

Make a Light Bulb with Batteries

This hands-on activity is designed for classroom use only, with supervision by a teacher, as this hands-on activity, when replicated as described, generates an electric circuit, and will create a flame burst under the glass! (When engaging in the IEEE REACH hands-on activities contemplated in the IEEE REACH lesson plans please proceed with caution and use all reasonable safety measures. All IEEE REACH hands-on activities are designed for classroom use only, with supervision by a teacher or an adult educator. Please be advised that IEEE shall not be responsible for any injuries or damages related to the use of these lesson plans or any activities described herein.)

Materials needed:

Safety Glasses

Glass Jar

Cardboard paper towel tube, or toilet paper tube

Either 2 long wires with alligator clips, or 4 short ones clipped together to make two long wires.

(Available on Amazon, Home Depot, Loews, Walmart, and Auto supply stores, etc.)

8 D Batteries - the large ones-

(Each D battery is 1.5V, connecting them all will provide 12V)

Pencil lead (use 0.5 mm) (these break easily, so you might want to have more than one handy)

Electrical Tape

Scissors

Safety Gloves

See video demonstration here: <https://vimeo.com/ieereach/electriclighthandson>



Activity

Tape all the batteries together, in a line, with electrical tape. Be sure that all the positive battery ends are touching the negative battery ends before taping, and that they remain touching when all are taped together.

Cut the cardboard tube so that it is short enough to fit in the glass jar when the glass jar is placed over it; at the same time, make sure the cardboard tube is tall enough that it reaches half way to the top of the jar.

Tape one end of the first alligator wire to the top of the cut cardboard, so that the alligator clip itself is set above the cardboard tube, and so that the bottom of the alligator clip is securely taped to the cardboard tube. Do be sure you can squeeze the alligator so it will open.

Tape the second alligator wire to the cardboard tube in the same fashion as above, so that the alligator clip itself is almost opposite the alligator clip already taped to the tube. Note: The pencil lead will be situated, and clipped, between the two alligator clips that are taped to the cardboard at the top, so be sure the width between the clips is close enough to allow for this to be done.

Stand the cardboard tube up so that the taped alligator clips are facing up.

Take one pencil lead and clip it to each of the alligator clips that are taped to the top of the cardboard tube. Ensure the pencil lead is secure and doesn't break. If it breaks, remove the broken pencil lead from the alligator clip and try again with a new pencil lead.

Stand the cardboard tube up, with the pencil lead in the alligator clips on top and the wires extending out to each side. Place the glass jar over the cardboard tube, so that the bottom of the glass jar is over and covering the cardboard tube with the pencil lead that is between and clipped to the alligator clips. Ensure that the glass is secure in its place.

Shut off the lights (***Put on the safety gloves, as the alligator clips can get very hot when connecting them to the batteries. When the alligator clips touch the batteries it creates an electric circuit - ensure all safety measures are being used!***) Take the alligator clips on the other end of the wires, and at the same time, connect one alligator clip to the open positive battery end on the connected batteries, and connect the other wire's alligator clip and connect it to the open negative battery end of the connected batteries. Again, connect these at the same time. It will light up!

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Extension

Afterwards, ask your students, what were the elements needed to make an electrical connection? Have students discuss the length of time the light stayed “on”. Why is this important and how do you think this affected society when electric lights first came into existence? What do you think needed to be achieved for using electric lights in the home? Think about not only the elements needed to make lights, but also think about safety, practicality, and economics.

Additional Resources for greater depth...

Thomas Edison – National Historical Park, NJ

Biography

<https://www.nps.gov/edis/learn/historyculture/edison-biography.htm>

"Edison next undertook his greatest challenge, the development of a practical incandescent, electric light. The idea of electric lighting was not new, and a number of people had worked on, and even developed forms of electric lighting. But up to that time, nothing had been developed that was remotely practical for home use. Edison's eventual achievement was inventing not just an incandescent electric light, but also an electric lighting system that contained all the elements necessary to make the incandescent light practical, safe, and economical. After one and a half years of work, success was achieved when an incandescent lamp with a filament of carbonized sewing thread burned for thirteen and a half hours. The first public demonstration of the Edison's incandescent lighting system was in December 1879, when the Menlo Park laboratory complex was electrically lighted. Edison spent the next several years creating the electric industry. In September 1882, the first commercial power station, located on Pearl Street in lower Manhattan, went into operation providing light and power to customers in a one square mile area; the electric age had begun."

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