OCR
Oxford Cambridge and RSA

# A level Physics B

**H557/03** Practical skills in physics

## Question Set 1

**1** This question is about using a thermistor in a temperature sensing circuit.
The graph, **Fig. 1.1**, shows how the resistance *R* of a thermistor varies with temperature *T*.

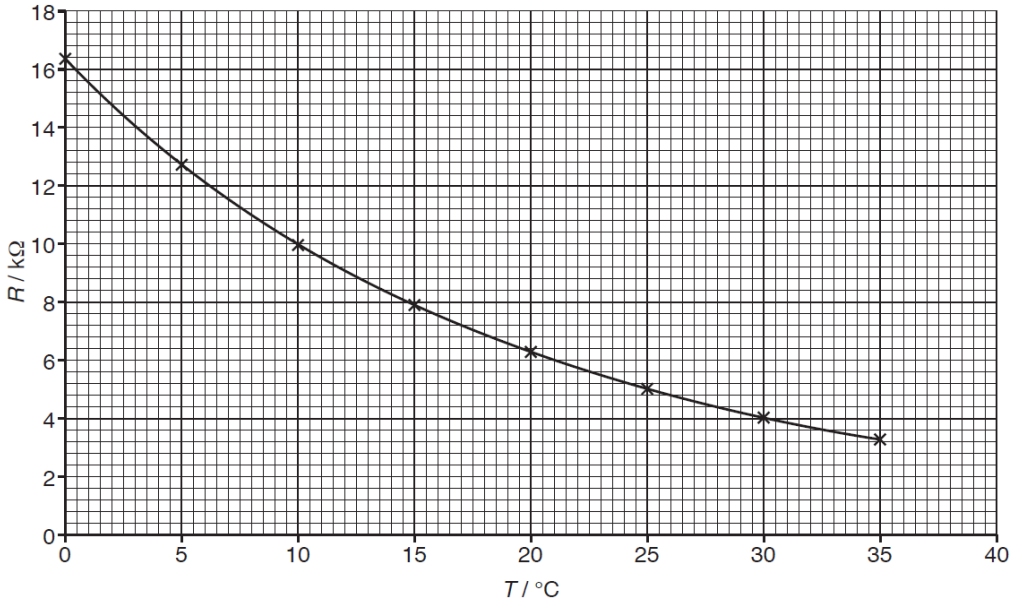


**Fig. 1.1**

**(a)** The resistance of the thermistor can be measured with a multimeter on the resistance range.Suggest how you might vary and measure the temperature of the thermistor so that the data for **Fig. 1.1**, could be collected.

**[2]**

**(b)** The thermistor is used in the potential divider shown in **Fig. 1.2**.

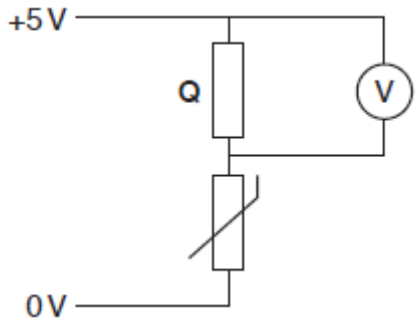


**Fig. 1.2**

Suggest why the voltmeter is connected across the fixed resistor **Q** rather than the thermistor in this temperature sensing circuit.

**[1]**

**(c)** Readings of voltage $V_{out}$ against temperature $T$ are recorded using an analogue voltmeter. The uncertainty in the voltmeter readings is ± 0.1 V and the uncertainty in the temperature readings is ± 1 °C. The data is shown in **Fig. 1.3** in the form of a graph.

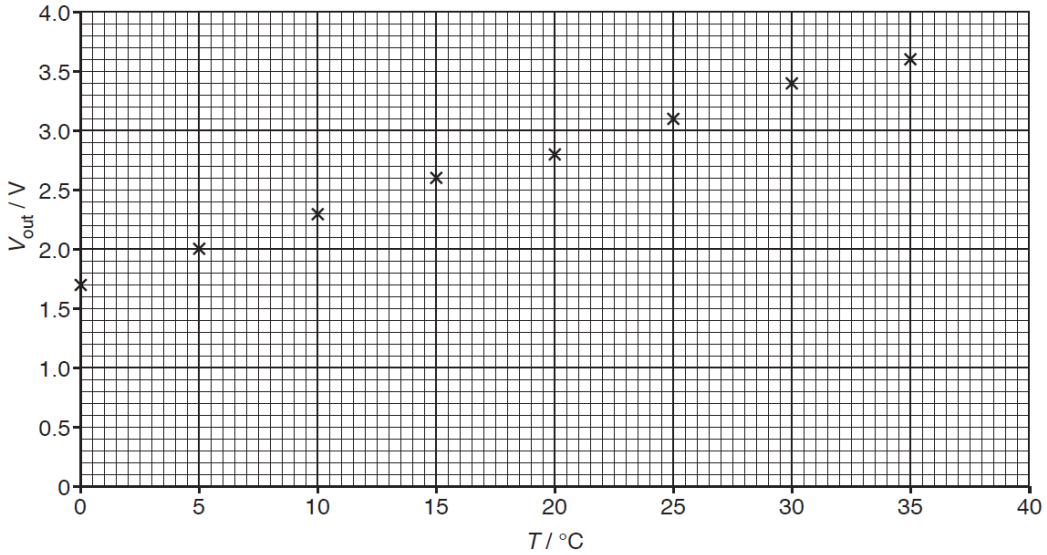


**Fig. 1.3**

It is suggested that $V_{out}$ varies linearly with $T$.

**(i)** By adding uncertainty bars to **Fig. 1.3**, use the graph to show that this is true over the temperature range tested. State your reasoning.

**[3]**

**(ii)** Explain how you could calibrate the analogue voltmeter scale to read temperature directly.

**[2]**

**(d)*** Discuss the effect of changing the fixed resistor **Q** to a higher **and** a lower value on the performance of the temperature sensing circuit over the range of temperatures 0 – 35 °C. Use data from **Fig. 1.1** and **Fig. 1.3** to perform calculations to support your ideas. **[6]**

## Total Marks for Question Set 1: 14