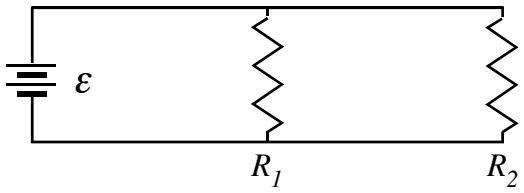
PhyzJob: Parallel Circuits
NUMBER PUZZLES

Apply Ohm's law, Joule's law, and your understanding of the nature of parallel circuits to solve the numerical problems that follow.

Ex. If $\mathcal{E} = 8$ V, $R_1 = 12\ \Omega$ and $R_2 = 6.0\ \Omega$, what is
a. the equivalent resistance of the circuit?
b. the total current in the circuit?
c. the power dissipated in R_1?
d. the current through R_2?



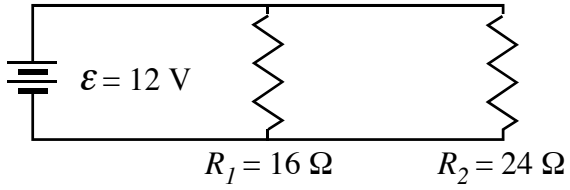
a. $R_{EQ} = R_1R_2 / (R_1 + R_2)$
$R_{EQ} = 12\ \Omega \cdot 6\ \Omega / (12\ \Omega + 6\ \Omega)$
$R_{EQ} = 4\ \Omega$

b. $I_{TOT} = \mathcal{E}/R_{EQ}$
$I_{TOT} = 8\ V / 4\ \Omega$
$I_{TOT} = 2$ A

c. $P_1 = \mathcal{E}^2/R_1$
$P_1 = (8\ V)^2 / 12\ \Omega$
$P_1 = 5.3$ W

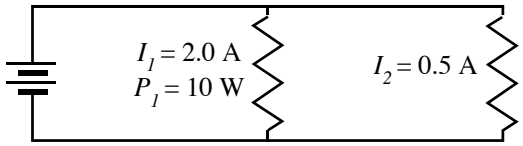
d. $I_2 = \mathcal{E}/R_2$
$I_2 = 8\ V / 6\ \Omega$
$I_2 = 1.3$ A

1. If $\mathcal{E} = 12$ V, $R_1 = 16\ \Omega$ and $R_2 = 24\ \Omega$, what is
a. the equivalent resistance of the circuit?
b. the total current in the circuit?
c. the power dissipated in R_1?
d. the current through R_2?



1.a. 9.6 Ω b. 1.3 A c. 9.0 W d. 0.5 A

2. If $I_1 = 2.0$ A, $P_1 = 10$ W, and $I_2 = 0.5$ A, what is
a. the voltage across R_1?
b. the resistance of R_2?
c. the power dissipated in the circuit?
d. the equivalent resistance of the circuit?



3. If $I_1 = 1.5$ A, $R_1 = 8.0\ \Omega$, and $R_2 = 6.0\ \Omega$, what is the voltage across R_2?

4. If $\mathcal{E} = 9.0$ V, $I_1 = 0.4$ A, and $I_2 = 1.2$ A, what is the power dissipated in the circuit?

5. If $\mathcal{E} = 32$ V, $R_1 = 18\ \Omega$, and $P_2 = 48$ W, what is the current
a. through R_1?
b. through R_2?
c. through the battery (total current in the circuit)?

2.a. 5 V b. 10 Ω c. 13 W d. 2 Ω 3. 12 V 4. 14 W 5.a. 1.8 A b. 1.5 A c. 3.3 A