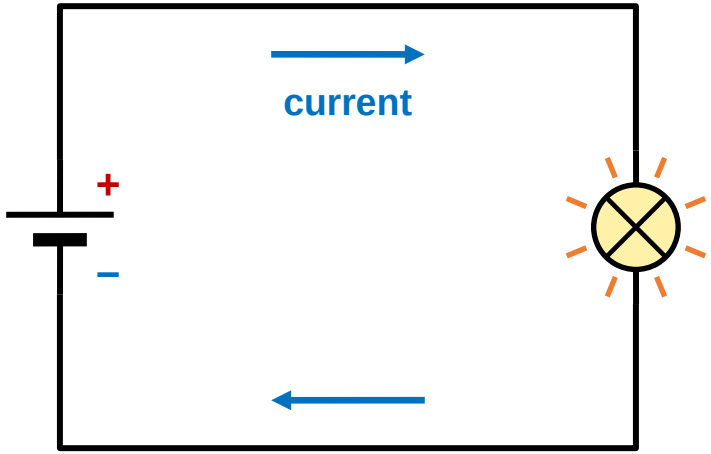
Essential Question

What does it take to make a bulb light up?

A Complete Circuit

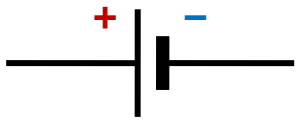
- Charges need a closed loop
- Battery → wire → bulb → back
- Any gap stops the flow



closed loop, so the bulb lights

Circuit Basics

Schematic Symbols



battery (cell)

wire

resistor

bulb (lamp)

open switch

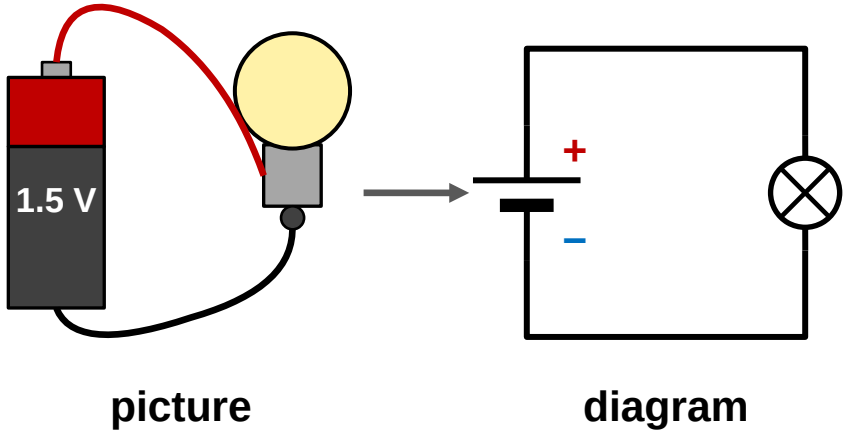
closed switch

ammeter

voltmeter

Drawing a Circuit Diagram

- Use symbols, not pictures
- Straight wires, square corners
- Same circuit, easier to read

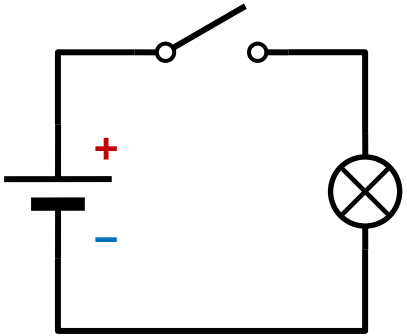


same circuit, easier to read

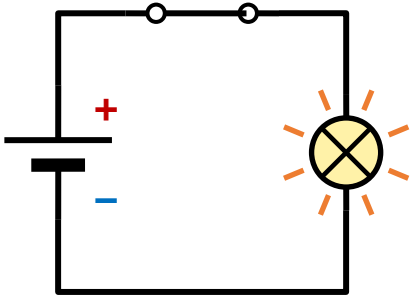
Circuit Basics

Switches

- Open switch: gap, bulb off
- Closed switch: loop complete
- Turns a circuit on and off



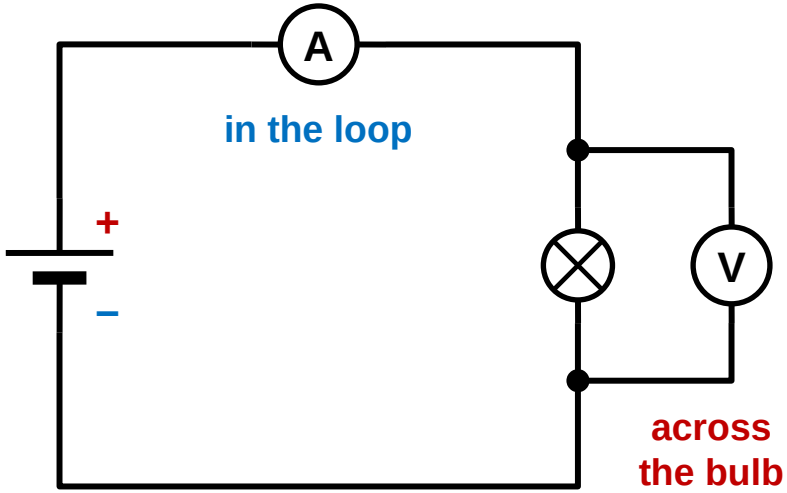
open: OFF



closed: ON

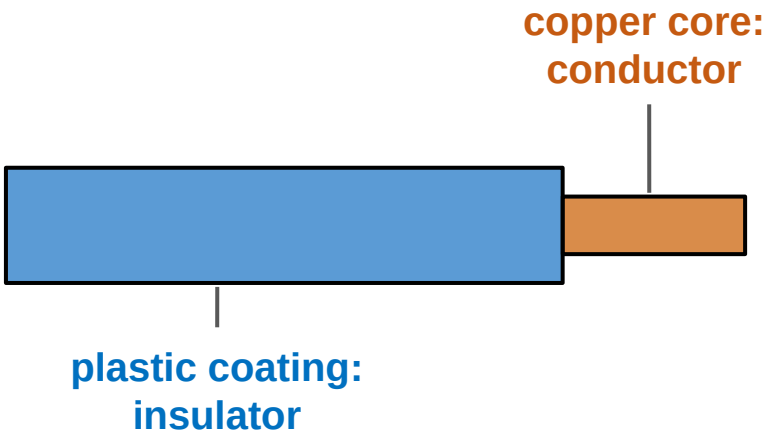
Measuring with Meters

- Ammeter (A): measures current
- Ammeter goes in the loop
- Voltmeter (V): measures voltage
- Voltmeter goes across a part



Conductors and Insulators

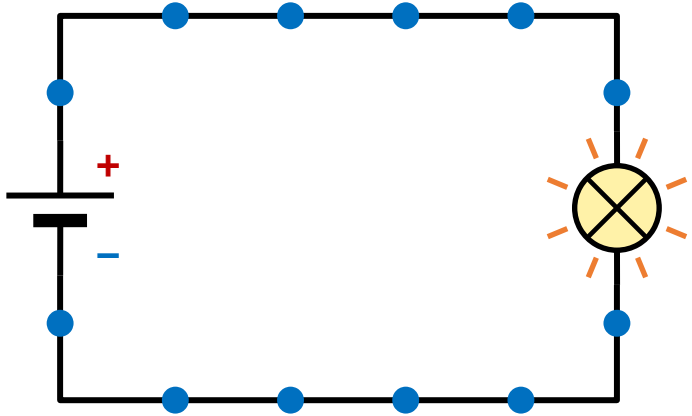
- Conductors let charge flow
- Metals: copper, aluminum, steel
- Insulators block charge flow
- Rubber, plastic, glass, wood



metal carries the charge, plastic keeps it in

Energy in a Circuit

- Battery stores chemical energy
- Moving charges carry energy
- Bulb turns it into light and heat
- Charges are not used up

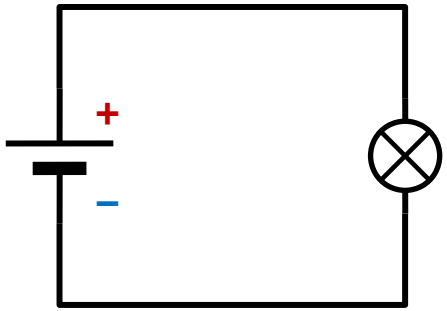


battery: chemical → electrical

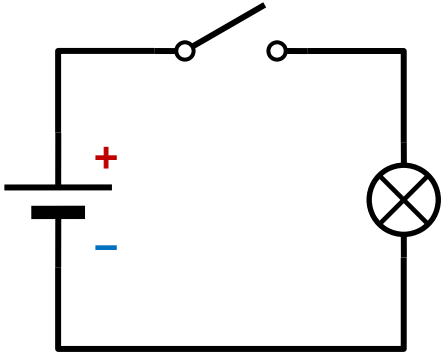
bulb: electrical → light + heat

Example: Will It Light?

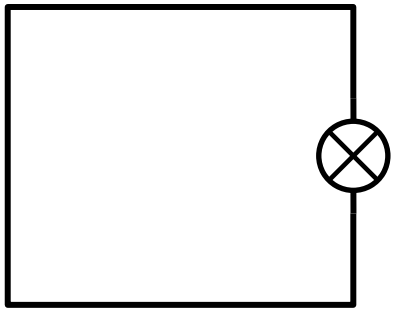
Which of these circuits will light the bulb? Explain why or why not for each one.



A



B



C

Example: Draw the Diagram

A flashlight has two cells, a switch, and one bulb, all connected in a single loop. Draw its circuit diagram.

Example: Conductor or Insulator?

Sort each item as a conductor or an insulator:

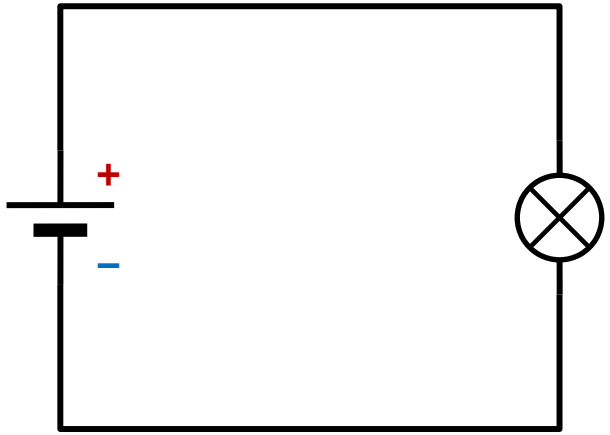
copper wire, rubber glove, aluminum foil, plastic ruler, steel paper clip, glass cup

Conductors

Insulators

Example: Placing the Meters

You want to measure the current through this bulb and the voltage across it. Where does each meter go?



Circuit Basics

Big Ideas

- A bulb needs a closed loop
- The battery supplies the energy
- Conductors carry charge, insulators block it
- Ammeter in the loop, voltmeter across