conclusions that the student should make from the graph in **Figure 5**.

[2 marks]

Conclusion **1**

.....

.....

Conclusion **2**

.....

.....

1.5 The motor wastes energy as it lifts the mass.

What happens to the energy that is wasted?

Tick **one** box.

[1 mark]

The energy causes pollution.	☐
The energy goes back into the motor.	☐
The energy heats the surroundings.	☐

1.6 The student then investigated how the mass lifted by the motor affects the time taken for the mass to be lifted through a distance of 1 metre.

Complete the sentence to predict what would be observed in this investigation.

Choose answers from the box.

Each answer can be used once, more than once or not at all.

[2 marks]

greater	less	the same

For a greater mass, the time taken is ..... because the work done

on the mass is .....

1.7 The time taken to lift a mass of 0.10 kg through a distance of 1 metre was 0.80 seconds.

Determine the input power of the motor.

Use information from **Table 1** and the Physics Equations Sheet.

[2 marks]

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.....

.....

Input Power = ... W

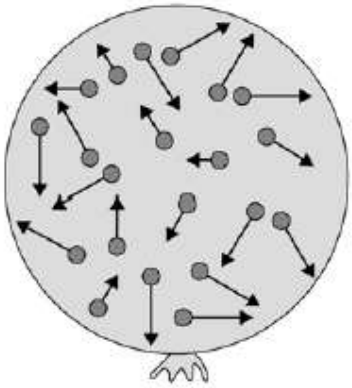
SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Figure 1 shows a balloon filled with helium gas.

Figure 1



1.1 Describe the movement of the particles of helium gas inside the balloon.

[2 marks]

.....

.....

.....

.....

1.2 What name is given to the total kinetic energy and potential energy of all the particles of helium gas in the balloon?

[1 mark]

Tick **one** box.

External energy ☐

Internal energy ☐

Movement energy ☐

1.3 Write down the equation which links density, mass and volume.

[1 mark]

.....

.....

1.4 The helium in the balloon has a mass of 0.00254 kg.

The balloon has a volume of 0.0141 m^3.

Calculate the density of helium. Include a unit with your answer.

[3 marks]

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Density = ... Unit: .....

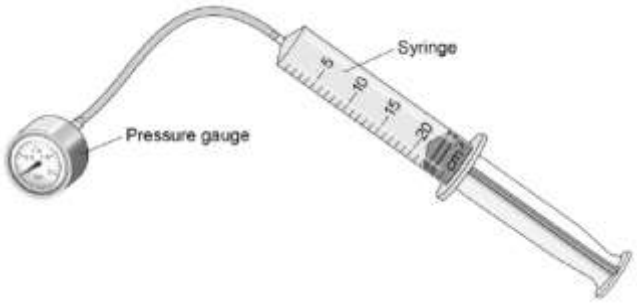
SECTION C
This is a revision question to consolidate your understanding.

You should aim to spend **10 minutes** answering this section.

1. A student investigated how the pressure of a gas varied with the volume of the gas.

The mass and temperature of the gas were constant.

The diagram shows the equipment the student used.



1.1 What is the range of the syringe?

Tick **one** box.

[1 Mark]

- 0 to 1 cm^3 ☐
- 0 to 5 cm^3 ☐
- 0 to 20 cm^3 ☐
- 0 to 25 cm^3 ☐

1.2 What type of variable was the mass of gas?

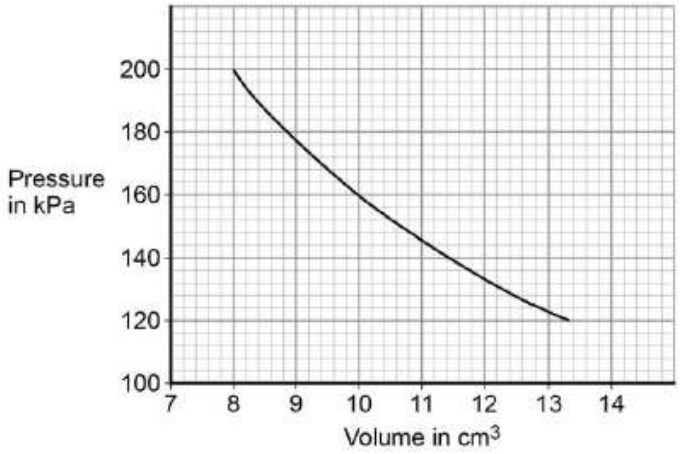
Tick **one** box.

[1 Mark]

- Control ☐
- Dependent ☐
- Independent ☐

The student compressed the gas in the syringe and read the pressure from the pressure gauge.

The graph shows the student's results.



1.3 The student concluded that when the pressure was multiplied by the corresponding volume the answer was the same.

Use data from the graph to show that the student's conclusion was correct.

[2 marks]

.....

.....

.....

.....

1.4 Complete the sentences.

Choose the answers from the box.

Each answer may be used once, more than once or not at all.

[3 Marks]

decreases	**increases**	**remains the same**

When the gas is compressed, the volume of gas in the syringe _____ .

So the number of collisions each second between the gas particles inside the syringe and the inside surface of the syringe _____ .

This means the force exerted on the inside surface of the container walls _____ .

FEEDBACK SHEET

Overall Mark:	**/28**	**GRADE ACHIEVED:** 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ U ☐
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Section B :	/7	
Section C :	/7	

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Student response

AQA
Realising potential

GCSE Physics Equation Sheet

1	**pressure due to a column of liquid = height of column × density of liquid × gravitational field strength (g)**	$p = h \rho g$
2	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
3	**force** $= \dfrac{\textbf{change in momentum}}{\textbf{time taken}}$	$F = \dfrac{m \Delta v}{\Delta t}$
4	elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \dfrac{1}{2} k e^2$
5	change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta \theta$
6	period $= \dfrac{1}{\text{frequency}}$	
7	magnification $= \dfrac{\text{image height}}{\text{object height}}$	
8	**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**	$F = B I l$
9	thermal energy for a change of state = mass × specific latent heat	$E = m L$
10	$\dfrac{\textbf{potential difference across primary coil}}{\textbf{potential difference across secondary coil}} = \dfrac{\textbf{number of turns in primary coil}}{\textbf{number of turns in secondary coil}}$	$\dfrac{V_p}{V_s} = \dfrac{n_p}{n_s}$
11	**potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil**	$V_s I_s = V_p I_p$
12	For gases: pressure × volume = constant	$p V = constant$

Acknowledgements

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All relevant information has been credited in the document.

This document has been produced for educational purposes only.

This document has been produced for the AQA GCSE Science Specification.