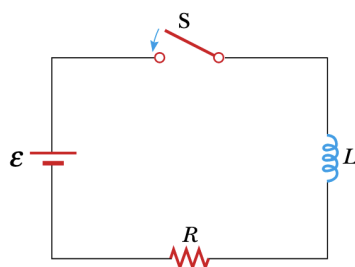
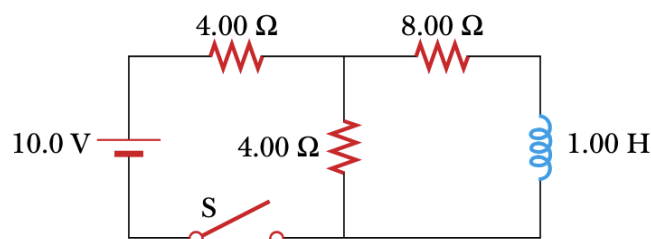


Exercise sheet #12

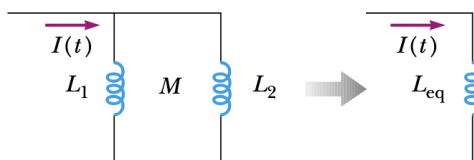
Problem 1. In the circuit shown below, let $L = 7.00\text{H}$, $R = 9.00\Omega$, and $\varepsilon = 120\text{ V}$. What is the self-induced emf 0.200 s after the switch is closed?



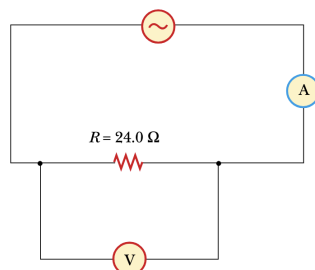
Problem 2. The switch in the figure below is open for $t < 0$ and then closed at time $t = 0$. Find the current in the inductor and the current in the switch as functions of time thereafter.



Problem 3. Two inductors having self-inductances L_1 and L_2 are connected in parallel as shown in the figure below. The mutual inductance between the two inductors is M . Determine the equivalent selfinductance L_{eq} for the system.



Problem 4. An AC power supply produces a maximum voltage of $V_0 = 100\text{ V}$. This power supply is connected to a $24.0\text{ }\Omega$ resistor, and the current and resistor voltage are measured with an ideal AC ammeter and an ideal AC voltmeter, as shown below. What does each meter read? Recall that an ideal ammeter has zero resistance and an ideal voltmeter has infinite resistance.



Problem 5. (a) For the series RLC connection shown below, draw a phasor diagram for the voltages. The amplitudes of the voltage drop across all the circuit elements involved should be represented with phasors.

- (b) An RLC circuit consists of a $150\text{ }\Omega$ resistor, a $21\text{ }\mu\text{F}$ capacitor and a 460 mH inductor, connected in series with a 120 V , 60 Hz power supply. What is the phase angle between the current and the applied voltage?
- (c) Which reaches its maximum earlier, the current or the voltage?

