Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic: Thermal Physics

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Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Q1.

Use the following data to answer the question below.

specific latent heat of fusion of lead = 23 kJ kg^{-1}
molar mass of lead = 0.21 kg mol^{-1}

(a) Estimate the mass of a lead atom.

_____

_____

_____

(b) Estimate the energy supplied to an atom of lead when solid lead melts.

_____

_____

_____

_____

(c) Calculate the speed of a lead atom with the same kinetic energy as the energy supplied in part (b).

_____

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_____

(Total 5 marks)

Q2.

(a) The molecular theory model of an ideal gas leads to the derivation of the equation

$$pV = \frac{1}{3}Nm\overline{c^2}.$$

Explain what each symbol in the equation represents.

p _____

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V _____

N _____

_____

m _____

$\overline{c^2}$ _____

_____

(4)

(b) One assumption used in the derivation of the equation stated in part (a) is that molecules are in state of *random motion*.

(i) Explain what is meant by random motion.

_____

_____

_____

(ii) State **two** more assumptions used in this derivation.

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_____

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_____

(3)

(c) Describe how the motion of gas molecules can be used to explain the pressure exerted by a gas on the walls of its container.

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(4)

(Total 11 marks)

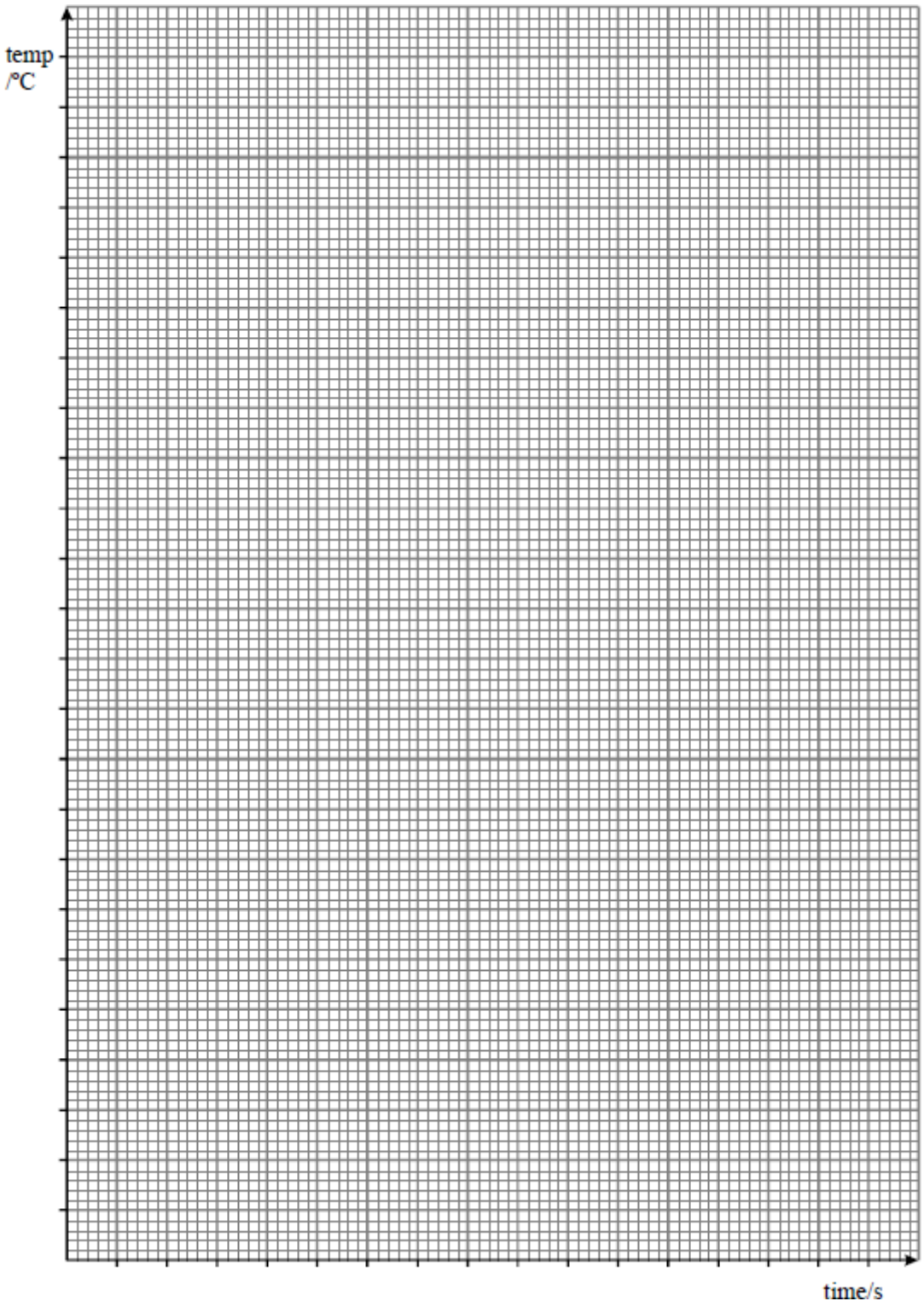
Q3.

An electrical heater is used to heat a 1.0 kg block of metal, which is well lagged. The table shows how the temperature of the block increased with time.

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temp / °C	20.1	23.0	26.9	30.0	33.1	36.9
time / s	0	60	120	180	240	300

(a) Plot a graph of temperature against time on the grid provided.



(3)

(b) Determine the gradient of the graph.

_____

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_____

(2)

(c) The heater provides thermal energy at the rate of 48 W. Use your value for the gradient of the graph to determine a value for the specific heat capacity of the metal in the block.

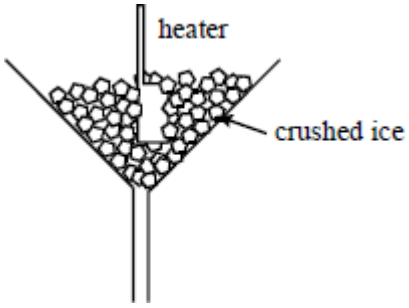
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(2)

(d) The heater in part (c) is placed in some crushed ice that has been placed in a funnel as shown.



The heater is switched on for 200 s and 32 g of ice are found to have melted during this time. Use this information to calculate a value for the specific latent heat of fusion for water, stating **one** assumption made.

_____

_____

_____

_____

_____

(3)

(Total 10 marks)

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