ST MARY'S SCIENCE DEPARTMENT:

PHYSICS

F

GCSE PHYSICS **HOMEWORK BOOK**
TOPIC 3: MAINS 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 3

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 Mains Electricity			
Task 2 Electrical Power			
Task 3 Electrical Energy			
Task 4 The National Grid			
Task 5 Static Charges			

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: MAINS ELECTRICITY

SPEC CHECK

Content	Achieved?
Most electrical appliances are connected to the mains using three-core cable. The insulation covering each wire is colour coded for easy identification: live wire – brown neutral wire – blue earth wire – green and yellow stripes. The live wire carries the alternating potential difference from the supply. The neutral wire completes the circuit. The earth wire is a safety wire to stop the appliance becoming live. The potential difference between the live wire and earth (0 V) is about 230 V. The neutral wire is at, or close to, earth potential (0 V). The earth wire is at 0 V, it only carries a current if there is a fault. Students should be able to explain: That a live wire may be dangerous even when a switch in the mains circuit is open. The dangers of providing any connection between the live wire and earth.	

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.

This is a task based on the key concepts of electrical circuits – a topic covered previously.

In a circuit, a bulb is connected to a battery. The bulb is lit.

Here are several sentences about this circuit. Each has a word missing.

For each sentence, choose the best word to fill the gap.

Tick **one** box to show the word you have chosen.

A1. When the bulb lights, there is _____ going through it.

Tick only **one** answer.

A. Electricity ☐

B. Electric Current ☐

C. Energy ☐

D. Potential Difference ☐

A2. While the circuit is complete, _____ flows all of the way around it.

Tick only **one** answer.

A. Electric Charge ☐

B. Energy ☐

C. Electricity ☐

D. Potential Difference ☐

A3. This flow is caused by the _____ across the terminals of the battery.

Tick only **one** answer.

A. Electric Charge ☐

B. Energy ☐

C. Electricity ☐

D. Potential Difference ☐

A4. While the circuit is switched on, _____ is constantly being transferred by the battery and the bulb.

Tick only **one** answer.

A. Electric Charge ☐

B. Energy ☐

C. Electricity ☐

D. Potential Difference ☐

A5. The amount of energy transferred per second from the bulb to its surroundings is its _____.

Tick only **one** answer.

A. Power Output ☐

B. Energy ☐

C. Electricity ☐

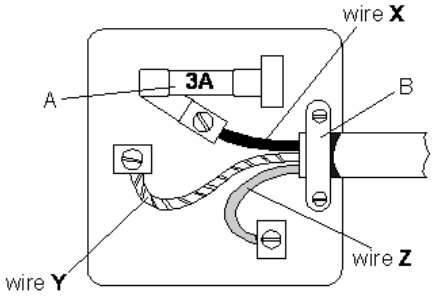
D. Potential Difference ☐

SECTION B

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

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

1. The diagram below shows an electric mains plug.



1.1 Name the parts of the plug labelled **A** and **B.**

[2 Marks]

A _____

B _____

1.2 Name the colour of each of the wires **X, Y** and **Z.**

[3 Marks]

X _____

Y _____

Z _____

1.3 Name a suitable material for the case of the plug.

[1 mark]

.....

.....

Electric fires have three wires connected in the plug. One is the live wire to feed electric current in, another is the neutral (return) wire.

1.4 What is the third wire called?

[1 mark]

.....

.....

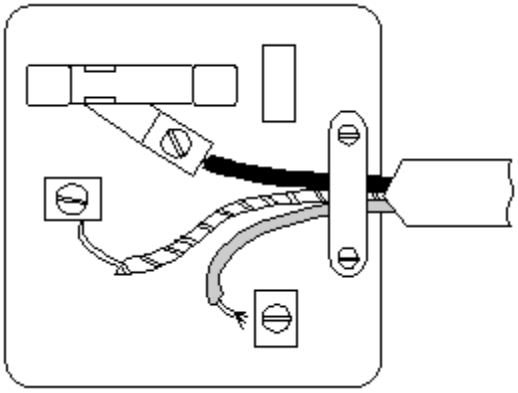
1.5 Why is it important that the third wire is also connected?

[1 mark]

.....

.....

1.6 The diagram below shows a badly wired mains plug.



Look at the plug carefully. What **four** changes should be made to make the plug safe?

[4 Marks]

Change **1**

.....

.....

Change **2**

.....

.....

Change **3**

.....

.....

Change **4**

.....

.....

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

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

1.1 Energy is transferred to consumers by the National Grid using an alternating potential difference.

What is meant by alternating potential difference?

[1 mark]

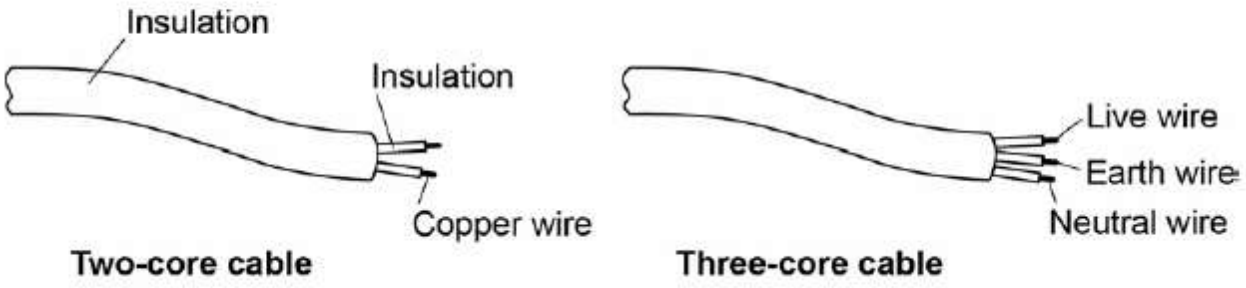
.....

.....

A clothes iron is a domestic appliance that is connected to the mains by a three-core cable.

Figure 2 shows a two-core cable and a three-core cable.

Figure 2



The different wires in each cable are covered with different colours of plastic insulation.

The live wire is covered in brown plastic insulation.

1.2 Why is it important that the live wire is always covered in the same colour of plastic insulation?

[1 mark]

.....

.....

.....

.....

1.3 Explain why a clothes iron with a metal base must be connected to the mains by a three-core cable.

[2 marks]

.....

.....

.....

.....

When the clothes iron is switched on the potential difference between the live wire and the neutral wire is 230 V.

1.4 Write down the equation that links current, potential difference and power.

[1 mark]

.....

.....

1.5 The current in the live wire is 9.0 A.

Calculate the power of the clothes iron.

[2 marks]

.....

.....

.....

.....

Power = ...W

FEEDBACK SHEET

Overall Mark:	**/24**	**GRADE ACHIEVED:**
Section A:	/5	**5** ☐ **1** ☐
Section B:	/12	**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: ELECTRICAL POWER

SPEC CHECK

Content	Achieved?
Students should be able to explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time: power= potential difference × current $P = V I$ power= current ^{2}× resistance $P = I^2 R$ power, P, in watts, W potential difference, V, in volts, V current, I, in amperes, A (amp is acceptable for ampere) resistance, R, in ohms, Ω	

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. Which description shows no work being done?

Tick **one** box only.

[1 Mark]

A. cycling to school ⬭

B. eating a pizza ⬭

C. leaning against a wall ⬭

D. using an LED torch ⬭

2. A car travels at 54 km/hour.

What is the speed of the car?

Tick **one** box only.

[1 Mark]

A. 0.15 m/s ⬭

B. 1.5 m/s ⬭

C. 15 m/s ⬭

D. 150 m/s ⬭

3. Four students **A**, **B**, **C** and **D** are discussing power. Which student has a correct idea about power?

Tick **one** box only.

[1 Mark]

A. Power is how quickly charge flows.

B. Power is the energy used. ⬭

C. Power is the rate at which energy is transferred. ⬭

D. Power is the rate at which resistance increases. ⬭

4. Which correctly describes an electrical current? ⬭

[1 Mark]

Tick **one** box only.

A. Rate of flow of charge ⬭

B. Rate of flow of coulombs ⬭

C. Rate of flow of energy ⬭

D. Rate of flow of potential difference ⬭

5. Which situation provides 10 W of power?

Situation	Energy (J)	Time (s)
P	1200	120
Q	600	60

Tick **one** box only.

[1 Mark]

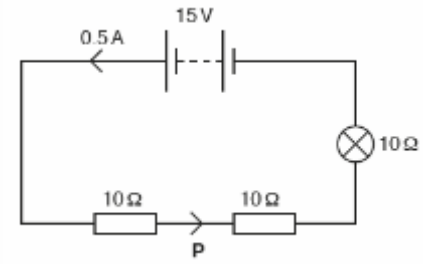
A. Neither P nor Q ⬭

B. Situation P only ⬭

C. Situation Q only ⬭

D. Situations P and Q ⬭

6. What is the current at point P in the circuit?



Tick **one** box only.

[1 Mark]

A. 0.5 A ⬭

B. 7.5 A ⬭

C. 15.0 A ⬭

D. 20.5 A ⬭

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 7 shows a person using an electric lawn mower.

Figure 7

1.1 The lawn mower is connected to the mains electricity supply.

What is the frequency of the mains electricity supply in the UK?

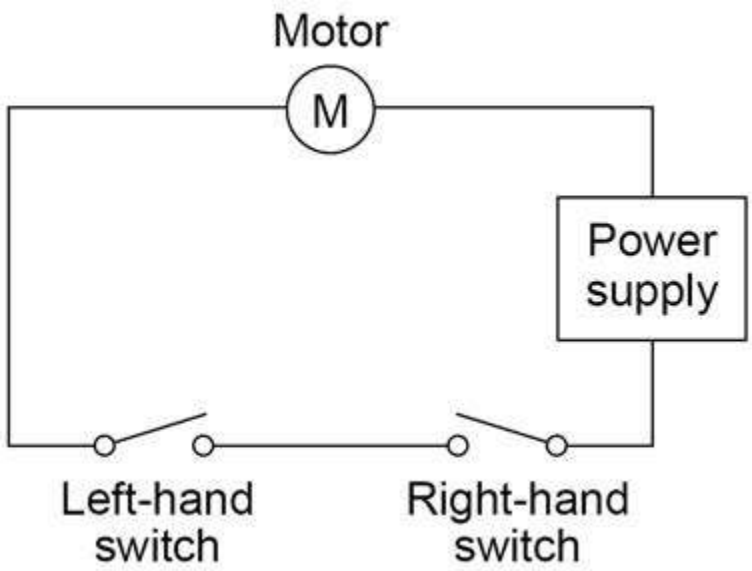
[2 marks]

Frequency =..... Unit: .....

The lawn mower has a switch on each side of the handle.

Figure 8 shows the circuit diagram for the lawn mower.

Figure 8



1.2 The motor in the lawn mower can only be turned on when the person using it holds the handle of the lawn mower with both hands.

Explain why.

[2 marks]

.....

.....

.....

.....

1.3 The power input to the motor is 1.8 kW

The resistance of the motor is 32 Ω

Calculate the current in the motor.

[3 marks]

.....

.....

.....

.....

.....

.....

Current = ... A

1.4 The useful power output from the motor is 1.5 kW

Calculate the time it takes for the motor to transfer 450 000 J of useful energy.

[3 marks]

.....

.....

.....

.....

Time = ... seconds

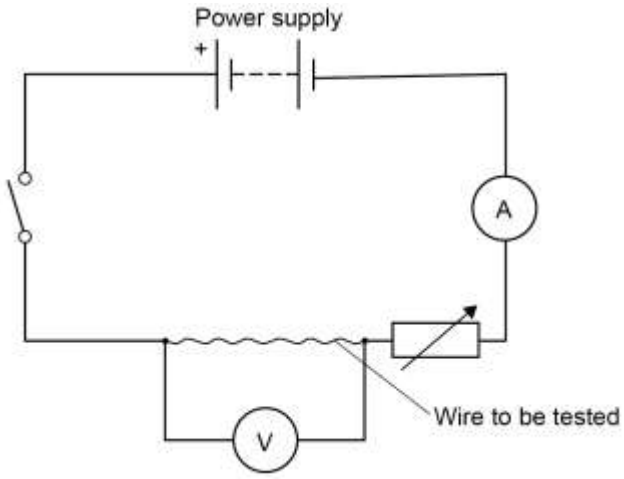
SECTION C

This is a revision question to consolidate your understanding.

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

1. The circuit in **Figure 5** is used to take measurements to determine the resistance of a wire.

Figure 5



The method for the experiment is:

- Use the variable resistor to set the potential difference (pd) across the wire to 0.5 V
- Record the current in amps
- Increase the pd to 1.0 V and record the current in amps
- Repeat the process at 0.5 V intervals up to a pd of 4.0 V.

1.1 What are the control variables in the experiment?

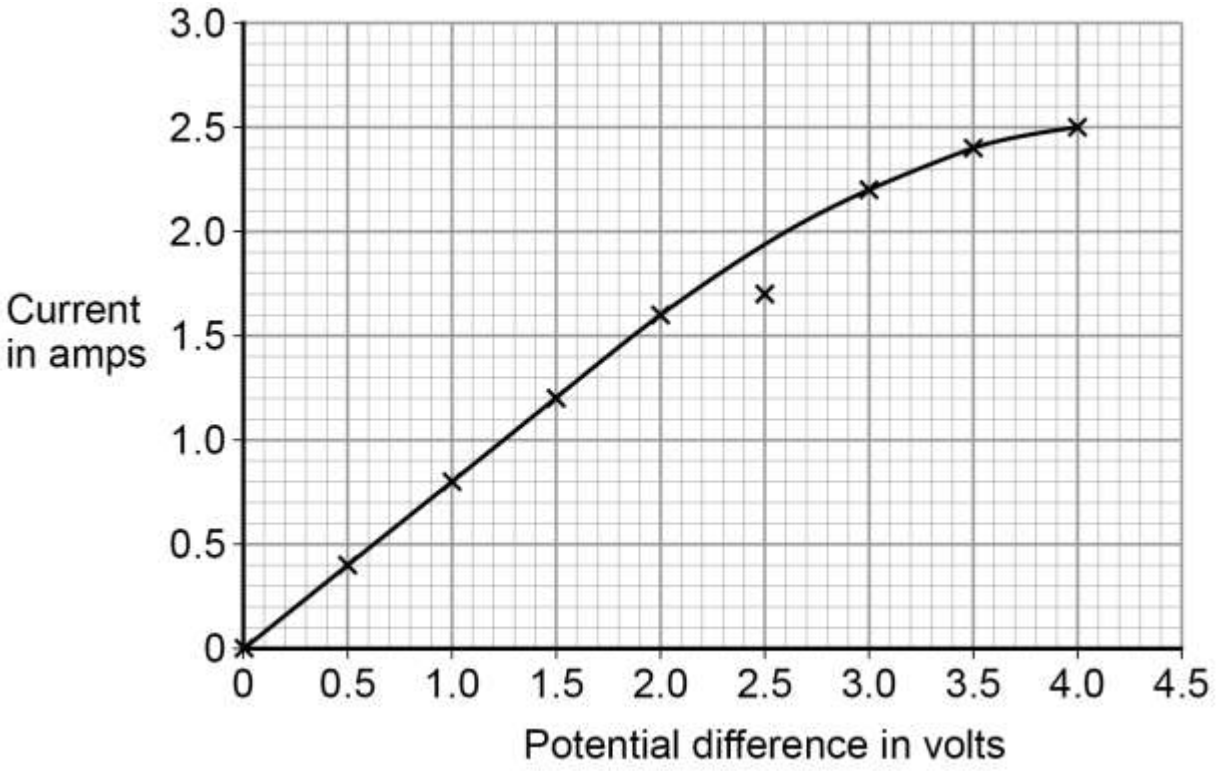
Tick **two** boxes.

[2 marks]

Current through the wire	☐
Length of the wire	☐
Material of the wire	☐
pd across the wire	☐
Resistance of the variable resistor	☐

Figure 6 shows the results of the experiment.

Figure 6



1.2 One result is anomalous.

Suggest one reason for this anomalous result.

[1 mark]

.....

.....

1.3 Explain how **Figure 6** shows that resistance does not remain constant.

[2 marks]

.....

.....

Resistance is calculated using the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

1.4 Calculate the change in resistance of the wire between a pd of 2.0 V and a pd of 4.0 V.

Use data from **Figure 6**.

[4 marks]

.....

.....

Resistance at 2.0 V = ...

.....

.....

Resistance at 4.0 V = ...

.....

.....

Change in resistance = ... Ω

1.5 Why has the resistance changed?

Tick **one** box.

[1 mark]

The wire has become thinner. ☐

The wire has cooled down. ☐

The wire has expanded. ☐

The wire has heated up. ☐

FEEDBACK SHEET

Overall Mark:	**/26**
Section A:	/6
Section B:	/10
Section C:	/10

GRADE ACHIEVED:

5 ☐ **1** ☐

4 ☐ **U** ☐

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 3: ELECTRICAL ENERGY

SPEC CHECK

Content	Achieved?
Everyday electrical appliances are designed to bring about energy transfers. The amount of energy an appliance transfers depends on how long the appliance is switched on for and the power of the appliance. Students should be able to describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices. Work is done when charge flows in a circuit. The amount of energy transferred by electrical work can be calculated using the equation: energy transferred = power× time E = P t energy transferred= charge flow × potential difference E = Q V energy transferred, E, in joules, J power, P, in watts, W time, t, in seconds, s charge flow, Q, in coulombs, C potential difference, V, in volts, V Students should be able to explain how the power of a circuit device is related to: The potential difference across it and the current through it The energy transferred over a given time. Students should be able to describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.	

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. Which of the following is a definition for specific heat capacity in physics?

Tick **one** box only.

[1 Mark]

A. Energy needed to increase the temperature of 1 g of material by 1 °C. ☐

B. Energy needed to increase the temperature of 1 kg of material by 1 °C. ☐

C. Energy needed to increase the temperature of 1 g of material by 10 °C. ☐

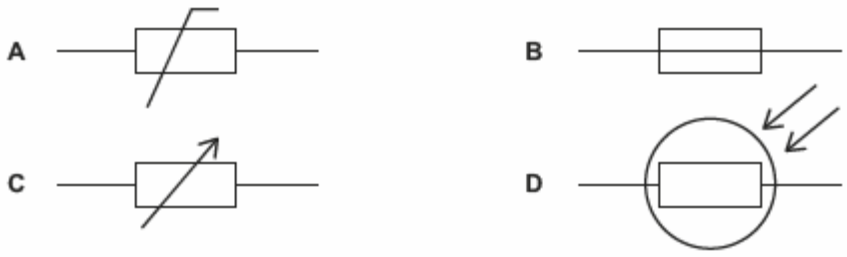
D. Energy needed to increase the temperature of 1 kg of material by 10 °C. ☐

2. A student wishes to draw a diagram of a circuit she has created.

Which diagram **A**, **B**, **C** or **D** shows the circuit symbol for a variable resistor?

Circle the correct answer.

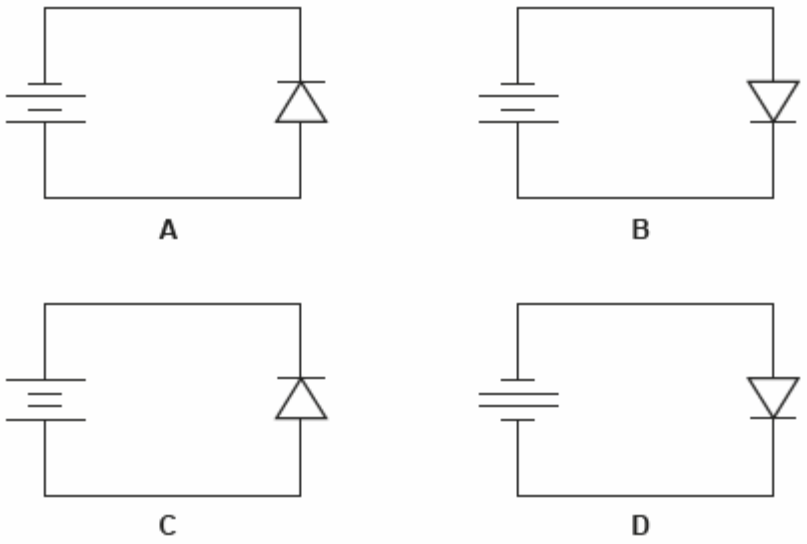
[1 Mark]



3. In which circuit would a current flow?

Circle the correct answer.

[1 Mark]



4. Which of the following is the same speed as 7.2 km / h?

Tick **one** box only.

[1 Mark]

A. 2.0 m / s ☐

B. 20.0 m / s ☐

C. 25.9 m / s ☐

D. 120.0 m / s ☐

5. A student is heating substances in four identical beakers A, B, C and D. Some information about the contents of the beakers is shown below.

Which beaker requires the greatest amount of energy to raise the temperature of its contents by 1 °C?

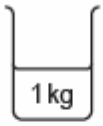
Circle the correct answer.

[1 Mark]

A

Specific heat capacity = 4200 J/kg °C

B



Specific heat capacity = 4200 J/kg °C

C

Specific heat capacity = 2000 J/kg °C

D

Specific heat capacity = 2000 J/kg °C

6. A student lifts four different objects onto a set of shelves.

Which object gains the most gravitational potential energy?

Circle the correct answer.

[1 Mark]

Object	Mass (kg)	Height lifted (m)
A	0.1	2.2
B	0.3	1.5
C	0.4	1.7
D	0.5	2.0

SECTION B

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

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

1. The circuit diagram shows a 50 W heater connected to a four-cell battery (**Figure 1**).

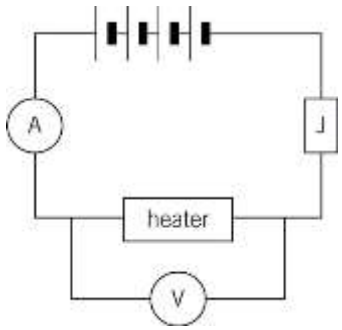


Figure 1

1.1 Calculate the potential difference of the battery. Each cell is 3.5 V.

[2 Marks]

.....

.....

Potential Difference: V

1.2 Calculate the current flowing through the heater.

[3 Marks]

.....

.....

.....

.....

Current: ..... A

1.3 Write down the equation that links energy transferred, power, and time.

[1 Mark]

.....

.....

1.4 Calculate the energy transferred to the heater when it is used for 10 minutes.

[3 Marks]

.....

.....

.....

.....

Energy Transferred: .....J

1.5 A student investigated the energy being transferred using the joulemeter (J).
The reading on the joulemeter was always 20 J lower than the calculated value.
Name the type of error in the investigation.

[1 Mark]

.....

.....

SECTION C

This is a revision question to consolidate your understanding.

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

1. Many electrical appliances are connected to the mains supply using a three-core cable and a three-pin plug.

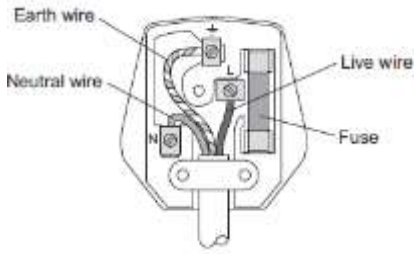
1.1 Use the correct answer from the box to complete the sentence.

[1 Mark]

charge	**energy**	**power**

Electric current is the rate of flow of _____ .

The diagram shows a three-pin plug connected to a three-core cable.



1.2 The three wires of the three-core cable have different coloured coverings.

State the colour of the covering of the neutral wire.

[1 Mark]

.....

.....

1.3 Which **two** parts of the plug shown above protect the wiring of a circuit?

Tick **two** boxes.

[2 Marks]

	Tick (✓)
Earth wire	
Fuse	
Live wire	
Neutral wire	

Some electrical appliances are connected to the mains supply using a two-core cable and a three-pin plug. Appliances that are double insulated do not require all three wires.

1.4 What does 'double insulated' mean?

[1 Mark]

.....

.....

1.5 State which of the three wires is **not** required.

[1 Mark]

.....

.....

1.6 An electrical appliance is connected to a 20 V supply.

The current in the appliance is 3 A.

Calculate the power of the appliance.

[2 Marks]

.....

.....

Power = _____ W

1.7 Another electrical appliance is connected to a 20 V supply.

The appliance transfers 300 J of energy.

Calculate the charge.

Give the unit.

[3 Marks]

.....

.....

.....

.....

Charge = _____

Unit _____

FEEDBACK SHEET

Overall Mark:	**/27**	**GRADE ACHIEVED:**	
Section A:	/6	**5** ☐	**1** ☐
Section B:	/10	**4** ☐	**U** ☐
Section C:	/11	**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
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To improve further you need to:

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☐ 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: NATIONAL GRID

SPEC CHECK

Content	Achieved?
The National Grid is a system of cables and transformers linking power stations to consumers. Electrical power is transferred from power stations to consumers using the National Grid. Step-up transformers are used to increase the potential difference from the power station to the transmission cables then step-down transformers are used to decrease, to a much lower value, the potential difference for domestic use. Students should be able to explain why the National Grid system is an efficient way to transfer energy.	

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.

The following questions are based on electrical plugs and mains electricity.

A1. Which wire is connected to the longest pin the plug?

Tick only **one** answer.

A. Earth wire ☐

B. Live wire ☐

C. Neutral wire ☐

D. None of the above ☐

A2. Which wire is connected to the fuse the plug?

Tick only **one** answer.

A. Earth wire ☐

B. Live wire ☐

C. Neutral wire ☐

D. None of the above ☐

A3. Which wire is missing if the device is doubly insulated?

Tick only **one** answer.

A. Earth wire ☐

B. Live wire ☐

C. Neutral wire ☐

D. None of the above ☐

A4. Why do some devices have thick cables?

Tick only **one** answer.

A. Looks nicer. ☐

B. More durable. ☐

C. The device requires a high current. ☐

D. The device requires a high potential difference. ☐

A5. When is work done by an electrical device?

Tick only **one** answer.

A. When there is a potential difference. ☐

B. When charge flows in a circuit. ☐

C. When the device is 'switched' on. ☐

D. When the device is plugged into the mains. ☐

A6. Which wire is used to prevent electrocution?

Tick only **one** answer.

A. Earth wire ☐

B. Live wire ☐

C. Neutral wire ☐

D. None of the above ☐

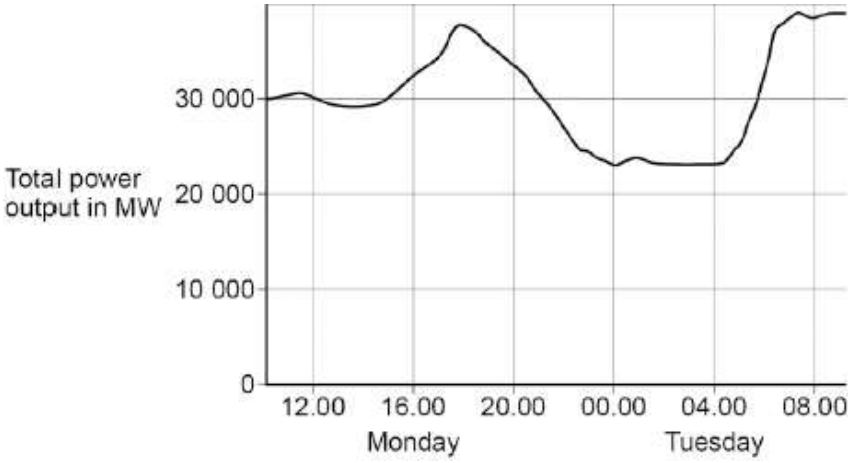
SECTION B

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

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

1. The National Grid ensures that the supply of electricity always meets the demand of the consumers.

The figure below shows how the output from fossil fuel power stations in the UK varied over a 24-hour period.



1.1 Suggest **one** reason for the shape of the graph between 15.00 and 18.00 on Monday.

[1 mark]

.....

.....

1.2 Gas fired power stations reduce their output when demand for electricity is low.

Suggest **one** time on the figure above when the demand for electricity was low.

[1 mark]

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.....

1.3 The National Grid ensures that fossil fuel power stations in the UK only produce about 33% of the total electricity they could produce when operating at a maximum output.

Suggest **two** reasons why.

[2 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. The table shows some information about electrical appliances in the home.

Appliance	Power (W)	Current (A)	Resistance (Ω)
Electric drill	800	3.48	66.1
Iron	2000	8.69	26.5
Kettle	2500	10.86	21.1
Security light	500	2.17	105.8
Toaster	1650	7.17	32.1

1.1 Use the table to describe the relationship between power and resistance.

[1 Mark]

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1.2 Explain this relationship. Use ideas about resistance in your answer.

[2 Marks]

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1.3 The security light is switched on for 45 minutes every day for 7 days.
Calculate the energy transferred in kWh.
Give your answer to 2 significant figures.

[4 Marks]

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.....

Answer = ... kWh

1.4 Explain the difference between direct potential difference and alternating potential difference.

[2 Marks]

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1.5 The electric drill does not need an earth wire.
Explain why.

[1 Mark]

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1.6 Mains electricity can be produced in a power station that burns coal.
An electric iron is plugged into the mains and switched on. The temperature of the iron increases.
Describe this process.
Use ideas about energy stores in your answer.

[3 Marks]

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FEEDBACK SHEET

Overall Mark:	**/23**	**GRADE ACHIEVED:**	
Section A:	/6	**5** ☐	**1** ☐
Section B:	/4	**4** ☐	**U** ☐
Section C:	/13	**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 5: AC AND DC

SPEC CHECK

Content	Achieved?
Mains electricity is an ac supply. In the United Kingdom the domestic electricity supply has a frequency of 50 Hz and is about 230 V. Students should be able to explain the difference between direct and alternating potential difference.	

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.

The following questions are based on electrical plugs and mains electricity.

A1. What is the mains potential difference in the UK?

Tick only **one** answer.

A. 0V ☐

B. 100V ☐

C. 230V ☐

D. 460V ☐

A2. What is the potential difference of a human standing on the Earth?

Tick only **one** answer.

A. 0V ☐

B. 100V ☐

C. 230V ☐

D. 460V ☐

A3. What is the potential difference in the earth wire?

Tick only **one** answer.

A. 0V ☐

B. 100V ☐

C. 230V ☐

D. 460V ☐

A4. Which material is **NOT** found in the plug?

Tick only **one** answer.

A. Brass ☐

B. Aluminium ☐

C. Copper ☐

D. Plastic ☐

A5. What colour is the neutral wire?

Tick only **one** answer.

A. Brown ☐

B. Blue ☐

C. Red ☐

D. Green and Yellow ☐

A5. What colour is the live wire?

Tick only **one** answer.

A. Brown ☐

B. Blue ☐

C. Red ☐

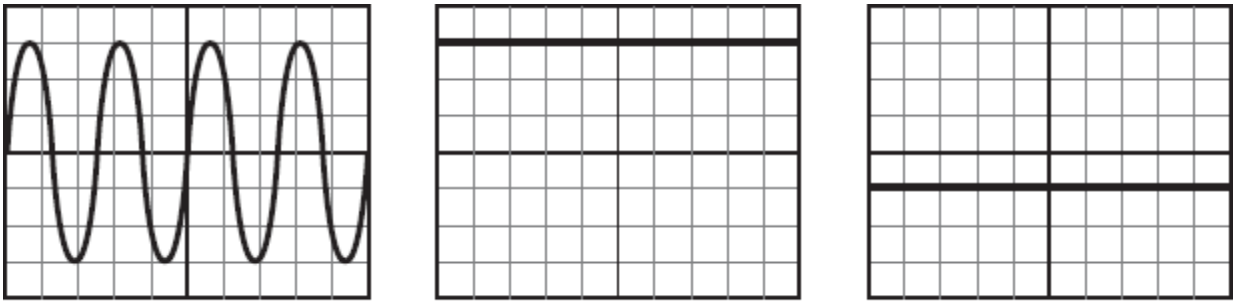
D. Green and Yellow ☐

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 The diagram shows the traces produced on an oscilloscope when it is connected across different electricity supplies.



Which of the traces could have been produced by the mains electricity supply?

[2 Marks]

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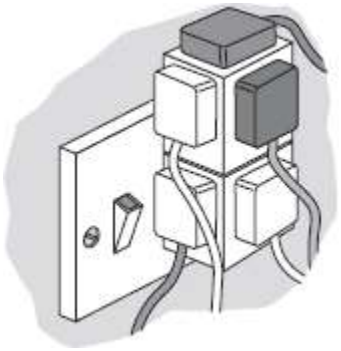
Give a reason for your answer.

.....

.....

1.2 The picture shows two adaptors being used to plug five electrical appliances into the same socket.



Explain why it is dangerous to have all five appliances switched on and working at the same time.

[2 Marks]

.....

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.....

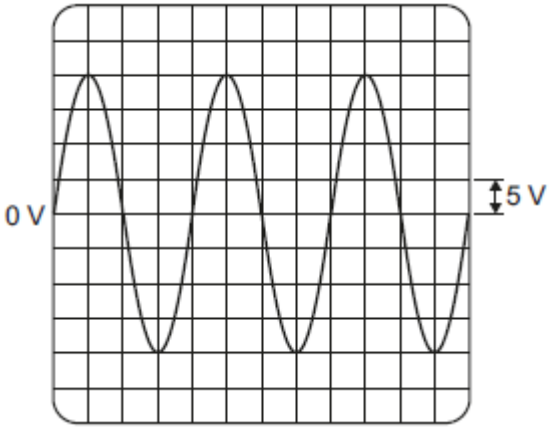
SECTION C

This is a revision question to consolidate your understanding.

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

1. Figure 1 shows the oscilloscope trace an alternating current (a.c.) electricity supply produces.

Figure 1



One vertical division on the oscilloscope screen represents 5 volts.

1.1 Calculate the peak potential difference of the electricity supply.

[1 Mark]

.....

.....

Peak potential difference = _____ V

1.2 Use the correct answer from the box to complete the sentence.

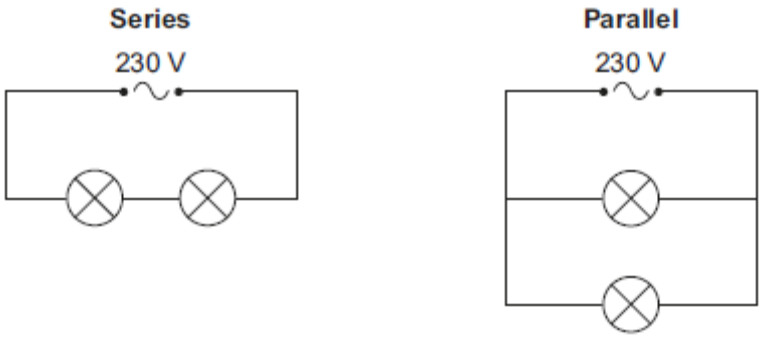
40	**50**	**60**

In the UK, the frequency of the a.c. mains electricity supply is _____ hertz.

[1 Mark]

Figure 2 shows how two lamps may be connected in series or in parallel to the 230 volt mains electricity supply.

Figure 2



1.3 Calculate the potential difference across each lamp when the lamps are connected in **series**.

The lamps are identical.

[1 Mark]

.....

.....

Potential difference when in series = _____ V

1.4 What is the potential difference across each lamp when the lamps are connected in **parallel**?

Tick **one** box.

[1 Mark]

115 V ☐ 230 V ☐ 460 V ☐

1.5 Give **one** advantage of connecting the lamps in parallel instead of in series.

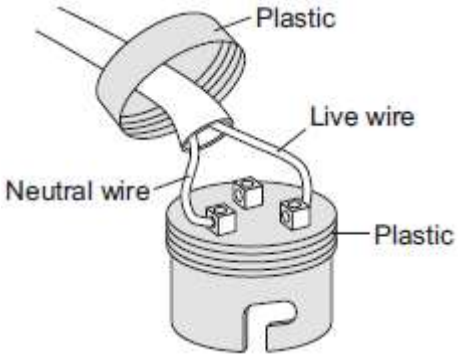
[1 Mark]

.....

.....

1.6 Figure 3 shows the light fitting used to connect a filament light bulb to the mains electricity supply.

Figure 3



The light fitting does **not** have an earth wire connected.

Explain why the light fitting is safe to use.

[2 marks]

.....

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1.7 A fuse can be used to protect an electrical circuit.

Name a different device that can also be used to protect an electrical circuit.

[1 Mark]

.....

.....

FEEDBACK SHEET

Overall Mark:	/18	**GRADE ACHIEVED:**	
Section A:	/6	**5** ☐	**1** ☐
Section B:	/4	**4** ☐	**U** ☐
Section C:	/8	**3** ☐	
		2 ☐	

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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	$\text{period} = \frac{1}{\text{frequency}}$	
7	$\text{magnification} = \frac{\text{image height}}{\text{object height}}$	
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	**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.