

Name:

Date:

P2 - Test 1
ELECTRICITY
Beginner

GCSE

PHYSICS

AQA - Combined Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

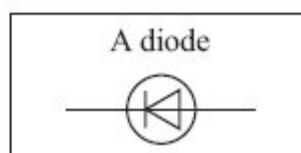
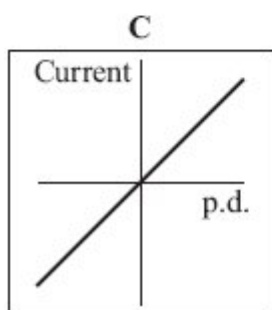
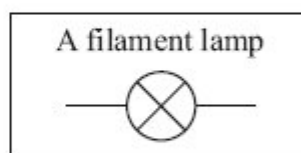
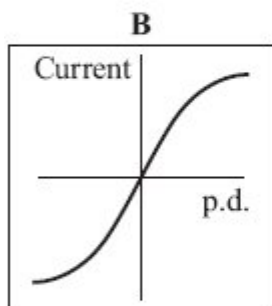
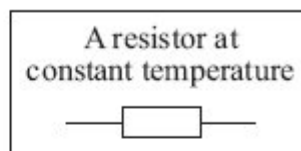
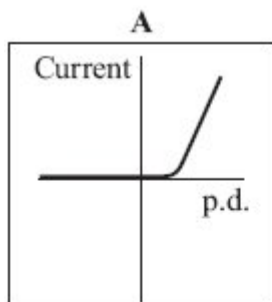
- The marks for the questions are shown in brackets

1.

- (a) The graphs, **A**, **B** and **C**, show how the current through a component varies with the potential difference (p.d.) across the component.

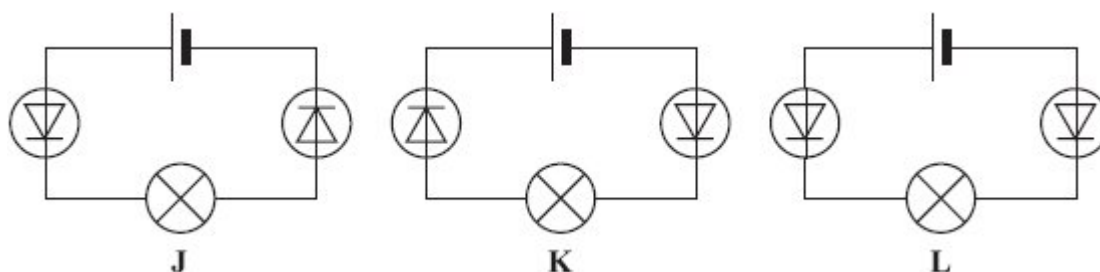
Draw a line to link each graph to the correct component.
Draw only **three** lines.

Component



(2)

- (b) Each of the circuits, **J**, **K** and **L**, include two diodes.



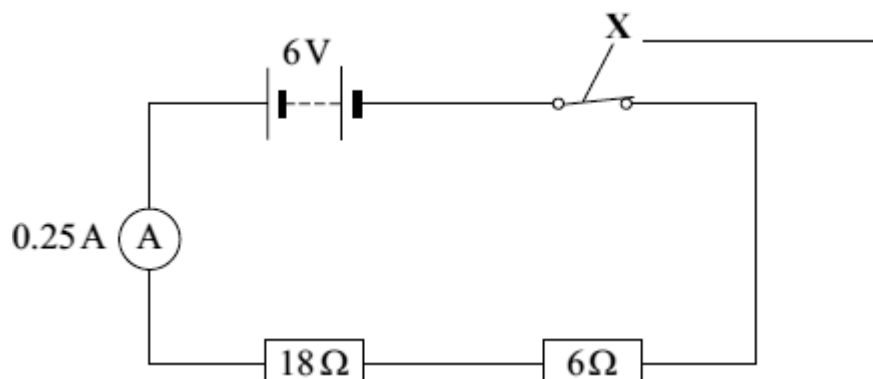
In which **one** of the circuits, **J**, **K** or **L**, would the filament lamp be on?

(1)

(Total 3 marks)

2.

A circuit diagram is shown below.



- (a) Use a word from the box to label component **X**.

fuse	switch	thermistor
------	--------	------------

(1)

- (b) Calculate the total resistance of the two resistors in the circuit.

Total resistance = _____ Ω

(1)

- (c) The reading on the ammeter is 0.25 A.

The current through the 6 Ω resistor will be:

bigger than 0.25 A **equal to 0.25 A** **smaller than 0.25 A**

Draw a ring around your answer

(1)

- (d) The 6 V battery is made by correctly joining several 1.5 V cells in series.

Calculate the number of cells needed to make the battery.

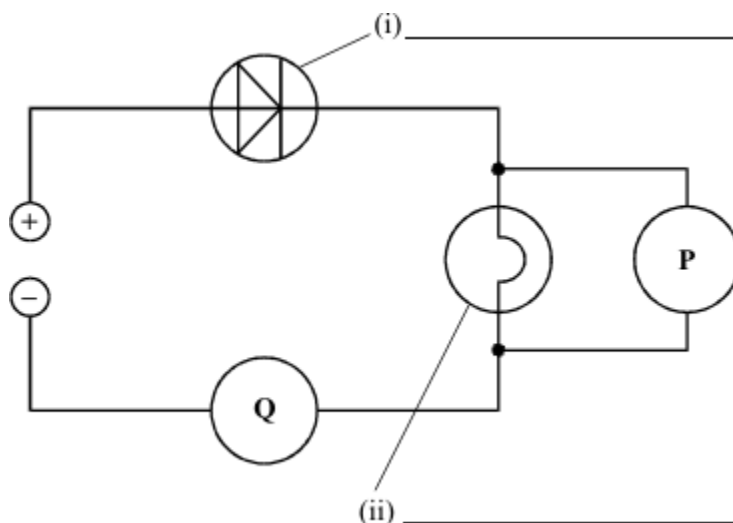
Number of cells = _____

(1)

(Total 4 marks)

3.

The diagram shows an electrical circuit.



- (a) Complete the two labels on the diagram.

(2)

- (b) **P** and **Q** are meters.

What is meter **P** measuring? _____

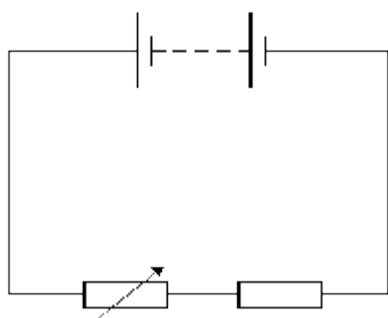
What is meter **Q** measuring? _____

(2)

(Total 4 marks)

4.

- (a) The diagram shows a simple circuit. Add an ammeter and a voltmeter to the circuit to show how to measure the current through the fixed resistor and the voltage across it.

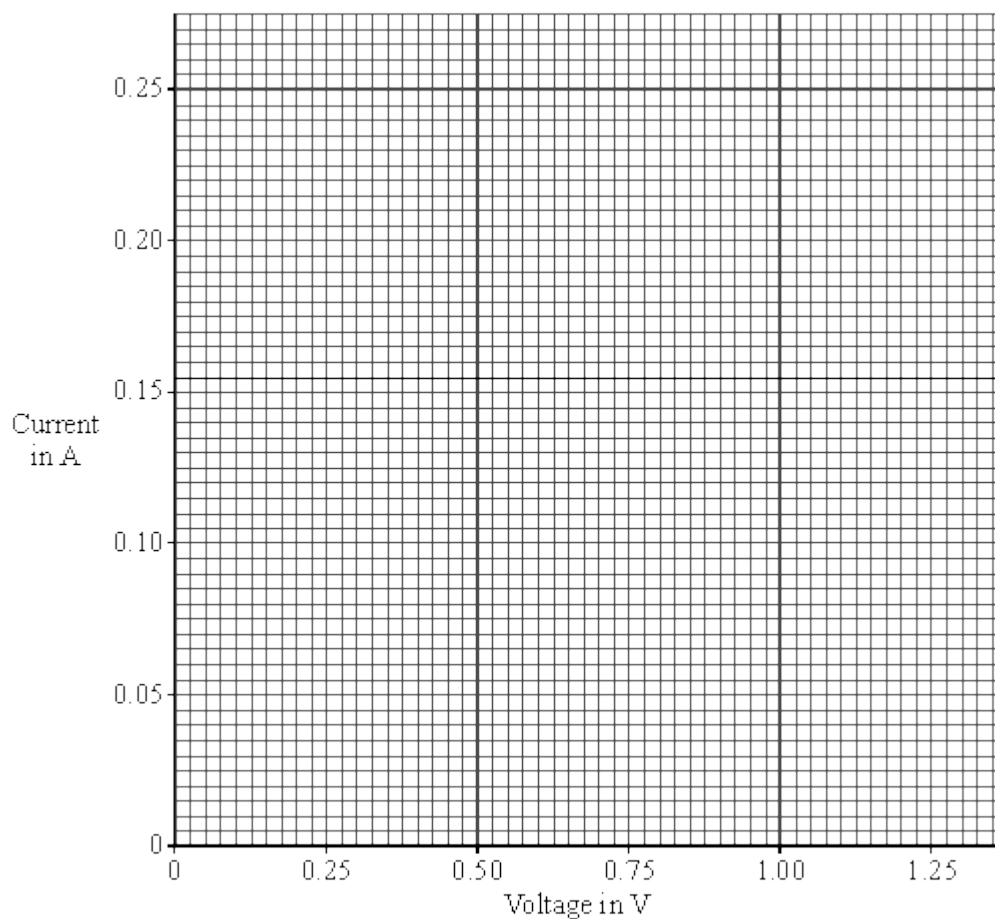


(2)

- (b) An experiment using a circuit like the one above was set up. The following results were obtained when the resistance of the variable resistor was decreased.

- (i) Draw a graph of the results below.

Voltage across fixed resistor in volts	Current in amps
0.50	0.10
0.75	0.15
1.00	0.20
1.25	0.25



(2)

- (ii) Use the graph to find the voltage when the current is 0.05 A.

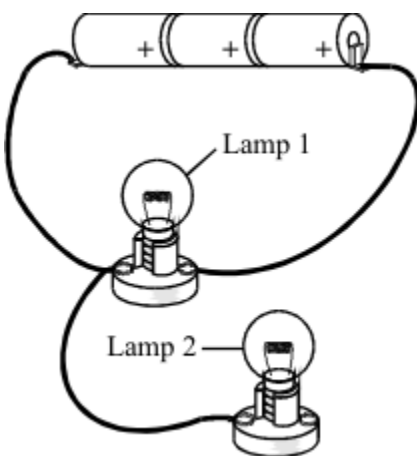
Voltage = _____ V

(1)

(Total 5 marks)

5.

The drawing shows three identical cells and two identical lamps joined in a circuit.



- (a) Use the correct symbols to draw a circuit diagram for this circuit.

(3)

- (b) Each of the cells provides a potential difference (voltage) of 1.5 volts. What is the total potential difference (voltage) provided by all three cells?

_____ volts

(1)

- (c) Complete this sentence by crossing out the **two** lines in the box that are wrong.

The current through lamp 2 will be

smaller than
the same as
bigger than

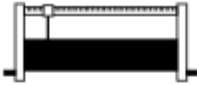



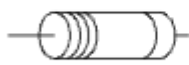



the current through lamp 1.

(1)

(Total 5 marks)

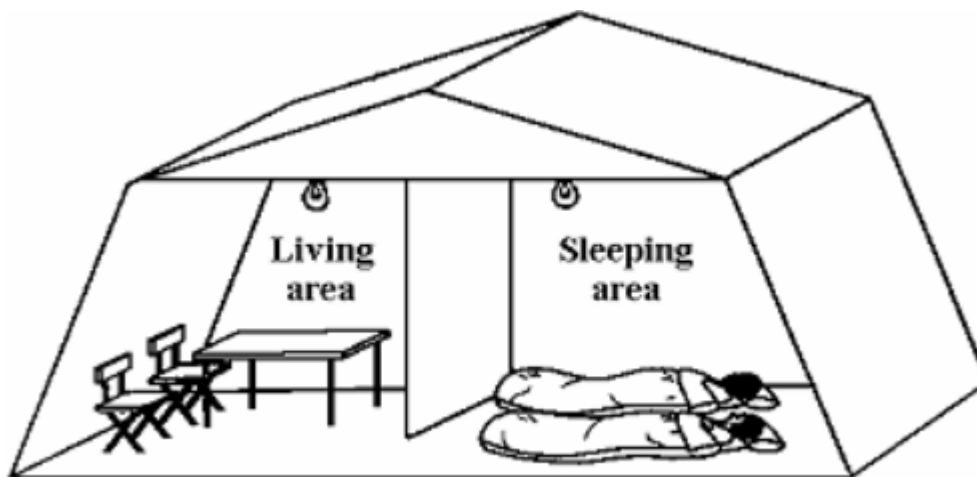
6.

- (a) Draw lines to join the picture to the correct circuit symbol. The lamp has been done for you.

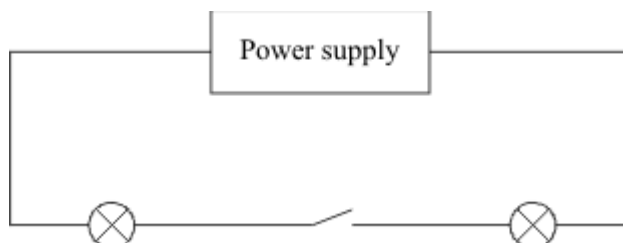
Variable resistor		
Diode		
Resistor		
Lamp		

(2)

- (b) A family tent is to be fitted with a simple lighting circuit.



The diagram shows the first circuit used.



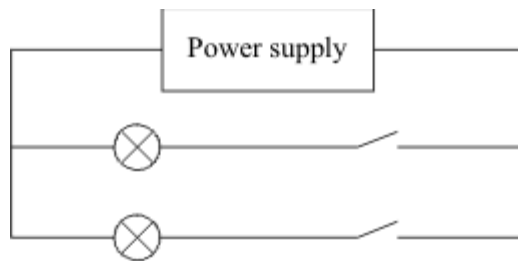
- (i) Are the lamps connected in series or in parallel?

(1)

- (ii) This is not a good circuit for using in the tent. Why?

(1)

The diagram shows the second circuit used.



- (iii) Give **two** reasons why this circuit is better than the first circuit.

1. _____

2. _____

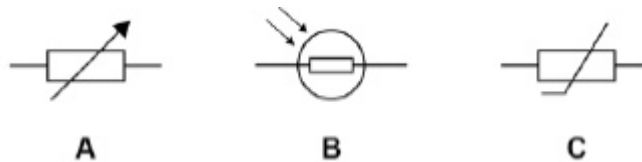
(2)

(Total 6 marks)

7.

Figure 1 shows the circuit symbol for three different components.

Figure 1



- (a) Which component is a variable resistor?

Tick **one** box.

A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input type="checkbox"/>
---	--------------------------	---	--------------------------	---	--------------------------

(1)

(b) Which component is a thermistor?

Tick **one** box.

A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input type="checkbox"/>
---	--------------------------	---	--------------------------	---	--------------------------

(1)

(c) In which component will the resistance decrease when the temperature increases?

Tick **one** box.

A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input type="checkbox"/>
---	--------------------------	---	--------------------------	---	--------------------------

(1)

(d) In which component will the resistance decrease when the light intensity increases?

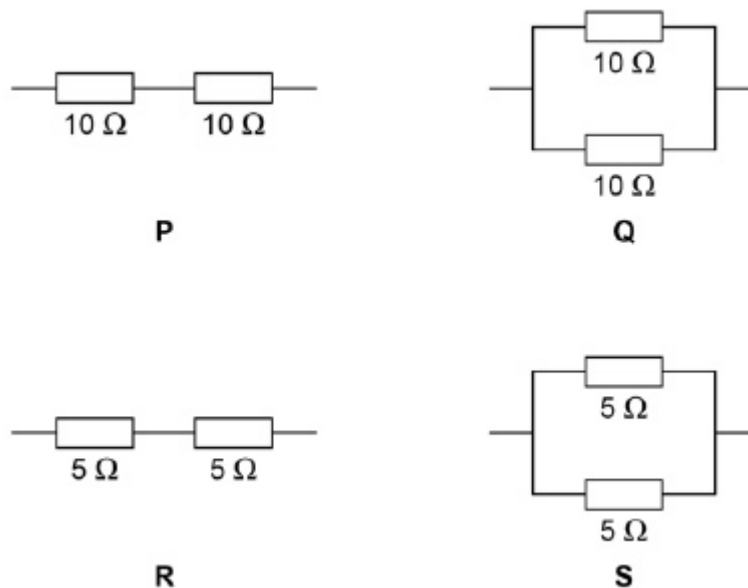
Tick **one** box.

A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input type="checkbox"/>
---	--------------------------	---	--------------------------	---	--------------------------

(1)

Figure 2 shows four different arrangements of resistors.

Figure 2



- (e) Two of the arrangements are in series and two are in parallel.

Describe the difference between a series and a parallel arrangement.

(2)

- (f) Which arrangement has a resistance of $10\ \Omega$?

Tick **one** box.

P	<input type="checkbox"/>	Q	<input type="checkbox"/>	R	<input type="checkbox"/>	S	<input type="checkbox"/>
---	--------------------------	---	--------------------------	---	--------------------------	---	--------------------------

(1)

- (g) Which arrangement has the highest resistance?

Tick **one** box.

P	<input type="checkbox"/>	Q	<input type="checkbox"/>	R	<input type="checkbox"/>	S	<input type="checkbox"/>
---	--------------------------	---	--------------------------	---	--------------------------	---	--------------------------

(1)

- (h) A student connects a resistor to a cell for 60 seconds.

The current through the resistor is 0.97 A

Calculate the charge flow.

Use the equation:

$$\text{charge flow} = \text{current} \times \text{time}$$

Give your answer to 2 significant figures.

Charge flow = _____ C

(3)

(Total 11 marks)

8.

Most electrical appliances are connected to the mains electricity using three-core cables.

- (a) What is the approximate value of the potential difference of the UK mains electricity supply?

Tick **one** box.

23 V

☐

230 V

☐

300 V

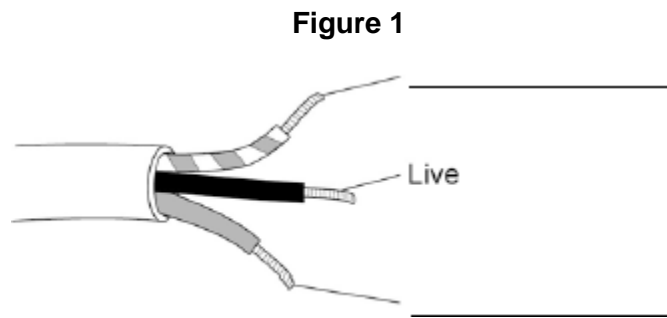
☐

350 V

☐

(1)

- (b) **Figure 1** shows a three-core cable.



Use answers from the box to label the wires and complete **Figure 1**.

Earth	Negative	Neutral
--------------	-----------------	----------------

(2)

- (c) In the UK the three wires in a three-core cable are always the same colours.

Why are the wires always the same colours?

Tick **one** box.

Each wire is made by a different company.

☐

It is easy to identify each wire.

☐

They are cheaper to manufacture.

☐

(1)

- (d) Touching the live wire is dangerous.

Use answers from the box to complete the sentences.

current	resistance	shock	force	voltage
----------------	-------------------	--------------	--------------	----------------

Touching the live wire causes a large potential difference to exist across the body.

This causes a _____ through the body, which

results in an electric _____

(2)

- (e) What is the approximate frequency of the UK mains electricity supply?

Tick **one** answer.

50 Hz

☐

75 Hz

☐

100 Hz

☐

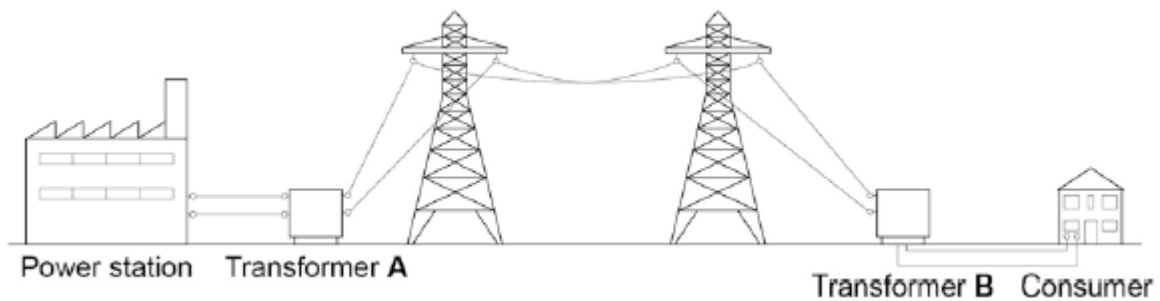
150 Hz

☐

(1)

- (f) **Figure 2** shows how power stations transfer electrical power to consumers using the National Grid.

Figure 2



The power station generates electricity at a voltage of 25 kV.

Transformer **A** increases the voltage by a factor of 16.

What is the voltage output of transformer **A**?

Output voltage = _____ kV

(2)

(g) Why is the voltage increased by transformer **A**?

Tick **one** box.

To reduce the energy lost due to heating

☐

To increase the power

☐

To increase the current

☐

(1)

(h) Why is it important that the voltage is decreased by transformer **B**?

Tick **one** box.

Less energy is used by consumers

☐

It is safer for consumers

☐

It reduces consumers' electricity bills

☐

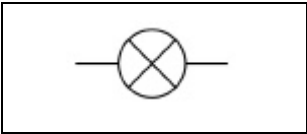
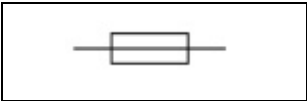
(1)

(Total 11 marks)

9.

Components can be connected in electrical circuits in different ways.

(a) Draw **one** line from each circuit symbol to the name of the component it represents.

Circuit symbol	Name of component
	cell
	diode
	fuse
	lamp
	variable resistor

(2)

(b) Complete the sentence.

Choose the answer from the box.

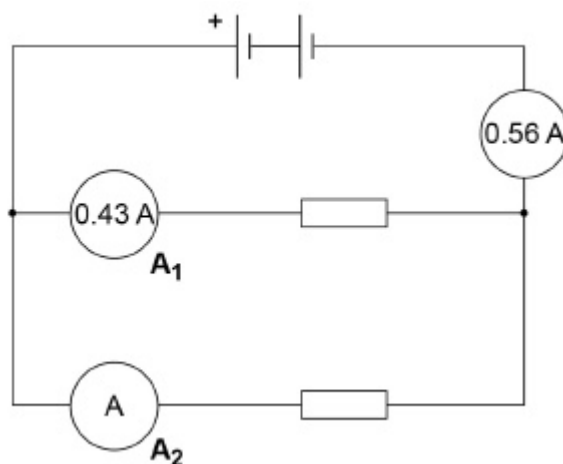
charge	energy	potential difference	resistance
--------	--------	----------------------	------------

Electric current is the rate of flow of _____.

(1)

Figure 1 shows a parallel circuit.

Figure 1



- (c) Calculate the current measured by ammeter **A₂**.

Current = _____ A

(1)

- (d) The circuit is connected for 300 s

The total current in the circuit stays at 0.56 A

Calculate the total charge flow.

Use the equation:

$$\text{charge flow} = \text{current} \times \text{time}$$

Charge flow = _____ C

(2)

- (e) The potential difference supplied by the battery is 4.5 V

Calculate the total energy transferred in 300 s

Use the equation:

$$\text{energy transferred} = \text{charge flow} \times \text{potential difference}$$

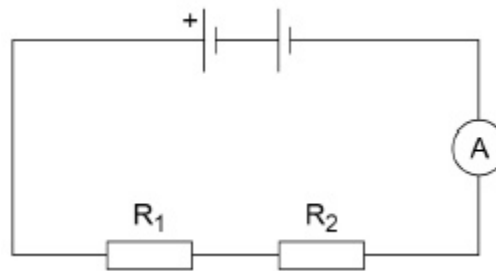
Use your answer to part (d).

Energy transferred = _____ J

(2)

- (f) **Figure 2** shows a series circuit.

Figure 2



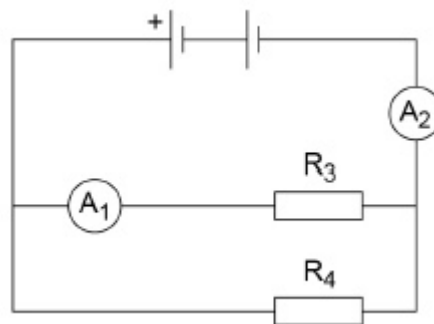
Resistor R_2 breaks.

What happens to the reading on the ammeter?

(1)

- (g) **Figure 3** shows a parallel circuit.

Figure 3



Resistor R_3 breaks.

What happens to the readings on the ammeter?

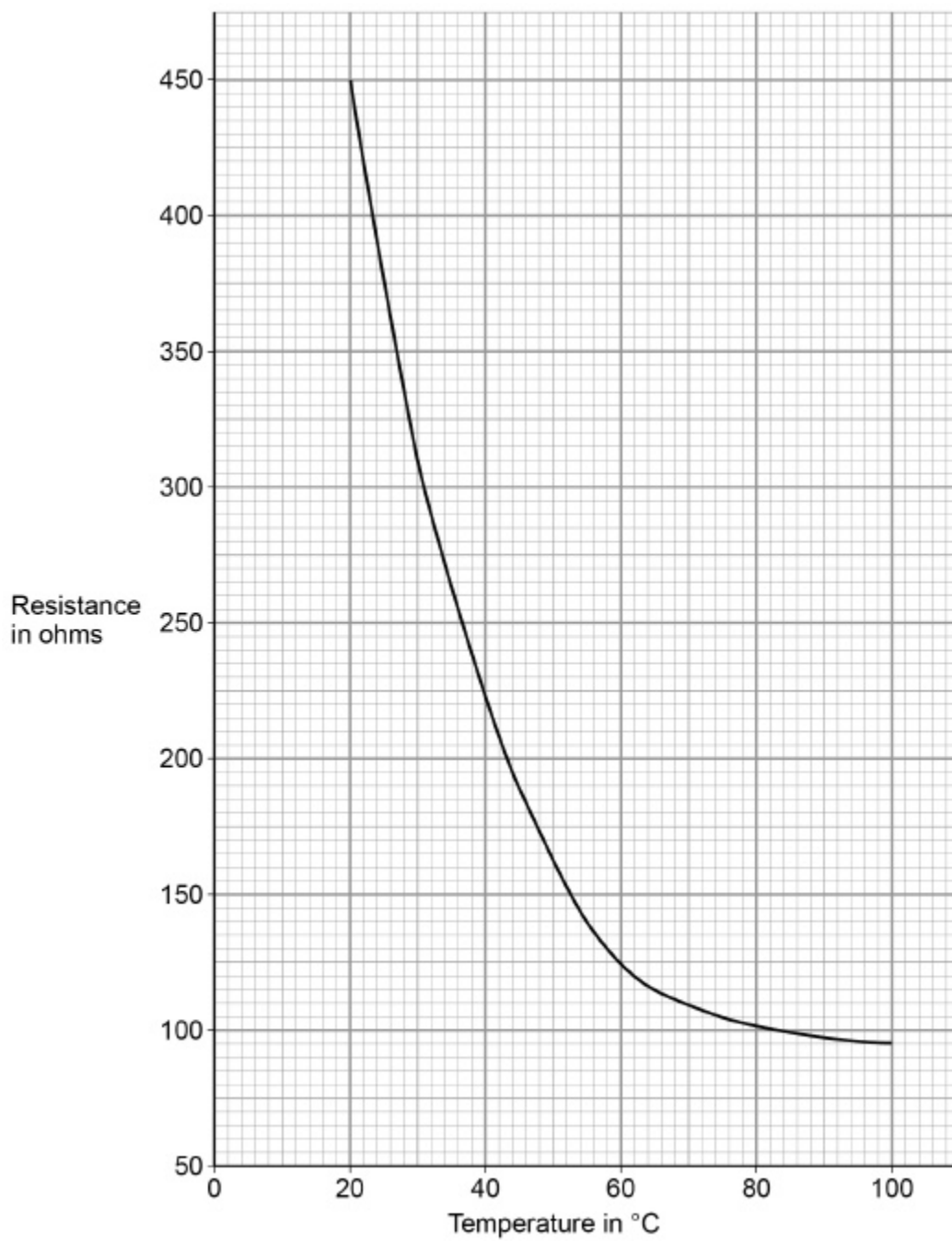
Ammeter A_1 _____

Ammeter A_2 _____

(2)

Figure 4 shows how the resistance of a component varies with temperature.

Figure 4



(h) What is the name of the component?

Tick **one** box.

LED

☐

LDR

☐

Resistor

☐

Thermistor

☐

(1)

(i) What is the resistance of the component at a temperature of 50 °C?

Resistance = _____ Ω

(1)

(Total 13 marks)

10.

Figure 1 shows the information label from a hairdryer.

Figure 1

50 Hz	230 V	2100 W
-------	-------	--------

(a) What is the power of the hairdryer?

Tick **one** box.

50 Hz

☐

230 V

☐

2100 W

☐

(1)

- (b) What is the equation which links current, potential difference and power?

Tick **one** box.

power = potential difference \times current

☐

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

☐

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

☐

(1)

- (c) The mains electricity supply in the UK is an alternating current (ac).

What is the frequency of the UK ac supply?

(1)

- (d) Some electrical appliances use batteries.

What type of current does a battery supply?

Tick **one** box.

Alternating current (ac) only

☐

Direct current (dc) only

☐

Both ac and dc

☐

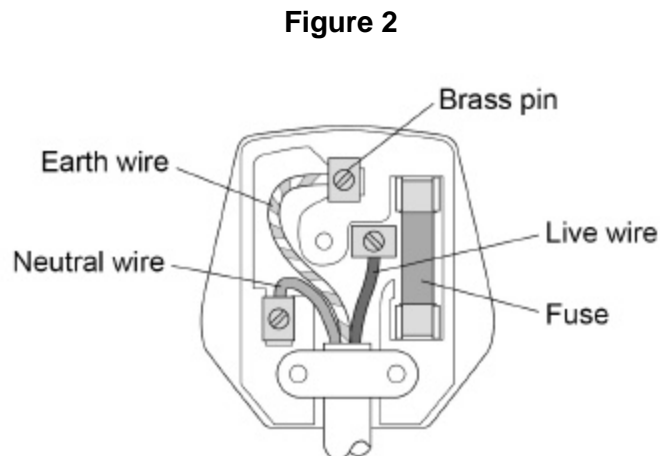
Not ac or dc

☐

(1)

The hairdryer is connected to the mains electricity supply by a plug.

Figure 2 shows the inside of a plug.



(e) Draw **one** line from each wire to the colour of insulation around the wire.

Wire	Colour of insulation around wire
	Blue
Live	Brown
	Green
Neutral	White
	Yellow

(2)

(f) The insulation around the Earth wire has two colours.

What are the **two** colours?

_____ and _____

(1)

- (g) Brass is an alloy of copper and zinc.

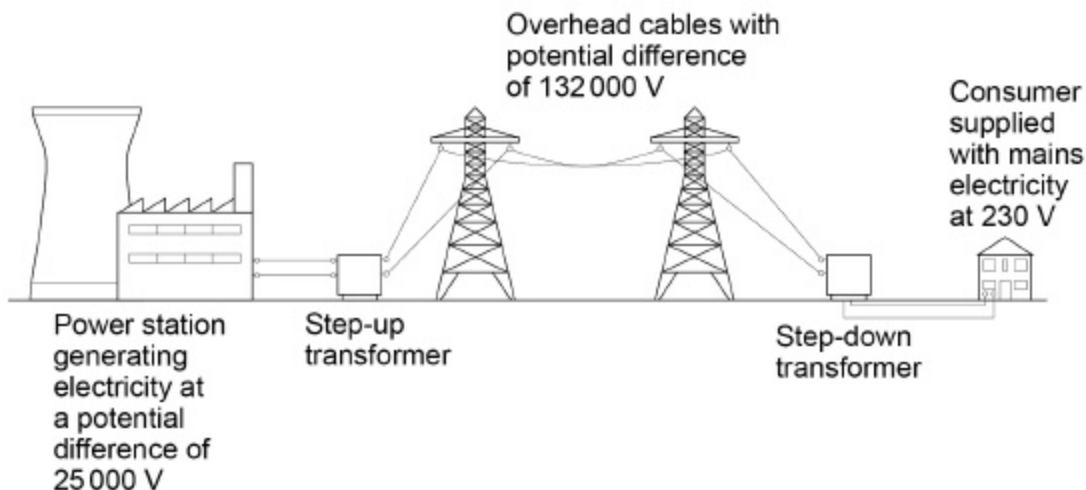
Give **two** properties of brass that make it suitable to use in the plug.

1. _____
2. _____

(2)

- (h) **Figure 3** shows how the National Grid links power stations to consumers.

Figure 3



Describe how electrical power is transferred from power stations to consumers by the National Grid.

(4)

(Total 13 marks)