

CIRCUITS DAY 2: SIMPLE CIRCUITS, SCHEMATICS & METERS

CED 11.2 · Skill 1.A · FRQ: TBR

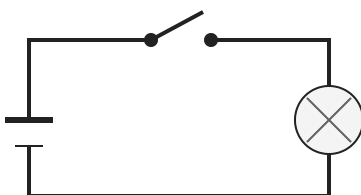
PREDICT BEFORE OBSERVING

The switch closes in a battery–bulb loop. Circle one: the bulb **responds as current begins throughout the loop / waits for electrons from the battery to reach it / remains off**. Be ready to defend your choice.

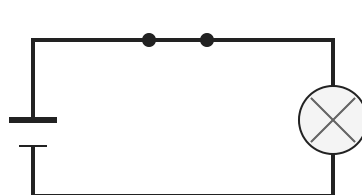
Observation source: battery, bulb, switch, and wires; projected PhET *Circuit Construction Kit: DC* as an exact substitute; or the printed setup below followed by the teacher-copy arrow reveal after everyone commits.

PRINTED FALLBACK — COMPARE THE SAME LOOP

A SWITCH OPEN



B SWITCH CLOSED



commit before the switch closes

A CIRCUIT IS A CONNECTED ARRANGEMENT

- A **closed circuit** contains a complete conducting path.
- An **open circuit** contains a gap that prevents current in that path.
- A schematic records the electrical connections, not the physical shape on the table.

QUICK Mark the break in panel A and trace the complete current path in panel B.

SYMBOLS AND PATHS

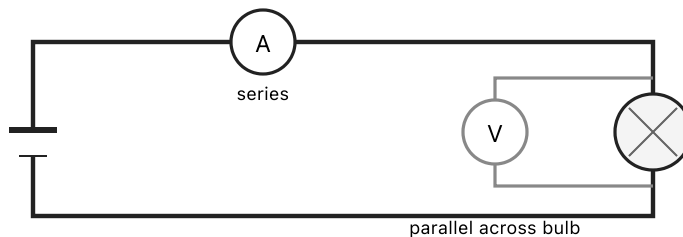
Element	What it does	Connection question
Battery	maintains a potential difference	Which terminal is higher potential?
Switch	opens or closes a path	Is there a continuous loop?
Bulb/resistor	transfers electrical energy	What current passes through it?
Ammeter	measures current	Is it in series?
Voltmeter	measures potential difference	Is it across two points?

A **short circuit** provides a very low-resistance path around an element or across a source. Large current can heat wires or damage a battery. Do not build a direct wire connection across a battery.

A BYPASS CHANGES THE ARRANGEMENT

The added wire bypasses the bulb. Treat this as a schematic warning, not a construction instruction.

REASON If an ideal wire is placed directly around a bulb, explain why the circuit is no longer equivalent to the original one-bulb loop.

MEASURING CURRENT AND POTENTIAL DIFFERENCE**CORRECT METER PLACEMENT**

An ammeter samples charge flow through one path. A voltmeter compares the potential at the bulb's two terminals.

Ammeter

Place it **in series** so the measured current passes through the meter.

Voltmeter

Place it **in parallel** across the two points whose potential difference is measured.

WE DO An ammeter reads 1.20 A before a bulb in a one-loop circuit. Find the current after the bulb and the charge delivered in 15 s .

YOU DO The switch opens. State the current everywhere in that loop and the charge delivered through the bulb during the next 10 s .

PRACTICE

1. A closed one-loop circuit carries 0.75 A . What current does an ammeter read at another point in the same loop?

2. That 0.75 A current continues for 24 s . Find the charge crossing the bulb.

3. A switch opens a series circuit. Find the charge crossing the open switch during the next 30 s .

4. Draw an ammeter that measures current through a bulb and a voltmeter that measures potential difference across it.



5. Explain why bending a wire into a different shape does not by itself change which elements are in series.