

- 5 A cell of e.m.f. 6.0 V and internal resistance r is connected in series with a fixed resistor S and a variable resistor as shown in Fig. 5.1. Voltmeter X is connected across the cell while voltmeter Y is connected across the variable resistor.

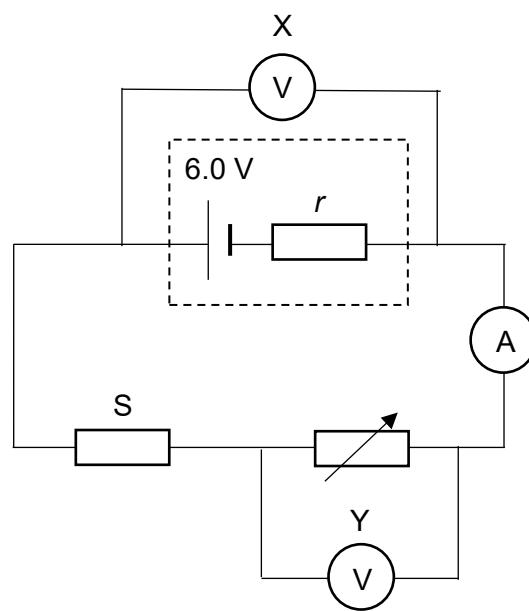


Fig. 5.1

- (a) State what is meant by *resistance* of a resistor.

[1]

- (b) The resistance of the variable resistor is varied and the variations of the readings V on voltmeters X and Y with the reading I on the ammeter are shown in Fig. 5.2.

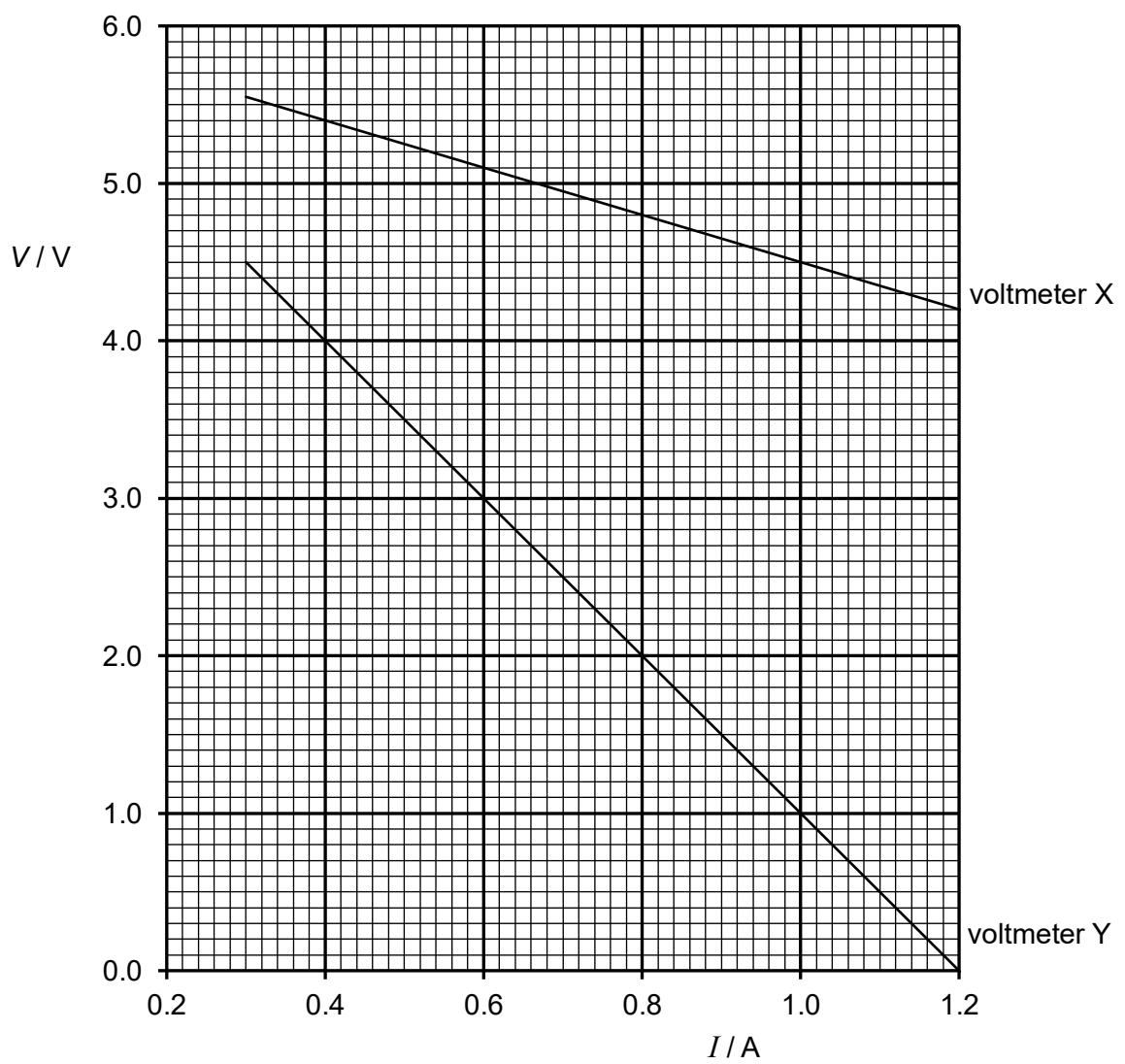


Fig. 5.2

- (i) Determine the internal resistance r of the cell.

$$r = \dots \Omega \quad [2]$$

- (ii) Show that the resistance of resistor S is 3.5Ω .

[2]

- (c) Explain why the current in the circuit cannot fall below 0.30 A.

.....
.....

[1]

- (d) The variable resistor is adjusted such that the reading on voltmeter X is 5.25 V.

Calculate the power dissipated in the variable resistor.

$$\text{power} = \dots \text{W} \quad [2]$$

- (e) (i) On Fig. 5.2, draw a graph of the variation of the potential difference across resistor S with I .

Label this graph Z.

[1]

- (ii) Hence or otherwise, state the value of I when the potential difference across resistor S and the potential difference across the variable resistor are equal.

$$I = \dots \text{A} \quad [1]$$

