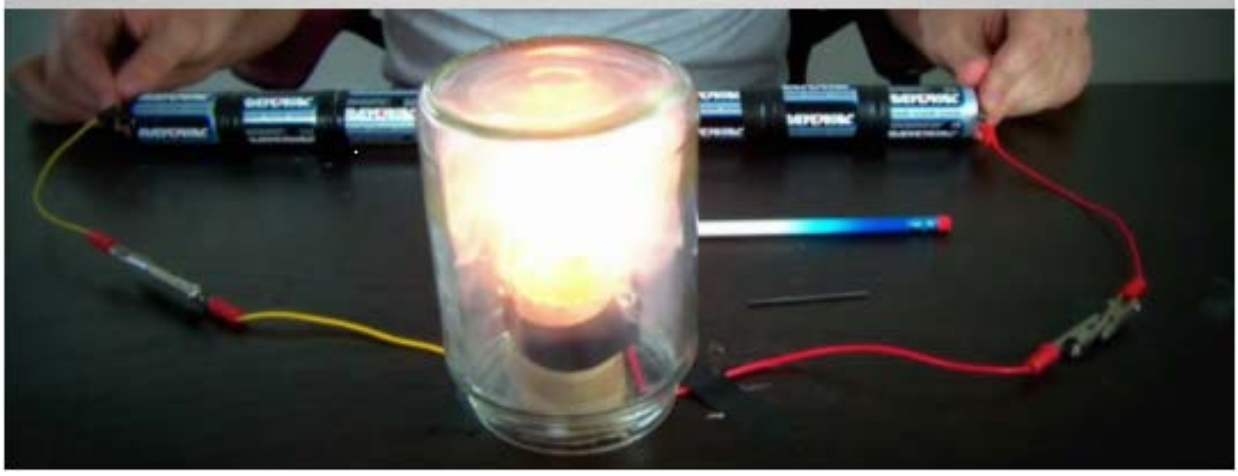
Inquiry Question
How did Thomas Edison build his first light bulb? How did it create light? Can you make a better version?

Name: _____ Date: _____

Thomas Edison was a famous inventor in the 19th century. Arguably, his best-known invention was the simple light bulb. We take this device for granted these days, but in the 19th century, the light bulb was truly life changing.

How did he build this? Can we make it better and more efficient? Let's find out.



General Instructions

Follow the instructions below to build your own light bulb. Then examine your project to determine how a light bulb works.

Materials you'll need:

- Your course notes
- The internet
- 8-D cell 1.5V batteries
- Mason Jar or clear glass
- electrical tape
- pie plate
- scissors
- plastic tube the size of a toilet paper tube (safer than paper)
- mechanical pencil refills
- two sets of small alligator clips at least 1 foot (30 cm) long (any electrical or hobby shop)
- nearby, functional fire extinguisher (better safe than sorry)

Procedure:

1. Make a powerful battery by connecting all eight of your D sized batteries together, end to end. Ensure that the positive end of one battery connects to the negative end of the next battery. This is a SERIES arrangement. Use the electrical tape to keep all of the batteries tight together.

2. Cut the length of the paper tube so that when it sits upright, the mason jar will fit upside down over top of the tube. There should be about a 6 cm gap between the top of the tube and the bottom of the jar.

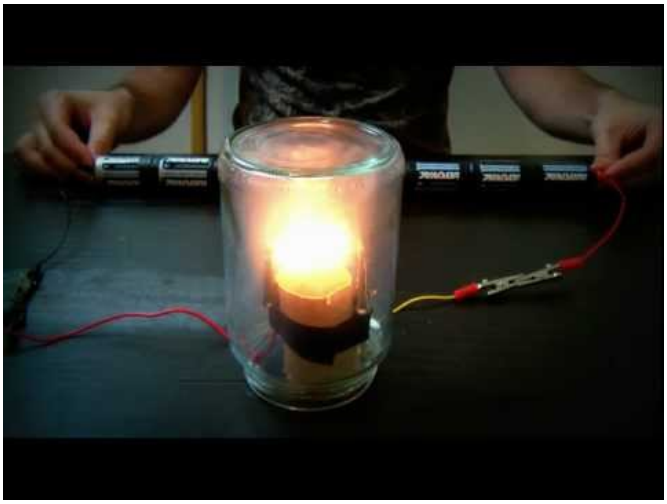
3. Tape one end from each of the alligator leads to the top of the tube so that they point upwards. The clips should point upwards, away from the tube.

4. Carefully place a pencil refill between the two clips taped to the tube.

5. Place the tube on a metal pie plate. Then tape down the tube to the pie plate to prevent it from tipping.

6. Gently cover the tube with an upside down mason jar or clear glass. Ensure that the wire alligator clips are outside the bottom of the glass.

7. Touch the ends of the wire clips to either side of your battery.



Ideas and Hints

- Keeping the eight batteries tight together can be a challenge. If you are having difficulty try placing them in a long tube (you can cut the tube in half to create a long "half pipe"). Then gently tilt one end of the tube to let gravity pull all of the batteries together.
- Best to do this outside. Although rare, the tube could catch fire.
- The batteries will drain quickly if you run your bulb too long.

Project submission:

- Upload your completed work to the Physics project drop box if you chose to submit online.
- You can either submit photos/video of your project (along with an explanation and/or steps of construction) or, if you can drop-in to the school, you can present it to your teacher in-person.
- Be sure to carefully organize any data collected so that any other student or teacher could reproduce your experiment and achieve the same results.

Project Timing:

- In its most basic form, this project will take the average student 2 hours. Locating all of the materials needed may vary.

Inquiry Questions and Experimental Design:

1. Why do you think the pencil refill glows?
2. Try different diameters of pencil refills if possible.
3. Try removing one battery at a time. What happens?
4. Do thicker pencil refills work better or worse than thinner? Why do you suppose this is?
5. Discuss ways to make your bulb even brighter.