ST MARY'S SCIENCE DEPARTMENT:

PHYSICS

H

GCSE PHYSICS **HOMEWORK BOOK**
TOPIC 2: CIRCUIT ELECTRICITY
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		
5		
OVERALL		

GCSE PHYSICS

YEAR 9

TOPIC 2

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 Introduction to Electricity			
Task 2 Current and Potential Difference			
Task 3 Resistance			
Task 4 Resistance in Series and Parallel			
Task 5 I-V Characteristics			

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.

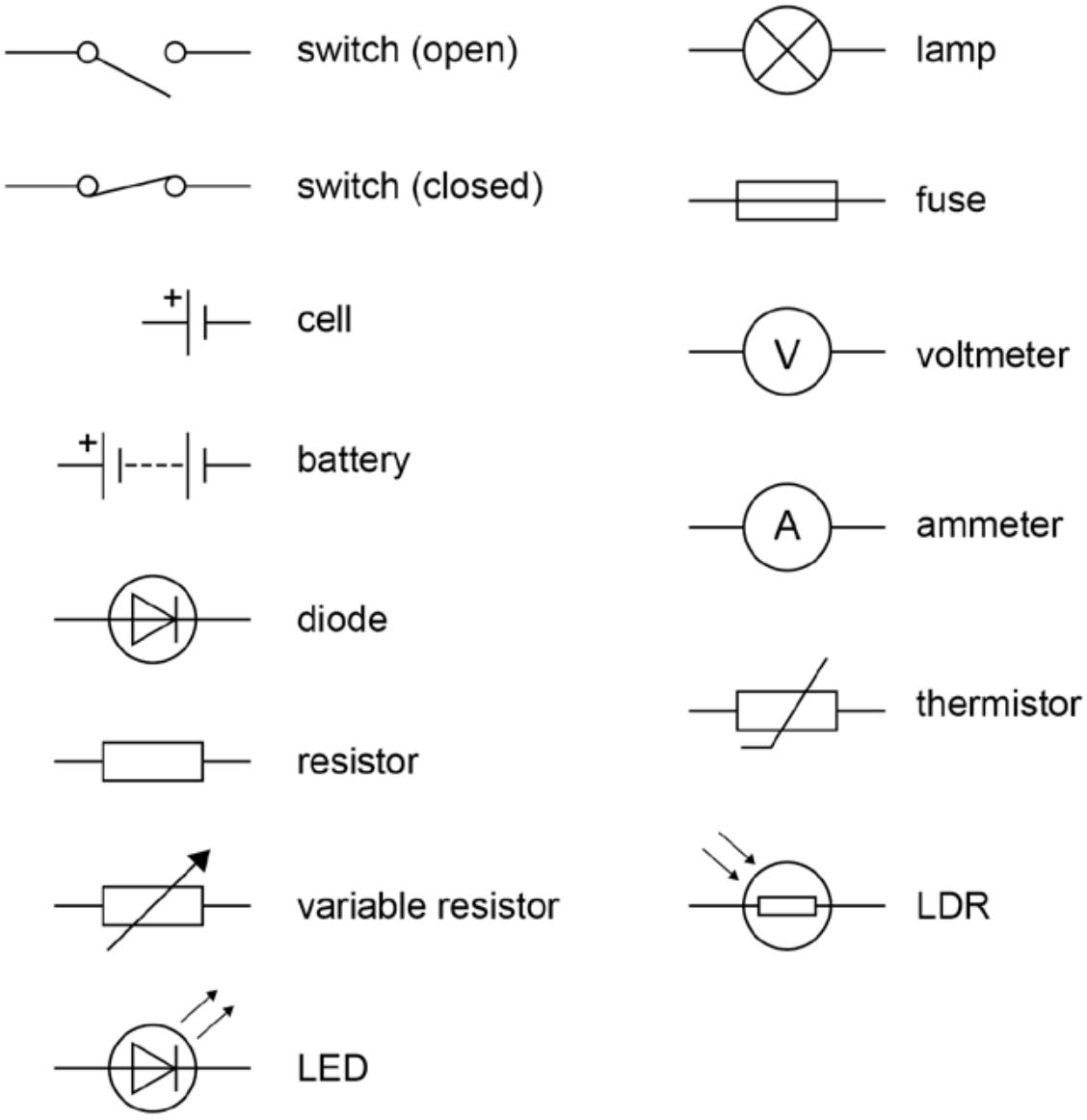
Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

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

Mr. Turnbull

TASK 1: INTRODUCTION TO ELECTRICITY

SPEC CHECK

Content	Achieved?
Circuit diagrams use standard symbols.  Students should be able to draw and interpret circuit diagrams.	

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 cyclist is riding a bicycle at a steady velocity of 12 m/s.
The cyclist and bicycle have a total mass of 68 kg.

1.1 Calculate the kinetic energy of the cyclist and bicycle.

[2 Marks]

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Kinetic Energy = ... J

1.2 Describe the energy transfers that happen when the cyclist uses the brakes to stop.

[2 Marks]

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1.3 The cyclist starts to cycle again.
The cyclist does 1600 J of useful work to travel 28 m.
Calculate the average force the cyclist exerts.

[3 Marks]

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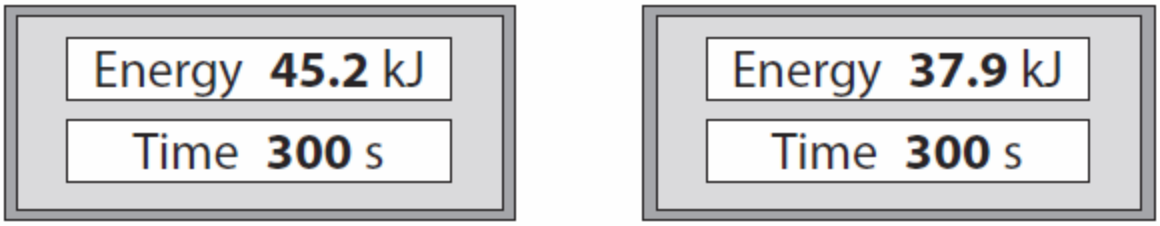
Average Force = ... N

1.4 An athlete uses a training machine in a gym.
The display on the machine shows the time spent on the machine and the amount of energy transferred during a training session.
Figure 5 shows the displays for two different sessions by the same athlete.

Figure 5



session 1 session 2

Explain what the displays show about the average power of the athlete in each of these two sessions.

[2 Marks]

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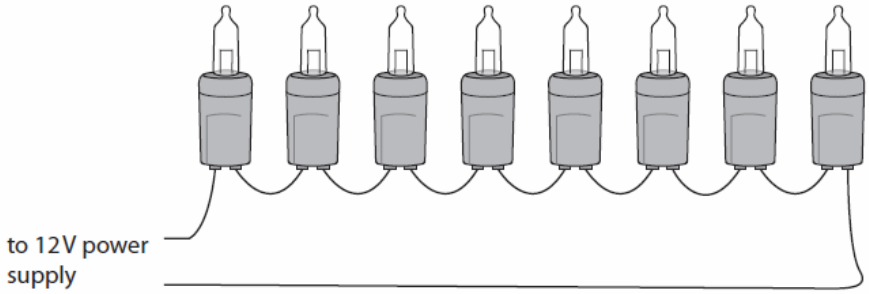
SECTION B

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

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

1. Figure 18 shows identical filament lamps connected together to a 12 V power supply.

Figure 18



1.1 Calculate the potential difference across each lamp.

[1 Mark]

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Potential Difference =..... V

1.2 The power output of each lamp is 0.75 W

Calculate the resistance of each lamp.

[4 Marks]

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Resistance =..... Ω

1.3 Explain, with the aid of a circuit diagram, the method a student could use to investigate how the resistance of a single lamp changes with the potential difference across the lamp.

[6 Marks]

SECTION C

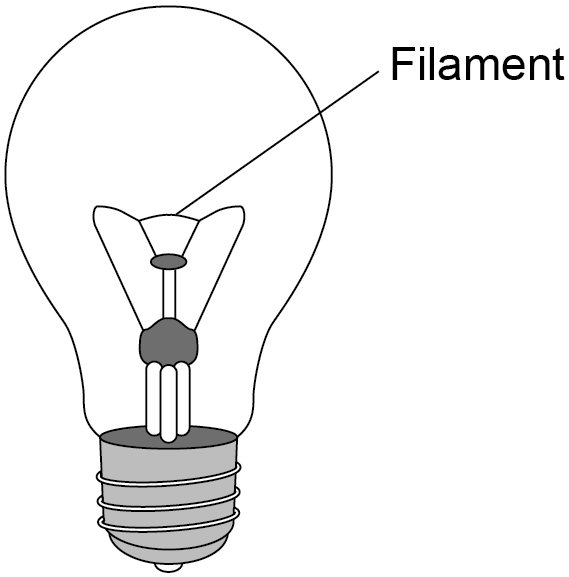
This is a challenge question to extend your understanding.

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

1. Figure 4 shows a filament lamp.

The filament inside the lamp glows to emit light.

Figure 4



1.1 Explain why the filament glows more brightly when the current through the lamp increases.

Answer in terms of the charges that move through the filament.

[4 marks]

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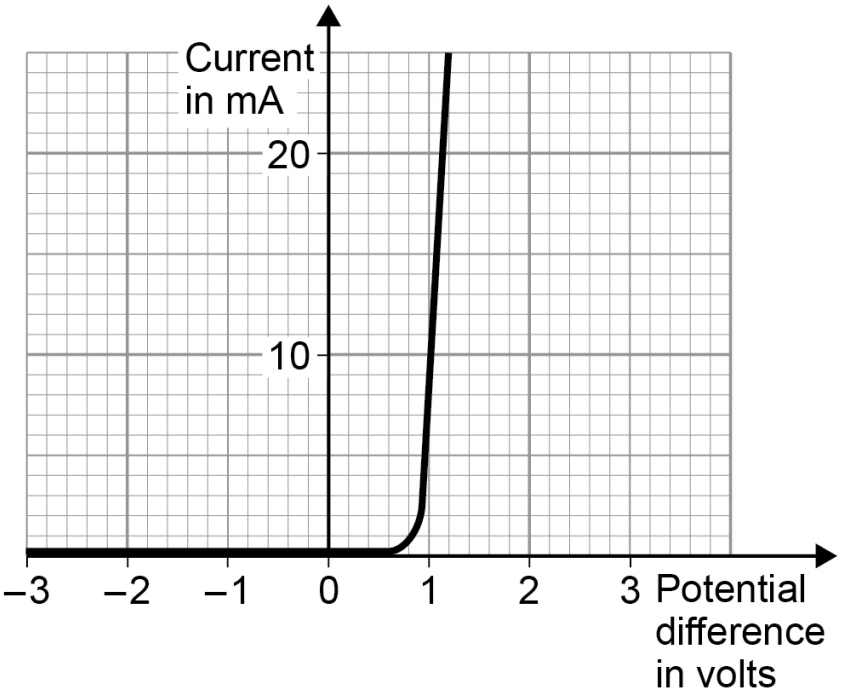
1.2 Filament lamps have been replaced by more energy-efficient bulbs, called Compact Fluorescent Lamps (CFLs) and Light Emitting Diode (LED) lamps.

Figure 5 shows how current varies with potential difference for an LED.

Figure 5



Describe how the resistance of the LED changes as potential difference varies.

Use data from **Figure 5** in your answer.

[3 marks]

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Table 2 shows some technical data on the different types of bulb.

Table 2

	Filament lamp	CFL	LED lamp
Cost to buy in $	1.00	3.00	7.00
Power rating in watts	60	15	10
Lifetime in hours	1000	10 000	50 000
Efficiency (%)	10	80	85

1.3 Suggest **two** reasons why many countries have banned the use of filament lamps for household lighting.

Use information from **Table 2** in your answer.

[2 marks]

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1.4 Explain why LED lamps are used more frequently than CFLs.

Use information from **Table 2.**

You should include calculations in your answer.

[4 marks]

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FEEDBACK SHEET

Overall Mark:	/33	**GRADE ACHIEVED:**	
Section A :	/9	**9** ☐	**5** ☐
Section B :	/11	**8** ☐	**4** ☐
Section C :	/13	**7** ☐	**3** ☐
		6 ☐	**U** ☐

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.	☐ 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 2: CURRENT AND POTENTIAL DIFFERENCE

SPEC CHECK

Content	Achieved?
The current (I) through a component depends on both the resistance (R) of the component and the potential difference (V) across the component. The greater the resistance of the component the smaller the current for a given potential difference (pd) across the component. Questions will be set using the term potential difference. Current, potential difference or resistance can be calculated using the equation: potential difference = current × resistance V = I R potential difference, V, in volts, V, current, I, in amperes, A (amp is acceptable for ampere) resistance, R, in ohms, Ω. Students should be able to recall and apply this equation.	

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 5 shows a cyclist riding along a straight, level road at a constant speed.

Figure 5

1.1 Complete the sentences.

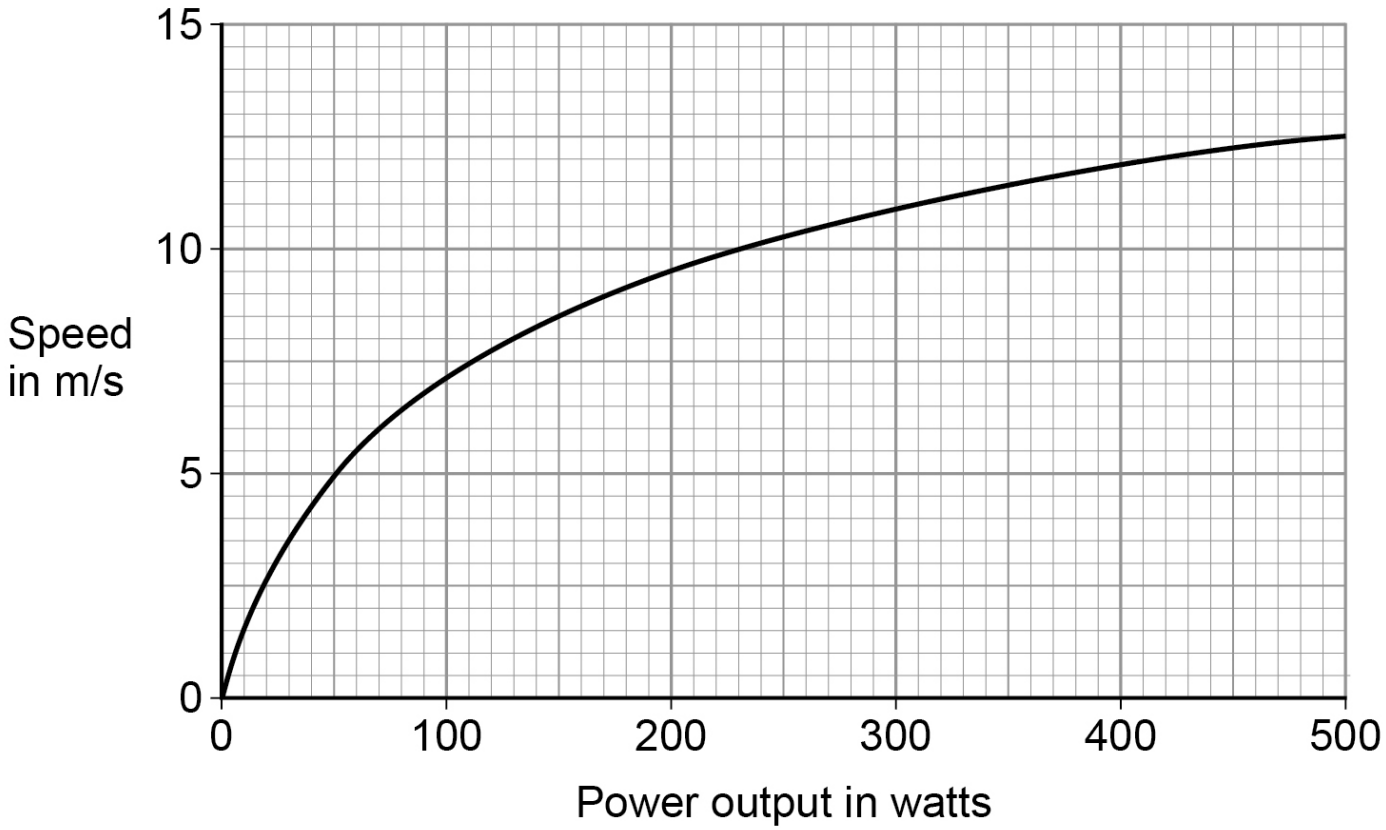
[2 marks]

As the cyclist rides along the road, the _____energy store in the cyclist's body decreases.

The speed of the cyclist is constant when the work done by the cyclist is _____ the work done against air resistance.

Figure 6 shows how the speed changes as the power output of the cyclist changes.

Figure 6



1.2 Write down the equation that links power, time and work done.

[1 mark]

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1.3 Calculate the work done by the cyclist when his power output is 200 W for 1800 seconds.

[3 marks]

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Work Done =..... J

1.4 Calculate the percentage increase in speed of the cyclist when the power output changes from 200 W to 300 W.

[2 marks]

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Percentage Increase in Speed = ...

1.5 The maximum speed this cyclist can travel on a level road is 14 m/s.

How does cycling uphill affect the maximum speed of this cyclist?

Explain your answer.

[3 marks]

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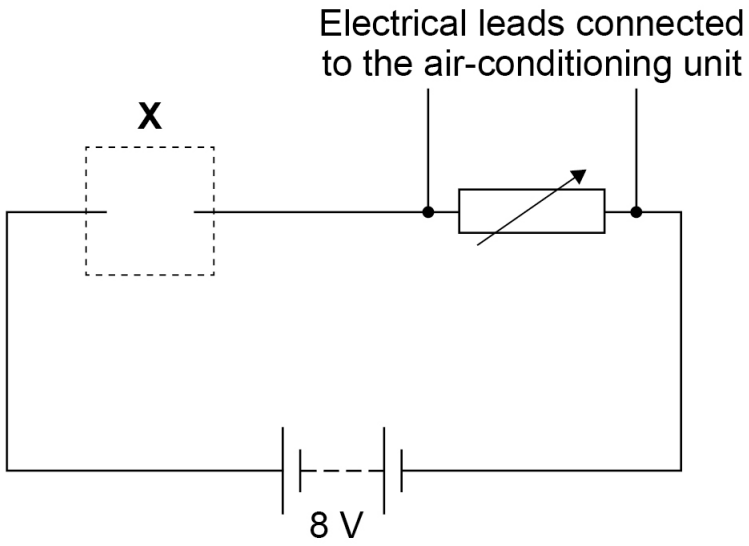
SECTION B

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

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

1. Figure 6 shows a simple sensor circuit for a thermostat connected to an air-conditioning unit.

Figure 6



1.1 The component labelled **X** is a thermistor.

Draw the circuit symbol for a thermistor in the space below.

[1 mark]

1.2 The temperature in the room increases.

Describe how the thermistor controls the air-conditioning unit.

[4 marks]

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1.3 The resistance of the variable resistor is set to 2000 Ω.

The potential difference across the variable resistor is 3.2 V.

Calculate the resistance of the thermistor.

[4 marks]

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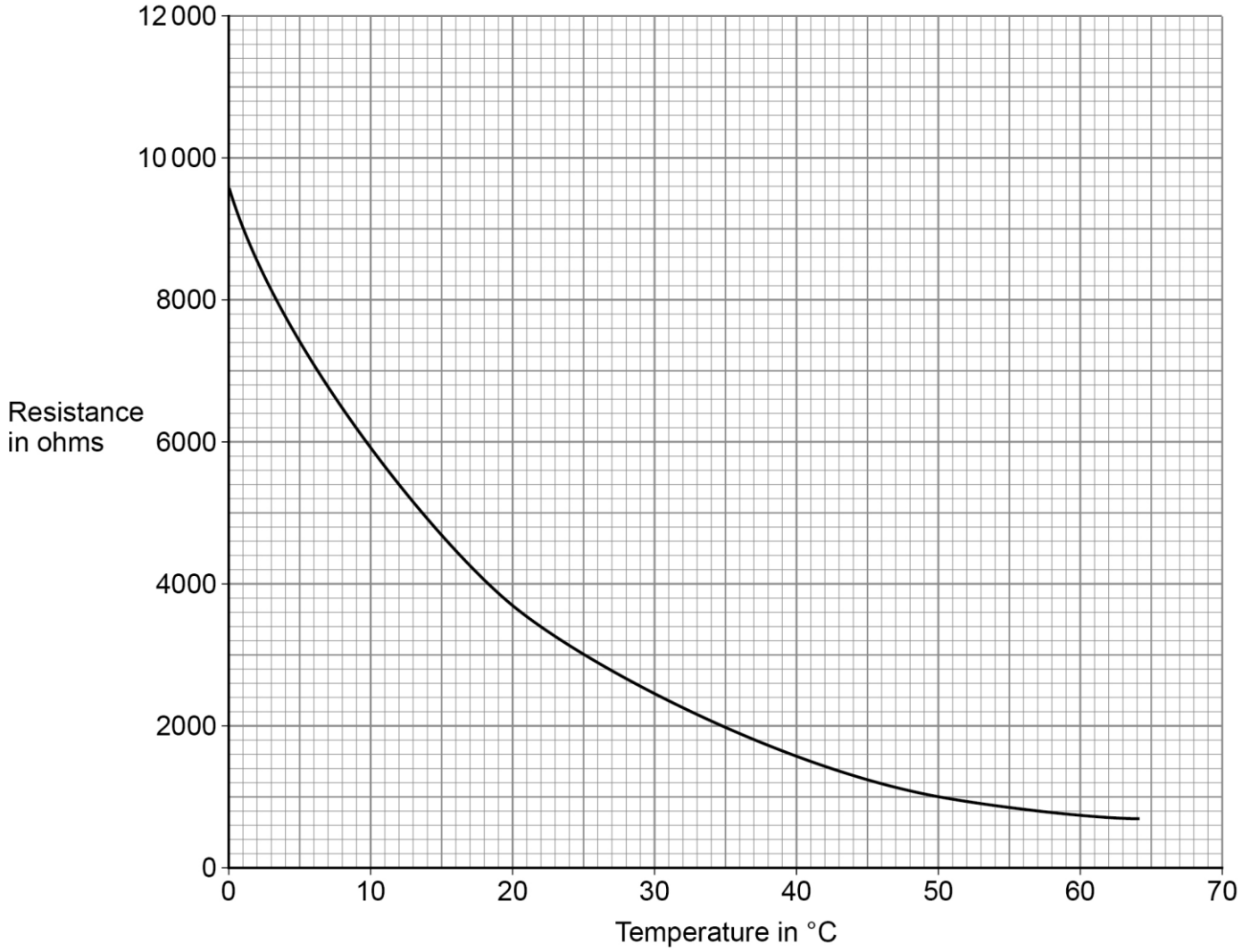
Resistance = ... Ω

1.4 Figure 7 shows how the resistance of the thermistor varies with temperature.

Figure 7



The temperature changes from 20 °C to 40 °C.

Determine the change in resistance of the thermistor.

[1 mark]

Change in Resistance = ... Ω

1.5 The thermistor in **Figure 6** is replaced with a second thermistor that has a greater change in resistance between 20 °C and 40 °C. This makes the thermostat more sensitive at room temperature.

Sketch a curve for the second thermistor on **Figure 7.**

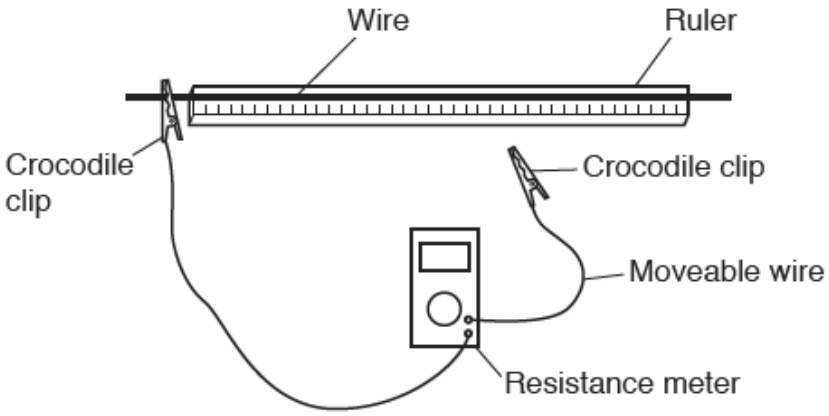
[1 mark]

SECTION C

This is a challenge question to extend your understanding.

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

1. Two students investigate the resistance of a wire.
They tape a length of wire to a metre ruler and connect it to a resistance meter using crocodile clips.



Look at their results.

Length of wire (cm)	Resistance (Ω)			
	Attempt 1	Attempt 2	Attempt 3	Mean
25	8.8	8.3	8.5	8.533
50	16.2	16.1	16.4	16.4
75	23.5	23.8	18.7	23.7
100	30.8	31.1	31.0	31.0

1.1 Describe the pattern shown by these results.
Use data in your answer.

[2 Marks]

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1.2 The students made two mistakes when they recorded their results and completed the table.
Identify the mistakes and explain what they should have done.

[2 Marks]

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1.3 The students have correctly handled an error in their results.
Identify the error and explain how it was correctly handled.

[2 Marks]

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1.4 The students plan to plot a graph of mean resistance against length.
What would you expect a graph of these results to look like?

[2 Marks]

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1.5 The actual mean resistance values are more than expected.
Suggest **two** possible errors with the experiment.

[2 Marks]

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1.6 For **one** of the errors, suggest how the experimental procedure could be improved.

[1 Mark]

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FEEDBACK SHEET

Overall Mark:	**/33**
Section A :	/11
Section B :	/11
Section C :	/11

GRADE ACHIEVED:

9	☐	**5**	☐
8	☐	**4**	☐
7	☐	**3**	☐
6	☐	**U**	☐

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 3: RESISTANCE

SPEC CHECK

Content	Achieved?
Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: The length of a wire at constant temperature.	

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

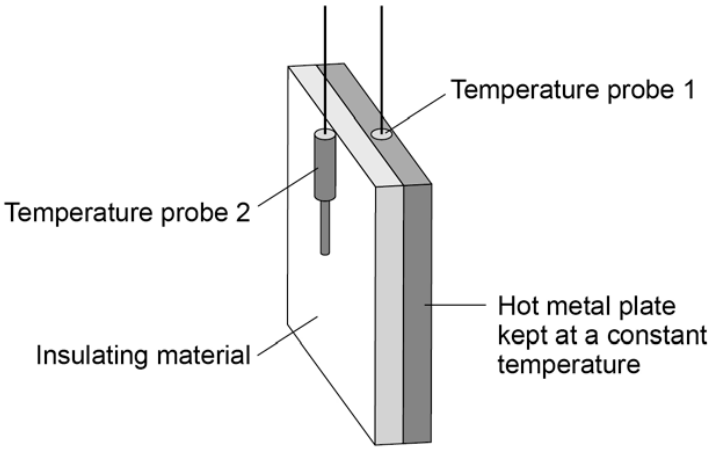
This is a revision question on a previous topic.

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

1. A student investigated the properties of three types of insulation.

Figure 7 shows the apparatus the student used.

Figure 7



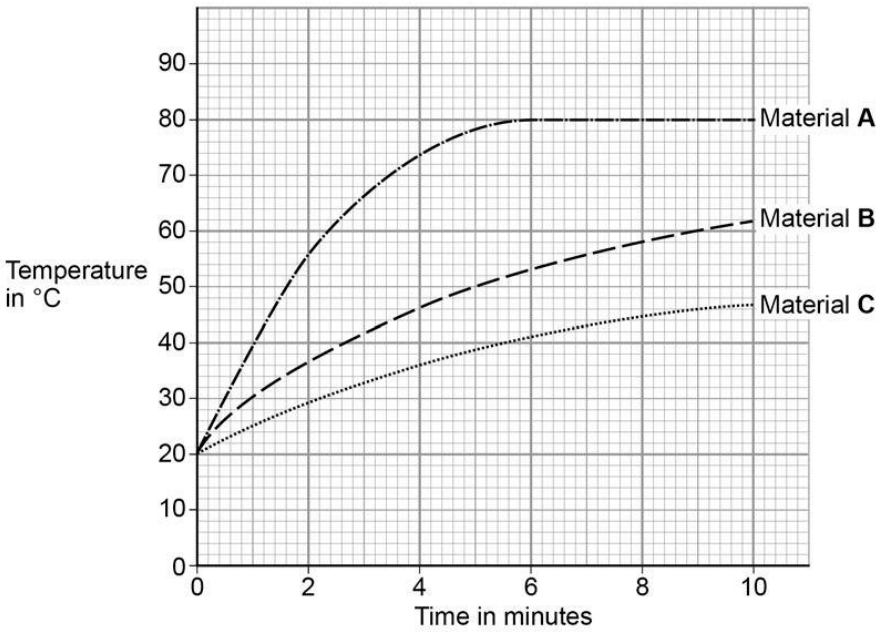
In the investigation different insulating materials were placed in contact with the hot metal plate.

Temperature probes measured the temperature on each side of the material.

The temperature probes were connected to a data logger.

Figure 8 shows how the temperature measured by temperature probe 2 changed over 10 minutes for each of the materials.

Figure 8



1.1 What was the temperature of the hot metal plate?

..... °C

[1 mark]

1.2 Which material is the best insulator?

[2 marks]

Tick **one** box.

A ☐ B ☐ C ☐

Give the reason for your answer.

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1.3 Another student repeated the investigation but doubled the thickness for all three insulating materials.

Suggest how using thicker insulation would affect the results of the second student's investigation compared with the first student's results.

[2 marks]

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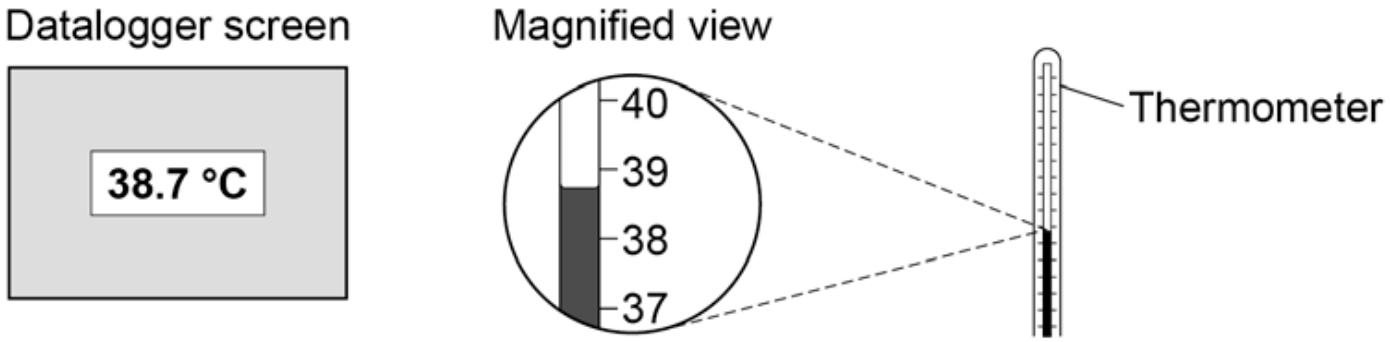
1.4 The students could have used a thermometer instead of temperature probes and a datalogger.

Figure 9 shows the datalogger screen and a thermometer.

Figure 9



Give **two** advantages of using the datalogger and temperature probes compared to a thermometer.

[2 marks]

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1.5 Table 2 gives information about four types of insulation that could be used for insulating the cavity walls of houses.

Table 2

Type of insulation	Thermal conductivity in W/m °C
Felt wool	0.070
Mineral wool	0.040
Polyurethane foam	0.030
Rock wool	0.045

Explain which **one** of the types of insulation in **Table 2** would be the best to use for cavity wall insulation.

[2 marks]

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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. A resistor is connected to a power supply.

The potential difference across the resistor is 6.0 V.

1.1 Which of these corresponds to a potential difference of 6.0 V?

[1 Mark]

- ☒ **A** 6.0 joules per ohm
- ☒ **B** 6.0 amps per coulomb
- ☒ **C** 6.0 joules per coulomb
- ☒ **D** 6.0 amps per ohm

1.2 The resistor remains connected for a period of time.

The current in the resistor is 200 mA.

A total charge of 42 C flows through the resistor.

Calculate, in minutes, the time taken for this amount of charge to flow through the resistor.

[3 Marks]

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Time = ... minutes

1.3 Calculate the total energy transferred by the 6.0 V power supply when a charge of 42 C flows through the resistor.

[2 Marks]

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Energy = ... J

1.4 The resistor becomes warm while there is a current in it.

Explain why the resistor becomes warm.

[2 Marks]

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1.5 Figure 16 shows a cardboard tube with a wire coming out from each end.

Figure 16

There are two 10 ohm resistors inside the cardboard tube.

A potential difference of 6.0 V is connected between **P** and **Q**.

There is a current of 1.2 A in the wires.

Deduce how the resistors have been arranged inside the cardboard tube.

[3 Marks]

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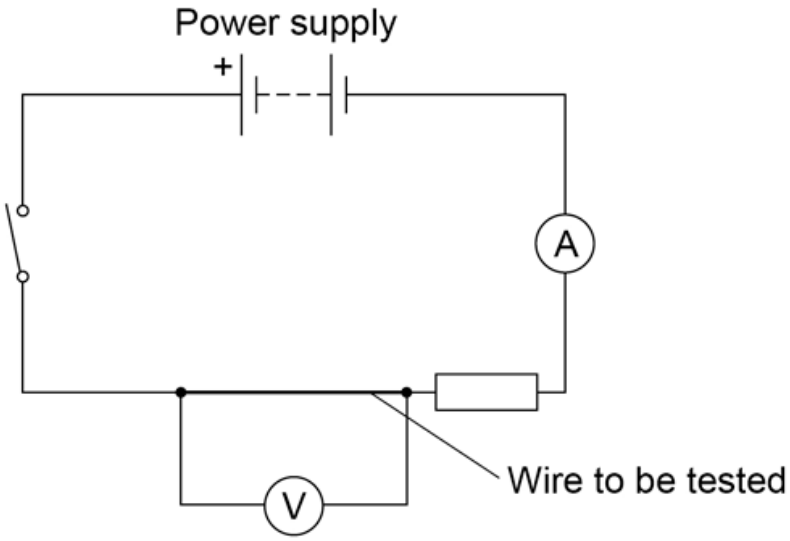
SECTION C

This is a challenge question to extend your understanding.

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

1. A student investigated how the resistance of a wire varies with its length.
Figure 6 shows the circuit diagram the student used to set up her apparatus.

Figure 6



1.1 The student switched the power supply off between each set of readings.
Explain why this should be done.

[2 marks]

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The student tested different lengths of wire.
For each length of wire, the student measured:
• The current through the wire
• The potential difference across the wire.

Table 1 shows the student's results.

Table 1

Length of wire in cm	Current in milliamperes	Potential difference in volts	Resistance in ohms
10.0	64	0.10	1.6
20.0	34	0.11	3.2
30.0	25	0.12	4.8
40.0	19	0.12	**X**
50.0	16	0.13	8.1
60.0	14	0.13	9.3

1.2 Calculate resistance **X**.

[4 marks]

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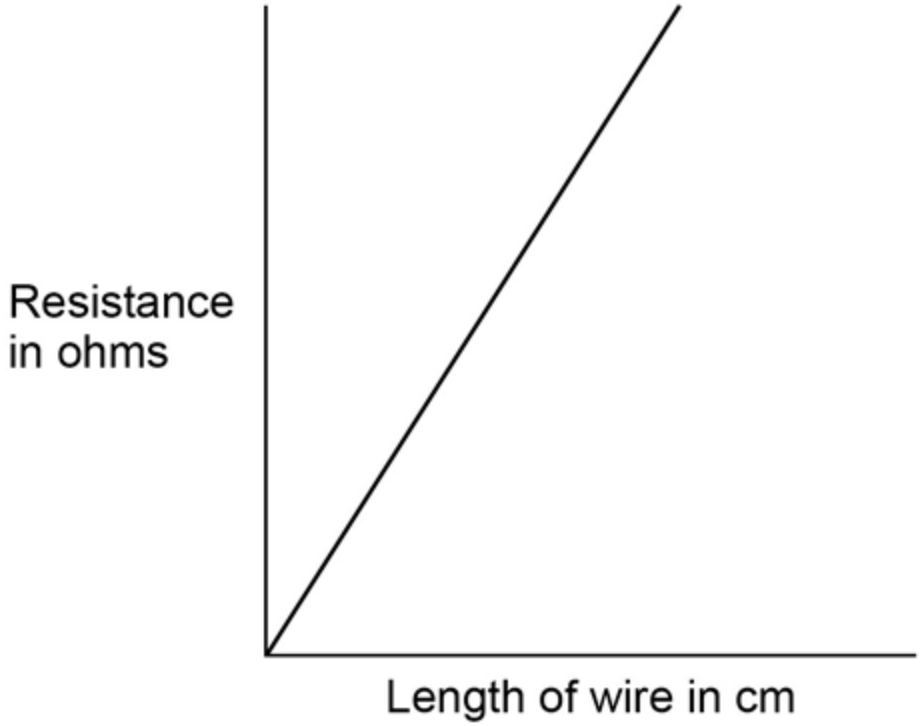
Resistance = ... Ω

1.3 Figure 7 shows a sketch graph of the results.

Figure 7



The resistance of the wire is directly proportional to the length.

How does the graph show this?

[1 mark]

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FEEDBACK SHEET

Overall Mark:	**/27**
Section A :	/9
Section B :	/11
Section C :	/7

GRADE ACHIEVED:

9	☐	**5**	☐
8	☐	**4**	☐
7	☐	**3**	☐
6	☐	**U**	☐

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
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☐ 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: RESISTANCE IN SERIES AND PARALLEL

SPEC CHECK

Content	Achieved?
Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include: Combinations of resistors in series and parallel.	

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 driver wants to buy a new car.

Table 3 shows some information about petrol cars, diesel cars and electric cars.

Table 3

Feature	Petrol car	Diesel car	Electric car
Cost of the car	$13 500	$16 000	$21 500
Cost of driving	$1.17 per litre of petrol	$1.06 per litre of diesel	$0.20 per kW h of energy
Maximum storage capacity	50 litres	50 litres	40 kW h
Maximum range in kilometres	720	960	240
Carbon dioxide emission while being driven in grams per kilometre	99	94	0

Maximum range is the distance the car can travel before needing to be refuelled or recharged.

1.1 Electric cars have a battery that needs to be charged using mains electricity.

Explain why the total carbon dioxide emission is not zero for an electric car.

[2 marks]

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1.2 Determine the difference between the cost of driving a petrol car and the cost of driving an electric car for 240 kilometres.

Use information from **Table 3.**

[4 marks]

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1.3 Compare the advantages and disadvantages of the three different types of car.

Use information from **Table 3**.

[6 marks]

SECTION B

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

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

1. A light dependent resistor (LDR) is connected in a circuit.

1.1 Draw the circuit symbol for an LDR.

[1 mark]

1.2 A student investigated the relationship between current and potential difference for an LDR.

How should the student have connected the ammeter and voltmeter in the circuit?

[1 mark]

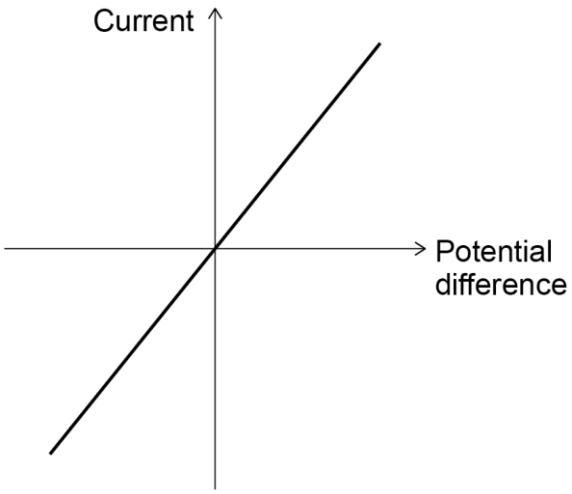
Tick **one** box.

Ammeter	Voltmeter	
in parallel with LDR	in parallel with LDR	☐
in parallel with LDR	in series with LDR	☐
in series with LDR	in parallel with LDR	☐
in series with LDR	in series with LDR	☐

Figure 1 shows a sketch graph of the student's results.

The LDR was in a constant bright light.

Figure 1



1.3 The student concluded that the current in the LDR is inversely proportional to the potential difference across the LDR.

Explain why the student's conclusion is incorrect.

[2 marks]

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1.4 The student repeated the investigation with the LDR in constant dark conditions.

Sketch on **Figure 1** the graph for the LDR in constant dark conditions.

[2 marks]

The LDR was placed near a light source.

The following results were recorded:

Potential difference = 5.50 V

Current = 12.5 mA

1.5 Write down the equation that links current, potential difference and resistance.

[1 mark]

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1.6 Calculate the resistance of the LDR.

[4 marks]

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Resistance =_____ Ω

SECTION C

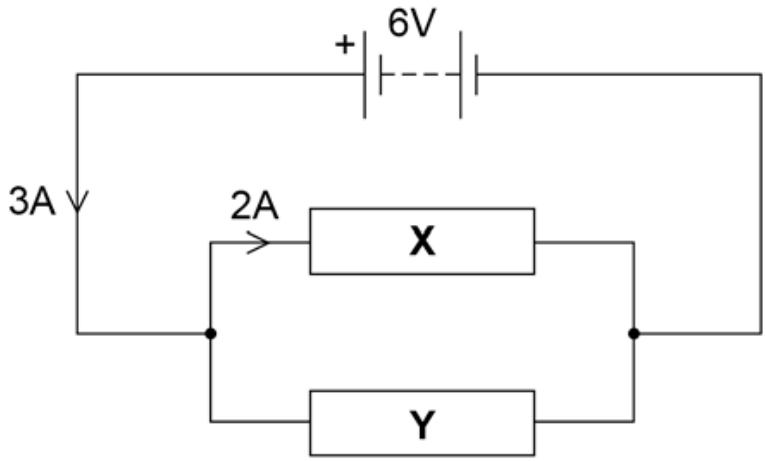
This is a challenge question to extend your understanding.

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

1. Look at **Figure 5**.

The circuit has two resistors, **X** and **Y**.

Figure 5



1.1 What is the potential difference across resistor **X**?

[1 mark]

Tick **one** box.

- 2 V ☐
- 3 V ☐
- 6 V ☐
- 12 V ☐

1.2 Determine which resistor, **X** or **Y**, will have the highest resistance.

Use the values of current shown in **Figure 5**.

[2 marks]

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1.3 Another resistor is added in parallel to **X** and **Y**.

What will happen to the total resistance of the circuit?

[1 mark]

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1.4 The three resistors are then arranged in series.

What will happen to the potential difference across resistor **X**?

[1 mark]

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1.5 How will the total resistance of the series circuit compare to the total resistance of the parallel circuit?

[1 mark]

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FEEDBACK SHEET

Overall Mark:	/29	**GRADE ACHIEVED:**	
Section A:	/12	**9** ☐	**5** ☐
Section B :	/11	**8** ☐	**4** ☐
Section C:	/6	**7** ☐	**3** ☐
		6 ☐	**U** ☐

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
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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.
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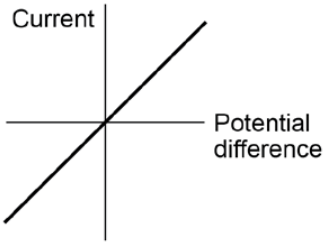
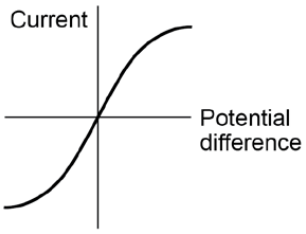
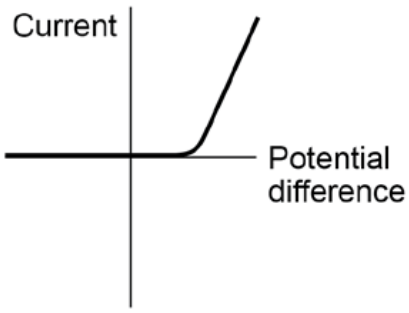
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 5: I-V CHARACTERISTICS

SPEC CHECK

Content	Achieved?
Students should be able to explain that, for some resistors, the value of R remains constant but that in others it can change as the current changes. The current through an ohmic conductor (at a constant temperature) is directly proportional to the potential difference across the resistor. This means that the resistance remains constant as the current changes.  The resistance of components such as lamps, diodes, thermistors and LDRs is not constant; it changes with the current through the component. The resistance of a filament lamp increases as the temperature of the filament increases.  The current through a diode flows in one direction only. The diode has a very high resistance in the reverse direction.  	

Target Setting

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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 powerlifter raises a bar from the floor to above his head.

Look at **Figure 4.**

Figure 4

1.1 Write down the equation that links power, time taken and work done.

[1 mark]

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1.2 To lift the bar, the powerlifter does 3.9 kJ of work in 3.0 s.

Calculate the power.

[3 marks]

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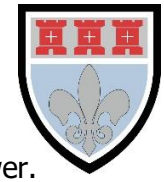
Power =..... W



1.3 Explain the effect reducing the time taken to lift the bar would have on the power.

[2 marks]

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1.4 Write down the equation that links gravitational field strength, gravitational potential energy, height and mass.

[1 mark]

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1.5 The bar has a mass of 180 kg.

The powerlifter raises the bar 2.1 m.

Gravitational field strength = 9.8 N/kg

Calculate the increase in the gravitational potential energy store of the bar.

Give your answer to 2 significant figures.

[3 marks]

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Increase in gravitational potential energy store = ... J

1.6 The powerlifter then drops the bar to the floor.

What is the maximum increase in the kinetic energy store of the bar?

[1 mark]

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Maximum increase in kinetic energy store =..... J

SECTION B

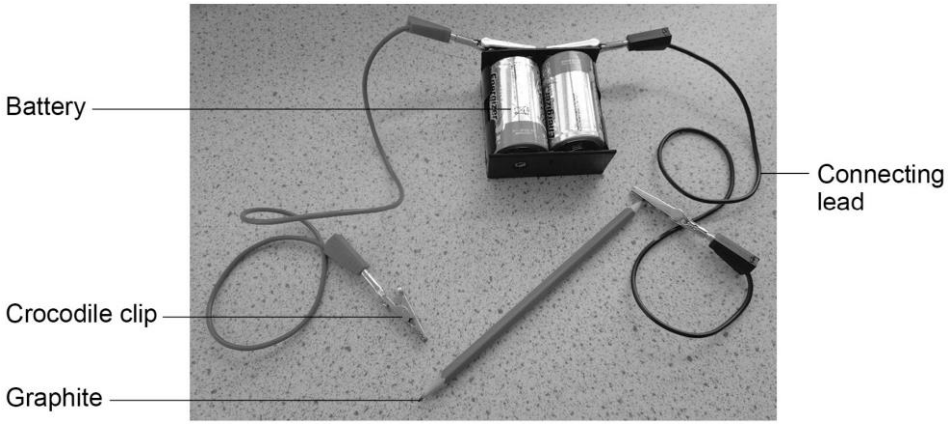
This is a question to revise understanding carried out in lesson.

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

1. A student investigated how the current in the graphite varies with the potential difference across it.

Figure 8 shows some of the apparatus used.

Figure 8



1.1 The student connected the pencil to a battery using crocodile clips and connecting leads.

List **three other** pieces of apparatus that the student should use that are not shown in **Figure 8**.

[2 marks]

Piece 1: .....

Piece 2: .....

Piece 3: .....

1.2 The student disconnected the battery between readings.

Explain why this improves the investigation.

[2 marks]

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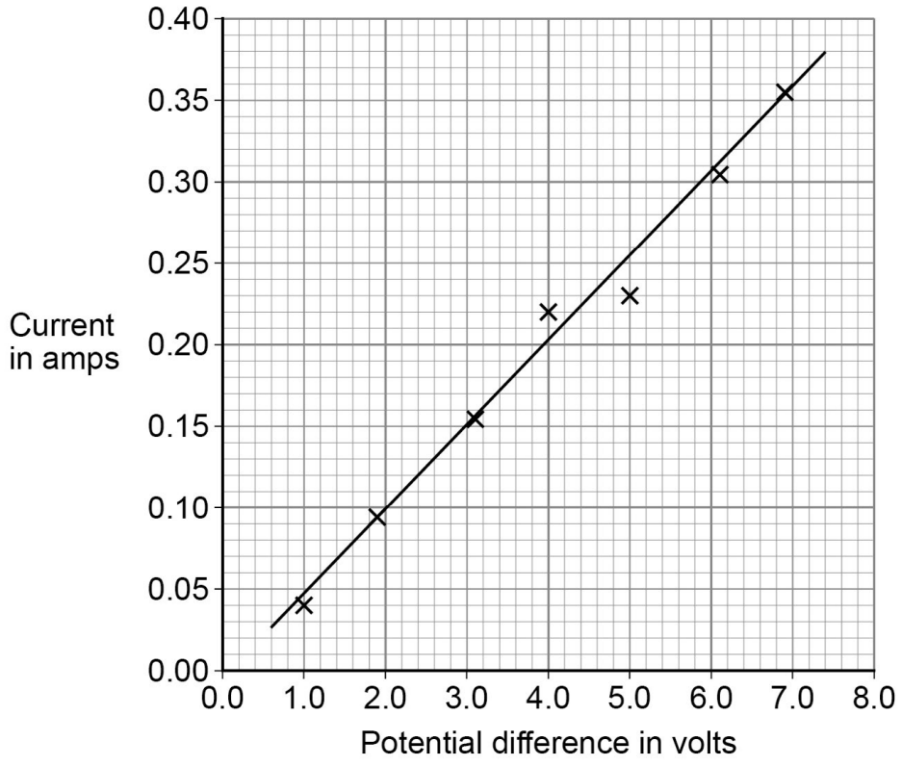
Figure 9 shows the results.

Figure 9



1.3 Give a conclusion that can be made from the graph in **Figure 9**.

Justify your answer.

[2 marks]

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1.5 Experimental data can contain random errors and systematic errors.

Explain how the data in **Figure 9** shows evidence of random errors and systematic errors.

[4 marks]

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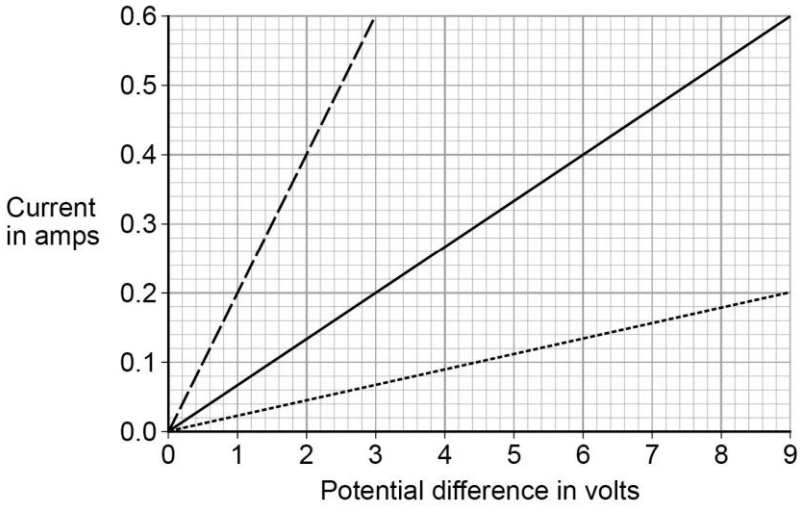
The student did a similar investigation using different pencils that contained different lengths of graphite. The lengths of graphite all had the same diameter.

Figure 10 shows the results.

Figure 10



1.6 Calculate the resistance of the longest piece of graphite in **Figure 10.**

Use the Physics Equations Sheet.

Give the unit.

[5 marks]

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Resistance = ...

Unit = ...

SECTION C

This is a challenge question to extend your understanding.

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

A student built a circuit using filament lamps.

1.1 Sketch a current potential difference graph for a filament lamp on **Figure 9**

[2 marks]

Figure 9

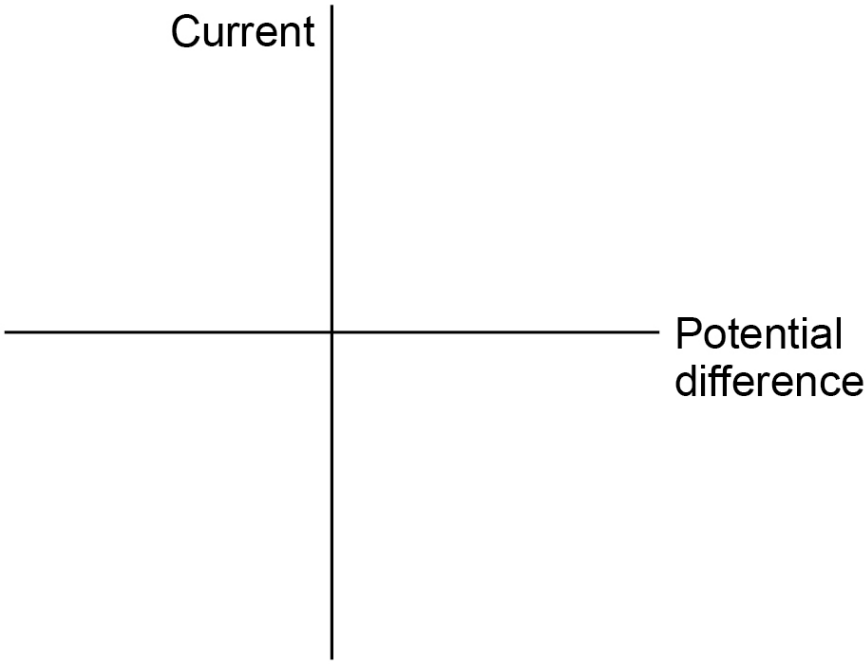
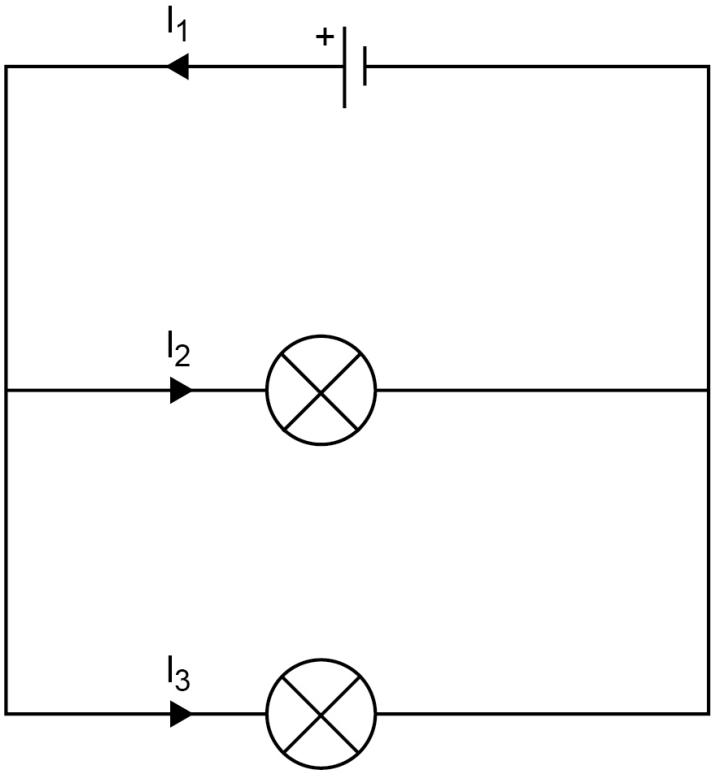


Figure 10 shows the circuit with two identical filament lamps.

Figure 10



1.2 Compare the currents I_1, I_2 and I_3

[2 marks]

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1.3 Calculate the charge that flows through the cell in 1 minute.
Each filament lamp has a power of 3 W and a resistance of 12 Ω
Write any equations that you use.
Give the unit.

[6 marks]

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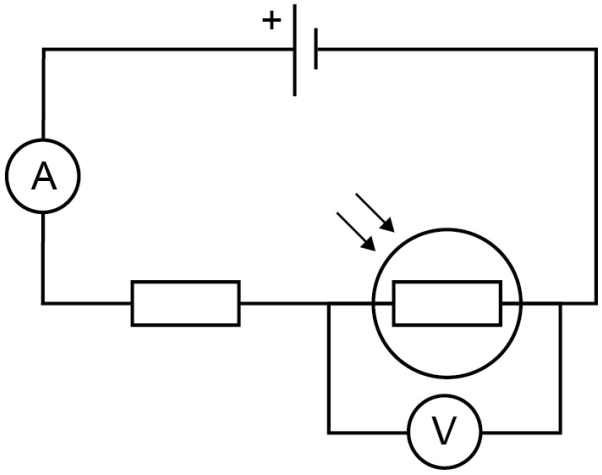
Charge = _____

Unit = _____

1.4 The student builds a different circuit.
Figure 11 shows the circuit.

Figure 11



Explain how the readings on both meters change when the environmental conditions change.

[6 marks]

FEEDBACK SHEET

Overall Mark:	**/42**	**GRADE ACHIEVED:**	
Section A :	/11	**9** ☐	**5** ☐
Section B :	/15	**8** ☐	**4** ☐
Section C :	/16	**7** ☐	**3** ☐
		6 ☐	**U** ☐

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Student response

EQUATIONS SHEET

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 = change in momentum / time taken**	$F = \frac{m \Delta v}{\Delta t}$
4	elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
5	change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta \theta$
6	period = 1 / frequency	
7	magnification = image height / 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	**potential difference across primary coil / potential difference across secondary coil = number of turns in primary coil / number of turns in secondary coil**	$\frac{V_p}{V_s} = \frac{n_p}{n_s}$
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

This document has been produced by Mr J Turnbull.

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.