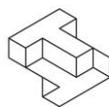


Drawing Circuits

Lab Related Activity: *Simplicity of Electricity*



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This activity is meant to extend your students' knowledge of the topics covered in our Simplicity of Electricity lab. In this activity, students will learn how to draw circuit diagrams and figure out if their circuit diagram will produce a working circuit.

Grade Levels: 4-8

Estimated Time: 45 minutes

Student Outcomes:

1. Students will be able to use appropriate symbols to create a circuit diagram.
2. Students will be able to use their circuit diagram to determine if the circuit will work.

Next Generation Science Standards

Physical Sciences:

Grade 4: 4-PS3-2, 4-PS3-4; **Grade 5:** 5-PS1-3

California State Science Standards

Physical Sciences: **Grade 4:** 4.1.a, g; **Grade 5:** 5.1.i;

Investigation and Experimentation: **Grade 4:** 4.6.c, d;

Grade 5: 5.6.a-c

Common Core ELA Standards

Grades 4-5: *Writing* W.7; W.8

Grade 4: *Speaking and Listening* 4.SL.1b-d

Grade 5: *Speaking and Listening* 5.SL.1b-d

Grades 6-8: *Writing* W.7; *Speaking and Listening* SL.1b-e

Vocabulary

- **Circuit:** a path which electrons from a voltage or current source flow.
- **Circuit diagram:** a visual representation of a circuit or circuits using a set of symbols (also called a schematic)
- **Symbol:** a thing, frequently a shape, that represents or stands for something else (e.g. the following symbol \$ represents money)
- **Electricity:** (from Greek, meaning "amber") phenomena resulting from the presence and flow of electric charge; includes: lightning, static electricity, electromagnetic field, and electromagnetic induction.

Materials

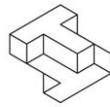
- Paper
- Pencils
- Circuit materials (optional)
 - Wires
 - Batteries
 - Light bulbs
 - Buzzers
 - Switches

Background Information

- Electricians use circuit diagrams or schematics to know how to build circuits in homes and buildings, or to fix circuits in already existing homes and buildings.
- Each schematic shows the components (such as lights, fans, etc.) that are in each circuit. This helps electricians see where there may be a problem or where to look when an electrical component is not working properly.
- Symbols used in a circuit diagram are not universal, so it is very important that electricians who create the diagrams have a key, like on a map, to show what each symbol represents.

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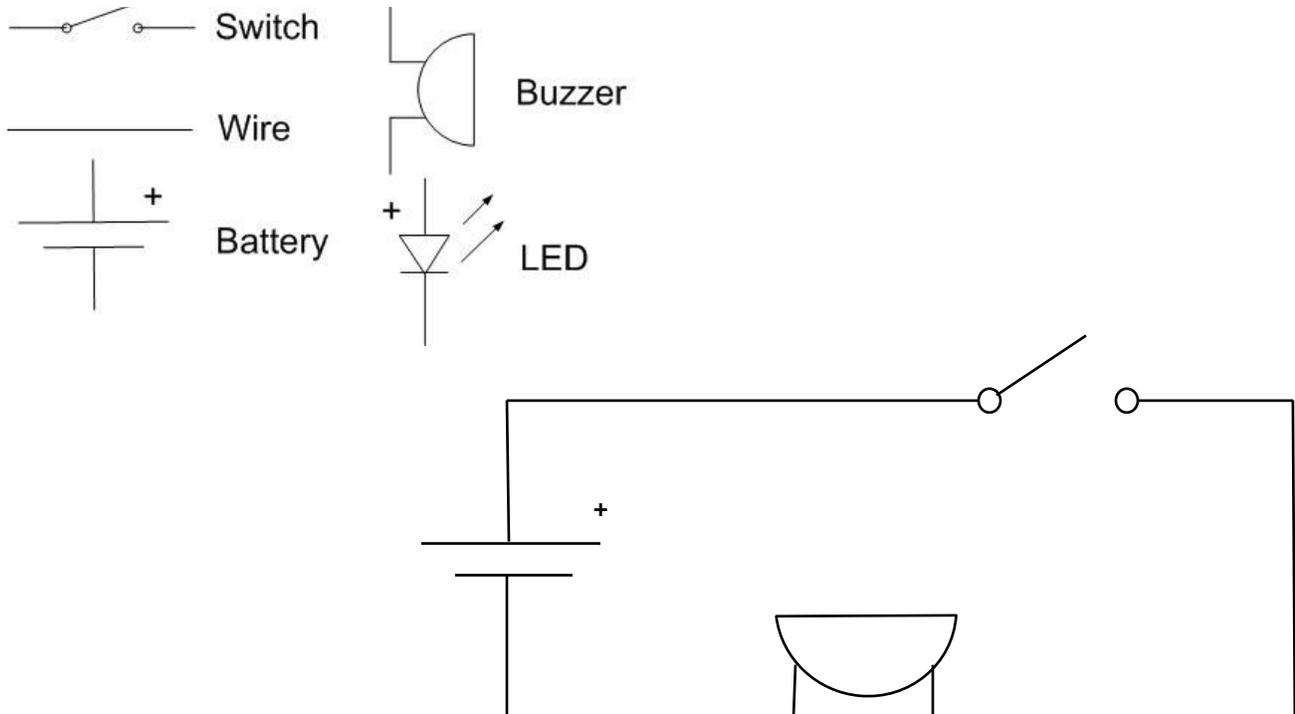
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Procedure

1. If students drew pictures of their circuits created in the lab, they may use those to create their circuit diagrams or try to create a diagram from memory. *If circuit materials are available, let students create their own circuits first so they have a visual while drawing their diagrams.*
2. Once students have their circuits made or have their drawing from the lab, let students take some time to create their own symbols for each component in their circuit. Symbols should be simple and easy to draw and read.
3. As students create their symbols, have them create a Key on a separate piece of paper with each symbol and the name of the component that it represents.
4. Once students have their key done, they may begin to draw their diagram of their circuit.
5. Diagrams should be neat and easy to read so that other electricians or engineers can read them and use them.
6. To demonstrate this, have students swap their diagrams (with keys) with another student and have them build their partner's circuit using only their diagram as the instructions. The diagram should be able to give the reader all the information needed to create the circuit without having to consult with the person who drew it.
7. If circuit materials are not available, still have students swap diagrams and have them trace the path of electricity from the power source to see if the circuit will work.

Below is an example of a simple key and diagram



Taking it Further

- Using the following link, students can input their circuits using drag and drop components and then convert the component images into electrical diagrams with proper electrical symbols.
http://www.cleo.net.uk/consultants_resources/science/circuitWorld/circuitworld.html