Answer on Question #46804, Physics, Other

A 9V battery is short-circuited. The potential difference across the battery is found to be 8V, and the current is 5A. What is the internal resistance of the battery?

0.1Ω
0.2Ω
0.3Ω
0.4Ω

Solution:

Given:

$\varepsilon = 9\ \text{V},$
$V = 8\ \text{V},$
$I = 5\ \text{A},$
$R_{inrernal} = ?$

$$I = \frac{\varepsilon}{R + R_{internal}}$$

So,

$$\varepsilon = IR + IR_{internal}$$

$$IR = V = 8\ \text{V}$$

Thus,

$$8 = 9 - 5R_{internal}$$

$$5R_{internal} = 1$$

$$R_{internal} = 0.2\ \Omega$$

Answer: 0.2Ω.