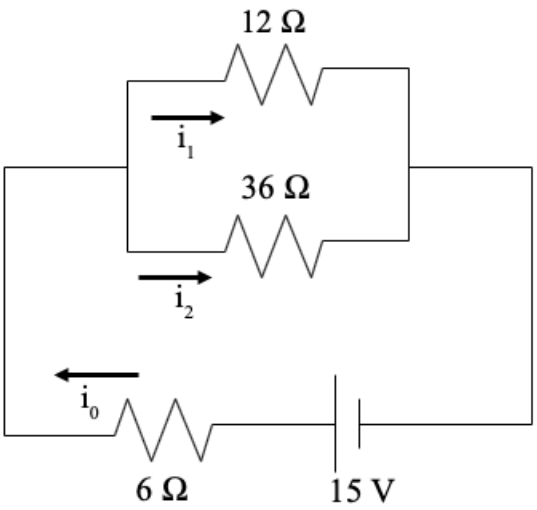
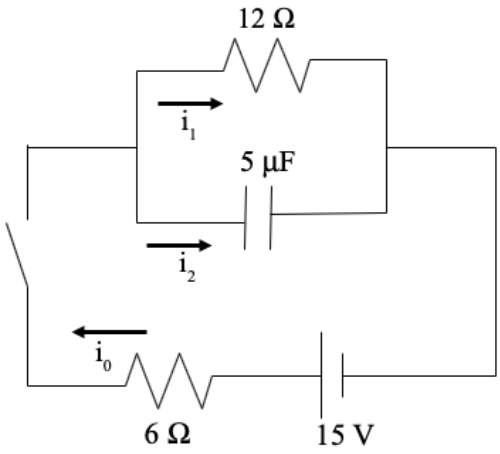
Off-the-wall question #2: Consider the circuit shown to the right.



a.) It is noted that the current i_o is 1.0 amps. An astute students looks at the circuit and, within seconds (obviously not using Kirchoff's Law) states that the current through the 12 Ω resistor must be 0.75 amps. Explain how she deduced that.

b.) If you were to use Kirchoff's Laws on this circuit and you wrote out three loop equations to accommodate the three unknown currents, your resulting values after solving the equations simultaneously would all have been zero. Explain why?

c.) At some point, the circuit is altered with a switch being placed in the main body of the circuit and a 5 microfarad capacitor replacing the 36 Ω resistor. If the cap is initially uncharged with the switch open, and if the switch is closed at t = 0 seconds:



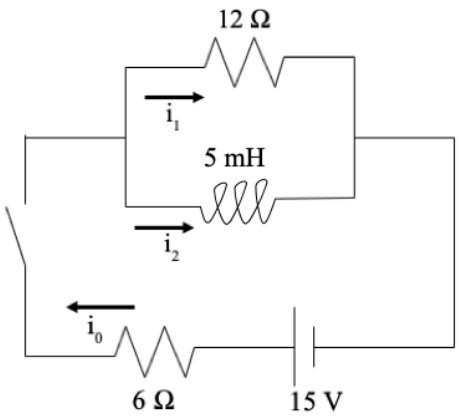
i.) Without doing calculations, will the initial current drawn from the batter in this circuit be:

___ greater than ___ the same as ____ smaller than

the current being drawn from the battery in the all resistor circuit (that current was, if you will remember, 1.0 amp). Justify your response.

ii.) What will the current in the circuit do with time? That is, will it increase or decrease or go to steady state or what? Explain fully what you think will happen.

d.) At some point, the circuit is altered. The switch remains but a 5 millihenry inductor replaces the capacitor. If the switch is closed at t = 0 seconds:



iii.) Without doing calculations, will the initial current drawn from the batter in this circuit be:

___ greater than ___ the same as ____ smaller than

the current being drawn from the battery in the all resistor circuit (that current was, if you will remember, 1.0 amp). Justify your response.

iv.) What will the current in the circuit do with time? That is, will it increase or decrease or go to steady state or what? Explain fully what you think will happen.