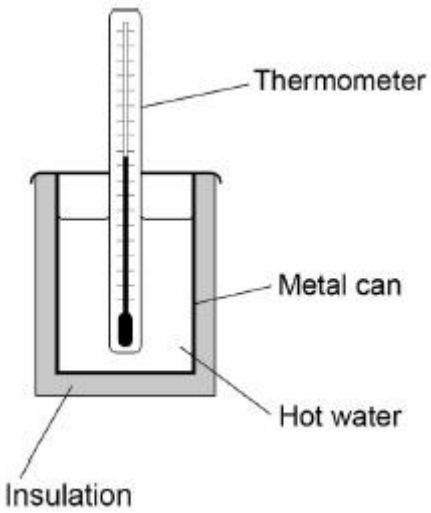
Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

A student investigated the properties of three insulating materials.

Figure 1 shows the apparatus the student used.

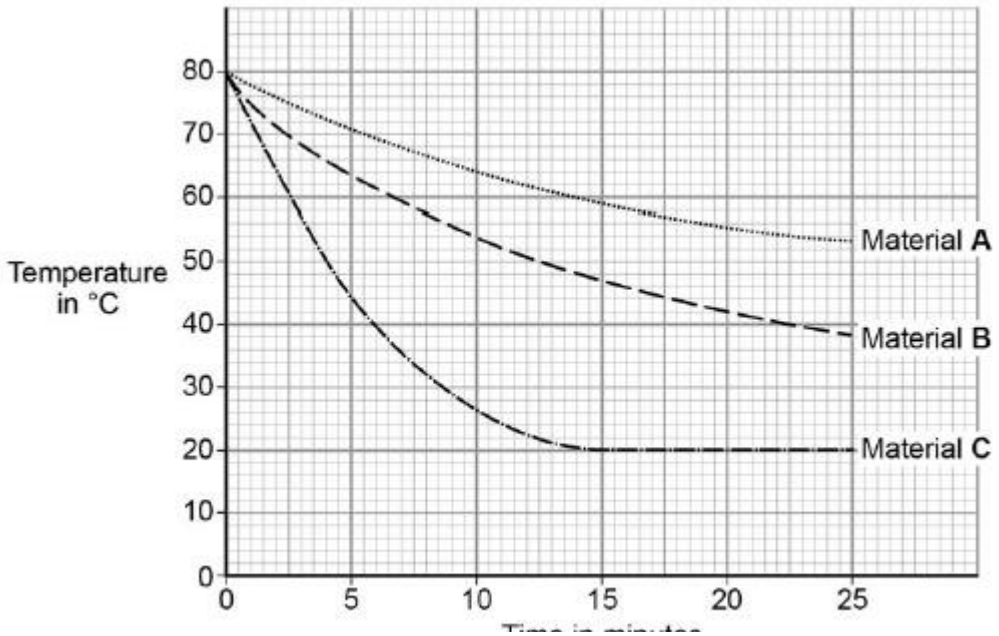
Figure 1



In the investigation, different insulating materials were used to insulate a metal can filled with hot water.

Figure 2 shows how the temperature measured by the thermometer changed over 25 minutes for each of the materials.

Figure 2



(a) What was the temperature of the room where the student carried out the investigation?

Tick **one** box.

20 °C ☐ 38 °C ☐ 53 °C ☐ 80 °C ☐

(1)

(b) Material C has the highest thermal conductivity.

How does the graph in **Figure 2** show this?

_____

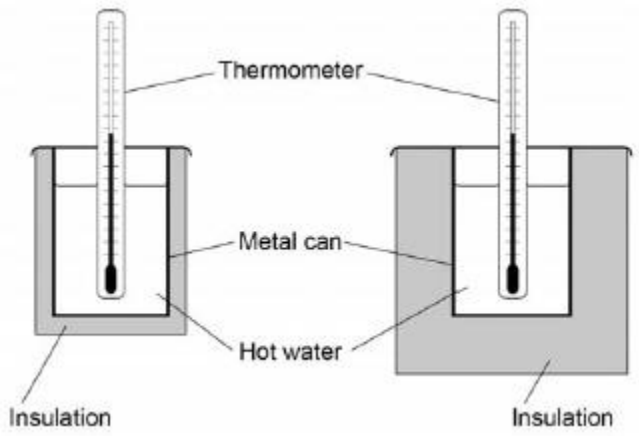
_____

(1)

(c) Another student repeated the investigation using the equipment shown in **Figure 3**.

Figure 1 shows the first set of equipment used.

Figure 1 **Figure 3**



Suggest how using the equipment in **Figure 3** will have affected the student's results.

_____

_____

_____

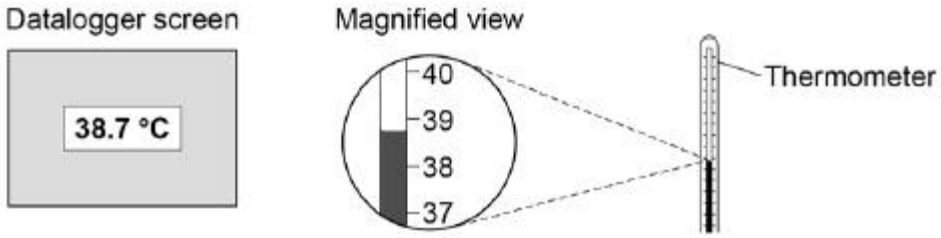
_____

(2)

(d) The students could have used a temperature probe and datalogger instead of a thermometer.

Figure 4 shows the datalogger screen and the thermometer.

Figure 4



Complete the sentences.

Choose the answers from the box.

higher	**lower**	**the same**

Compared to the thermometer, the datalogger and temperature probe have

a resolution that is _____ .

Compared to the thermometer, the chance of misreading the datalogger and

temperature probe is _____ .

(2)

(e) The table gives information about four types of insulation that could be used in the walls of houses.

Type of insulation	**Thermal conductivity in W/m °C**
Felt wool	0.070
Mineral wool	0.040
Polyurethane foam	0.030
Rock wool	0.045

Which type of insulation would be most effective in reducing the rate of cooling of a building?

Tick **one** box.

Felt wool ☐

Mineral wool ☐

Polyurethane foam ☐

Rock wool ☐

Give a reason for your answer.

_____

_____

_____

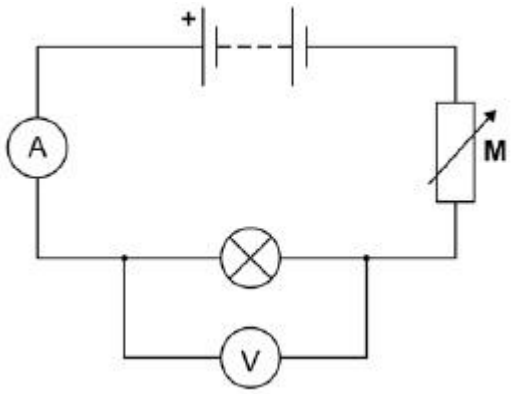
_____

(2)

(Total 8 marks)

Q2.

The diagram shows the circuit used to obtain the data needed to plot the current-potential difference graph for a filament lamp.



(a) Why is component **M** included in the circuit?

Tick **one** box.

To keep the current constant. ☐

To keep the potential difference constant. ☐

To vary the current. ☐

(1)

(b) Why does the resistance of the lamp increase as the potential difference across the lamp

increases?

_____

_____

_____

(1)

(c) The potential difference across the lamp is 12.0 V

Calculate the energy transferred by the lamp when 8.5 C of charge flows through the lamp.

Use the equation:

energy transferred = charge flow × potential difference

_____

_____

_____

Energy transferred = _____ J

(2)

(d) The table gives data about two types of lamp that householders may use in their homes.

Type of lamp	**Energy efficiency**	**Mean lifetime in hours**
Halogen	10%	2000
LED	90%	36000

Both types of lamp produce the same amount of light.

Describe the environmental advantages of using the LED lamp compared with the halogen lamp.

_____

_____

_____

_____

_____

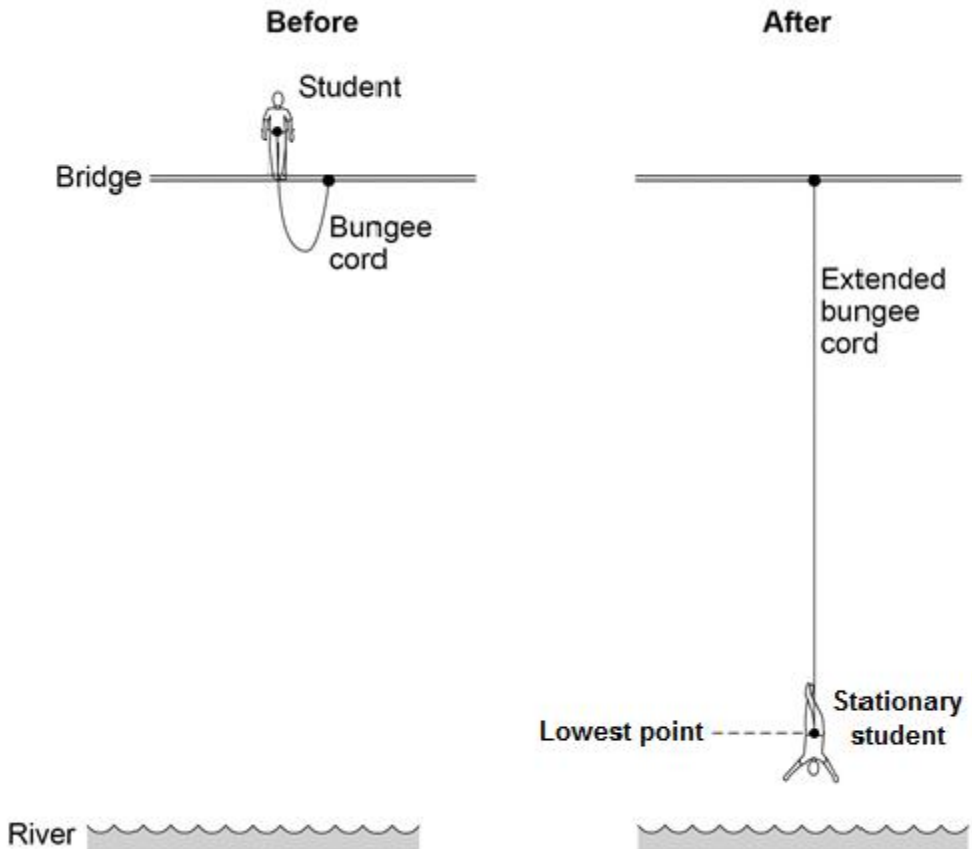
(2)

(Total 6 marks)

Q3.

The image below shows a student before and after a bungee jump.

The bungee cord has an unstretched length of 20 m.



(a) For safety reasons, it is important that the bungee cord used is appropriate for the student's weight.

Give **two** reasons why.

1. _____

_____

2. _____

_____

(2)

(b) The student jumps off the bridge.

Complete the sentences to describe the energy transfers.

Use answers from the box.

elastic potential	**gravitational potential**	**kinetic**	**sound**	**thermal**

Before the student jumps from the bridge he has a store of

_____ energy.

When he is falling, the student's store of _____

energy increases.

When the bungee cord is stretched, the cord stores energy as

_____ energy.

(3)

(c) At the lowest point in the jump when the student is stationary, the extension of the bungee cord is 35 metres.

The bungee cord behaves like a spring with a spring constant of 40 N / m.

Calculate the energy stored in the stretched bungee cord.

Use the correct equation from the Physics Equations Sheet.

_____

_____

_____

Energy = _____ J

(2)

(Total 7 marks)