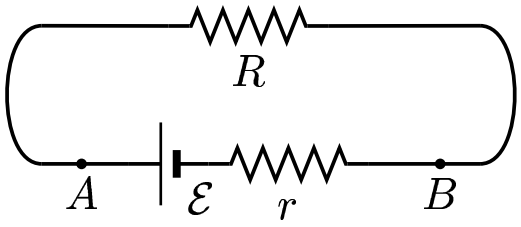
Given battery has *emf* $\mathcal{E} = 10$ V and the internal resistance $r = 1\,\Omega$, as shown in the figure below. An external resistance $R = 100.0\,\Omega$ is connected to the battery.



Compare V_{AB} with $\mathcal{E}$.

A) $V_{AB} \ll \mathcal{E}$.

B) $V_{AB} \approx \mathcal{E}$.

C) $V_{AB} \gg \mathcal{E}$.

$$R_{total} = R + r$$

$$I = \frac{\mathcal{E}}{R + r}$$

$$V_{AB} = \frac{R}{R + r}\,\mathcal{E} = \frac{100}{100 + 1}\ 10\ \text{V} = 9.9\ \text{V}$$

This simple calculation shows $V_{AB} = 9.9\,\text{V} \approx \mathcal{E}$. In other words, when $r \ll R$, most of the potential drop is across the external resistance R.

Answer **B**.

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