6 A nichrome wire X of length 45 cm and cross-sectional area $4.7 \times 10^{-7}\,m^2$ is connected into the circuit shown in Fig. 6.1.

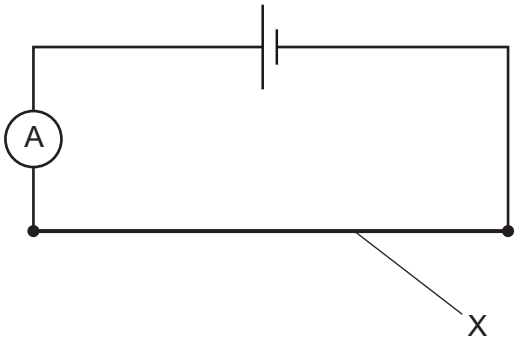

Fig. 6.1

The resistance of X is 1.1 Ω. The cell has electromotive force (e.m.f.) 1.3 V and negligible internal resistance.

(a) (i) Calculate the current in X.

current = ...A [1]

(ii) The number density of charge carriers (electrons) in nichrome is $8.5 \times 10^{28}\,m^{-3}$.

Calculate the average drift speed of the charge carriers in X.

average drift speed = ... $m\,s^{-1}$ [2]

(iii) Calculate the resistivity of the nichrome.

resistivity = ... Ω m [3]

(b) Wire Y is identical to wire X. Wire Y is added to the circuit in parallel with wire X, as shown in Fig. 6.2.

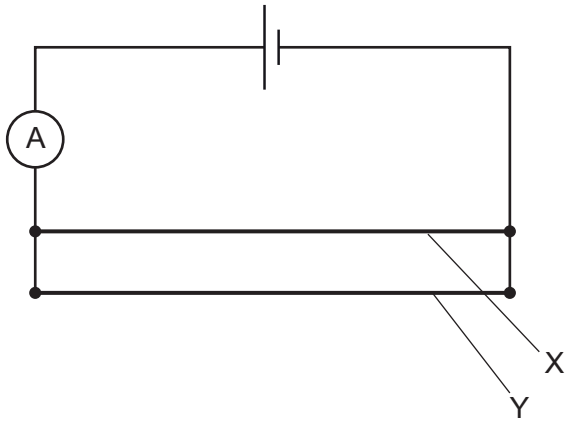

Fig. 6.2

State and explain the effect, if any, of this change on:

(i) the reading on the ammeter

.....

.....

..... [2]

(ii) the average drift speed of the charge carriers in X.

.....

..... [1]

[Total: 9]