Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

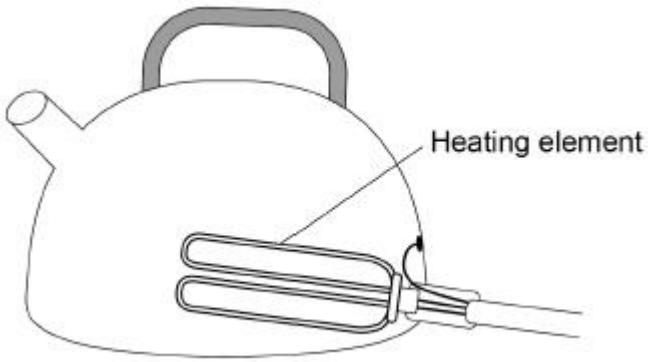
Q1.

A student investigated how the mass of water in an electric kettle affected the time taken for the water to reach boiling point.

The kettle switched off when the water reached boiling point.

Figure 1 shows the kettle.

Figure 1



(a) The heating element of the kettle was connected to the mains supply.

Explain why the temperature of the heating element increased.

_____

_____

_____

_____

_____

_____

(2)

(b) Give **one** variable that the student should have controlled.

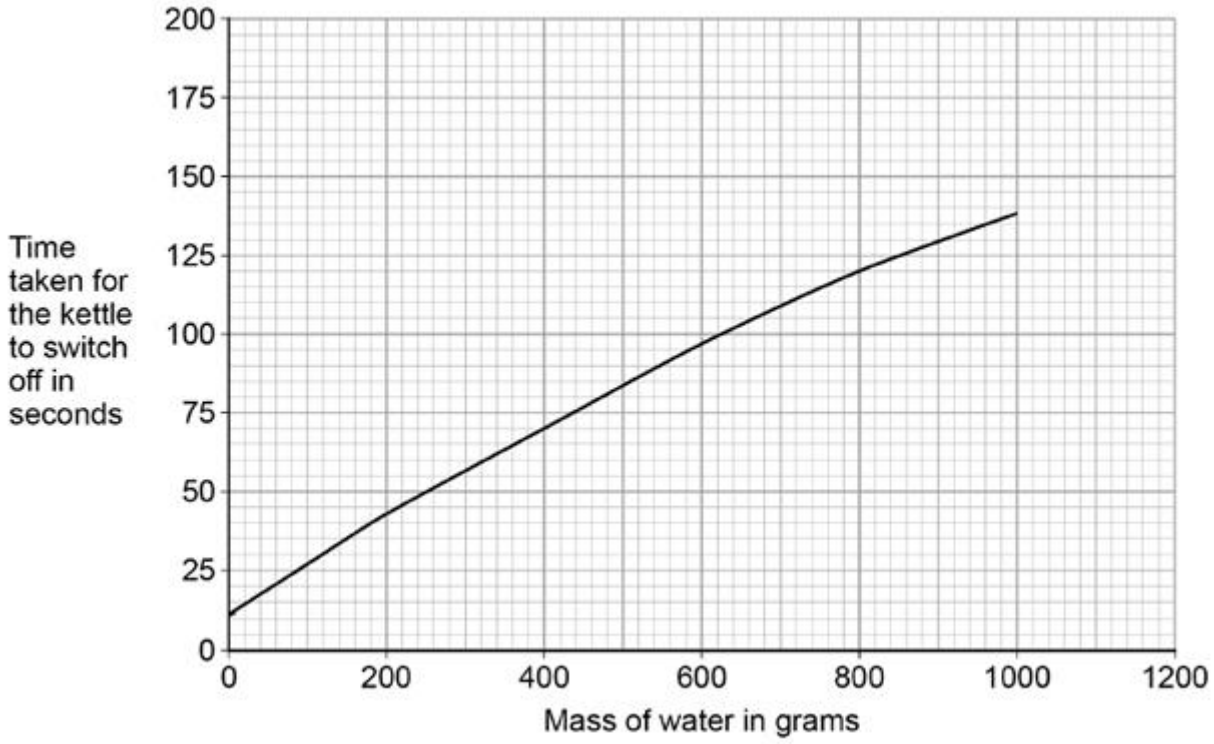
_____

_____

(1)

Figure 2 shows how the mass of water in the kettle affected the time taken for the kettle to switch off.

Figure 2



(c) Suggest why the line on **Figure 2** does **not** go through the origin.

_____

_____

(1)

(d) Suggest why the results give a non-linear pattern.

_____

_____

(1)

(e) The power of the kettle was 2.6 kW

The kettle took 120 seconds to heat 0.80 kg of water from 18 °C to 100 °C

Calculate the specific heat capacity of water using this information.

Give your answer to 2 significant figures.

_____

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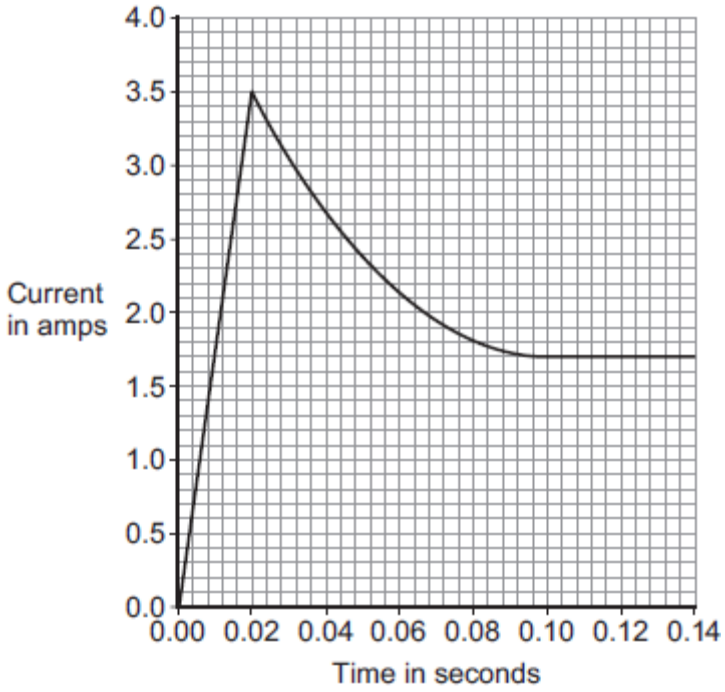
Specific heat capacity = _____ J/kg °C

(6)

(Total 11 marks)

Q2.

A 12 V filament bulb is connected to a 12 V power supply.
The graph shows how the current changes after the bulb is switched on.



(a) (i) After 0.10 seconds, the bulb works at its normal brightness.

What is the current through the bulb when it is working at normal brightness?

Current = _____ A

(1)

(ii) The bulb works at normal brightness for 30 seconds before it is switched off.

Calculate the charge that flows through the bulb in the 30 seconds before it is switched off. Give the unit.

_____

_____

_____

Charge = _____ unit _____

(3)

(iii) Calculate the energy transferred by the 12 V bulb when it is working at normal brightness for 30 seconds.

_____

_____

Energy transferred = _____ J

(2)

(b) Between 0.02 seconds and 0.08 seconds, there is an increase in both the resistance and the temperature of the metal filament inside the bulb.

Explain, in terms of the electrons and ions inside the filament, why both the temperature and the resistance increase.

_____

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_____

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(2)
(Total 8 marks)