

- 3 (a) The resistance of a thermistor at  $0^{\circ}\text{C}$  is  $3840\Omega$ . At  $100^{\circ}\text{C}$  the resistance is  $190\Omega$ . When the thermistor is placed in water at a particular constant temperature, its resistance is  $2300\Omega$ .

- (i) Assuming that the resistance of the thermistor varies linearly with temperature, calculate the temperature of the water.

temperature = .....  $^{\circ}\text{C}$  [2]

- (ii) The temperature of the water, as measured on the thermodynamic scale of temperature, is  $286\text{K}$ .

By reference to what is meant by the thermodynamic scale of temperature, comment on your answer in (i).

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[3]

- (b) A polystyrene cup contains a mass of  $95\text{g}$  of water at  $28^{\circ}\text{C}$ .

A cube of ice of mass  $12\text{g}$  is put into the water. Initially, the ice is at  $0^{\circ}\text{C}$ . The water, of specific heat capacity  $4.2 \times 10^3\text{ J kg}^{-1}\text{ K}^{-1}$ , is stirred until all the ice melts.

Assuming that the cup has negligible mass and that there is no heat exchange with the atmosphere, calculate the final temperature of the water.

The specific latent heat of fusion of ice is  $3.3 \times 10^5\text{ J kg}^{-1}$ .

temperature = .....  $^{\circ}\text{C}$  [4]