Answer on Question #45988-Physics-Electromagnetism

Battery of e.m.f. $\mathcal{E}$ and negligible internal resistance is connected to two resistors of resistances R_1 and R_2 as shown in the figure. What is the potential difference across the resistor of resistance R_2.

Solution

Two resistors of resistances must be connected in series, because from parallel connection we know $U_1 = U_2 = \mathcal{E}$.

According Kirchhoff law:

$$\mathcal{E} - IR_1 - IR_2 = 0 \rightarrow I = \frac{\mathcal{E}}{R_1 + R_2},$$

where I is the current.

The potential difference across the resistor of resistance R_2:

$$U_2 = IR_2 = \frac{\mathcal{E}R_2}{R_1 + R_2}.$$

Answer: $\boldsymbol{\frac{\mathcal{E}R_2}{R_1+R_2}}$