Solutions to Period 12 Exercises

E.1 **You have four identical pieces of wire. Each wire is 10 feet long and has a resistance of 1.0 ohm. If you connect the four wires in series, what is their combined resistance?**

a) 0.25 ohms
b) 1 ohm
c) 2 ohms
d) 4 ohms
e) 10 ohms

E.1 = d

E.2 **If you connected the four wires in E.1 in parallel, what would be their resistance?**

a) less than 1.0 ohm
b) equal to 1.0 ohm
c) more than 1.0 ohm
d) zero ohms
e) negative 10 ohms

E.2 = a

E.3 **The starter motor on a car draws 60 amps of current at 12 volts. How small must the resistance of each wire of a pair of jumper cables be if the voltage drop along each wire is to be less than 1 volt?**

a) 0.016 ohms

b) 0.20 ohms

c) 5.0 ohms

d) 60 ohms

e) 75 ohms

Solve $V = I R$ for R

$$R = \frac{V}{I} = \frac{1 \text{ volt}}{60 \text{ amps}} = 0.016 \text{ ohms}$$

E.3 = a

E.4 **A 10 ohm resistor and a 20 ohm resistor are connected in series with a battery. Which of the following statements is TRUE?**

a) The current through the 10 ohm resistor is less than the current through the 20 ohm resistor.

b) The current through the 10 ohm resistor is greater than the current through the 20 ohm resistor.

c) The voltage drop across the 10 ohm resistor is less than the voltage drop across the 20 ohm resistor.

d) The voltage drop across the 10 ohm resistor is greater than the voltage drop across the 20 ohm resistor

e) The voltage drops across the 10 ohm and the 20 ohm resistors are identical.

The same amount of current flows through each resistor.

The resistor with greater resistance (20 ohms) has a larger voltage drop across it.

E.4 = c

E.5 **A circuit consists of two resistors with resistances of 5.0 ohms and 2.5 ohms. What is the total circuit resistance when the resistors are connected in parallel?**

a) 0.6 ohms

b) 1.7 ohms

c) 2.5 ohms

d) 5.0 ohms

e) 7.5 ohms

$$\frac{1}{R_{Tot}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{5.0\ \Omega} + \frac{1}{2.5\ \Omega} = \frac{1}{5.0\ \Omega} + \frac{2}{5.0\ \Omega} = \frac{3}{5.0\ \Omega}$$

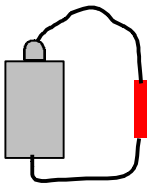
$$R_{Tot} = \frac{5.0\ \Omega}{3} = 1.7\Omega$$

The total resistance of the parallel circuit is less than the resistance of either resistor.

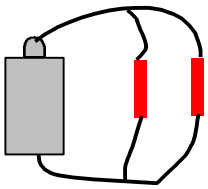
E.5 = b

E.6 **The circuits below have identical resistors and batteries. Rank the circuits in order from the circuit in which the largest amount of current would flow from the battery to the circuit in which the smallest amount of current would flow from the battery.**

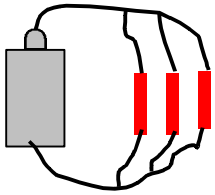
a)



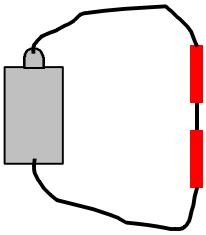
b)



c)



d)



Adding resistors in parallel reduces the resistance of the circuit. Less resistance allows more current to flow.

Adding resistors in series increases the circuit resistance and decreases the current

a) = third most current

b) = second most current

c) = most current

d) = least current

Solutions to Period 12 Exercises

E.1 = d

E.2 = a

E.3 = a

E.4 = c

E.5 = b

E.6

a) = third most current

b) = second most current

c) = most current

d) = least current