

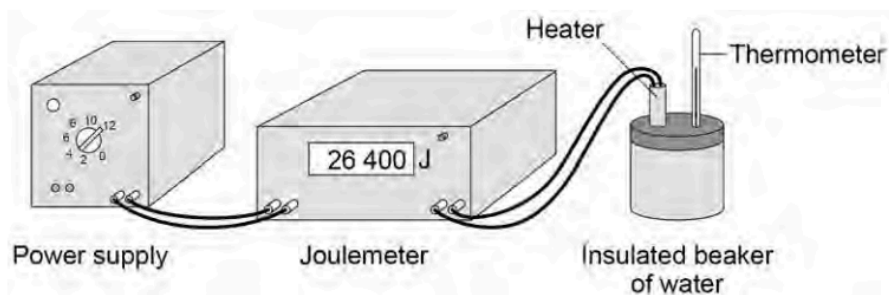
Q1.(2019)

a)

A student carried out an experiment to determine the specific heat capacity of water.

Figure 12 shows the equipment the student used to heat the water.

Figure 12



Why did the student insulate the beaker of water?

[1 mark]

Tick (✓) **one** box.

To increase energy transfer to the surroundings.

☐

To reduce energy transfer to the surroundings.

☐

To stop energy transfer to the surroundings.

☐

b)

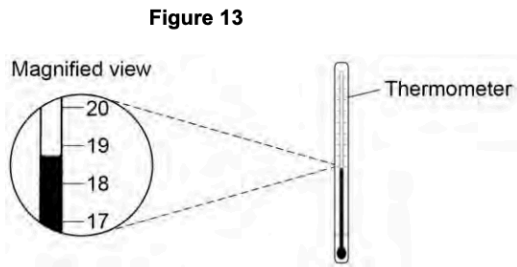
One hazard in this experiment is the hot water.

Give **one** risk to the student caused by this hazard.

[1 mark]

c)

Figure 13 shows the thermometer that the student used.



What is the resolution of the thermometer?

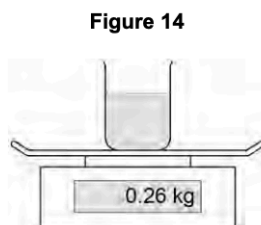
[1 mark]

Tick (✓) **one** box.

- 1 °C ☐
- 3 °C ☐
- 19 °C ☐

d)

Figure 14 shows the beaker of water on a balance.



The mass of the water was 0.20 kg

What was the mass of the beaker?

[1 mark]

Tick (✓) **one** box.

- 0.06 kg ☐
- 0.20 kg ☐
- 0.26 kg ☐
- 0.46 kg ☐

e)

The energy transferred to the water was 26 400 J

The mass of water was 0.20 kg

The temperature increase of the water was 30 °C

Calculate the specific heat capacity of water using the data from this experiment.

Use the Physics Equations Sheet.

Choose the unit from the box.

[4 marks]

J/kg	J/kg°C	J/°C
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Specific heat capacity = _____ Unit _____

Q2.(2020)

A student heated water in an electric kettle.

Water has a high specific heat capacity.

Complete the sentence.

Choose answers from the box.

[2 marks]

°C	J	kg	s	W
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The specific heat capacity of a substance is the energy needed to raise the temperature of 1 _____ of the substance by 1 _____.

Q3.(2020)

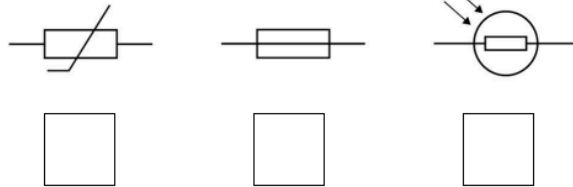
a)

The kettle circuit contains a thermistor which is used to switch the kettle off when the water reaches 100 °C.

What is the correct symbol for a thermistor?

[1 mark]

Tick (✓) **one** box.



b)

The resistance of the heating element in the kettle is 15 Ω .

The current in the heating element is 12 A.

Calculate the power of the heating element.

Use the equation:

$$\text{power} = (\text{current})^2 \times \text{resistance}$$

[2 marks]

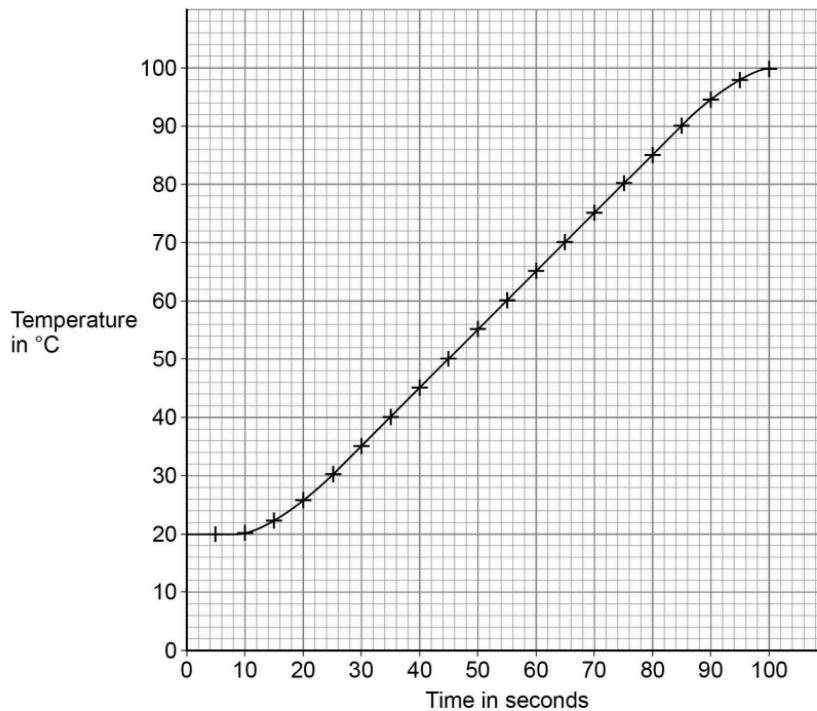
Power = _____ W

c)

The student investigated how quickly the kettle could increase the temperature of 0.50 kg of water.

Figure 10 shows the results of the investigation.

Figure 10



The temperature of the water did **not** start to increase until 10 seconds after the kettle was switched on.

What is the reason for this?

[1 mark]

Tick (✓) **one** box.

Energy is transferred from the surroundings to the kettle.

☐

The charge flows slowly through the kettle circuit.

☐

The heating element in the kettle takes time to heat up.

☐

The power output of the kettle increases slowly.

☐

d)

Describe a method the student could have used to obtain the results shown in **Figure 10**.

[6 marks]

e)

The mass of water in the kettle was 0.50 kg.

The temperature of the water increased from 20 °C to 100 °C.

specific heat capacity of water = 4200 J/kg °C

Calculate the energy transferred to the water.

Use the Physics Equations Sheet.

[3 marks]

Energy = _____ J

f)

The water in the kettle boiled for a short time before the kettle switched off.

During this time 5.0 g of water changed to steam.

specific latent heat of vaporisation of water = 2 260 000 J/kg

Calculate the energy transferred to change the water to steam.

Use the Physics Equations Sheet.

[3 marks]

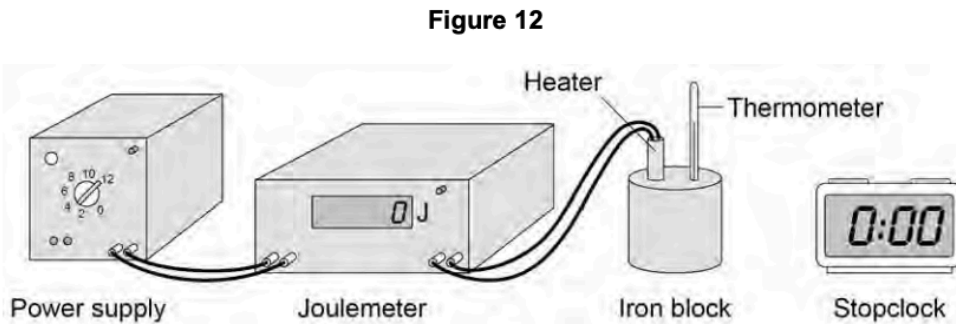
Energy = _____ J

Q4.(2023)

a)

Figure 12 shows the equipment a student used to determine the specific heat capacity of iron.

The iron block the student used has two holes, one for the heater and one for the thermometer.



Before the power supply was switched on, the thermometer was used to measure the temperature of the iron block.

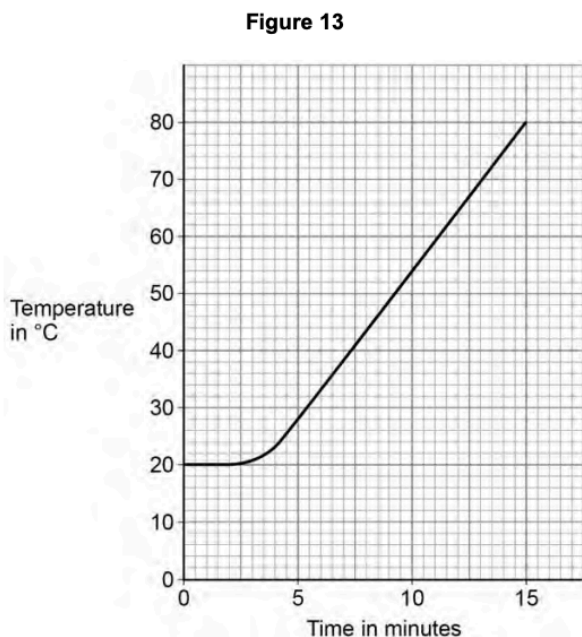
The student left the thermometer in the iron block for a few minutes before recording the initial temperature.

Suggest why.

[1 mark]

b)

Figure 13 shows how the temperature changed after the power supply was switched on.



The energy transferred to the iron block between 5 and 10 minutes was 26 000 J.

The mass of the iron block was 2.0 kg.

Calculate the specific heat capacity of iron.

Use information from **Figure 13** and the Physics Equations Sheet.

[4 marks]

c)

The student repeated the investigation but wrapped insulation around the iron block.

What effect will adding insulation have had on the investigation?

[2 marks]

Tick (✓) **two** boxes.

The calculated specific heat capacity will be more accurate.

☐

The iron block will transfer thermal energy to the surroundings at a lower rate.

☐

The power output of the heater will be lower than expected.

☐

The temperature of the iron block will increase more slowly than expected.

☐

The uncertainty in the temperature measurement will be greater.

☐