Name: _____ Class: _____ Date: _____

Electrical Circuits - Wiring Your Home

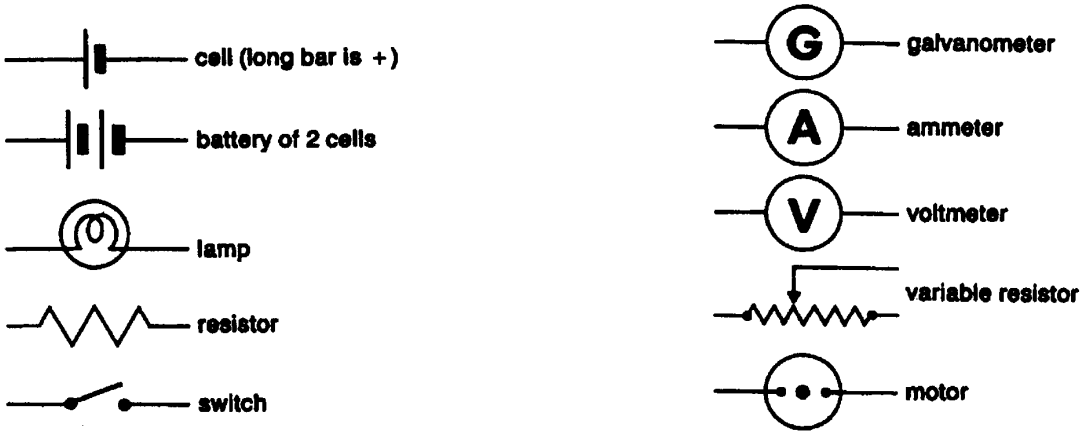
Learner Outcomes:

- Use switches and resistors to control electrical flow and predict the effects of these and other devices in given applications
- Develop, test and troubleshoot circuit designs for a variety of specific purposes, based on low voltage circuits (e.g., test and evaluate the use of series and parallel circuits for wiring a set of lights.

Key Terms:

Circuit	Schematic design	Conductor
Series circuit	Load	Electrical source
Parallel circuit	Switch	

Background Information: Engineers and designers of electrical circuits use special symbols that show the components and connections of a circuit clearly. These symbols make up a plan, expressed in a drawing or schematic diagram, to analyze a circuit before it is built. Some common symbols used are:



Research Question: How can we create common circuits in the home for rooms where there is / are:

a. only one light and a switch

b. two lights that can be turned on and off independently of one another

This investigation / activity has been adapted from:

Mah K, Martha J, McClelland L, et al. *Science in Action 9.* Toronto, ON: Addison Wesley.

c. one light and a variable speed fan can operate independently of one another.
d. a security system where one light and an alarm (buzzer) work together but independently of a second light.
e. a room with a security system, one light, and one fan that work independently and a master switch for the entire room.

Materials:

Battery pack	Bulbs	Bell or buzzer
Conducting Wires	Switches	Motor

Procedure:

1. Create a circuit diagram on paper for each of the scenarios described in the research question.
2. Build the circuit represented by each diagram and test each to ensure they are working properly. Describe what you did to test each circuit and the results of each test.
3. If needed, adjust each circuit accordingly to ensure it meets the description given above. Re-write the schematics to reflect any changes you had to make.

Planning: Draw each of the schematics for the scenarios described in the research question in the space below using proper conventions and notation.

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Observations: Describe what you did to 'test' each circuit and what the results of your tests showed. Re-draw the schematics for any circuits you needed to change to meet the goals described in the research question.

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Analysis:

1. What criteria indicated you needed to wire a circuit in series? Give an example.

2. What criteria indicated you needed to wire a circuit in parallel? Give an example.

3. Were each of the circuits you designed entirely in series or entirely in parallel? Explain.

4. How did you control the speed of the fan? What other devices could you control using this same method?

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5. How did you place the 'master switch' to ensure you could shut everything off all at once? What kind of device would do this in a house or in a car?

Conclusion: Summarize all of the different ways you used to control the operation of a circuit.

Extension:

1. Select one room in your home. Identify all of the electrical components to that room and draw a schematic to illustrate how that room is likely wired.
2. Investigate a toy, model, or household appliance and identify all of the different types of loads it has on its electrical components. Draw a circuit diagram to show the flow of electricity through it.
3. Investigate the circuit board of a micro-electronic circuit and identify the similarities and differences between a microelectronic circuit and the

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circuit in a house. Create a table or concept-map to illustrate the similarities and differences.

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