Electricity & Circuits
Teacher Facilitation Notes

In General . . .

- Project the slide deck in edit mode–do not show it as a slideshow.
- Hide the speaker notes before projecting. (View/Show Speaker Notes)
- Hide the toolbar. (Click on the up arrow at the right end of the tool bar.)
- Call on students to read the various content shown on slides.
- For each investigation, assemble the needed materials for each group and place in a central location for ease of distribution.
- Duplicate copies of the data sheets for each student.

Materials Needed Per Group:

Explore–Circuit Building

Batteries, 2	Wires, 6	Bulbs, 3
Bulb holders, 3	Switch, 1	Battery holders, 2

Other Materials

Student Recording Sheets	Pencils	Science Notebooks
Projection device	Student Quiz	

Engage: See, Think, Wonder

- Guide students through a *See, Think, Wonder* routine. This routine encourages students to make observations, helps stimulate curiosity, and sets the stage for the upcoming inquiry activities.
  - What do you see in this picture? Students just record what they see. They do not make inferences or draw conclusions about what is happening.
  - What does this picture make you think? Be sure they give evidence from the picture to explain their thinking.
  - What does this picture make you wonder? Students record what they wonder about the topic: electricity and circuits.
- Let individual students share their observations, thinking, and wonderings with the class. Discuss as desired.

***NOTE:** This thinking activity comes from Project Zero, Harvard University Graduate School of Education.

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Explore: Circuit Building

- Show and discuss the first slide for *Circuit Building*. Read the paragraph and watch the video on the second slide.
- Read through the next two slides about the components of a circuit and the places where the wires can connect to the bulb and the battery.
- Depending on students' ability levels, allow groups to work independently to complete the six tasks or read through directions and proceed together as a class. Remind students to record their drawings, observations, and answers to any questions in their science notebooks.
- Circulate among groups as they work, asking questions or redirecting thinking as needed.
- Once all of the tasks have been completed, have students answer the questions and record their conclusions on the data sheet for this activity.
- Discuss as desired.

Explain: Analyzing Circuits

- Read through the introductory slides with the students. Discuss as desired.
- Have students complete the data sheets independently.

Elaborate: Electrified–Let's Play

- Divide the class into 4-5 teams. Assign each team one of the colored pawns to use virtually during the game.
- Read through the rules with the class. Explain where necessary or if anyone has questions about how the game is played.
- Follow these directions to play the game.
    - Place all the team pawns on the "START" box. Decide which team will go first.
    - Click on the number cube. After a second or two, click on it again to stop the numbers. Move the starting team's pawn ahead that number of spaces on the game board.
    - Click on the box under the pawn and follow the link to that question. Depending on ability levels, either read the question out loud or allow the students to read it independently. Let the group members discuss the question for 20 seconds or less. ONE member gives the answer.
    - Click on the word "Back Side" to go to the question's answer. Decide if the group gave the correct answer. If they gave the correct answer, click on the large X in the upper right-hand corner of the slide to go back to the game board. (If they missed the question, you can click on the arrow in the answer box to go back to the question.)

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Elaborate: Electrified–Let's Play, continued

- If the team got the right answer, they stay on that space. If they gave an incorrect answer, they must move back 2 spaces (or start if they are on space #1.).
- The first team to reach the finish line is the winner.

- If a team lands on a space where the question has already been answered, they still must answer it themselves. This will help reinforce learning the concepts.
- Discuss as desired.

Evaluate

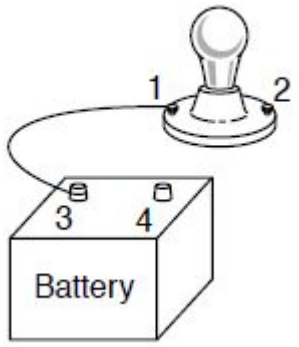
- Have students turn back to the page in their notebooks where they recorded their ideas in the engage part of the lesson (See, Think, Wonder).
- Read the See, Think, Wonder Revisited slide.
- Guide students in recording what they learned and any new "wonderings" they have in their science notebooks.
- Let students complete the quiz independently.
- Discuss evaluation activities as desired.

Electricity & Circuits

Name: KEY

Evaluation

1. The diagram below shows an open circuit. The bulb is not lit. Four places in the circuit are labeled 1, 2, 3, and 4. One wire has been connected between 1 and 3. In order to light the bulb, another wire should be connected between–



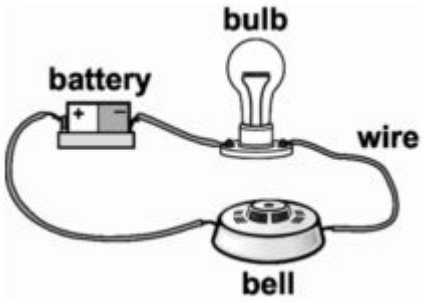
A 1 and 2

B 1 and 4

C 2 and 3

D 2 and 4

2. What will happen if a wire is disconnected in the circuit shown here?



F Electricity will continue to flow to the bulb.

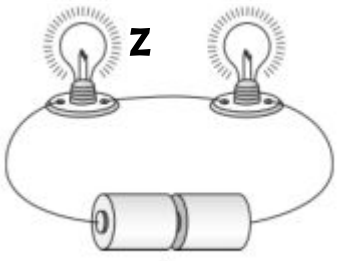
G The energy from the battery will go into the air.

H The bulb will be unable to light up.

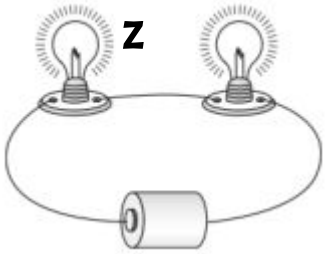
J The bulb will stay lit.

3. All of the bulbs and the batteries in the circuits shown below are the same. In which of the circuits would bulb Z be the brightest?

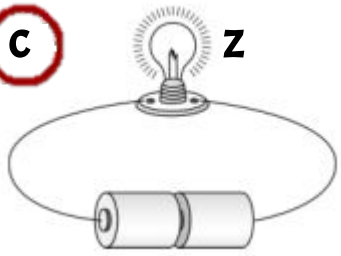
A



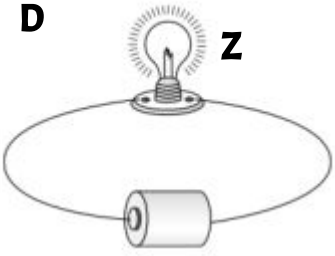
B



C



D

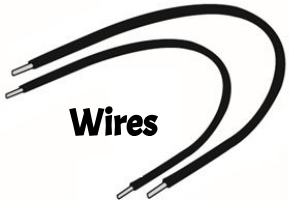


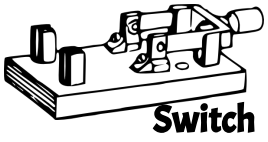
Electricity & Circuits

Name: KEY

Evaluation, page 2

4. Some parts of a circuit are shown below.





Which of the following is needed in order to make a working circuit with these parts?

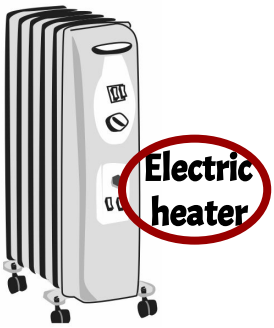
F a device that uses electricity

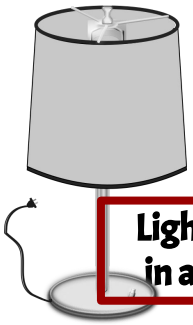
G a material that stops the flow of electricity

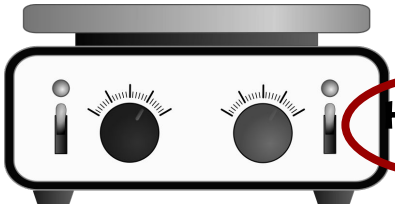
H a power source that provides electricity

J a device that controls the flow of electricity

5. Draw a rectangle around all of the names of devices that are found in circuits designed to produce light energy. Draw an oval or circle around all of the names of devices that are found in circuits designed to produce thermal energy.







Electricity & Circuits

Name: _____

Explore: Circuit Building

1. What must every circuit have in order to make an electrical device work?

2. In the circuits you made, what provided the power to make the bulbs light up?

3. In the circuits you made, what conducted the electricity from the power source to the bulbs?

4. What is the purpose of a switch in a circuit?

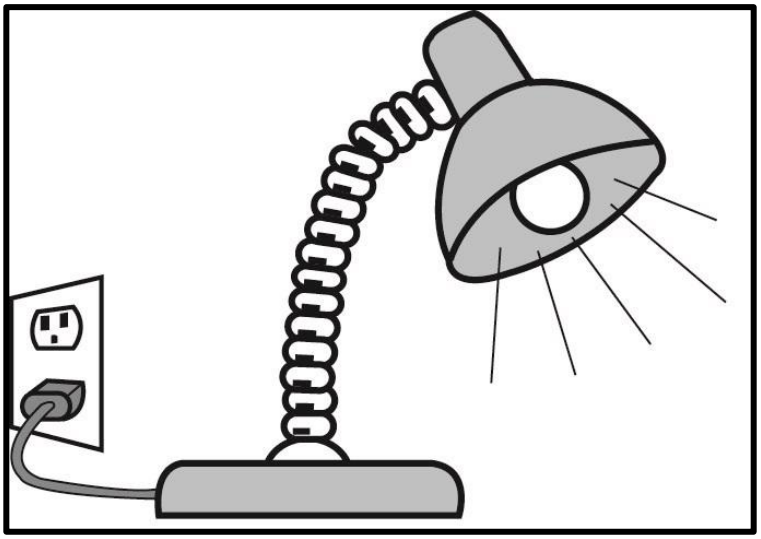
My Conclusions: How does changing the number of bulbs or batteries affect the brightness of the lights in a circuits?

Electricity & Circuits

Name: _____

Explain: Analyzing Circuits

1. Hot plate _____
2. Lamp _____
3. Store sign _____
4. Clothes iron _____
5. Toaster _____
6. Hair dryer _____
7. Television _____
8. Electric microscope _____
9. Study the circuit pictured below. Use the terms *power source, conductor, and load* to label the parts of the circuit. Describe what type(s) of energy is produced when the circuit is working.



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Electricity & Circuits

Name: _____

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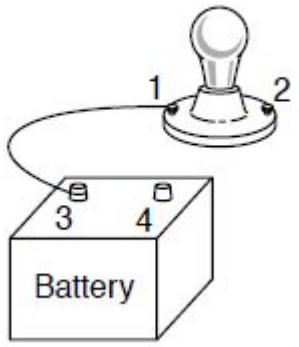

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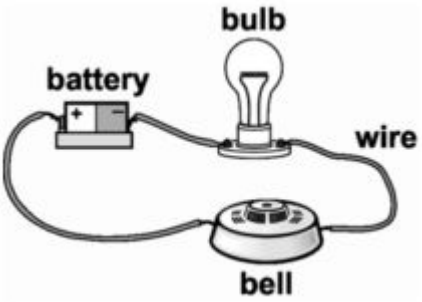

F Electricity will continue to flow to the bulb.

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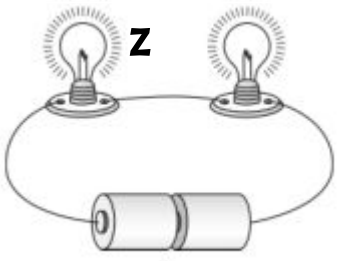
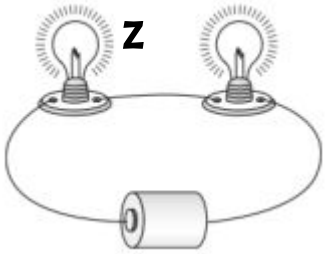
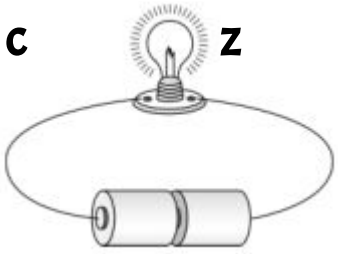


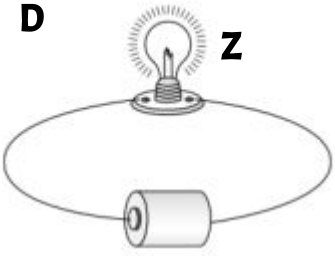
B



C



D



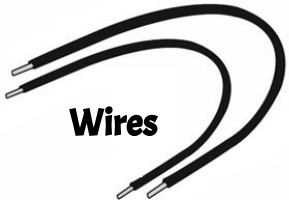
Electricity & Circuits

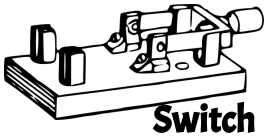
Name: _____

Evaluation, page 2

4. Some parts of a circuit are shown below.


Light bulb


Wires


Switch

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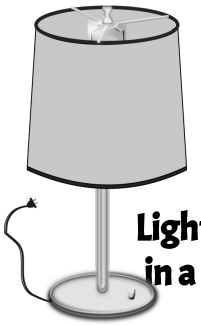
Electric heater

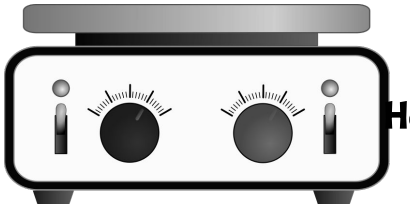

Hair curling iron


Coffee maker


Spot light


Light bulb in a lamp


Tablet


Hot plate