

- 6 (a) A circuit is setup as shown below in Fig 6.1. A cell E with internal resistance r is connected to a network of resistors.

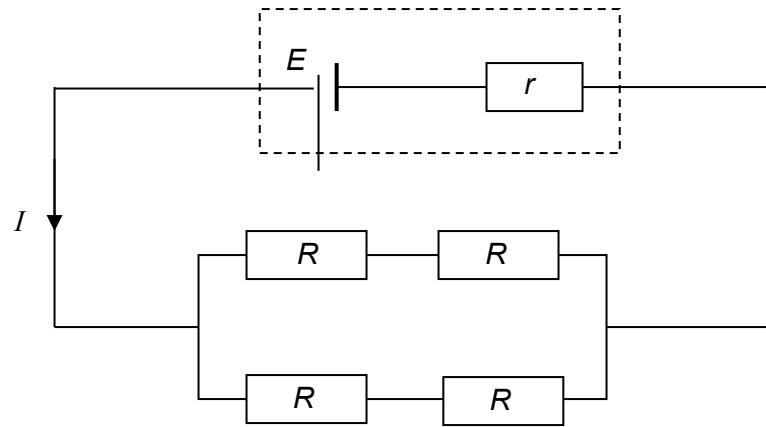


Fig 6.1

- (i) Express the current I in the circuit, in terms of R , r and E .

[2]

- (ii) Show that the fraction of power dissipated in the external resistors by the battery is
$$\frac{R}{R+r}$$
 [1]

- (iii) Suggest a reason for having 4 resistors connected in a network as shown in Fig 6.1 instead of just using a single resistor of resistance R .
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[1]

- (b) A circuit is set up as shown in Fig 6.2 below. The potentiometer wire XY has a resistance of 1.5Ω and is 1.00 m long. The movable contact J can be connected to any point along wire XY.

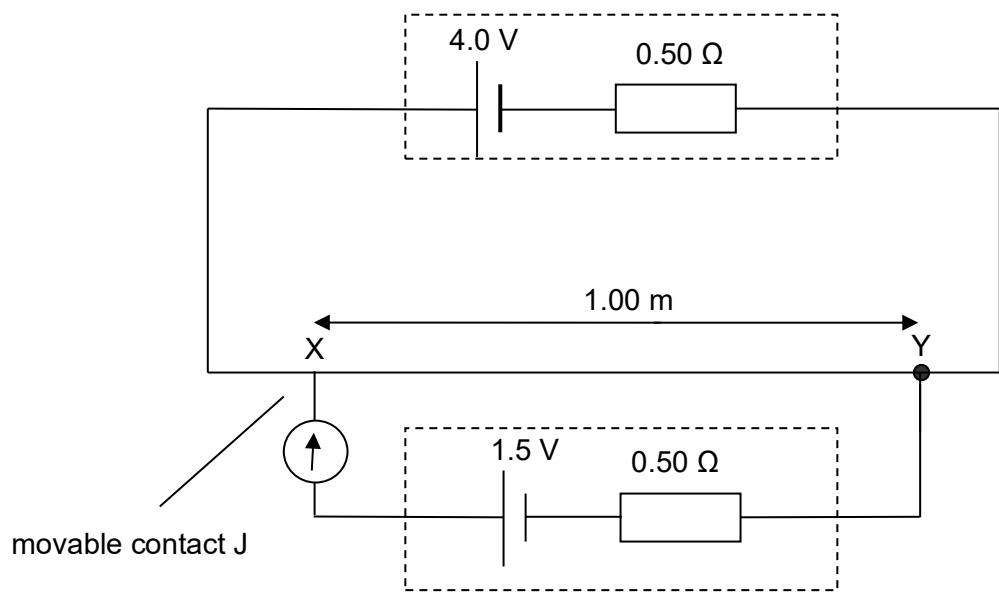
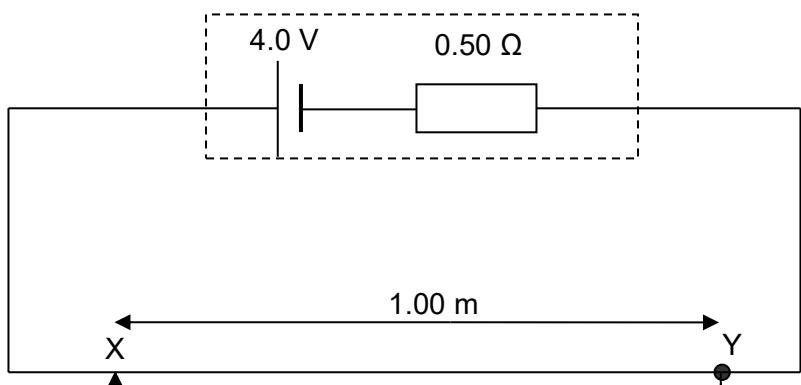


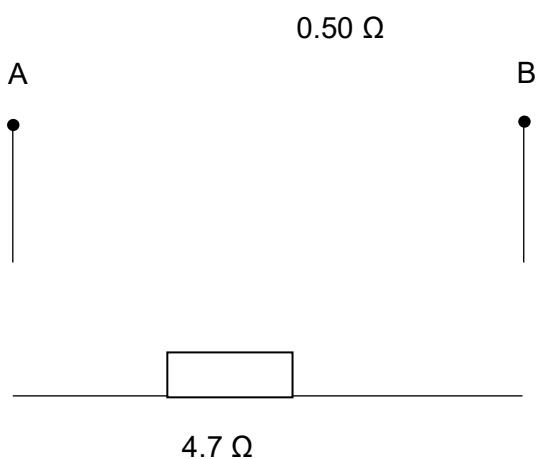
Fig 6.2

- (i) Determine the distance of the contact J from Y, such that there is no deflection in the galvanometer.

distance JY = m [2]

- (ii) Now, a $4.7\ \Omega$ resistor is connected across points A and B.





Determine the new distance of the contact J from Y, such that there is no deflection in the galvanometer.

new distance = m [3]

[Total: 9 marks]