Basic Circuits

Name _____

Objectives:

Students will be able to….

- know the difference between a closed circuit and an open circuit.
- construct simple to more complicated series and parallel circuits
- explain the difference between a series and parallel circuit.
- use symbols to draw the different circuits they created.

Vocabulary: Define these words on a sheet of paper or in your science notebook.

- Circuit
- Conductor
- Current
- Electrons
- Voltage
- Series Circuit
- Parallel Circuit
- Resistance

Materials per group of 2 students

- 2 D batteries
- 3 Small penlight bulbs
- 3 Sockets
- 2 switches
- Many pieces of Insulated wire

Symbols to use when you draw your circuits:

Images from http://whyfiles.larc.nasa.gov/text/kids/Problem_Board/problems/electricity/circuits2.html

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Directions:

Using the materials on your desk, create the following circuits:

Series Circuits: Once your circuit is working, have your teacher check the circuit. Using the symbols above, draw the circuit you created.

a. Using one bulb, batteries and some wires**, make one light bulb turn on.**	**b.** Now make **2 light bulbs turn on** with batteries and some wire.
c. Using 3 bulbs, batteries, and some wires, **make 3 light bulbs turn on.**	What do you notice about the **brightness** of the bulbs in each circuit?
After you have made 3 light bulbs light, **unscrew one bulb** and record what happens. Screw the bulb back on, what happens**?**	**d.** Using one light bulb and a switch, make **one bulb turn on and off** with the **switch.**

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e. using 2 bulbs, batteries, 1 switch, and some wires, make 2 light bulbs light up and turn off at the **same time** with the **switch.**	**f.** using 3 bulbs, batteries, and 1 switch, **make 3 light bulbs light up and turn off at the same time with the switch.**
g. With 3 light bulbs and a switch, can you **make 1 or 2 light bulbs light up and not the other(s)?** Why/Why not?	Explain what makes a circuit **closed** or **open**.

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<u>Parallel Circuits</u>: Remember to draw your circuits after your teacher has checked to see if your circuit works.

h. Using 2 bulbs, batteries, and some wires, **make 2 light bulbs light up**. After they are lit, unscrew one bulb, what happens? If both lights go out, try the circuit again.	**i**. **Make 3 light bulbs light up**. Unscrew one bulb, what happens to the other 2? Unscrew 2 bulbs, what happens to the 3rd bulb?
j. Make 2 light bulbs **turn on and off** at the **same time** with a switch.	**k**. Make 1 light bulb **turn on and off** with a **switch** while the other bulb stays lit.

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l. **Challenge**: Make 2 light bulbs turn on and off with a switch while the 3rd bulb **stays lit**.	**m**. **Challenge**: Using 2 switches and 3 bulbs, what other combinations can you make?

Conclusions:

1. Describe the differences between a **closed** and **open** circuit.

_____
_____
_____
_____

2 What do you notice about the **brightness** of the bulbs in the **series** circuits as you added more bulbs to it?

_____
_____
_____

3. What do you notice about the **brightness** of the bulbs in the **parallel** circuits as you added more bulbs to it?

_____
_____
_____

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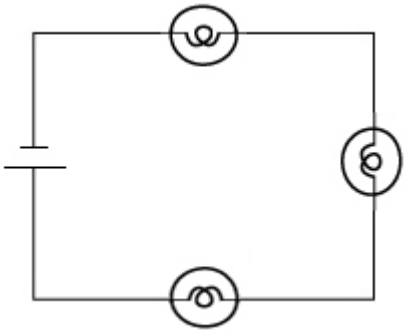
4. How does removing a bulb or opening and closing the switch affect a **series** circuit?

_____
_____
_____

5. How does removing a bulb or opening and closing the switch affect a **parallel** circuit?

_____
_____
_____

6. Look at the diagrams below and label all the parts and tell if each is a series or parallel circuit:



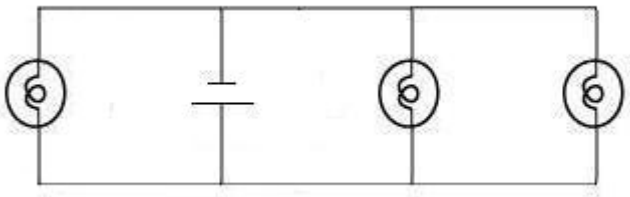


Image source: http://iss.cet.edu/electricity/pages/g1.xml

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Online Resources:

- This site has really good basic information about circuits: http://www.energyquest.ca.gov/story/chapter04.html

- This is a very informative site with great diagrams: http://www.glenbrook.k12.il.us/gbssci/phys/Class/circuits/u9l4b.html

- This is great interactive website that uses Flash, you can view this before or after this exercise: http://www.thetech.org/exhibits/online/topics/1xa_flash.html then click on **#3 Circuits**, or this link: http://www.thetech.org/exhibits/online/topics/12a.html

- More info on series circuits: http://cipco.apogee.net/foe/fcsps.asp

- For advanced students or students who are done with the experiment early, try this interactive circuit lesson online: http://www.schoolscience.co.uk/content/3/physics/circuits/circh3pg1.html

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