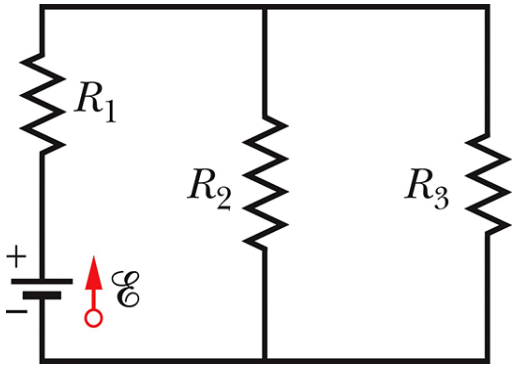
Phyx 135-2, Fall 2016, Quiz #3 **Name** _____
Lecture Section 02 (1 pm)

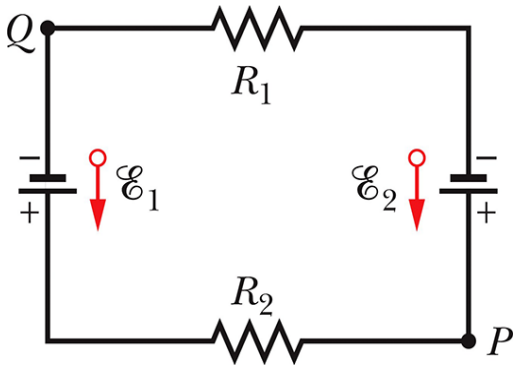
1) (12 points) In the circuit at right, the ideal battery has an emf of 12 volts. $R_1 = 15\ \Omega$, $R_2 = 20\ \Omega$, and $R_3 = 10\ \Omega$. What is the current flowing through R_2?



Solution: First we must calculate the current in the circuit. R_2 and R_3 are in parallel, so their equivalent resistance is $^1/_R = {}^1/_{20} + {}^1/_{10}$, or $R = {}^{20}/_3 = 6.67\ \Omega$. Adding this to R_1 gives a total series resistance of 21.67 Ω, which means the current is 12 = i(21.67), or i = 0.554 amps.

The voltage drop across R_1 is thus (0.554)(15) = 8.3 volts, so the voltage drop across R_2 and R_3 must be 12 – 8.3 = 3.7 volts. We have 3.7 = i(20), or i = 0.185 amps.

2) (8 points) In the circuit at right, suppose $\mathcal{E}_1 = 9$ v, $\mathcal{E}_2 = 12$ v, $R_1 = 10\ \Omega$, and R_2 is an unknown resistance. If the power being dissipated by $R_1 = 0.5$ watts, then what is the resistance of R_2?



Solution
The current flowing in R_1 must satisfy the relation $P = i^2R$, so we have $0.5 = i^2(10)$, or i = 0.224 amp.

For the entire circuit, we require that 12 – 9 = (0.224)(10 + R_2), so $R_2 = 3.4\ \Omega$.