

Building and drawing simple circuits

Grade 6 science (Year 7 · Class 6) · Worksheet answers

Each answer names the components or materials, explains the reasoning about gaps and loops, and gives the final conclusion in bold. Compare your reasons as well as your answers, because explanation matters in circuit work.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS2-3

Problem 1 Component jobs

1. **Wire.**
2. **Switch.**
3. **Bulb.**
4. **Cell.**

Problem 2 Conductor or insulator?

Conductors: copper wire, aluminium foil, steel spoon.

Insulators: rubber glove, glass tumbler, wooden pencil case.

Problem 3 Will it light?

1. **Yes:** the loop is complete.
2. **No:** the open switch is a gap.
3. **No:** the cut wire is a gap.
4. **No:** there is no source of energy.

Problem 4 Comparing three circuits

1. **Circuit A** only.
2. The switch is open, so the circuit is open.
3. There is a break in the bottom wire, so the loop is not complete.

Problem 5 The torch switch

1. The switch opens or closes the circuit, so the bulb can be turned on and off.
2. Plastic is an **insulator**, so the current stays in the circuit and the user is protected.

Problem 6 Safe or not?

1. **No.**
2. Mains electricity is much stronger than a cell and can cause a dangerous or fatal electric

shock.

3. A **small cell** (such as 1.5 V) is safe to use.

Problem 7 Circuit with a motor

1. Cell, switch and motor.
2. It leaves the **positive terminal** (the long line of the cell), passes through the switch and the motor and returns to the negative terminal, going clockwise.
3. The motor **stops** because the open switch makes a gap in the loop, so no current flows.

Problem 8 Testing objects

1. **Steel key, copper coin, pencil lead.**
2. **Plastic comb, rubber band, glass marble.**
3. Pencil lead conducts, but not as well as the metals.

Problem 9 Missing return wire

1. Current flows only in a **complete loop**. With no return path the circuit is open and nothing flows.
2. Add a wire from the bulb to the negative terminal of the cell.

Problem 10 Faulty circuit

1. The loose bulb makes a poor contact, so there is a gap and the circuit is open.
2. **Replace the bulb** with another one, or connect the cell to a bulb known to work: if it lights, the cell is fine.

Problem 11 Choosing materials

1. **Copper**: it is a good conductor.
2. **Plastic**: it is an insulator.
3. **Rubber** (or plastic): it is an insulator, so the user is protected.

Problem 12 Testing a material

1. It must **light**.
2. Steel paper clip: lights; rubber band: stays off; aluminium strip: lights.
3. Metals are conductors and rubber is an insulator.

Problem 13 Complete the paragraph

1. **closed**.
2. **cell**.
3. **switch**.
4. **conductor**.
5. **insulator**.

Problem 14 Kites and power lines

1. The string could conduct the current from the power line to his body, which is dangerous.
2. **Wet string is more dangerous:** it contains water, which conducts better than the dry string, so more current could flow.

Problem 15 Building a circuit

1. **D, B, C, A.**
2. The diagram plans the loop so that no component is missed and no gap is left.

Problem 16 Predicting with a table

- 1: **lights**, the loop is complete.
- 2: **off**, there is no bulb, so the loop has a gap.
- 3: **off**, there is no cell to push the current.
- 4: **off**, the loose wire makes a gap.

Problem 17 Key-activated lamp

1. **Connect the cell, the bulb and two clips in a closed loop**, leaving a gap between the clips. Putting the key across the clips completes the loop, so the bulb lights.
2. Plastic is an insulator, so it does not complete the circuit.
3. Use only cells, never mains electricity.

Problem 18 Wire material data

1. **Copper, aluminium, steel, graphite.**
2. **Copper**, because the bulb is brightest, so it lets current flow best.
3. The plastic is an insulator, so people do not touch the live conductor and wires cannot touch each other.

Problem 19 Does water conduct?

1. She changes the **type of liquid** and observes the **brightness of the bulb**.
2. Keep the gap between the wires and the volume of the liquid (and the same cell) the same.
3. Use only a small cell, never mains electricity, and keep the cell and bulb away from spilled liquid.

Problem 20 Switch position

1. He is **wrong**. A switch anywhere in the loop opens the whole circuit when it is open.
2. Nothing changes. The bulb still goes off when the switch is open, because the loop is broken.