

Answer to Question #70149, Physics / Electric Circuits

Question:

A battery has an internal resistance of $0.30\ \Omega$. The potential difference between its terminals is $1.48\ \text{V}$ when a current of $0.20\ \text{A}$ is being drawn from it.

a) What is its e.m.f.?

b) What is the power rating of a television receiver that uses $270,000\ \text{Joules}$ to operate for $1.5\ \text{hours}$?

Solution:

a)

The voltage V of the battery is related to its e.m.f. \mathcal{E} and internal resistance r via

$$V = \mathcal{E} - Ir$$

so

$$\mathcal{E} = V + Ir = 1.48 + 0.2 * 0.3 = 1.54\ \text{V}$$

b)

This question has nothing to do with the a) section above

The power rating of equipment is the highest power input allowed to flow through particular equipment. A power rating can also involve average and maximum power. In our case the problem points to average power consumed by the TV.

$$P = \frac{E}{t} = \frac{270000}{1.5 * 60 * 60} = 50\ \text{W}$$

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