4 A thermistor is connected in series with a fixed resistor of 1.20 kΩ and a battery, as shown in Fig 4.1. The e.m.f. *E* of the battery is unknown and its internal resistance is negligible.

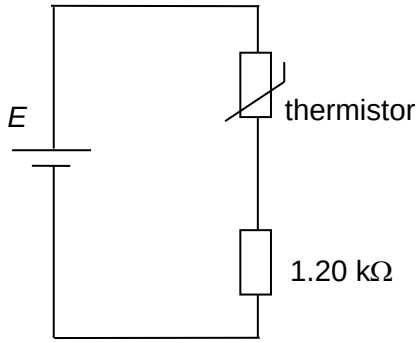

Fig. 4.1

The variation with temperature θ of the resistance R of the thermistor is shown in Fig. 4.2.

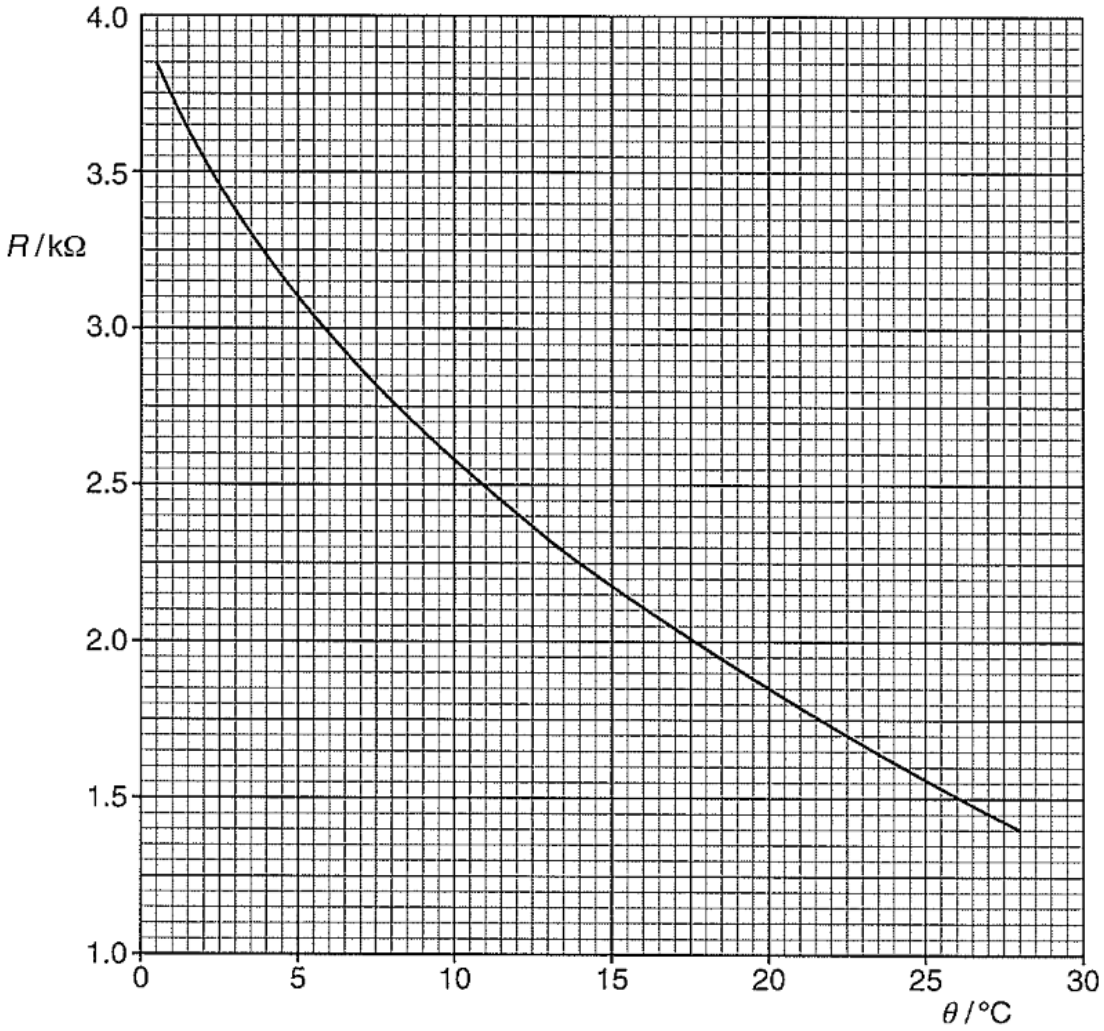

Fig. 4.2

The thermistor is immersed in a liquid maintained at a constant temperature of 5.0 °C. The energy delivered by the battery is 11.3 J for a duration of 10.0 min.

(a) **(i)** Determine the power delivered by the battery.

power = ... W [2]

(ii) Hence, determine the e.m.f. E of the battery.

E = ... V [3]

(b) The thermistor is removed and immersed in another liquid maintained at a constant temperature of 17.5 °C. The fixed resistor is replaced with another fixed resistor with a different resistance.

If the battery delivers the same power as before, determine the resistance of the fixed resistor.

resistance = ...Ω [3]

[Total: 8]