6 A battery of e.m.f. 6.0 V and internal resistance of 0.70 Ω is connected to 4 different components as shown in Fig. 6.1.

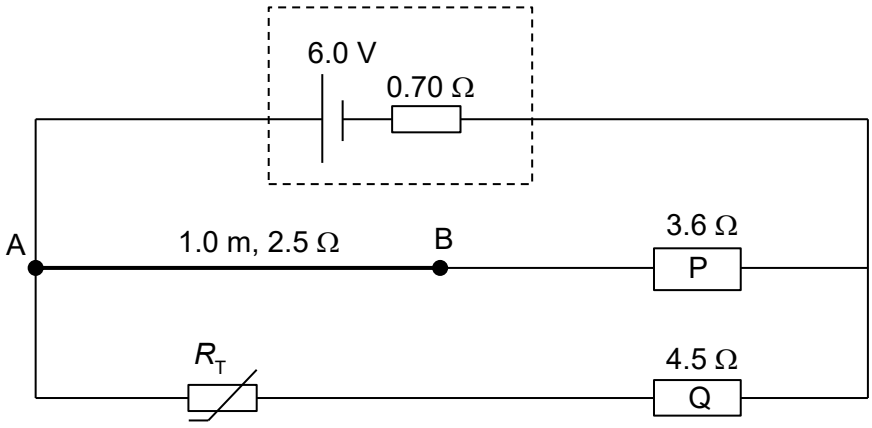

Fig. 6.1

Wire AB is a uniform resistance wire of length 1.0 m and resistance 2.5 Ω.
P and Q are fixed resistors of resistances 3.6 Ω and 4.5 Ω respectively.
R_T is a thermistor, and the variation with temperature θ of its resistance is shown in Fig. 6.2.

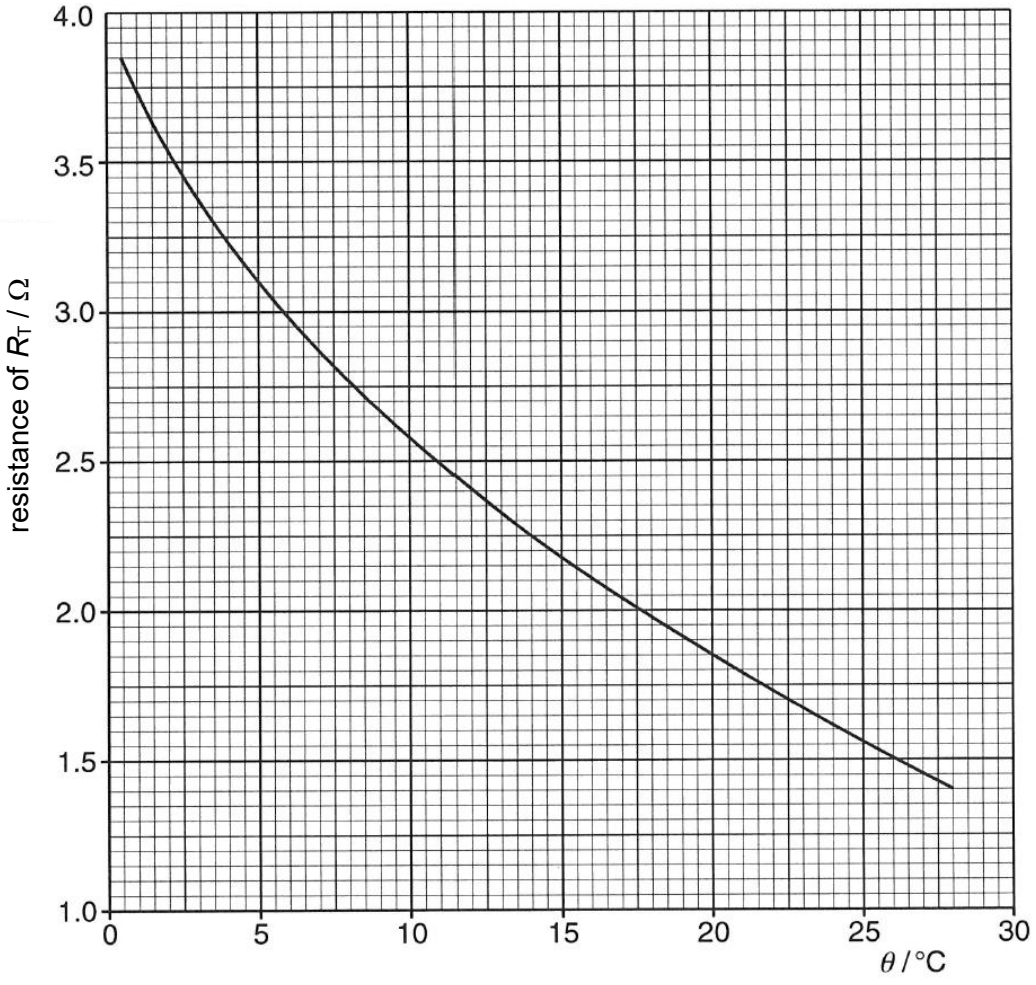

Fig. 6.2

The temperature of the thermistor is maintained at 20 °C.

(a) Using Fig. 6.2, determine the resistance of R_T.

resistance = …… Ω [1]

(b) Show that the terminal potential difference across the battery is 4.9 V.

[2]

(c) Determine the current flowing through the thermistor.

current = …… A [2]

(d) Hence, or otherwise, determine the potential difference across the thermistor.

potential difference = …… V [1]

(e) A galvanometer is now connected to point C on wire AB, and point D between the thermistor and Q, as shown in Fig. 6.3.

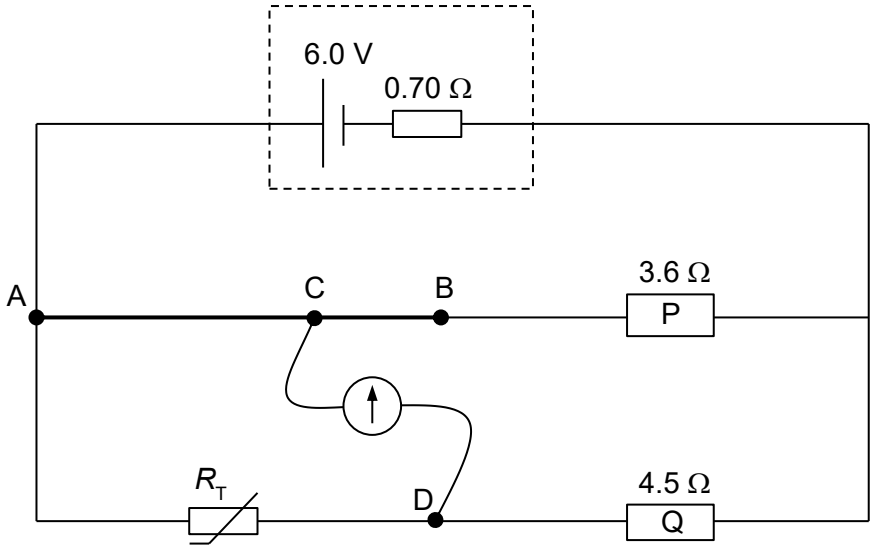

Fig. 6.3

Determine the length of wire between points A and C, such that the reading on the galvanometer is zero.

length of AC = …… m [2]