2. (a) This question concerns thermal heat capacities.

(i) In the box below, state the equation that relates C to c.

(1 mark)

(ii) State the name of the physical quantity that each letter represents.

C: .....

.....

c: .....

.....

(2 marks)

(iii) Distinguish between *'C'* and *'c'*.

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(2 marks)

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(b) A substance which has a melting point of 80 °C is cooled from 90 °C to a complete solid at its melting point.

Sketch a graph in Figure 1 to represent the statement above.

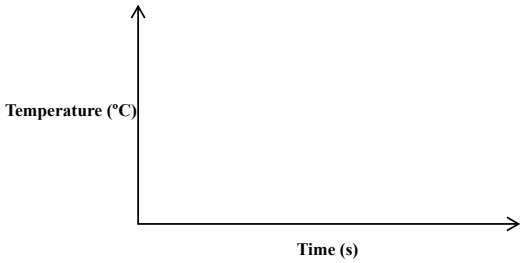

Figure 1

(2 marks)

(c) A physicist converted 2 kg of water at 37 °C to steam at 100 °C.

Assuming no heat is lost, calculate the amount of energy needed

(i) to heat the water to 100 °C

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(4 marks)

(ii) to heat the water from 100 °C to steam at 100 °C.

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(3 marks)

(iii) to completely convert the water from 37 °C to steam at 100 °C.

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.....

(1 mark)

(Specific heat capacity of water = 4200 J kg^{-1} K^{-1}
Specific latent heat of vaporization of water = 2.3 $\times$ 10^{6} J kg^{-1})

Total 15 marks

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