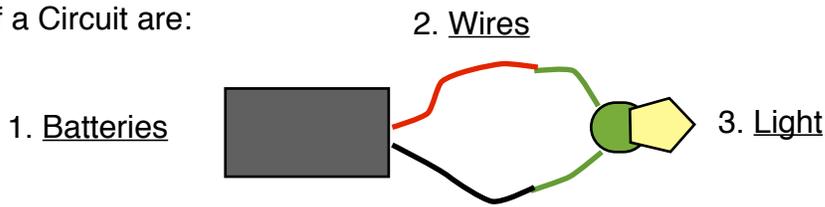


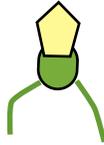
Flashing Flashlight - Worksheet

3 Parts of a Circuit are:



Try building a circuit with a:

Christmas light



LED light

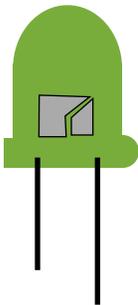


Can you figure out the difference between the two lights? What is it?

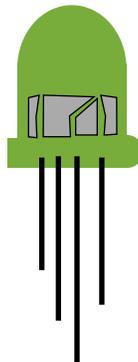
LED lights have a positive and a negative side, like batteries. Have you ever put a battery in backwards? What happened? It didn't work! When batteries, LEDs and other things with positive and negative sides are put into a circuit the wrong way, electricity can't flow through the circuit.

Compare different LED lights to find out how they are different:

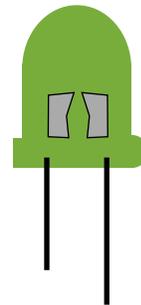
1.



2.



3.



Which LED is solid colored?

Which LED blinks?

Which LED lets you choose what color to light up?

Flashing Flashlight - Planning Sheet

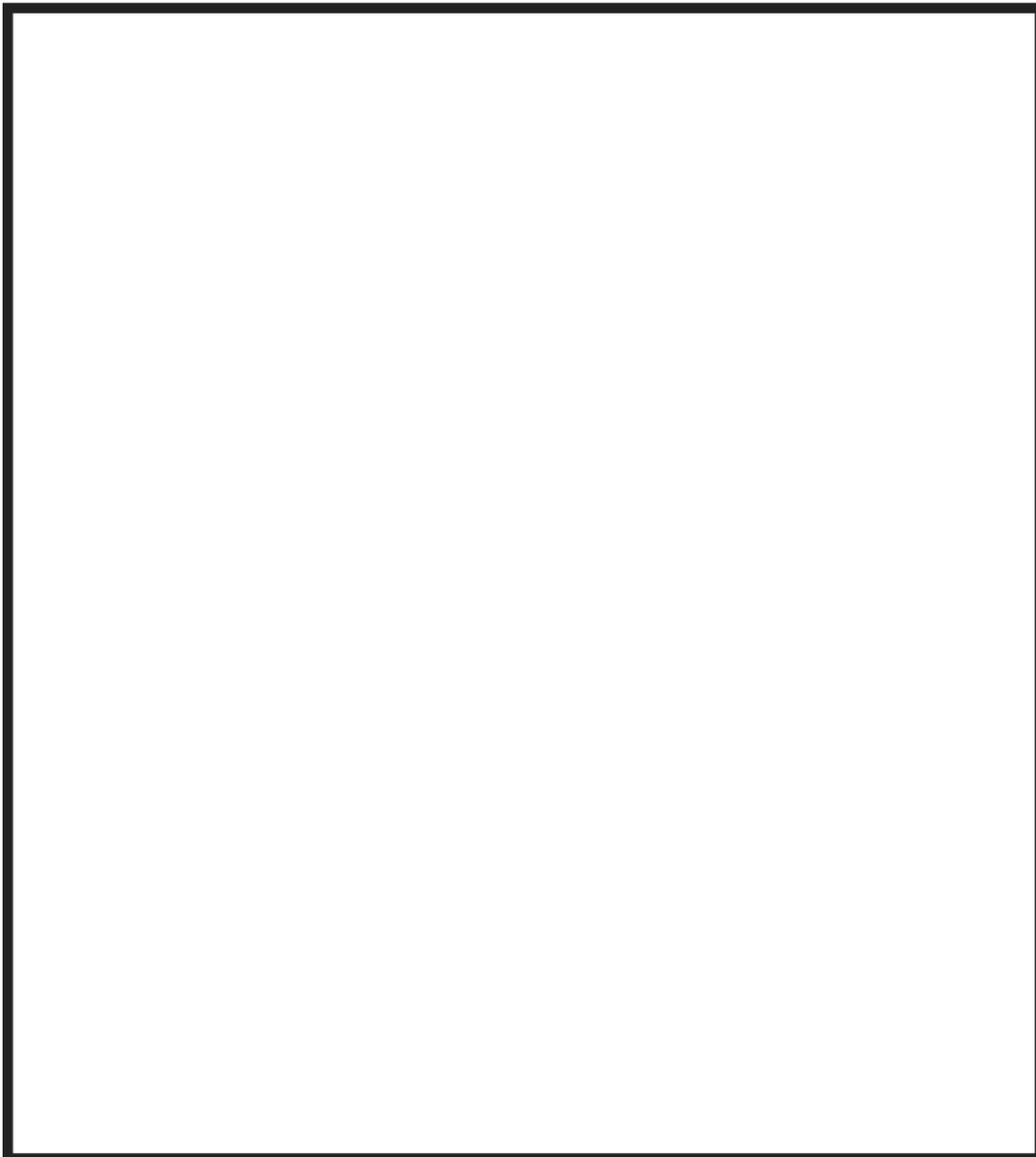
You may use 4 or 5 LED lights to complete your flashlight. You may choose 4 or 5 LEDs from this combination of lights.

- 3 red, green, or blue lights I will use _____ red, green, or blue lights.
- 2 blinking green lights I will use _____ blinking green lights.
- 1 tri-colored light I will use _____ tri-colored lights.

+ _____

Total number of lights I will use is _____

Draw your flashlight plan and light bulb combination in the space below. What order will the bulbs be placed in on your flashlight? Mark which color light bulb you will use next to it in your drawing.



Flashing Flashlight - Directions

Materials:

- | | | | |
|--|--|---|--|
| <input type="checkbox"/> LED lights - solid, blinkers and flashers | <input type="checkbox"/> 1K resistor | <input type="checkbox"/> X-acto knife | <input type="checkbox"/> Masking tape |
| <input type="checkbox"/> 9V battery | <input type="checkbox"/> Bottle or container | <input type="checkbox"/> Awl | <input type="checkbox"/> Permanent markers |
| <input type="checkbox"/> 9V battery snap | <input type="checkbox"/> Slide switch | <input type="checkbox"/> Soldering iron | |
| | <input type="checkbox"/> Copper wire | <input type="checkbox"/> Hot glue gun | |

Directions:

1. Plan your flashlight.
2. Pick your LED lights.
3. Find the LEDs that have 4 legs and the LEDs that flash 3 different colors.
4. Solder a resistor to the longest leg on each of the LEDs you identified in Step 4. DO NOT put resistors on the green blinking LED lights.
5. Get a bottle.
6. Use an x-acto knife to carefully cut a hole in the side of the bottle for the switch.
7. Use an awl to carefully poke 2 holes in the black cap on the bottle.
8. Get some copper wire. Cut 2 pieces of copper wire 6 inches long.
9. Get the battery snap and a switch.
10. Solder the red wire from the battery snap to one of the middle legs of the switch.



11. Solder one of the copper wires to a leg on the end of the switch.



12. Put a small piece of tape on the end of this copper wire.
13. Find the black wire attached to the battery snap.
14. Solder the second copper wire to the black wire on the battery snap.
15. Unscrew the black cap on the bottle.
16. Poke the copper wires through the holes in black cap.
17. Make sure the copper wires do not touch and hot glue them in the holes on the lid.
18. Plug the battery in to the snap and turn the switch on.
19. Test LED lights to figure out which direction they need to face. Remember to keep the positive leg of the LED to the positive copper wire, which is the copper wire with tape on it.
20. Solder the LED lights in place.
21. Carefully hot glue the switch inside the bottle.
22. Carefully glue the battery inside the bottle.
23. Screw the lid on the bottle and decorate your flashlight with permanent markers.
24. Remember! DO NOT let the copper wires touch!