

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 .

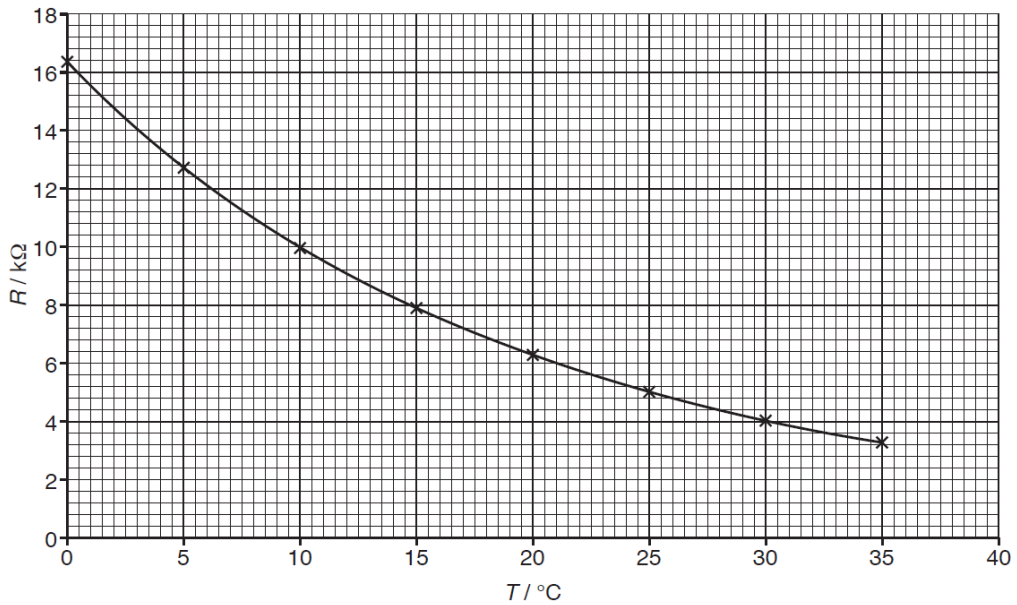


Fig. 1.1

- (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**.

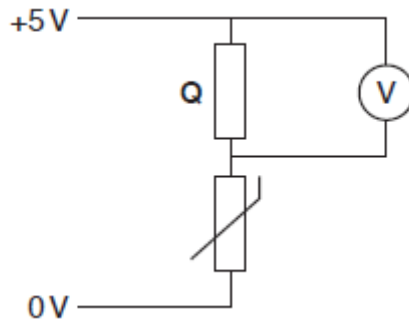


Fig. 1.2

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 $\pm 0.1 \text{ V}$ and the uncertainty in the temperature readings is $\pm 1^\circ\text{C}$. The data is shown in **Fig. 1.3** in the form of a graph.

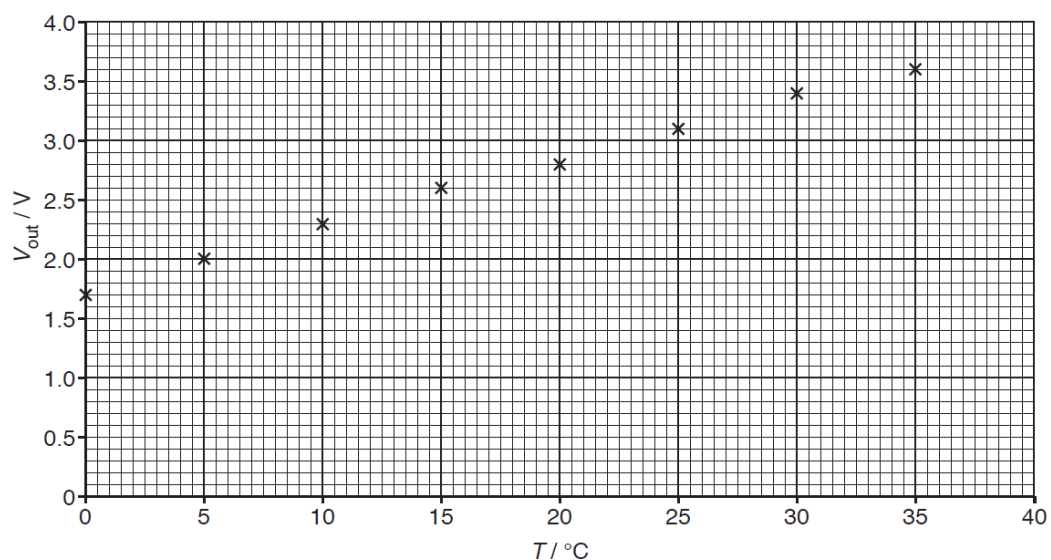


Fig. 1.3

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 $0 - 35^\circ\text{C}$. 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

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