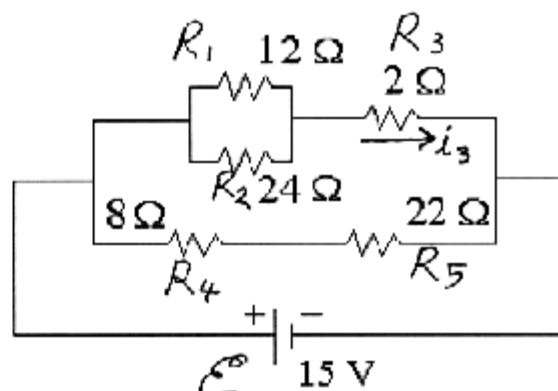


Name: KEY

PHYSICS 2220 - QUIZ #5 - SPRING 2009

1. A circuit containing five resistors connected to a battery with a 15.0 V emf is shown.



- a. Find the equivalent resistance of the five resistors.

$$\text{parallel: } R_{12} = \frac{R_1 R_2}{R_1 + R_2} = \frac{(12 \Omega)(24 \Omega)}{12 \Omega + 24 \Omega} = 8 \Omega$$

$$\text{series: } R_{123} = R_{12} + R_3 = 8 \Omega + 2 \Omega = 10 \Omega$$

$$\text{series: } R_{45} = R_4 + R_5 = 8 \Omega + 22 \Omega = 30 \Omega$$

$$\text{parallel: } R_{eq} = \frac{R_{123} R_{45}}{R_{123} + R_{45}} = \frac{(10 \Omega)(30 \Omega)}{10 \Omega + 30 \Omega} = \boxed{7.5 \Omega}$$

- b. What is the voltage across the 2.0 Ω resistor?

The voltage across R_{123} is 15 V,
so the current thru R_3 is

$$i_3 = \frac{15 \text{ V}}{R_{123}} = \frac{15 \text{ V}}{10 \Omega} = 1.5 \text{ A}$$

So the voltage across R_3 is

$$i_3 R_3 = (1.5 \text{ A})(2 \Omega) = \boxed{3 \text{ V}}$$