Example problems – Ohm’s law and single-resistor circuits

1. How much current does the resistor draw from the source in each situation?

 (a) a 5 Ω resistor connected to a 5-V source

 (b) a 5 Ω resistor connected to a 10-V source

(c) a 10 Ω resistor connected to a 10-V source

2. A 150-ohm resistor is connected to a 15-volt battery.

 (a) How much current (in amps and in mA) does the resistor draw from the battery?

 (b) How much power (in watts and in kW) does the battery produce?

 (c) How much power (in watts and in kW) does the resistor consume?

 (d) How much electrical energy (in joules and in kWh) does the resistor use in 30 minutes of operation?

 (e) How much electric charge passes through the circuit in 6 seconds?

 (f) How many electrons pass through the resistor in 6 seconds?

3. A vacuum cleaner draws 14 A from a 120-V source.

 (a) What is the resistance of the vacuum cleaner motor?

 (b) What is the power consumption of the vacuum cleaner motor?

 (c) If electricity costs $0.15 per kWh, how much does it cost me to run the vacuum for 15 minutes?

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Answers

 1. (a) 1 A

 (b) 2 A

 (c) 1 A

2. (a) 0.1 A 🡪 100 mA

 (b) 1.5 W 🡪 0.0015 kW

 (c) 1.5 W 🡪 0.0015 kW

 (d) 2700 J 🡪 0.00075 kWh

 (e) 0.6 C

 (f) 3.75 X 10 18 electrons

3. (a) 8.6 ohms

 (b) 1680 W 🡪 1.68 kW

 (c) $0.07 🡪 7¢