

- 8 Fig. 8.1 shows a potential divider circuit with a 9.0 V supply. A variable resistor of resistance R_1 is connected in series with a fixed resistor of resistance R_2 . A voltmeter is connected across the fixed resistor.

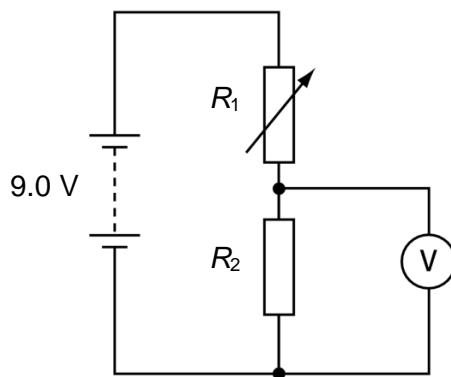


Fig. 8.1

- (a) (i) The battery has negligible internal resistance and the voltmeter has infinite resistance.

If the fixed resistor R_2 has a resistance of 470Ω , determine the reading in the voltmeter if the variable resistor is adjusted to 1650Ω .

$$\text{voltmeter reading} = \dots \text{V} \quad [1]$$

- (ii) The variable resistance R_1 has a range of 0 to $2.0 \text{ k}\Omega$.

In Fig. 8.2, sketch the variation of the voltmeter reading with resistance R_1 . Label the appropriate values in your axes.

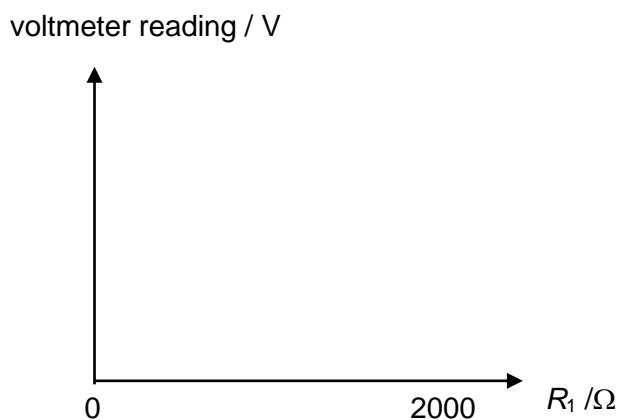


Fig. 8.2

[2]

- (b) (i)** In practice, the voltmeter does not have infinite resistance.

If the voltmeter has a resistance of $0.10 \text{ M}\Omega$, determine the percentage change in your answer in **(a)(i)**. You may assume the battery to have negligible internal resistance.

$$\text{percentage change} = \dots \text{ %} \quad [3]$$

- (ii)** Over time, the battery may develop some internal resistance usually in the order of a few ohms.

Suggest an explanation why the effect of internal resistance can be ignored in the calculation in **(a)(i)**.

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[2]