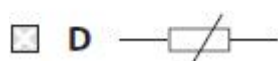
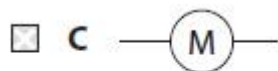
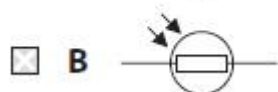


Q2.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Which of these symbols is used to represent a thermistor in an electrical circuit?

(1)



(Total for question = 1 mark)

Q3.

A student investigates how the resistance of a thermistor varies with temperature.

(a) The student sets up the circuit shown in Figure 5 to measure current and voltage.

He finds that it does not work.

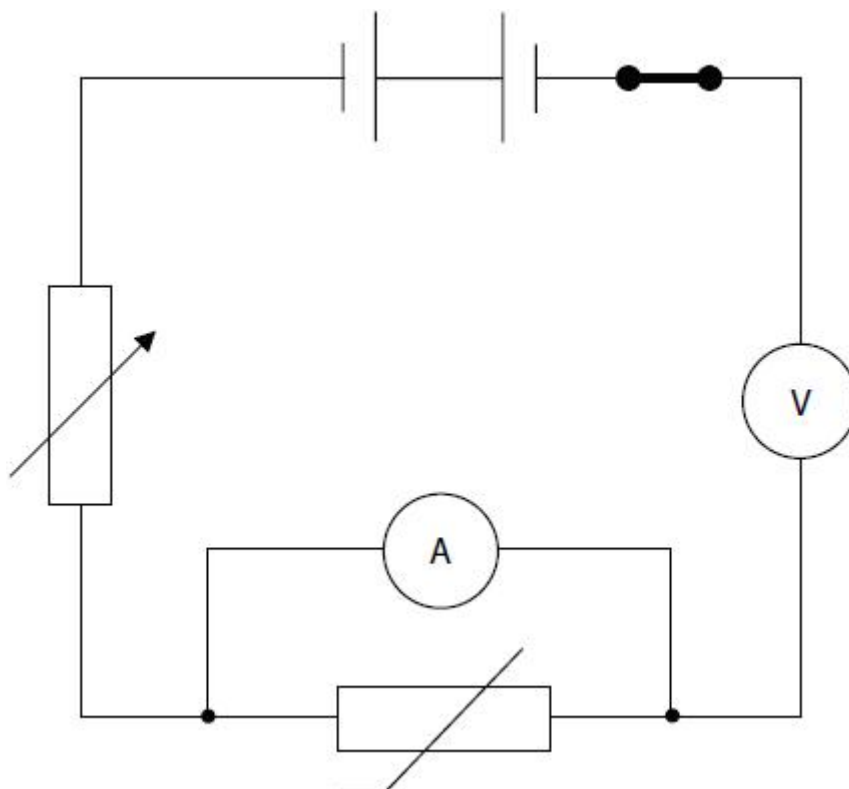


Figure 5

Give **three** modifications the student should make to the circuit so that the circuit works correctly.

(3)

- 1
- 2
- 3

(b) The student uses the equipment shown in Figure 6 to measure the temperature of the thermistor.

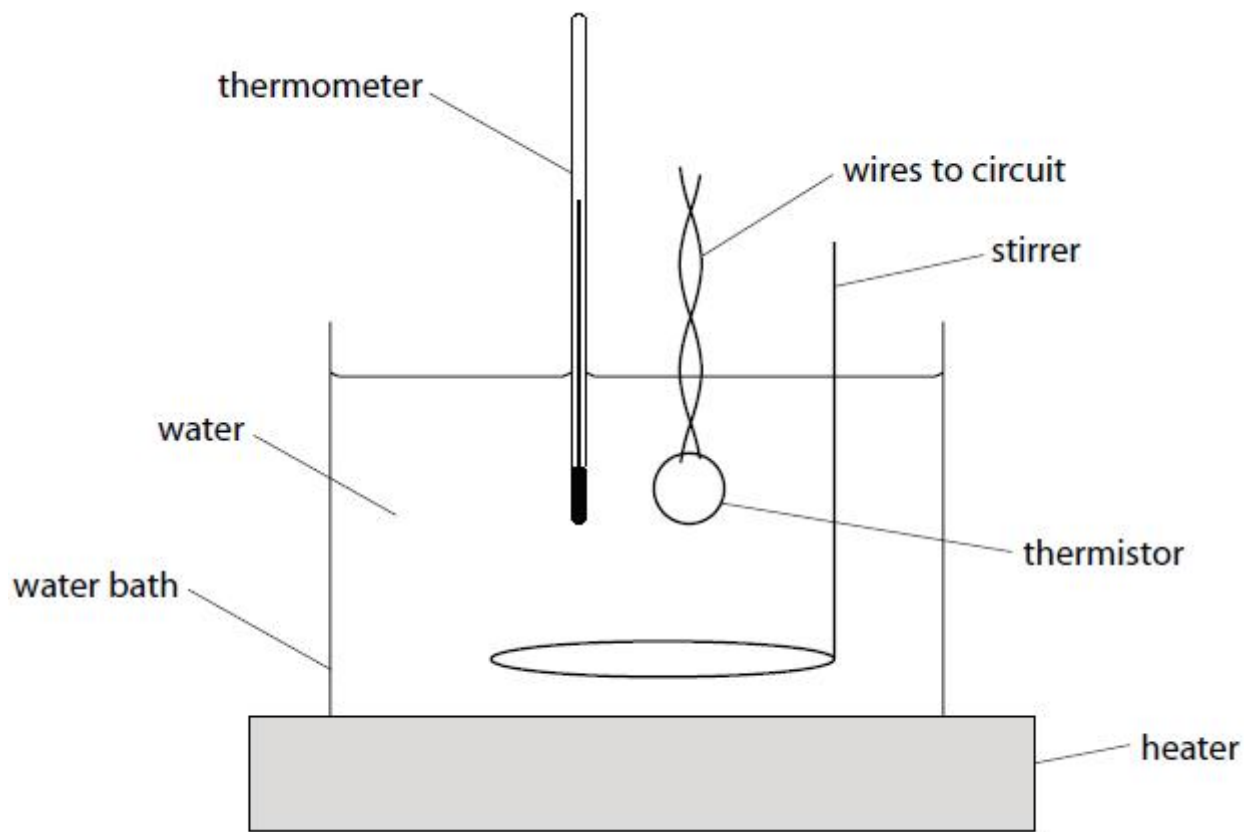


Figure 6

(i) Give **one** reason for using the water bath.

(1)

.....

.....

(ii) The equipment shown in Figure 6 is for investigations in the temperature range from 20°C to 100°C. State **one** way the student could develop this experimental procedure to investigate temperatures outside this range.

(1)

.....

.....

(c) The student takes measurements for two other components, **A** and **B**.

The results for both these components are shown in Figure 7.

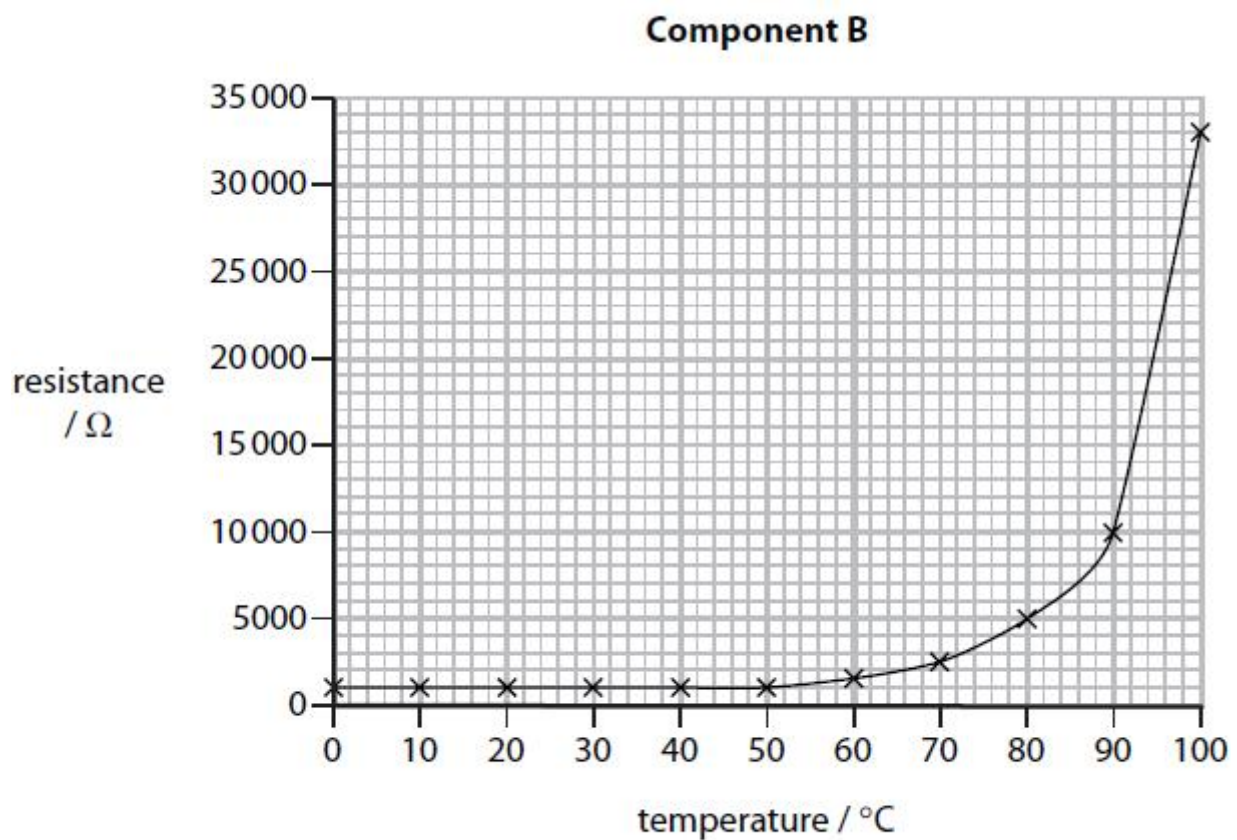
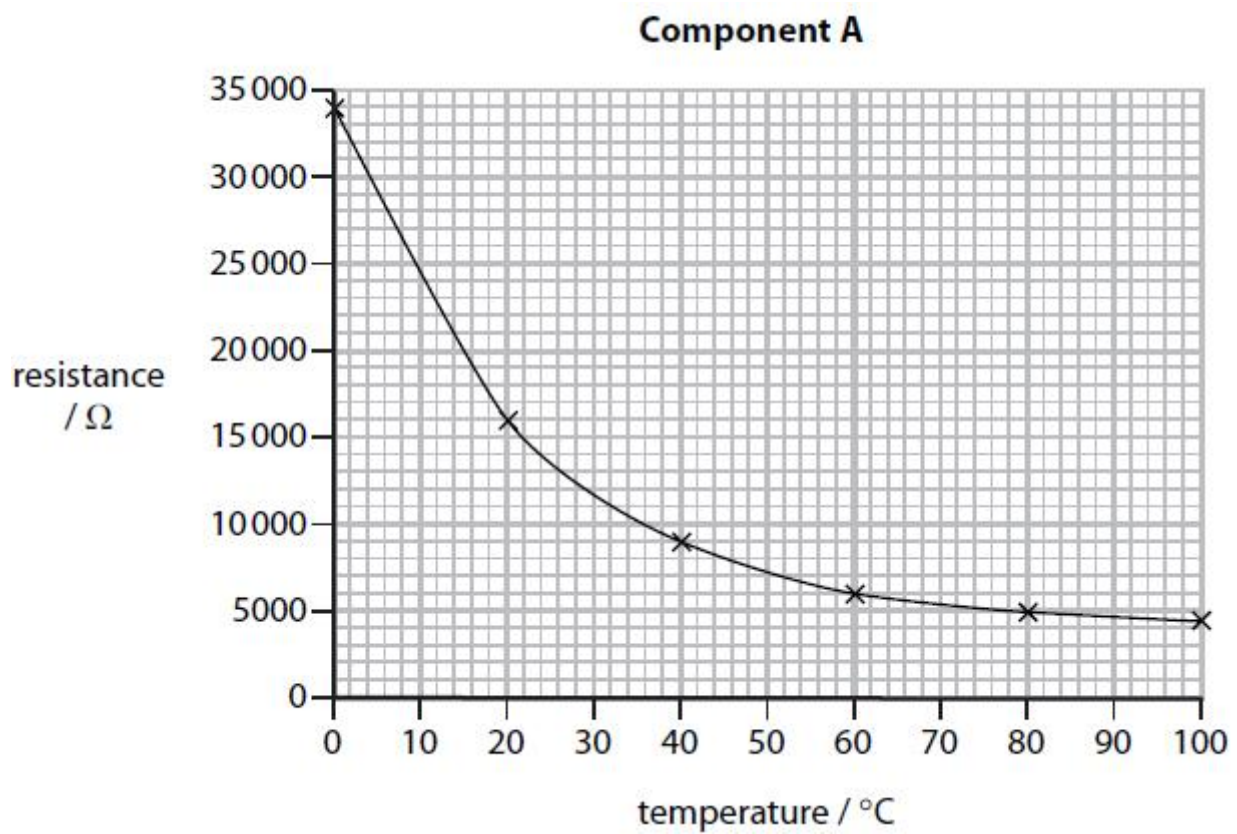


Figure 7

- (i) Compare and contrast how the resistances of component **A** and component **B** vary with temperature. (3)

.....

.....

.....

.....

.....

.....

(ii) Component **A** is connected to a 12 V supply.

Which of these is the current in component **A** when the temperature is 80°C?

(1)

☐ **A** $I = 12 \times 5000$

☐ **B** $I = \frac{12}{5000}$

☐ **C** $I = \frac{12^2}{5000}$

☐ **D** $I = \sqrt{\left(\frac{12}{5000}\right)}$

(Total for question = 3 marks)

Q4.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (~~☒~~) and then mark your new answer with a cross (☒).

Which of these equations is correct?

(1)

- ☐ **A** $\text{time} = \frac{\text{charge}}{\text{current}}$
- ☐ **B** $\text{time} = \text{charge} \times \text{current}$
- ☐ **C** $\text{time} = \frac{\text{power}}{\text{energy}}$
- ☐ **D** $\text{time} = \text{power} \times \text{energy}$

(Total for question = 1 mark)

Q5.

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

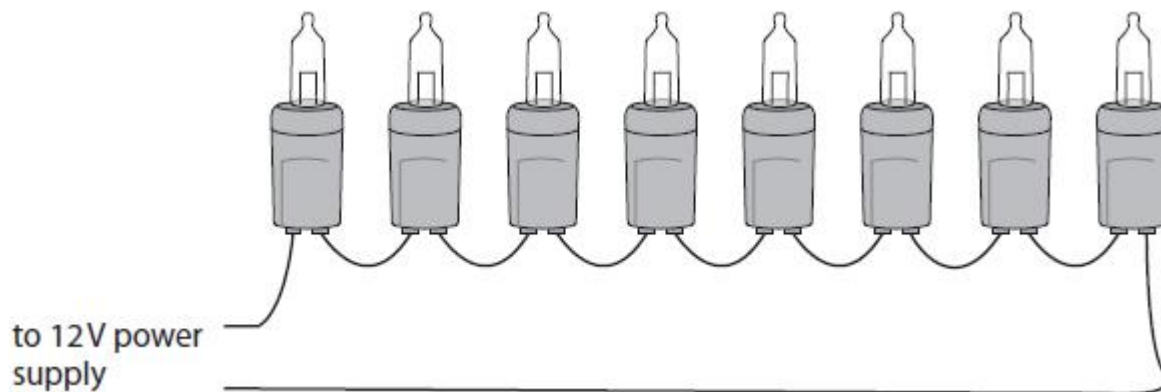


Figure 18

(i) Calculate the potential difference across each lamp.

(1)

potential difference = ... V

(ii) The power output of each lamp is 0.75 W
Calculate the resistance of each lamp.

(4)

resistance = ... Ω

(Total for question = 5 marks)

Q6.

A technician investigates different electrical devices that are used in a car.
The technician connects a device to the 12 V car battery.
The technician measures the current in the circuit and the potential difference (voltage) across the device.
Figure 8 shows the car battery and the device that is being tested.



Figure 8

(i) Draw on Figure 8 to show how the circuit should be completed so that the current in the circuit and voltage across the device can be measured.

(2)

(ii) The technician tests a headlamp.

The current in the headlamp is 4.8 A when connected to the 12 V battery.
Calculate the power supplied to the headlamp.

(2)

power = ... W

(iii) The technician tests an interior light.

The current in the interior light is 600 mA when connected to the 12 V battery.
Calculate the energy transferred to the interior light in 7 minutes.
Use an equation selected from the list of equations at the end of the paper.

(2)

energy transferred = ... J

(Total for question = 6 marks)

Q7.

Figure 1 shows a lamp connected to a d.c. power supply.

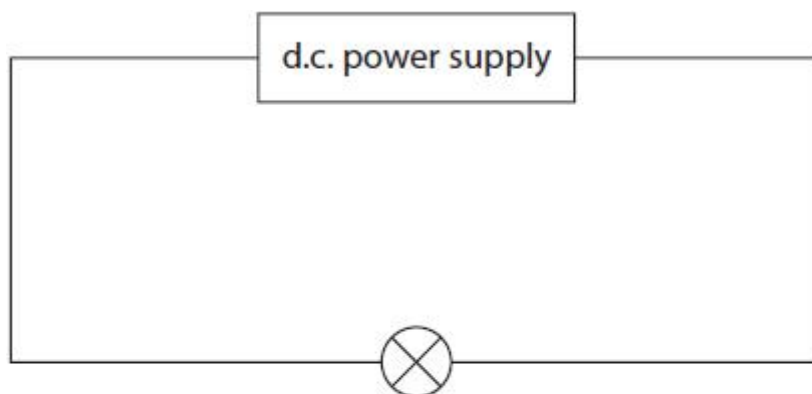


Figure 1

The power supply provides a potential difference (voltage) of 4.5 V.

The current in the lamp is 0.30 A.

Another **identical** lamp is added to the circuit, as shown in Figure 2.

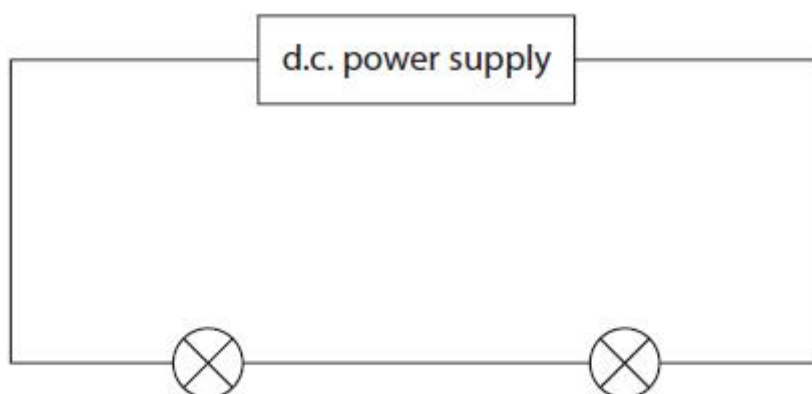


Figure 2

The power supply provides the same potential difference as it provided in the circuit in Figure 1.

State and explain the difference between the brightness of the lamp in Figure 1 and the brightness of a lamp in Figure 2.

(3)

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.....

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.....

.....

.....

(Total for question = 3 marks)