FACILITATOR COPY · ANSWERS SEPARATE

Paper Circuit Builder · Teacher guide

> **PAPER MODEL ONLY.** These pieces do not carry electricity. Do not connect them to real batteries, outlets, lamps, or equipment. Ask an adult before using scissors.

Scope: A general paper-only electrical concept extension for Explorer 7–9, Builder 10–12, Technician 13–14. It is not a verified Book 1 story/chapter activity and does not depict Theo's internal wiring.

Goal: Identify source, path, switch and load; explain why one gap stops the modeled loop. **Planning estimate:** 10–15 minutes, not learner-validated.

Print and prepare

Use	Pages / quantity
Teacher model	One full seven-page learner kit, plus this separate two-page teacher guide.
Each learner or pair	One set of pages 3–7. Keep pages 1–2 visible for reference.
Reusable cards	Page 4 contains all four component cards and three nested wire strips. Print one extra page 4 if you want to keep an unmarked master.

Materials: Printed pages, pencils, adult-supervised child-safe scissors. No batteries, metal wire, tape, real lamp, meter or power source. An adult can pre-cut, or learners can point to the uncut sheet.

I do · We do · You do

Stage	One prompt at a time
I do	Point to the battery + terminal. Model tracing through wire 1, the switch, wire 2, the lamp, wire 3, back to −. Keep the switch OPEN first; point to the gap.
We do	Ask the group whether the paper lamp should show rays. Choose CLOSED. Trace every connection together. Draw three rays only for the complete closed loop.
You do	Learners arrange cards and complete pages 5–7. Explorer may point/say; Builder predicts and compares; Technician locates one deliberately missing connection.

Safety and scope

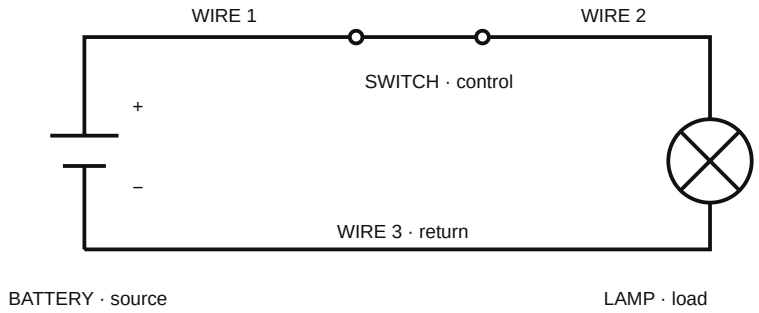
Paper cards cannot carry current and no real lamp lights. Do not ask learners to open, wire, energize, test, diagnose, repair or adjust real devices. This packet is not equipment instruction. Any physical demonstration is outside its scope. Keep scissors adult-supervised.

Set the kit beside, not inside, the Book 1 thermostat/comfort core lesson. Read the actual supplied book separately; do not claim a circuit scene appears in it.

FACILITATOR COPY · ANSWERS SEPARATE

Answers, recovery and completion

Complete modeled path:
Battery + → wire 1 → switch terminal → CLOSED switch link → switch terminal → wire 2 → lamp terminal → lamp symbol → lamp terminal → wire 3 → battery −.



Worksheet answers

Learner page	Supported answer
3 · Prediction	Closed switch + every connection present: draw 3 lamp rays. Open switch: leave unlit.
5 · Comparison	OPEN: no complete loop; leave unlit. CLOSED with every connection present: complete loop; draw rays. Remove any one wire: incomplete loop; leave unlit even if the switch is closed.
6 · Vocabulary	Battery = SOURCE; wire = PATH; switch = CONTROL; lamp = LOAD. Blanks: lit, unlit. Switch joins/breaks the path; it does not create energy.
7 · Drawing	Accept any orientation with the source, both lamp terminals, switch, three connections and full return. Result must match the chosen switch state and any gaps. No single drawing style is required.

Recovery prompts

Wrong rays: “Follow the path. Where is the gap?” **Missing return:** “Can you get back to minus?” **Lamp outside loop:** “Does the path enter one terminal and leave the other?” **Same terminal twice:** “Which two terminals still need a connection?” Let the learner revise; a correct first attempt earns completion.

Observe, do not collect identities

Can the learner point to the source, trace the loop, and explain why a gap changes the modeled lamp? Ask: “What did you change, and what happened?” Use anonymous notes only; do not request names, birth dates, IDs or grades.

Technical boundary: No current values, voltage drop, component ratings, parallel circuits or real device behavior are modeled. Conventional path tracing from + to − is an abstract circuit convention, not an electron-flow lesson.