

- 6 A battery of electromotive force (e.m.f.) 6.0V and negligible internal resistance is connected in series with a variable resistor and a uniform resistance wire XY, as shown in Fig. 6.1.

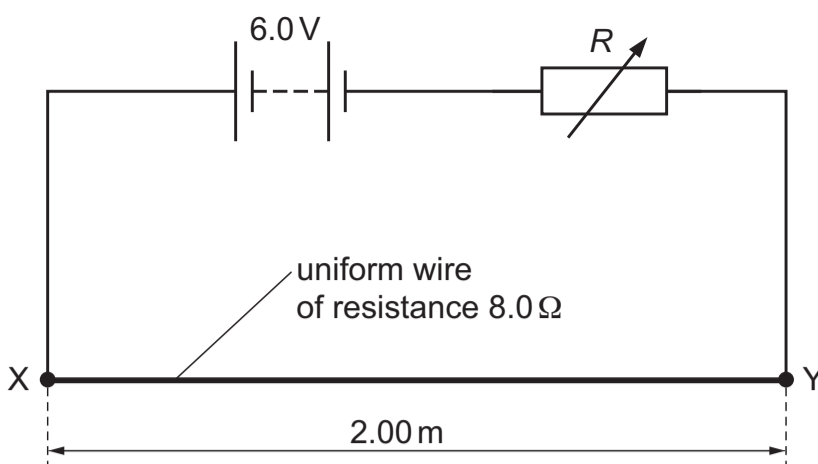


Fig. 6.1

Wire XY has length 2.00m and resistance 8.0Ω . The resistance R of the variable resistor is adjusted so that the potential difference across wire XY is 2.4V.

- (a) Determine R .

$R = \dots\dots\dots \Omega$ [2]

- (b) Explain why the potential difference V between any two points on wire XY is proportional to the distance L between those points.

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 [2]

- (c) A cell of e.m.f. E and internal resistance r is connected to the circuit, as shown in Fig. 6.2.

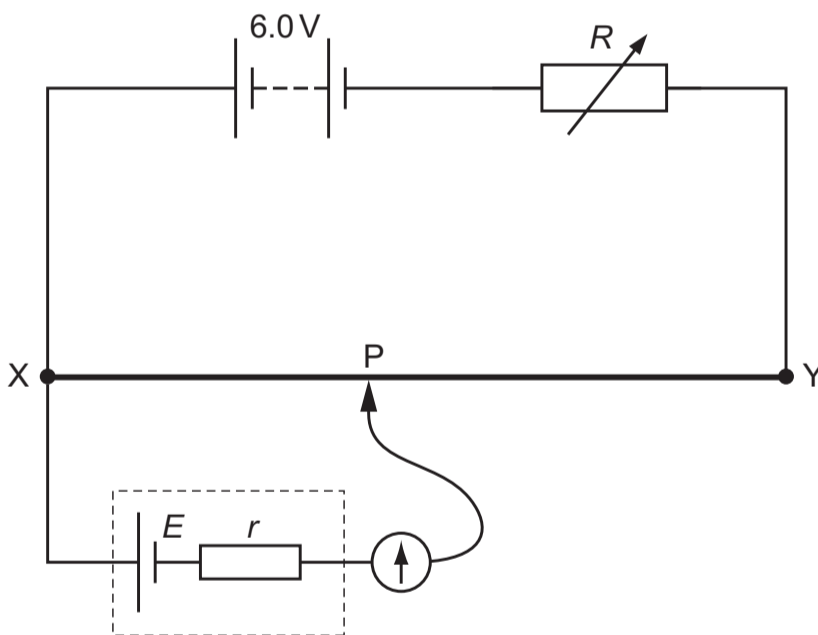


Fig. 6.2

Resistance R is unchanged.
 The movable connection P is positioned on wire XY so that the galvanometer reading is zero.
 Distance XP is 1.24 m.

- (i) Calculate E .

$E = \dots\dots\dots V$ [2]

- (ii) The value of R is now decreased.

State and explain the change that must be made to the position of P on wire XY so that the galvanometer reads zero again.

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 [2]