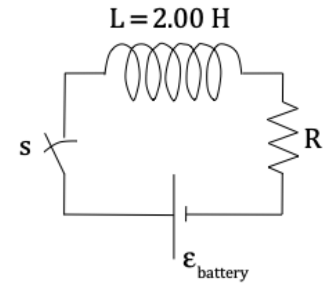
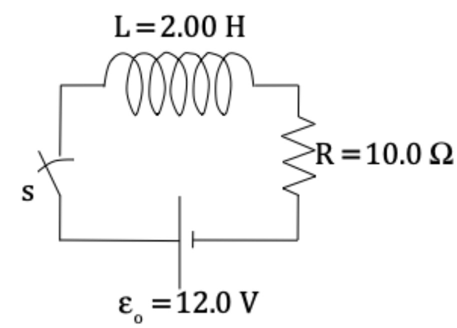
32-Series Problem (Inductance)



32.3) A 0.500 amp current passes through a 2.00 H inductor. The switch in the circuit is opened at *t = 0 seconds* with the current essentially dropping to zero in 10.0 ms. Determine the average induced EMF in the inductor over that time period.

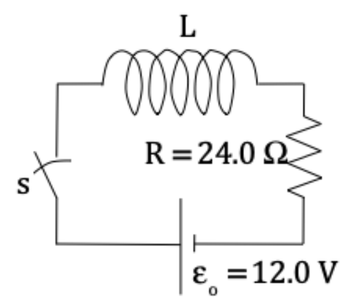
32.7) A current of $I = I_o \sin(\omega t)$ exists in a simple circuit in which resides a 10.0 mH inductor. If the maximum current is 5.00 A and the frequency of the source is 60.0 Hz, determine the function that defines the self-induced EMF across the inductor as a function of time.

32.10) A solenoid, being a coil, has inductance. Our solenoid has 420 winds and is 16.0 cm long. If the current through the solenoid decreases at a rate of 0.421 A/s, it is observed that an induced EMF of $175\ \mu V$ is generated across the solenoid. What must the solenoid's radius be?



32.14) At t = 0, the switch in the circuit to the right is thrown.

- a.) How long will it take for the current to reach 50.0% of its maximum?
- b.) How long will it take for the current to reach 90.0% of its maximum?



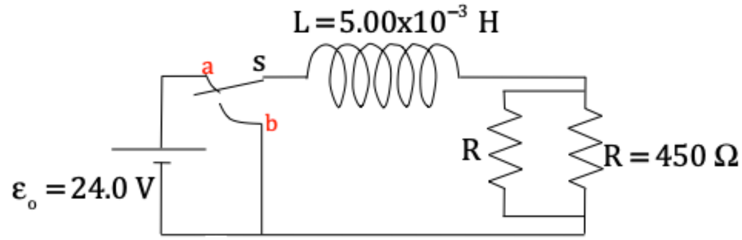
32.16) (This is going to be fun.) At *t = 0*, the switch in the circuit shown to the right is closed. Labeling the initial and final values for the current, and using a single axes, sketch the *current versus time* graph for $t \geq 0$, assuming that:

- a.) L = 0;
- b.) L is relatively small;
- c.) L is relatively large.

32.17) Consider the figure to the right.

a.) How large must the resistor R be if the circuit's *time constant* is $15.0\ \mu s$ when the switch is in *position a*?

b.) When the switch is thrown to *position b*, what is the initial current in the inductor?



32.21) In the circuit to the right, $R = 4.00\ \Omega$, $L = 1.00H$ and $\varepsilon_o = 10.0V$. If the switch is closed at $t = 0$, find:

a.) the current as a function of time through the inductor, and;

b.) the current as a function of time through the switch.