Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

A steel ball has a volume of 3.6 cm^3 and a mass of 28 g.

(i) Calculate the density of steel in kg/m3.

(3)

density = ... kg/m^3

(ii) The steel ball is at a room temperature of 20 °C.

It is then put in a pan of boiling water maintained at 100 °C.
Calculate how much thermal energy the ball gains as its temperature increases from 20 °C to 100 °C.
Specific heat capacity of steel = 510 J/kg °C
Use an equation selected from the list of equations at the end of this paper.

(2)

thermal energy gained = ... J

(iii) The steel ball is put into a furnace where it melts.

Compare the motion of particles in the steel when they are in the solid state with their motion when in the molten (liquid) state.

(3)

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(Total for question = 8 marks)

Q2.

A beaker contains 0.25 kg of water at room temperature.
The beaker of water is heated until the water reaches boiling point (100 °C).
The specific heat capacity of water is 4200 J/kg °C.
The total amount of thermal energy supplied to the water is 84 000 J.

(i) Calculate the temperature of the water before it was heated.

Use an equation selected from the list of equations from the relevant equation sheet.

(3)

temperature before heating = ... °C

(ii) The heating continues until 0.15 kg of the water has turned into steam.

The thermal energy needed to turn the boiling water into steam is 0.34 MJ.
Calculate the specific latent heat of vapourisation of water.
Use an equation selected from the list of equations from the relevant equation sheet.

(2)

specific latent heat = ... MJ/kg

(iii) The graph in Figure 6 shows how the **volume** of 1 kg of water changes with temperature.

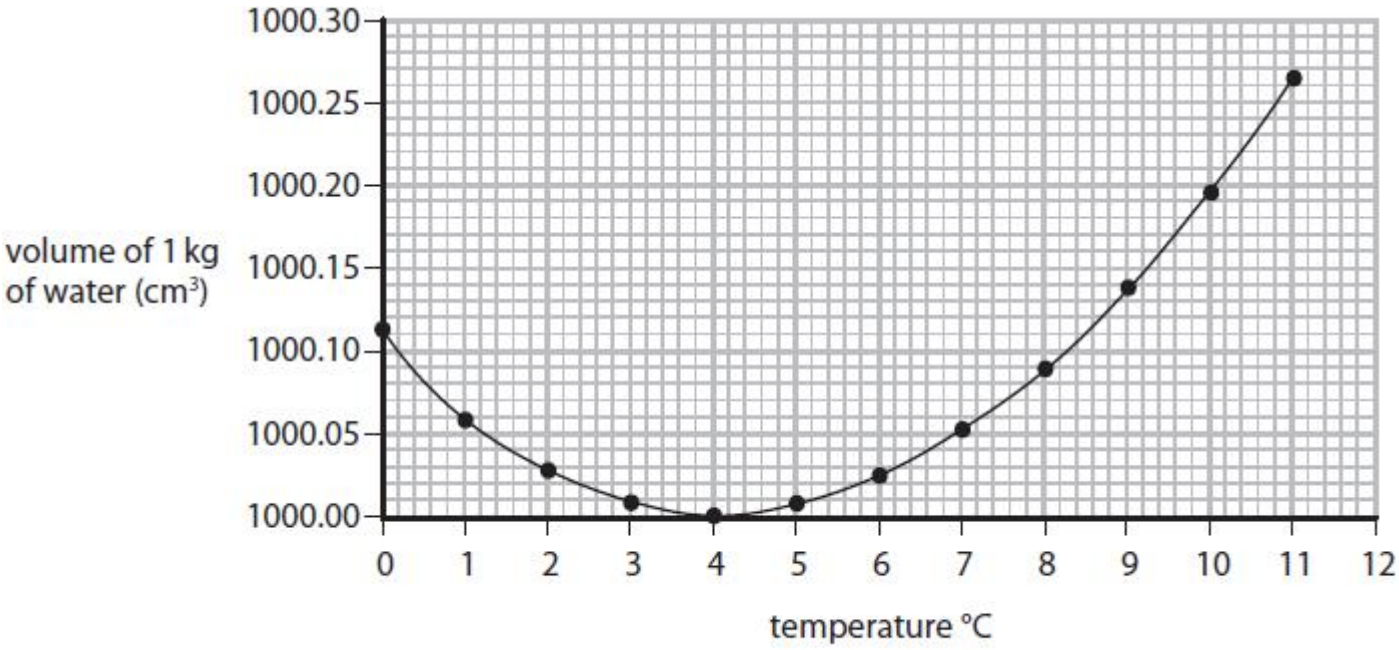

Figure 6

Describe how the **density** of water changes with temperature over the range of temperature shown in Figure 6.
Calculations are not required.

(2)

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(Total for question = 7 marks)

Q3.

A student boils some water.

Calculate the amount of thermal energy needed to change 60.0 g of water to steam at its boiling point.

The specific latent heat of vaporisation of water, L, is 2.26×10^6 J/kg.

Use the equation

$$Q = m \times L$$

(2)

amount of thermal energy = ... J

(Total for question = 2 marks)