Circuit Lab Worksheet

Series and Parallel Circuits

Name: _____ **Date:** _____

Use the Circuit Lab simulator to complete this worksheet. Build each circuit for real before you write your answer. Engineers test, then write.

Part 1: Know Your Parts

Match each part to its job. Write the letter on the line.

Part	Job
_____ Battery	A. An input you control. It opens and closes the loop.
_____ Switch	B. An output that turns electrical energy into light.
_____ Wire	C. The power source that pushes energy around the loop.
_____ Bulb	D. An output that turns electrical energy into sound.
_____ Buzzer	E. The connector the energy travels through.

In your own words: What is the difference between an INPUT and an OUTPUT?

Part 2: Build and Observe

Build 1: One bulb. Build a loop with one battery, one bulb, wires, and a switch.

- Draw your circuit here (show the battery, switch, bulb, and wires):
- Flip the switch open. What happens to the bulb? _____
- Why? _____

Build 2: Two bulbs in SERIES. Put both bulbs on the SAME loop, one after the other.

- Are the bulbs brighter, dimmer, or the same as one bulb alone? _____
- Explain why, using the words "share" and "battery":

Build 3: Two bulbs in PARALLEL. Give each bulb its OWN loop (its own branch) back to the battery. Use the Parallel Example if you get stuck.

- Are the bulbs brighter, dimmer, or the same as one bulb alone? _____
- Explain why:

Part 3: The Burn-Out Test 🔥

Use the Burn Out tool in the simulator.

Test	What I predicted	What actually happened
Series: burn out 1 of 2 bulbs		
Parallel: burn out 1 of 2 bulbs		

The big idea: In a _____ circuit, one burnt out bulb breaks the only loop, so everything goes out. In a _____ circuit, each bulb has its own loop, so the rest stay lit.

Part 4: Pros and Cons

Fill in one pro and one con for each type. Use your builds as evidence.

_____	Pro (good thing)	Con (bad thing)
Series		
Parallel		

Part 5: Real World Thinking

1. Old holiday light strings used to go completely dark when one bulb died. Were those strings wired in series or parallel? _____ How do you know?

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1. Your house is wired in parallel. Give TWO reasons that is the better choice for a house:

Reason 1: _____

Reason 2: _____

1. A flashlight holds its batteries and one bulb on a single loop. Is that a series or parallel circuit? _____ Why does that design make sense for a flashlight?

Exit Ticket

Circle the best answer.

1. A switch is an: **INPUT / OUTPUT / POWER SOURCE**
2. Two bulbs in parallel are: **DIMMER / BRIGHTER / THE SAME BRIGHTNESS** as two bulbs in series.
3. In a series circuit, if one bulb burns out, the others: **STAY LIT / GO OUT / GET BRIGHTER**
4. Every circuit must be a complete: **LINE / LOOP / SQUARE**

One sentence: Which circuit would you use to wire the lights in a treehouse, and why?

TEACHER ANSWER KEY — Circuit Lab Worksheet

Part 1: Battery = C, Switch = A, Wire = E, Bulb = B, Buzzer = D. Input vs output: an input sends information or control INTO the circuit (the switch tells it on or off); an output is how the circuit sends something OUT to the world (light, sound). The battery is neither: it is the power source.

Part 2: Build 1: opening the switch breaks the loop, so the bulb goes out; energy cannot complete the circuit. Build 2: dimmer; the two bulbs share the battery's push (voltage), so each gets only part of it. Build 3: same brightness as one bulb alone (full brightness); each branch gets the battery's full push.

Part 3: Series burn-out: both bulbs go out. Parallel burn-out: only the burnt bulb goes out, the other stays lit. Big idea: series / parallel.

Part 4 (sample answers): Series pro: simple, less wire, one switch controls all. Series con: dimmer with more bulbs, one failure kills all. Parallel pro: full brightness, failures stay local, branches can be switched separately. Parallel con: more wire, drains the battery faster, harder to build.

Part 5: 1. Series: one dead bulb broke the single loop. 2. Any two: bulbs stay full brightness; one burnt out bulb or turned off light does not kill the rest; each room or outlet can be controlled on its own branch. 3. Series: there is a single loop, which is simple, cheap, and small, and a flashlight only needs one bulb, so the downsides of series do not matter much.

Exit ticket: 1. INPUT. 2. BRIGHTER. 3. GO OUT. 4. LOOP. Final sentence: parallel is the

expected choice (lights stay bright and one dead bulb does not darken the treehouse); accept series only with a strong simplicity argument.