Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

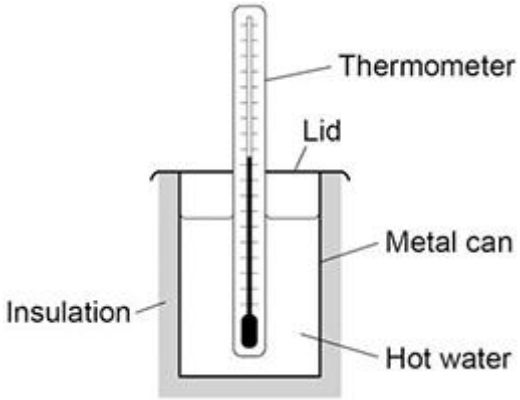
Q1.

A student investigated the insulating properties of two different materials.

The same thickness of each material was used.

Figure 1 shows some of the equipment used by the student.

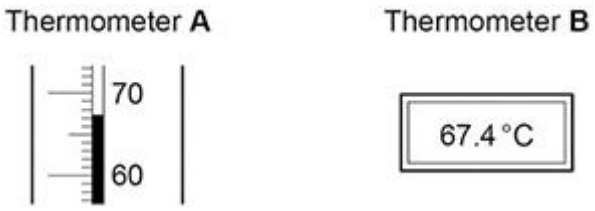
Figure 1



The student used two different types of thermometer to measure the temperature changes.

Figure 2 shows a reading on each thermometer.

Figure 2



(a) What is the resolution of thermometer **B**?

Tick (✓) **one** box.

0.1 °C ☐

0.4 °C ☐

67.0 °C ☐

67.4 °C ☐

(1)

(b) Complete the sentence.

Choose the answer from the box.

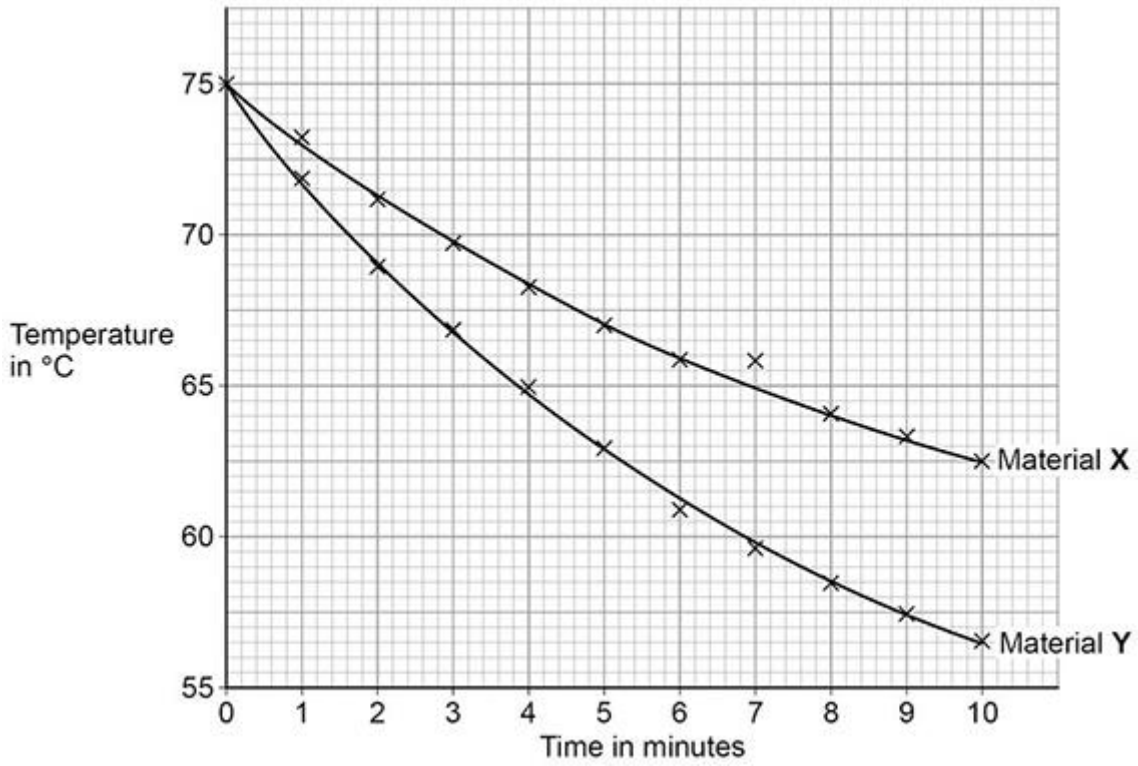
a smaller	**the same**	**a bigger**

Thermometer **A** has _____ chance of being misread than thermometer **B**.

(1)

Figure 3 shows the results.

Figure 3



(c) The mass of water used was 0.12 kg.

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

Determine the total change in thermal energy of the water when Material **X** was used.

Use values from **Figure 3**.

Use the Physics Equations Sheet.

_____

_____

_____

_____

_____

_____

Total change in thermal energy = _____J

(4)

(d) There is an anomalous result on **Figure 3**.

Draw a ring around the anomalous result.

(1)

(e) Give **two** conclusions that can be made from **Figure 3**.

1. _____

_____

_____

2. _____

_____

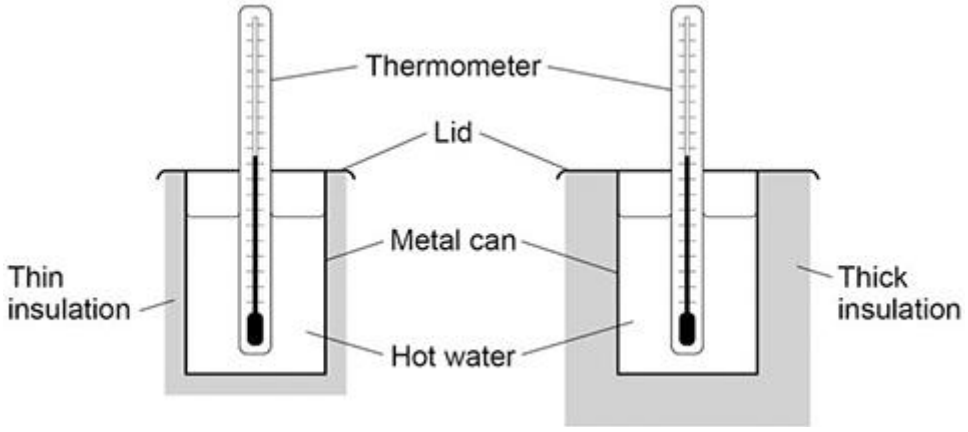
_____

(2)

Another student investigated how the thickness of the insulation affected the rate of cooling of hot water.

Figure 4 shows some of the equipment used.

Figure 4



(f) How would using thick insulation affect the rate of cooling of hot water compared with using thin insulation?

Tick (✓) **one** box.

The rate of cooling would be higher. ☐

The rate of cooling would be lower. ☐

The rate of cooling would not change. ☐

(1)

(g) Predict how using thick insulation would affect the temperature of the water after 10 minutes compared with using thin insulation.

Tick (✓) **one** box.

The temperature would be higher. ☐

The temperature would be lower. ☐

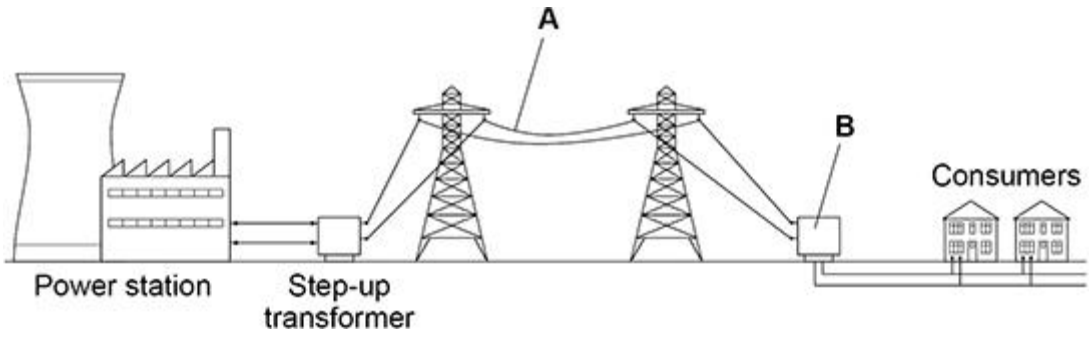
The temperature would be the same. ☐

(1)

(Total 11 marks)

Q2.

The figure below shows part of the National Grid linking a power station to consumers.



(a) Name the parts of the figure above labelled **A** and **B**.

A _____

B _____

(2)

(b) Electricity is transmitted through **A** at a very high potential difference.

What is the advantage of transmitting electricity at a very high potential difference?

Tick (✓) **one** box.

A high potential difference is safer for consumers. ☐

Less thermal energy is transferred to the surroundings. ☐

Power transmission is faster. ☐

(1)

(c) The power station generates electricity at a potential difference of 25 000 V.

The energy transferred by the power station in one second is 500 000 000 J.

Calculate the charge flow from the power station in one second.

Use the equation:

$$\text{charge flow} = \frac{\text{energy}}{\text{potential difference}}$$

_____

_____

_____

Charge flow in one second = _____ C

(2)

The electricity supply to a house has a potential difference of 230 V.

The table below shows the current in some appliances in the house.

Appliance	**Current in amps**
Dishwasher	6.50
DVD player	0.10
Lamp	0.40
TV	0.20

(d) Calculate the total power of all the appliances in the table above.

Use the equation:

power = potential difference × current

_____

_____

_____

_____

_____

Total power = _____ W

(3)

(e) Each appliance in the table above is switched on for 2 hours.

Which appliance will transfer the most energy?

Give a reason for your answer.

Appliance _____

Reason _____

_____

_____

(2)

(f) The average energy transferred from the National Grid every second for each person in the UK is 600 J.

There are 32 000 000 seconds in one year.

Calculate the average energy transferred each year from the National Grid for each person in the UK.

_____

_____

_____

Average energy transferred = _____ J

(2)

(Total 12 marks)