Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

A student investigated the thermal conductivity of different metals.

This is the method used:

1. Measure the mass of an ice cube.
2. Put the ice cube on a metal block which is at room temperature.
3. Measure the mass of the ice cube after one minute.
4. Repeat with other blocks of the same mass made from different metals.

The following table shows the student's results.

Metal	Initial mass of ice cube in grams	Final mass of ice cube in grams	Change in mass of ice cube in grams
Aluminium	25.85	21.14	4.71
Copper	26.20	20.27	5.93
Lead	25.53	21.97	3.56
Steel	24.95	19.45	5.50

(a) The initial temperature of each ice cube was –15 °C

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Why was it important that the initial temperature of each ice cube was the same?

Tick (✓) **one** box.

Initial temperature was a continuous variable.	☐
Initial temperature was a control variable.	☐
Initial temperature was the dependent variable.	☐
Initial temperature was the independent variable.	☐

(1)

(b) Which metal had the highest thermal conductivity?

Give a reason for your answer.

Metal: _____

Reason: _____

_____

_____

(2)

(c) Suggest **one** source of random error in the student's investigation.

_____

_____

_____

_____

(1)

(d) An ice cube has a temperature of −15.0 °C

The total thermal energy needed to raise the temperature of this ice cube to 0.0 °C and completely melt the ice cube is 5848 J

specific heat capacity of ice = 2100 J/kg °C
specific latent heat of fusion of ice = 334 000 J/kg

Calculate the mass of the ice cube.

_____

_____

_____

_____

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Mass of ice cube = _____ kg

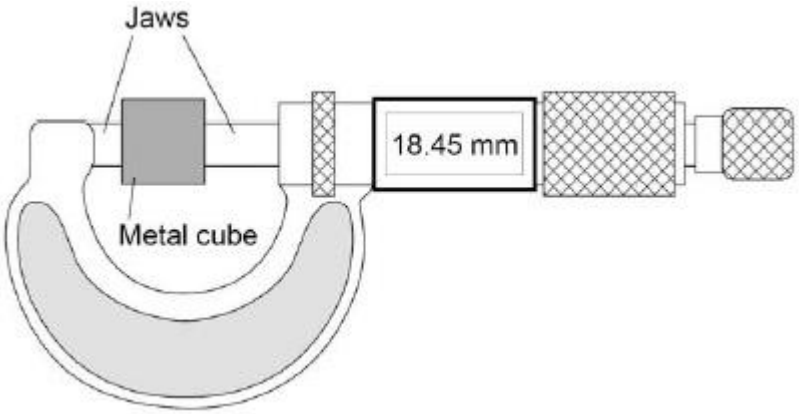
(5)

(Total 9 marks)

Q2.

A student measured the width of a solid metal cube using a digital micrometer.

The figure below shows the micrometer.



(a) The resolution of the micrometer is 0.01 mm

The student could have used a metre rule to measure the width of the cube.

Explain how using a metre rule would have affected the accuracy of the student's measurement of width.

(2)

(b) The mass of the metal cube was measured using a top pan balance.

The balance had a zero error.

Explain how the zero error may be corrected after readings had been taken from the balance.

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_____

_____

_____

(2)

(c) The width of the cube was 18.45 mm. The density of the cube was 8.0×10^3 kg/m^3

Calculate the mass of the cube.

_____

_____

_____

_____

_____

_____

_____

Mass = _____ kg

(5)

(Total 9 marks)

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