

Making a Flashlight

Fourth Grade

Activity: 20

Time: 2 Class Periods

General Description

Students who have some understanding of electricity will enjoy this activity since they will be asked to create a flashlight thus demonstrating their understanding of a small system and how electricity travels through a flashlight to make it work. This is not an activity to use at the beginning of an electricity unit.

Objectives

Students will create a flashlight using house hold materials and identify the importance of each component and the components interact.

Arizona State Standards

SC04 S5C3 PO1 Demonstrate that electricity flowing in circuits can produce light, heat, sound, and magnetic effects

SC04 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry

SC04 S2C1 PO2 Describe the interaction of components in a system (e.g., flashlight, radio)

SC04 S3C2 PO1 Describe how science and technology (e.g., computers, air conditioning, and medicine) have improved the lives of many people

W04 S3C2 PO1 Record information (e.g. observation, notes, lists, charts, map labels, and legends) related to the topic

Teacher Information

Light is a form of energy known as radiant energy because of how it spreads, or radiates, from its source. Students will construct a flashlight using basic everyday materials. The flashlight will convert the electricity into light. Students will use their skills as a scientist to complete a task, identify problems, resolve those problems, and identify the components of a system.

Materials (per flash light to be made)

Science Journals

Activity Card 4-20

Empty water bottle (700ml size works best)

Two "C" batteries

Paper fasteners/brads

Sharp pencil

Aluminum foil

Cotton (or old newspaper)

Bulb

Bulb holder

Paper clip

Three pieces of insulated wire (each about 8" long)
Wire cutters
Electric tape
Scissors/utility knife
Ruler
Index card



Procedures/Exploration

1. As the students work through this task, have them diagram the components of the flashlight and journal problems they had and how they solved them. Children must work in a minimum of pairs. Some steps require extra hands.
2. The teacher may want to prepare the bottles for the students. Peel off the label and throw away the screw top. Using pointed scissors or a utility knife cut the top of the bottle off at about 2.5 inches from the top.



3. Cut the neck off the bottle also. Allow the students to line the inside of the bottle top with aluminum foil and put a hole where the liquid pours out. Shiny side out works best. Set aside.

4. Using a sharp object put two holes into the side of the bottle about an inch apart. (an electric drill does a nice job and could be drilled before the students start working with the bottle) Set aside.



5. Tape the two batteries together making sure the positive end is lined up to a negative end. Use electrical tape and make sure it is a tight hold.



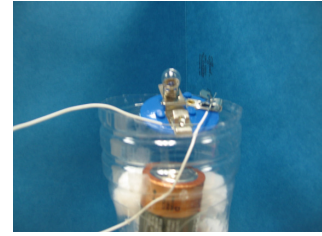
6. Using the wire cutters strip the insulation off the ends of all three wires.



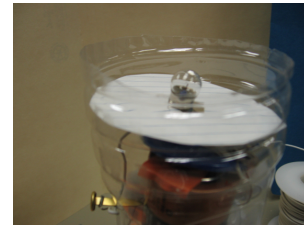
7. Take one wire and tape it to the bottom, the flat end, of one of the batteries. Use electrical tape for this step.
8. Slide the batteries into the water bottle and then feed the wire through the bottom hole in the bottle. Feed it from the inside to the outside.



9. Stuff some cotton or old newspaper into the bottle to hold the batteries still. DO NOT stuff it to the top.
10. Put the light bulb into the holder.
11. Feed another wire through the top hole, place the bulb and holder on top of the battery and attach the wire to the holder.
12. Attach the last wire to the other side of the light holder and the other end to the battery on top. You will now want to squish those wires into the bottle and set the light bulb on the top.
13. The wires which are through the holes in the side of the bottle can be touched together as a test. If the light bulb lights proceed, otherwise check all your connections before finishing.
14. Take a brad and wrap the un-insulated end of the wire around the brad and then push the remaining wire back into the bottle and force the brad into the hole.
15. Do the same for the second wire and brad.



16. Cut the index card into a circle the same diameter as the bottle.
17. Cut a hole in the center of the index card to let the light bulb go through and place as a shield over the wires.
18. Take the top of the bottle and place as a reflector. See diagram.
19. Hang the paper clip on the top brad and gently touch the bottom brad and your flashlight should work.



Discussion

Ask the students what struggles they had and what they did to problem solve. Ask them how they worked like a real scientist. Have students share a model of their flashlight and discuss why each component is critical in the design.

Flashlight

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Prepare the bottles for the students.

Peel off the label and throw away the screw top.

Using pointed scissors or a utility knife cut the top of the bottle off at about 2.5 inches from the top.



Cut the neck off the bottle also.

Line the inside of the bottle top with aluminum foil.



Using a sharp object put two holes into the side of the bottle about an inch apart.

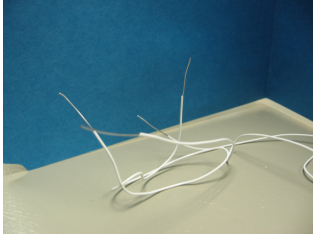


Tape the two batteries together making sure the positive end is lined up to a negative end.

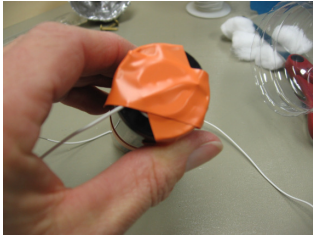


Use electrical tape and make sure it is a tight hold.

APS Power Posse™



Using the wire cutters strip the insulation off the ends of all three wires.



Take one wire and tape it to the bottom, the flat end, of one of the batteries.

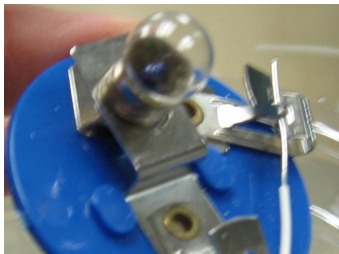
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Slide the batteries into the water bottle and then feed the wire through the bottom hole in the bottle. Feed it from the inside to the outside

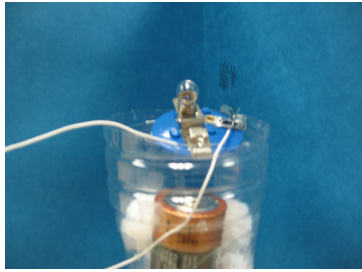
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DO NOT stuff it to the top.

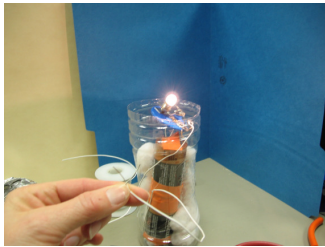


Put the light bulb into the holder.

Feed another wire through the top hole, place the bulb and holder on top of the battery and attach the wire to the light bulb holder.



Attach the last wire to the other side of the light holder and the other end to the battery on top. You will now want to squish those wires into the bottle and set the light bulb on the top.

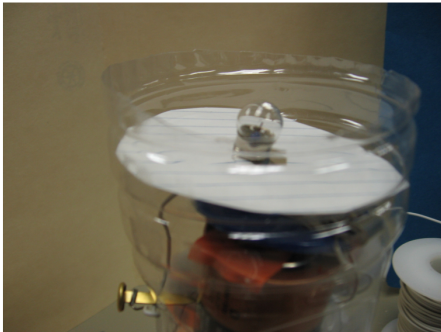


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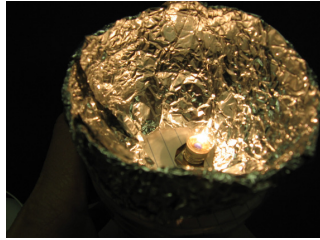


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Cut a hole in the center of the index card to let the light bulb go through and place as a shield over the wires.



Take the top of the bottle and place as a reflector.



Hang the paper clip on the top brad and gently touch the bottom brad and your flashlight should work.