Electricity & Magnetism
Induction
LR Lab

Name _____

Teacher _____

Period _____

Purpose

Materials computer and internet
http://phet.colorado.edu/new/simulations/sims.php?sim=Circuit_Construction_Kit_ACDC
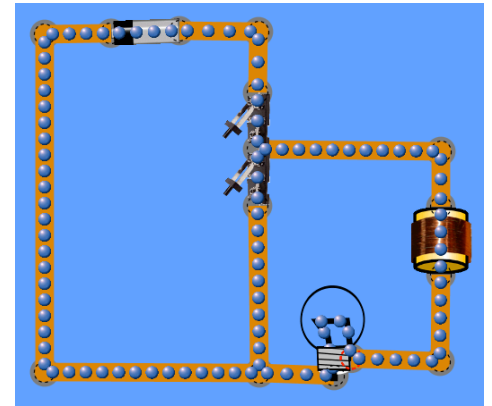
Background Tipler Chapter 30-8
http://hyperphysics.phy-astr.gsu.edu/hbase/electric/induct.html#c1

Directions
1. Construct the circuit shown to the right.
2. What is the unit of the quotient of inductance and resistance? Show your work below.

3. The quotient of L and R is called the time constant. Adjust the time constant of the circuit to one second. Record the value of inductor and bulb's resistance.

4. An inductor will be fully charged/discharged in a time of 4 to 5 L/R. How long will it take your LR combination to fully charge or discharge?

L =

R =

time =

5. Add the necessary meters and sketch the graphs of i vs t, and $V_{Resistor}$ vs t, on the graphs below when the inductor is charging and discharging.
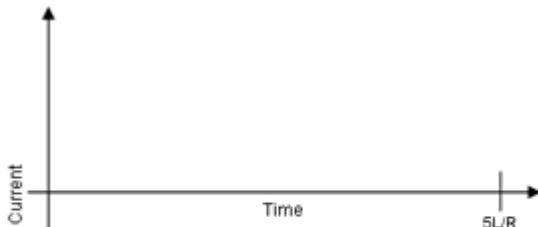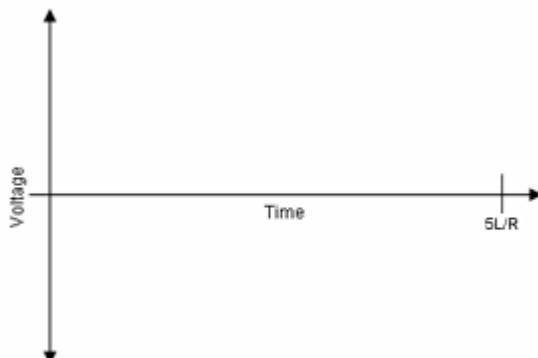
Inductor is Charging	**Inductor is Discharging**
Current vs. Time	Current vs. Time

Current — Time — 5L/R

Current — Time — 5L/R

| $V_{Resistor}$ vs. Time | $V_{Resistor}$ vs. Time |

Voltage — Time — 5L/R

Voltage — Time — 5L/R
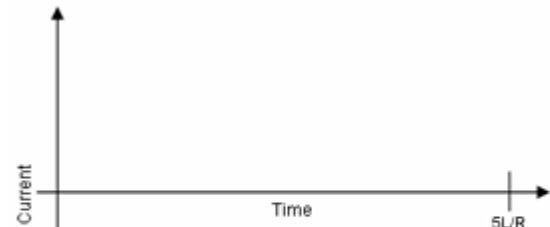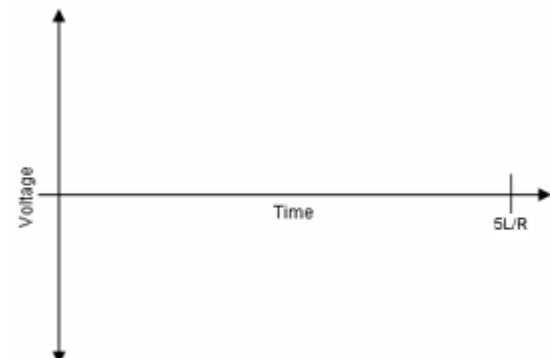
6. Add the necessary meters and sketch the graphs of i vs t, and $V_{Inductor}$ vs t, on the graphs below when the inductor is charging and discharging.
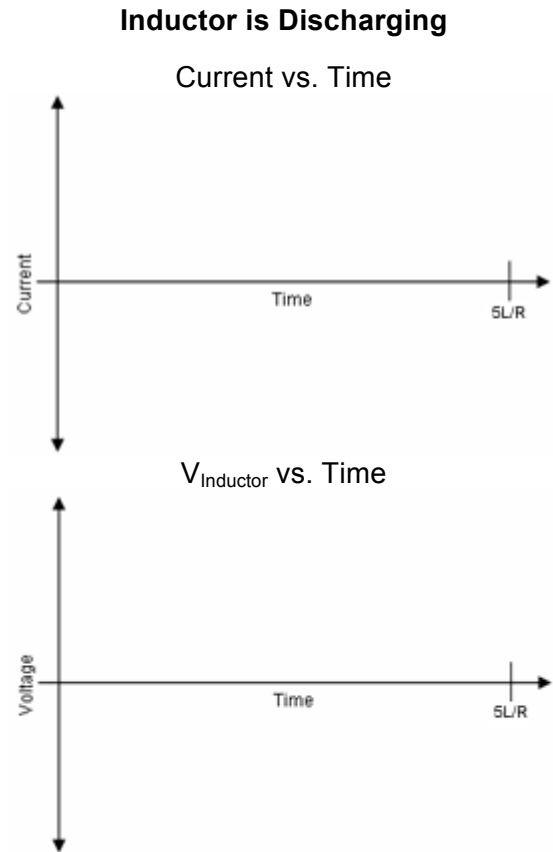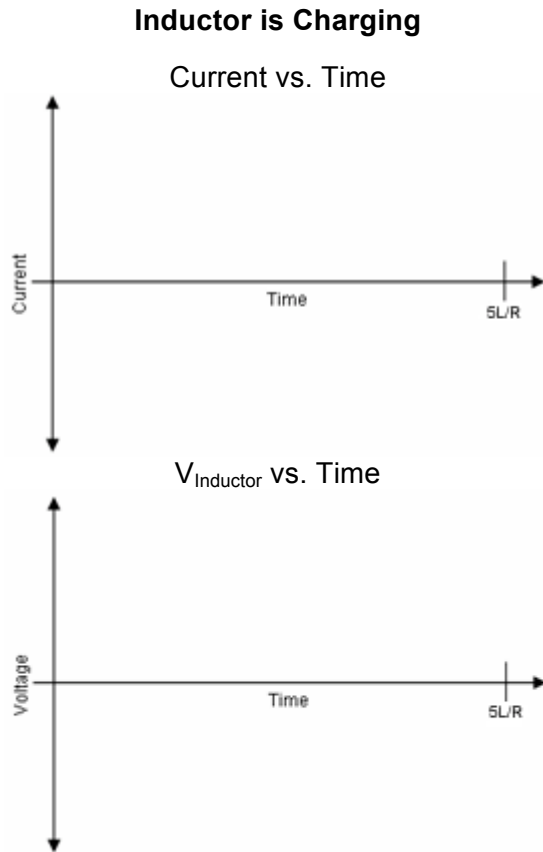
Inductor is Charging	**Inductor is Discharging**

Current vs. Time   Current vs. Time

$V_{Inductor}$ vs. Time $V_{Inductor}$ vs. Time

7. When is the brightness of the bulb increasing?

8. When is the brightness of the bulb decreasing?

9. When does the battery supply the potential to light the bulb?

10. When does the inductor supply the potential to light the bulb?

11. Does the direction of charge flow change through the inductor? If yes, explain when.