Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

A student uses the apparatus in Figure 17 to determine the specific heat capacity of water.

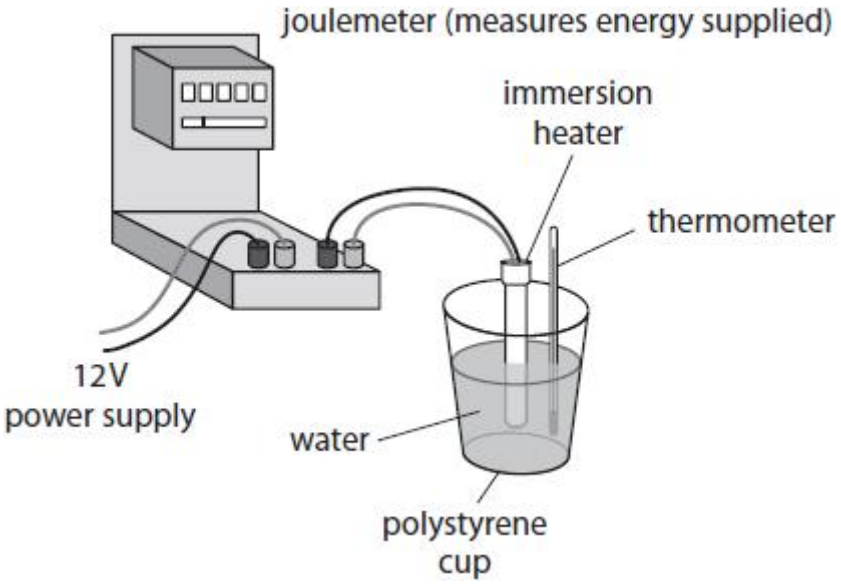


Figure 17

(i) State the measurements needed to calculate the specific heat capacity of water.

(4)

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(ii) State **two** ways that the apparatus could be adapted to improve the procedure.

(2)

1 .....
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2 .....
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(Total for question = 6 marks)

Q2.

A student sets up an experiment to measure the specific heat capacity of a metal.

Figure 5 shows the apparatus.

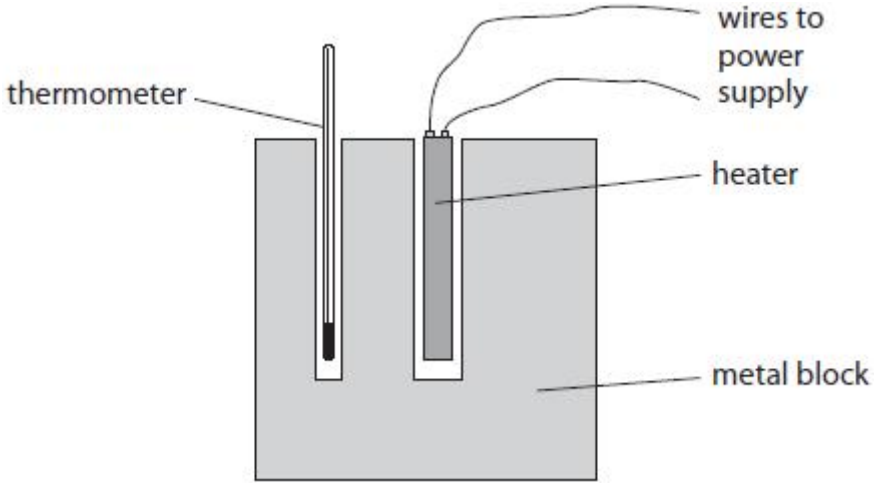


Figure 5

The heater is connected to a power supply and has a power of 50 W.

The student switches on the heater and measures the temperature rise after 5 minutes.

(i) State **two** improvements the student could make to the experiment.

(2)

1 .....

.....

2 .....

.....

(ii) Figure 6 shows the student's results.

mass of metal block	0.92 kg
power of heater	50 W
starting temperature	20 °C
finishing temperature	54 °C
time	300 s

Figure 6

Use the data in Figure 6 to calculate a value for the specific heat capacity of the metal.
Use the equation

$$\text{specific heat capacity} = \frac{\text{power} \times \text{time}}{\text{mass} \times \text{temperature rise}}$$

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(3)

specific heat capacity = ... J/kg °C

(Total for question = 5 marks)

Q3.

A student wants to determine the specific heat capacity of copper.

Figure 10 shows a piece of copper, with a thread tied around it, in a glass beaker of boiling water.

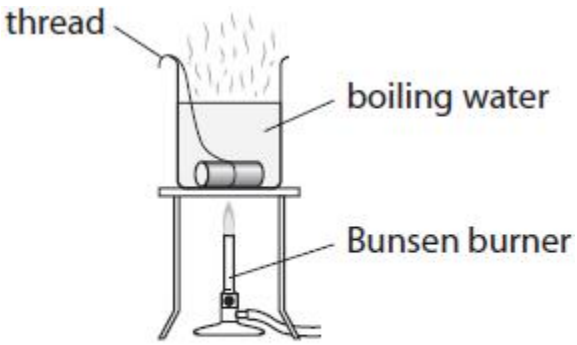


Figure 10

The student leaves the piece of copper in the boiling water so that the copper reaches a temperature of 100 °C.

The student uses the thread to take the piece of copper out of the boiling water.

The student puts the hot piece of copper into a different beaker of cold water at 20 °C.

The apparatus is shown in Figure 11.

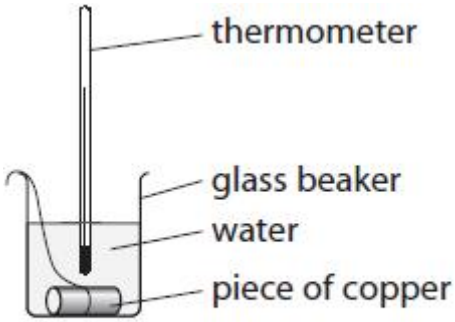


Figure 11

The student assumes that the thermal energy gained by the water equals the

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thermal energy lost by the piece of copper.

The water and copper both reach a temperature of 22 °C.

The cold water gains 1050 J of energy.

The mass of the piece of copper is 0.058 kg.

(i) Calculate a value for the specific heat capacity of copper, using these results.

Use the equation

change in thermal energy = mass × specific heat capacity × change in temperature

$$\Delta Q = m \times c \times \Delta\theta$$

(2)

specific heat capacity of copper from these results = ... J/kg °C

(ii) The value for the specific heat capacity of copper obtained from the student's results is lower than the correct value.

State **two** ways that the experiment could be improved to give a value that is closer to the correct value.

(2)

1 .....

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2 .....

.....

(Total for question = 4 marks)

Q4.

* The table shows some properties of two materials used as thermal insulation.

The higher the R-value, the better the thermal insulating properties of the material.

material	R-value	fire resistance
fibreglass, made from sand	R-3.3	non-flammable
polystyrene, made from petroleum oil	R-4.0	melts at 270 °C and spreads fire very quickly

Assess which of these materials may be the more suitable to use as thermal insulation in a building.

Your answer should compare the properties of fibreglass and polystyrene given in the table.

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(6)

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(Total for question = 6 marks)

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