

LESSON 4

How Can We Design a Flashlight?




What are the necessary parts of a flashlight?
What type of circuit is found in a flashlight?

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1. Can you name the parts of a flashlight that make it work?



2. Why are each of these materials necessary? What could we leave out?
✓ = Needed items

3. Which type of circuit makes a flashlight work?

A series circuit is where electrical current only has one path to follow. It makes the lights brighter but if one bulb in the circuit goes out: they all go out.

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Page 24 - it is a blank page

PREDICT WHICH OBJECTS/MATERIALS WILL MAKE A CLOSED CIRCUIT.

We will know it is closed because the light bulb will light up, showing that the current is able to flow through that object.

Conductors Insulators

Material/Object tested	Predictions yes it lights/no it won't	Bulb lights	Bulb doesn't light
Felt/Cloth			✗
Washer/Iron		✗	
Paper clip		✗	
Balloon/rubber			✗
Penny		✗	
Nail/Steel		✗	
Wood			✗
Cardboard			✗

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Conductivity Lab Record on page 24's data table

- Connect a wire with alligator clips to each side of a bulb holder.
- Connect one wire to one end of the battery holder. Connect the third alligator clip wire to the opposite end of the battery holder.
- Hold one of the materials to be tested between the ends of the free alligator clips. Make sure the clips are not touching each other.
- Record the results on your data table, repeat for all materials.

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Vocabulary to add to the glossary in your notes

Conductor - a material or object that *lets* electric current pass through it easily
Examples: *Penny, paper clip, Washer*

Insulator - a material that *does not* let electric current pass through it easily
Examples: *cardboard, rubber, cloth, wood*

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How could you design a working flashlight? Record your ideas in detail.

Lab Activity Designing a Flashlight

- You will design a flashlight. These are the three requirements of the project:
 - It must have a switch so it can be turned on and off.
 - It must produce the best possible brightness with only two batteries.
 - It must be portable and easy to use and handle.
- Discuss the flashlight's assembly with your partner. Focus on the following questions:
 - What materials will you use?
 - How will the flashlight be assembled?
 - How will the switch work?
- Draw the flashlight and label all of its components in your Science Notebook.
- Discuss the designs. Make any necessary changes to your design.
- Using the materials from the box, test your ideas about the different circuits you will be able to use. During the next lesson you will build the flashlight.



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MATERIALS AVAILABLE: WIRES, BATTERIES, BULBS AND HOLDERS, BRADS, PAPER CLIPS, TAPE, PAPER

Lab activity

1. Draw your plan for your flashlight. Label all of its components.

Explain

1. What are some ways that cooking with a recipe is similar to carrying out science experiments?

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Lay the paper clip on a small section of index card, and mark two dots in pencil – one at each end of the paper clip.

Use pencil or pen tip to poke two small holes where the dots were marked. Put one brad through one of the holes.

Put the other brad through one end of the paper clip and then put it through the other hole of the index card.

Tape a wire to the metal of one of the brads on the reverse side of the index card, repeat for the other wire on the other brad.

Wires should not touch each other, these wires will be used to connect the switch to the batteries and the light bulb holder.

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Page 29 lab activity

1. What is important about contact points when designing an electrical circuit?

Contact points are where metal touches metal in the circuit. They are important because if you do not have good contact points (metal touching metal) anywhere in your circuit the current can't flow through the wires, bulb, or batteries.

2. How did your design compare to other students designs?

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3. Did your initial (first) design work? If not what revisions (changes) did you need to make?

4. Does your design meet all of the requirements listed in #1 of your student lab manual?

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page 31 Vocabulary

1. What role does the battery play in creating a flashlight that works?
The battery plays the energy source in the flashlight. (stored chemical energy becomes electrical energy)
2. Why is it important for scientists to keep detailed and accurate notes in their journals or notebooks?
It has to be detailed because something may not work and other scientists would not understand why. If they had multiple ideas for how or why things worked, if the first idea didn't work they could look back at their notes & try a different idea. If the notes were not accurate another scientist could not repeat the experiment and get the same result.

May 11-11:50 AM