

## IGCSE Physics - Section 2 - Electricity – practice exam questions.

### Question 1.

1 Mains electricity is used in circuits at home.

(a) Double insulation is needed for safety when there is

(1)

- A no circuit breaker
- B no earth connection
- C no fuse
- D no switch

(b) A fuse is used so that

(1)

- A an earth connection is not needed
- B the appliances are more efficient
- C the circuit cannot overheat if there is a fault
- D the user cannot touch a live wire

(c) Most lamps at home have their own switch.

This is because the lamps are connected

(1)

- A in parallel
- B in series
- C to a fuse
- D to an earth wire

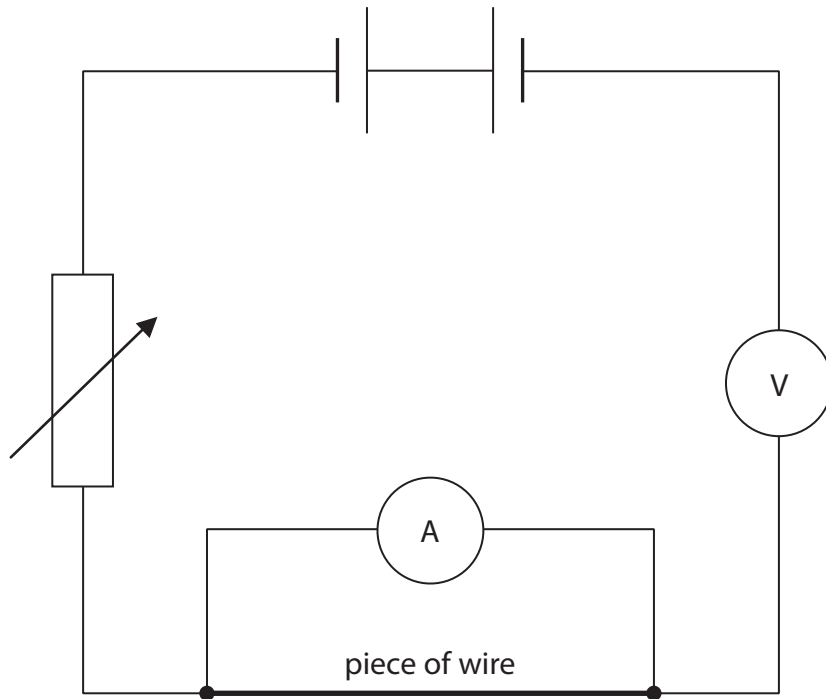
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**(Total for Question 1 = 3 marks)**

**Question 2.**

**10** A student plans to measure the resistance of a piece of wire.

He sets up this circuit and finds that it does not work.



(a) Identify the three errors in the student's circuit.

(3)

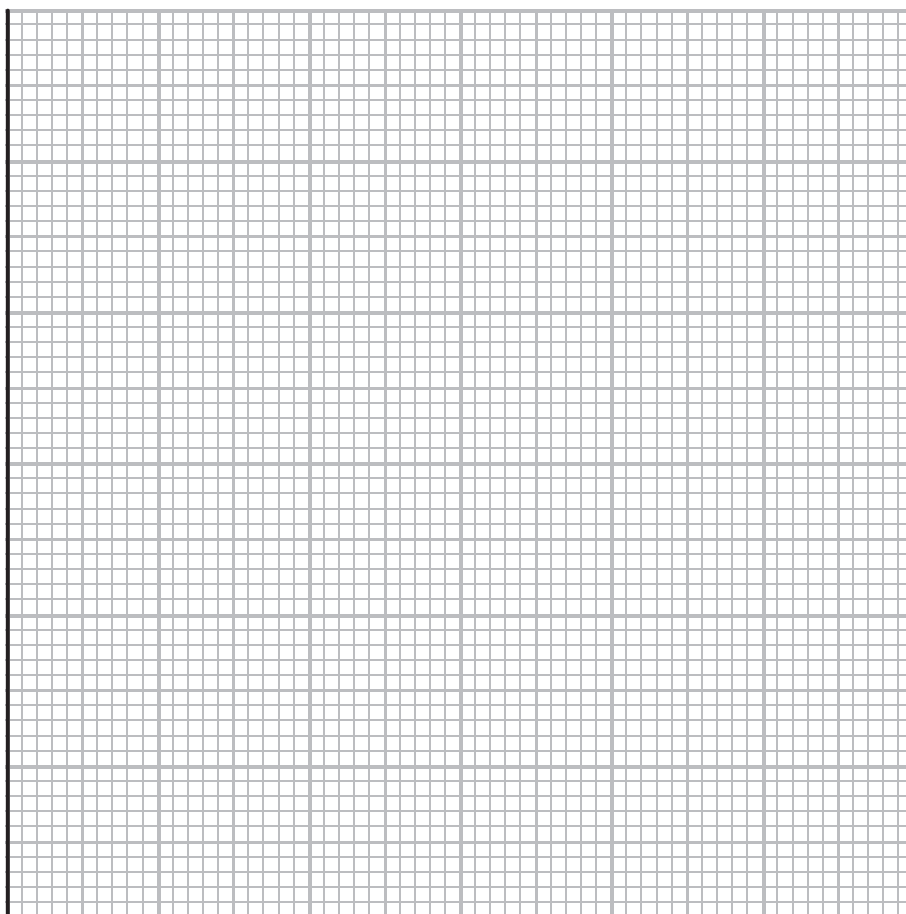
- 1.....
- 2.....
- 3.....

(b) The student uses a correct circuit to obtain these results.

Current in amps	Voltage in volts
0.00	0.0
0.24	1.5
0.71	4.5
0.89	6.0
1.00	7.5
1.10	9.0

(i) Plot a graph to show the relationship between current and voltage for the wire.

(5)



(ii) Find the current when the voltage is 2.5 V.

(1)

(iii) Suggest why the line on the graph curves.

(1)

(iv) Describe what else the student should do to find an accurate value for the resistance of the piece of wire at a constant temperature.

(4)

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**(Total for Question 10 = 14 marks)**

**Question 3.**

**3** The photograph shows a fuel delivery at a petrol station.



Source: Jeeferon Siegel, New York Daily News

(a) Explain how a fuel tanker can become electrically charged while it is moving.

(2)

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(b) Pumping fuel from an electrically-charged tanker can be dangerous.

(i) Describe a possible danger of pumping fuel from an electrically-charged tanker.

(1)

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(ii) The driver connects an earth wire to the fuel tanker before pumping fuel.

Explain how connecting the earth wire reduces the possible dangers.

(2)

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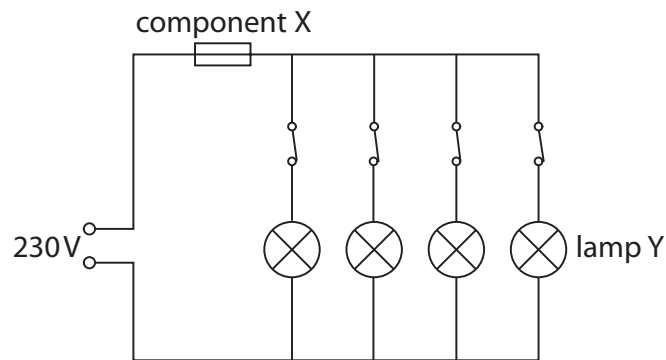
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**(Total for Question 3 = 5 marks)**

**Question 4.**

**3** The diagram shows a lighting circuit in a house.



(a) (i) Component X is

(1)

- A** a double insulated wire
- B** an earth connection
- C** a fuse
- D** a switch

(ii) The lamps are connected in parallel.

State an advantage of using a parallel circuit for lighting.

(1)

(b) The lighting circuit is connected to a mains supply that provides an alternating current.

Explain what is meant by an alternating current.

You may draw a diagram to help your answer.

(2)

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(c) Lamp Y is removed and replaced with a low-energy lamp.

When the low-energy lamp is connected to a 230 V supply, the current in it is 0.12 A.

(i) Calculate the amount of energy transferred by the low-energy lamp in 7 hours.

(3)

energy transferred = ..... J

(ii) The low-energy lamp gives the same amount of light as lamp Y, but uses much less power.

Which row of the table compares the low-energy lamp correctly to lamp Y?

(1)

	<b>Voltage across low-energy lamp compared to voltage across lamp Y</b>	<b>Current in low-energy lamp compared to current in lamp Y</b>
<input checked="" type="checkbox"/> <b>A</b>	less than	same as
<input checked="" type="checkbox"/> <b>B</b>	same as	less than
<input checked="" type="checkbox"/> <b>C</b>	less than	less than
<input checked="" type="checkbox"/> <b>D</b>	same as	same as

**(Total for Question 3 = 8 marks)**

**Question 5.**

**4** A kitchen has a water supply, an electricity supply and electric lighting.

There are several electrical appliances in the kitchen including a toaster, a kettle, a clothes iron, a microwave oven and a dishwasher.

Discuss three hazards of using electricity in this kitchen.

**(6)**

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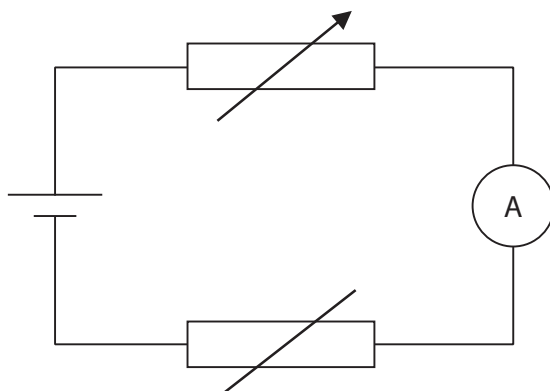
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**(Total for Question 4 = 6 marks)**



### Question 6.

14 A student investigates the current in a thermistor at different temperatures, using the circuit shown in the diagram.



(a) The student uses a voltmeter to check that the voltage across the thermistor stays constant throughout the investigation.

(i) Add this voltmeter to the circuit diagram.

(2)

(ii) Give a reason for keeping the voltage across the thermistor constant.

(1)

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(iii) Give a reason for including the variable resistor in the circuit.

(1)

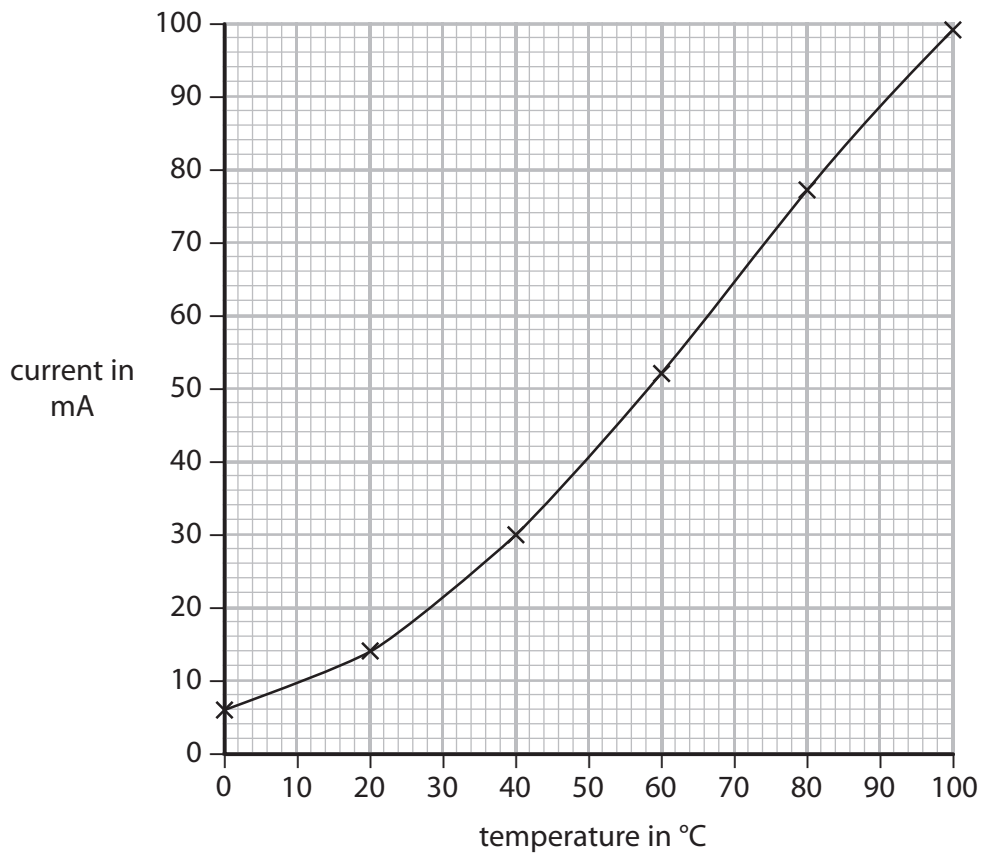
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(b) The student increases the temperature of the thermistor and records the current and temperature readings.

The graph shows the student's results.



The student plans to use his circuit to make an electronic thermometer.

He notices that both the scales on the graph go up to 100.

He thinks that the current reading, measured in mA, gives a direct indication of the temperature measured in °C.

He labels the ammeter's scale 'temperature in °C'.

Give three reasons why the student's electronic thermometer is unlikely to show the correct temperature.

You may use information from the circuit and the graph to support your answer.

(3)

1 .....

2 .....

3 .....

**(Total for Question 14 = 7 marks)**

### Question 7.

2 An electric kettle is connected to the 230 V mains supply.

The power of the kettle is 960 W.



(a) (i) A power of 960 watts is the same as

(1)

- A 960 joules per coulomb
- B 960 joules per second
- C 960 newtons per metre
- D 960 newtons per second

(ii) State the equation linking power, current and voltage.

(1)

(iii) Show that the current in the kettle is about 4 A.

(2)

(b) The 960 W kettle is earthed and fitted with a fuse.

(i) Explain how this can protect the person using the kettle if there is a fault.

(3)

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(ii) Another kettle has twice as much power.

It is connected to the same mains supply.

Which of these fuse ratings should be used for this kettle?

(1)

- A** 1 A
- B** 3 A
- C** 5 A
- D** 13 A

(c) A student has a pack of fuses labelled 2 A.

Explain how she could use one of these fuses to check that the label is correct.

You may draw a circuit diagram to help your answer.

(3)

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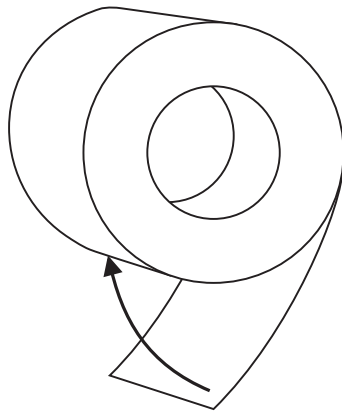
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**(Total for Question 2 = 11 marks)**



(b) The student lets go of the end of the tape and the charges cause it to move towards the roll.



Explain why the end of the tape moves back towards the roll.

(2)

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**(Total for Question 6 = 5 marks)**

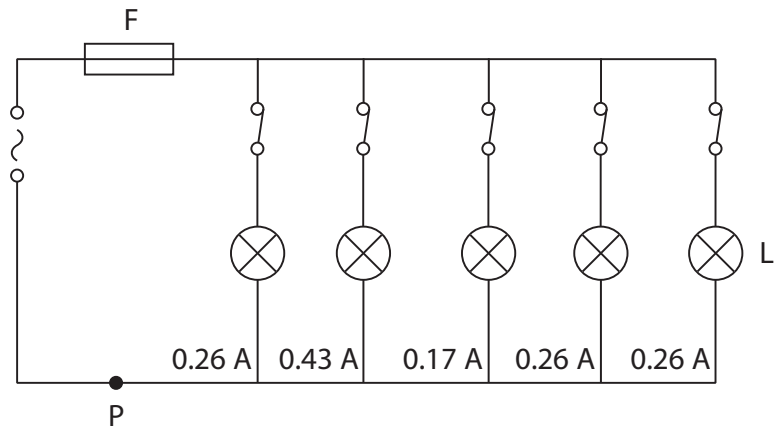
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**Question 9.**

**2** The diagram shows part of a lighting circuit in a house.

The circuit is protected by fuse F.



(a) Give two reasons why the lamps are wired in parallel.

(2)

1 .....

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2 .....

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(b) What is the current at P?

(1)

**A** 0.17 A

**B** 0.26 A

**C** 0.43 A

**D** 1.38 A

(c) Explain how the fuse protects the circuit.

(3)

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(d) (i) State the equation linking power, current and voltage.

(1)

(ii) Calculate the power of lamp L.  
[assume the mains voltage is 230 V]

(2)

power = ..... W

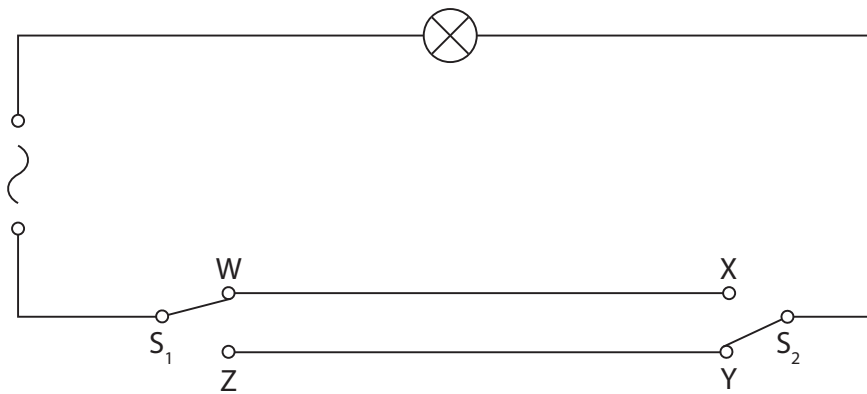
(iii) Calculate the amount of energy transferred by lamp L in 3 minutes.

Give the unit.

(3)

energy transferred = ..... unit .....

(e) This diagram shows another lighting circuit.



(i) Complete the table by putting a tick (✓) in the box if the lamp is lit and a cross (✗) in the box if the lamp is not lit.

(2)

S <sub>1</sub> position	S <sub>2</sub> position	lamp lit (✓ or ✗)
W	X	
W	Y	
Z	X	
Z	Y	

(ii) Suggest where this circuit would be useful in a house.

(1)

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**(Total for Question 2 = 15 marks)**

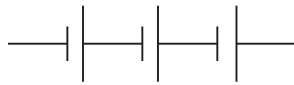
**Question 10.**

**6** (a) The diagram shows part of an electric circuit.

Complete the circuit diagram by adding

- a resistor in series with the lamp and battery
- a second lamp in parallel with the first lamp
- a voltmeter that measures the voltage across the resistor
- an ammeter that measures the current in the resistor

(4)

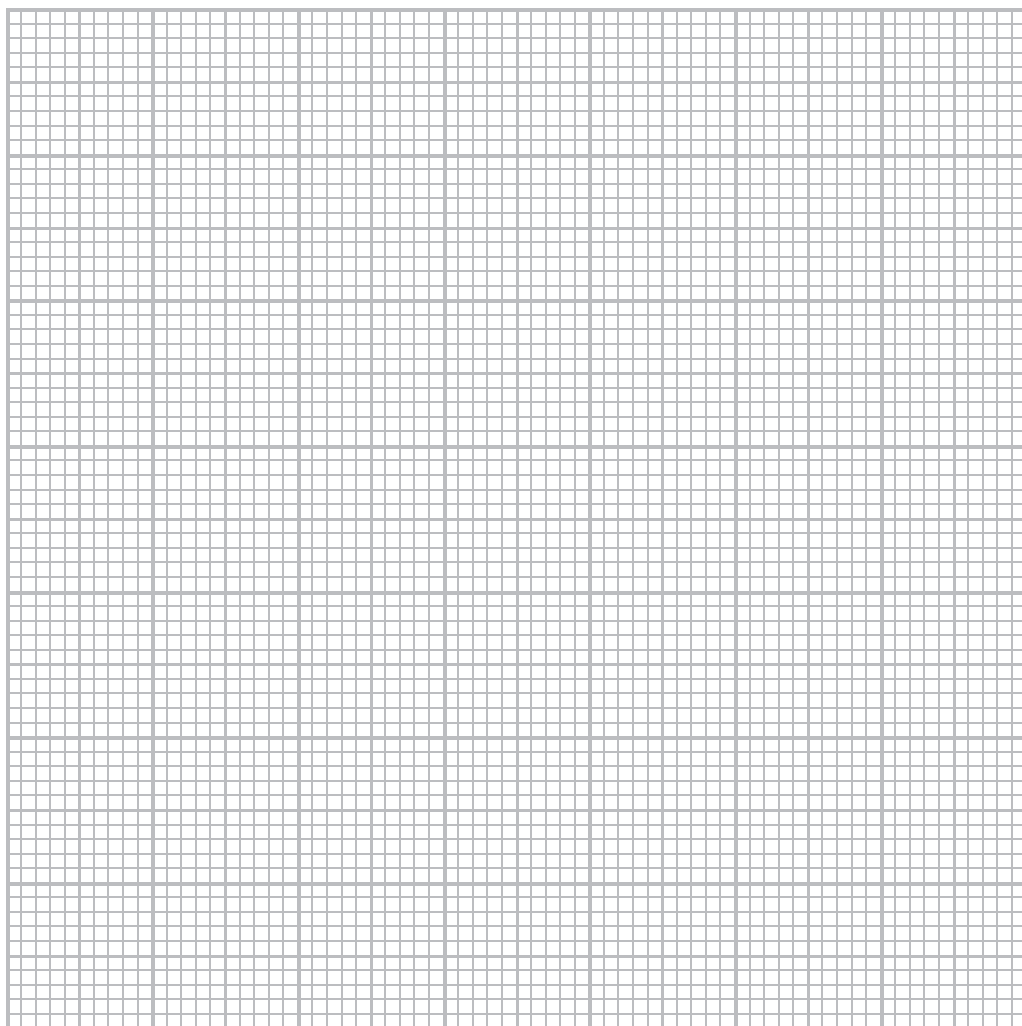


(b) The current in a resistor is measured for different voltages.

The table shows the results.

Voltage in V	Current in A
1.0	0.10
2.5	0.25
3.0	0.30
4.5	0.40
5.0	0.50
6.0	0.60

- (i) Plot a graph of this data on the grid. (4)
- (ii) Circle the anomalous point on the graph. (1)
- (iii) Draw a line of best fit. (1)



(iv) State the equation linking voltage, current and resistance.

(1)

(v) Use your graph to find a value for the resistance of the resistor.

(2)

resistance .....  $\Omega$

**(Total for Question 6 = 13 marks)**

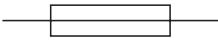
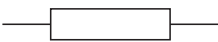
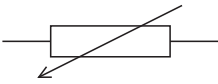

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**Question 11.**

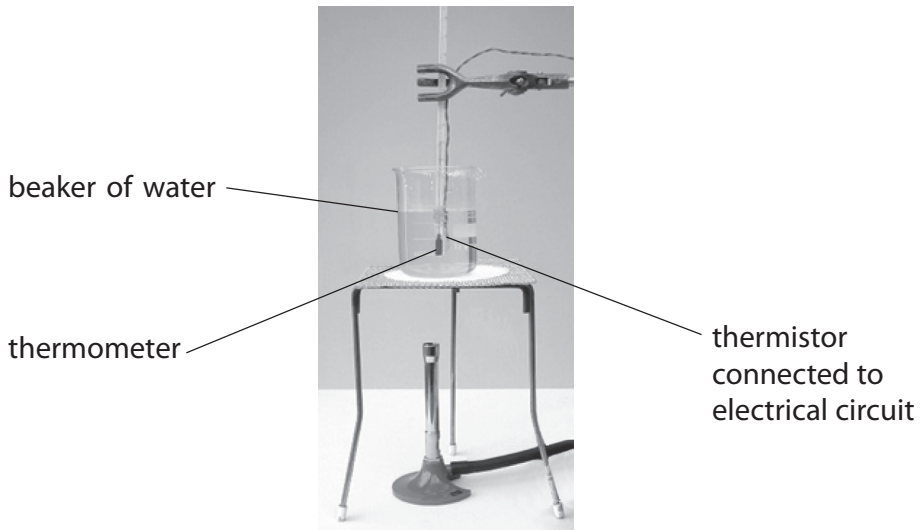
**5** A student investigates the resistance of a thermistor.

(a) Which of these is the correct symbol for a thermistor

(1)

<input type="checkbox"/>	<b>A</b>	
<input type="checkbox"/>	<b>B</b>	
<input type="checkbox"/>	<b>C</b>	
<input type="checkbox"/>	<b>D</b>	

(b) The student uses this apparatus to investigate how the resistance of a thermistor changes with temperature.



(i) Explain why the student places the thermistor in a beaker of water.

(2)

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(ii) The student also uses a voltmeter and an ammeter.

How should the voltmeter and the ammeter be connected in his circuit?

(1)

	<b>Voltmeter</b>	<b>Ammeter</b>
<input type="checkbox"/> <b>A</b>	in parallel across the power supply	in parallel across the thermistor
<input type="checkbox"/> <b>B</b>	in parallel across the thermistor	in series with the thermistor
<input type="checkbox"/> <b>C</b>	in series with the power supply	in series with the thermistor
<input type="checkbox"/> <b>D</b>	in series with the thermistor	in parallel across the thermistor



(c) The table shows the student's results.

Temperature in °C	Resistance in $\Omega$
0	10 000
10	7 060
20	5 000
40	2 670
60	2 350
80	1 080
100	609

(i) Plot a graph of these results on the grid.

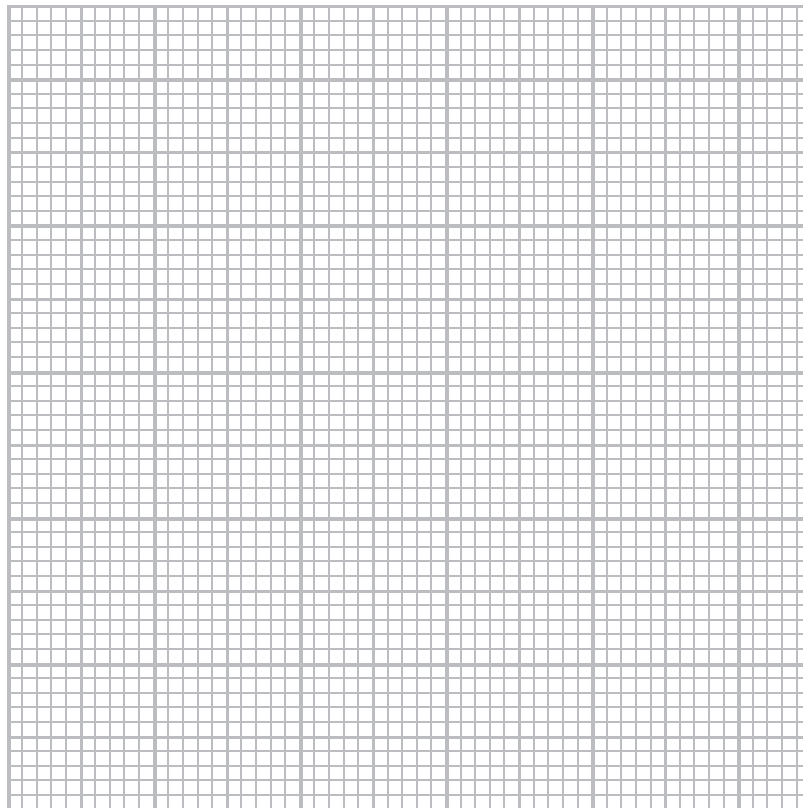
(4)

(ii) Circle the anomalous point on the graph.

(1)

(iii) Draw a curve of best fit.

(1)



(d) (i) Why is the maximum temperature in the student's investigation limited to 100°C? (1)

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(ii) Suggest how the student obtains readings below room temperature. (1)

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**(Total for Question 5 =12 marks)**

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