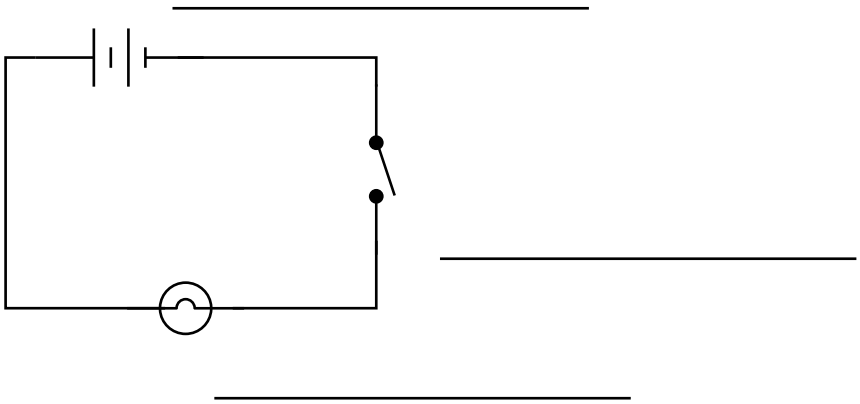
Name:_____

Simple circuits

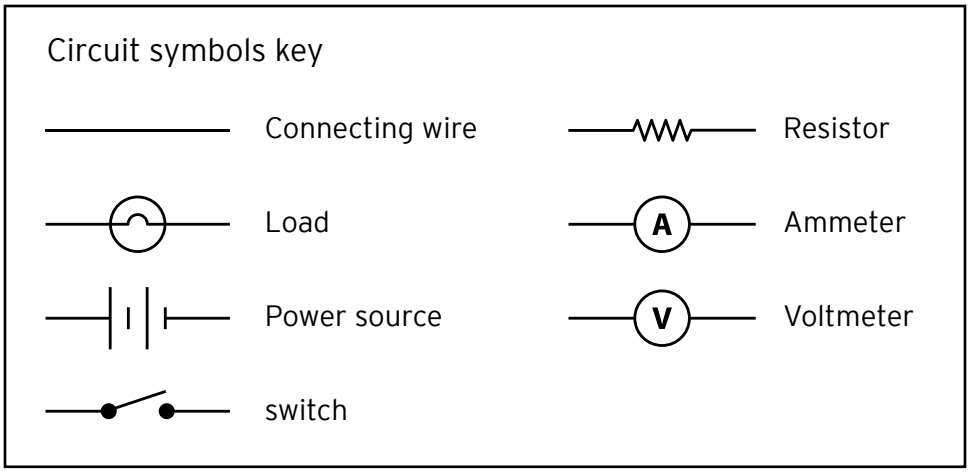
Use this handout to guide you through the design and construction of simple circuits. Complete each section in order.

1. Questions I have about circuits:

2. Circuit diagrams can be used to represent the design of a circuit using symbols and lines (see top of page two). Below is an example of a simple circuit diagram. Label the circuit diagram based on your understanding of the parts of a circuit.



Note that circuit diagrams use generally agreed-upon symbols.



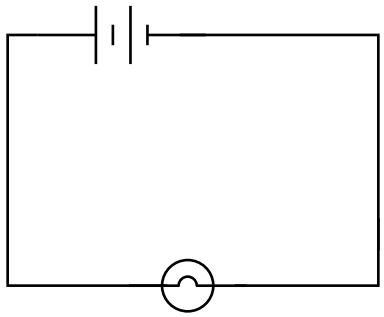
3. In the space provided, draw and label a simple circuit diagram that includes a 1.5 V source, a load, a switch, and connecting wires. Use the proper symbols.

Simple circuit diagram

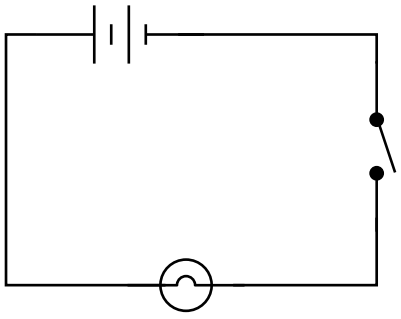
4. Use the materials provided by the teacher from the Circuit Challenges Kit to construct the simple circuits shown below. Here are a few quick tips before you begin:

   - Be sure that all the necessary circuit components are attached properly before lowering the switch and closing the circuit. This will help you avoid getting shocked by the circuit.
   - Make sure all the wires are connected properly. Metal needs to be directly connected to metal as other substances (e.g., rubber) may act as insulators that decrease the ability for current to flow.
   - Make sure you connect the red wires to the positive terminal and the black wires to the negative terminal of the load.
   - Avoid causing an overload—don't use more than three sources per circuit.
   - If you're still having trouble setting up your simple circuit, ask your peers or teacher for troubleshooting help.

   a.



   b.



5. Measure the current and voltage of a simple circuit, using an ammeter and voltmeter (or multimeter). To use the ammeter and voltmeter (or multimeters), follow these instructions:

   - Connect the black probe to the COM port and the red probe to the VΩmA port
   - Set to DC (V with ⎓ symbol)
   - Set to maximum voltage that may be calculated (e.g., if >2 V is expected, set to 20V)
   - Connect the black probe to the negative wire(s) and red probe to the positive wire(s)

   In the space provided, draw two simple circuit diagrams that include a source, a load, a switch, connecting wires and a multimeter. Think about the different places a multimeter (or voltmeter or ammeter) can go. Construct the circuits using the materials provided. Record the voltage and current of each of your circuits.

Two circuit diagrams with multimeters	
Circuit one	Voltage: Current:
Circuit two	Voltage: Current:

6. Now that you've finished constructing your circuits and measuring the voltage and current, answer these questions.

a. Does the location of the multimeter change the voltage or the current of the circuit? Explain why/why not.

b. Based on your circuit measurements, what is the relationship between voltage and current?

c. Explain ways you could make a more complicated circuit?