7 A nichrome resistance wire has length 150 cm, cross-sectional area $2.45 \times 10^{-7}\,m^2$ and resistivity $1.12 \times 10^{-6}\,\Omega m$.

(a) Calculate, to three significant figures, the resistance of the wire.

resistance = ... Ω [3]

(b) The nichrome wire forms part of a potentiometer circuit together with a cell of electromotive force (e.m.f.) 1.2 V and negligible internal resistance, as shown in Fig. 7.1.

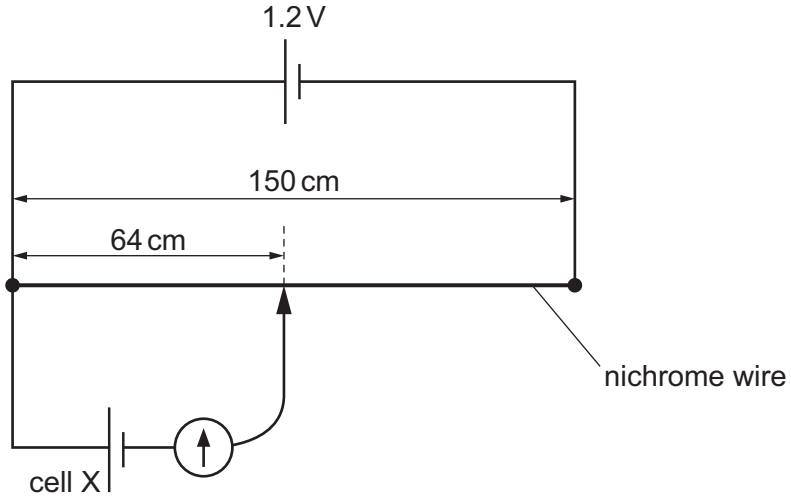

Fig. 7.1 (not to scale)

The circuit is used to determine the e.m.f. of cell X.

The galvanometer is used in a null method to find the null point 64 cm from the left-hand end of the nichrome wire.

(i) Explain what is meant by a null method.

.....

..... [1]

(ii) Calculate the e.m.f. of cell X.

e.m.f. = ... V [2]

(iii) The cell of e.m.f. 1.2 V is replaced by a new cell with the same e.m.f. but with an internal resistance that is **not** negligible.

State and explain the effect, if any, of the internal resistance of the new cell on the position of the null point.

.....

.....

.....

..... [2]

[Total: 8]