

**Before starting this project,  
here's a quick and important safety tip!**

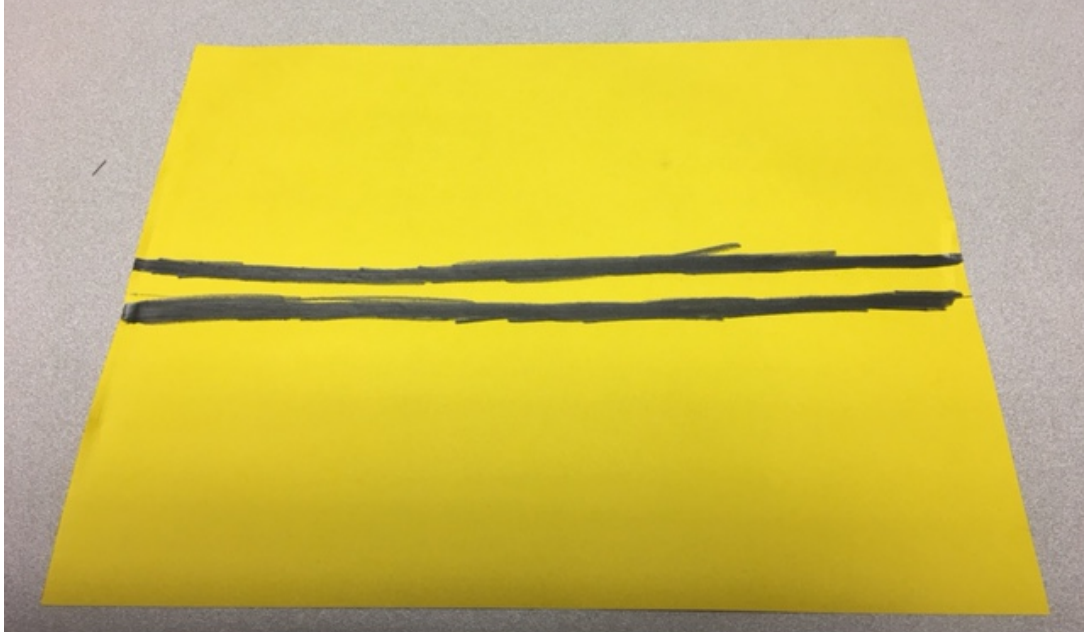
**WHEN USING LEADS AND BATTERIES,  
ALWAYS MAKE SURE YOU ARE MATCHING  
CONNECTIONS.**

**THE POSITIVE LINE MUST CONNECT TO THE POSITIVE  
BATTERY PLUG  
AND  
THE NEGATIVE LINE MUST CONNECT TO THE  
NEGATIVE BATTERY PLUG.**

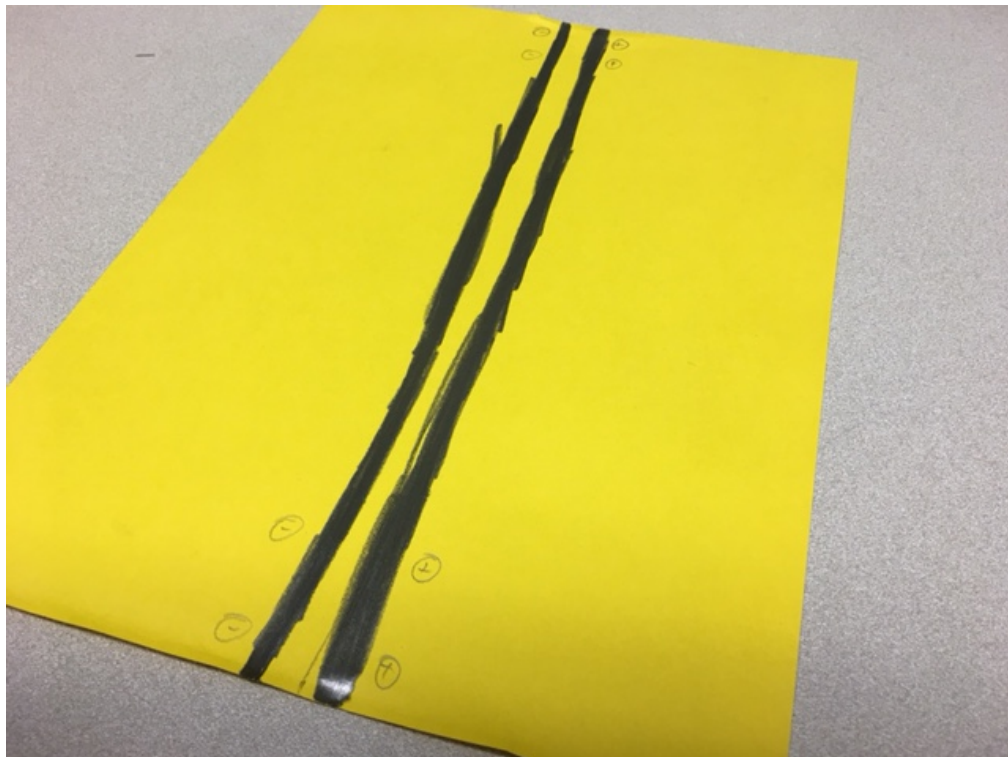
**Mixing the lines can cause the battery to  
overheat. If this happens, disconnect the leads  
IMMEDIATELY and set the battery aside.**

## Paper Flashlight Instructions

Take a piece of paper and draw two lines close together with the graphite pencil. It may not look it, but **graphite is a conductor of electricity and will transfer the power from the battery to the LED**. The trick is that the lines need to be super thick, so make sure your lines are good and dark!



When you're done drawing your lines, put a positive ("+") sign and a negative ("-") sign at several points on either line. This will help you make the right connections in the later stage of the project.



Let's test it out! Take an LED and spread the two silver legs so that the ends touch the positive and negative lines you drew. How do you know which stalk is positive or negative? Easy! The longer stalk on an LED is positive, so make sure it touches the line you marked with a "+" symbol. The shorter leg is negative and should touch the line marked with a "-".



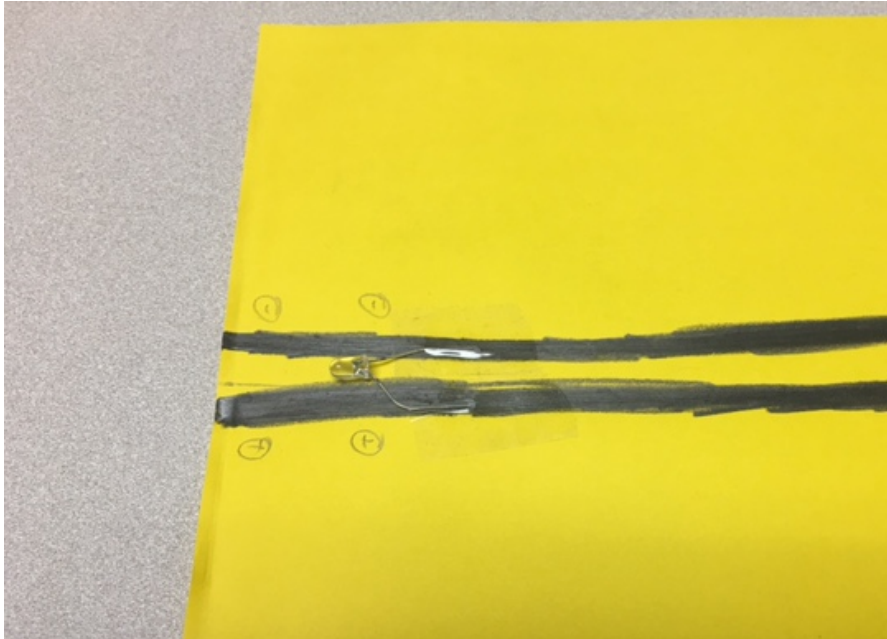
Place the 9V battery (plugs side down) on your graphite lines, making sure the positive and negative plugs match your positive and negative graphite lines. Put the LED on the graphite and it should light up! Congrats!

If it doesn't, try these troubleshooting suggestions:

- Make sure the LED legs are touching the appropriate (positive/negative) lines
- If the LED's stalks are touching the graphite but not turning on, you may need to darken your lines.

## How to make the flashlight

Tape down the stalks of your LED to the graphite lines just inside the edge of the paper. Roll the paper into a cone and tape the ends together to secure the tube shape.

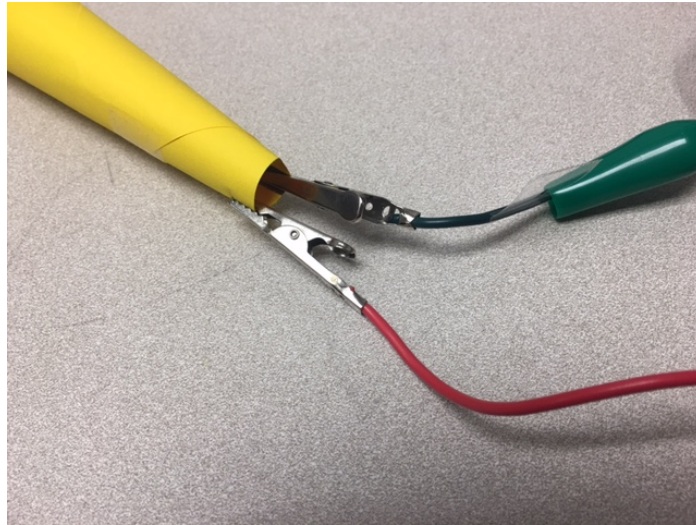


Cute the pointed end of the tube. Make sure your graphite lines are exposed and you can see which lines are positive and negative. You may have to trim and push away paper to expose both lines.





Attach the leads to the paper...



Now, connect the leads to...

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disconnect the leads IMMEDIATELY and set the battery aside.**

Connect the leads from the paper tube to the batter (again, **be sure to not to mix the positive and negative connections**) and you've got yourself a flashlight!

