H01 Tinkercad Verification Guide

Calculate first, simulate second, build third

Technology Commons

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Document role: This guide contains simulator construction, measurements, screenshots, comparison, and simulation limitations. Complete calculations and predictions in the worksheet before using this guide.

Verification sequence

1. **Calculate first.** Use GUESS for $I = (V_S - V_F)/R$ and $P_R = I^2 R$.
2. **Build the circuit.** Add a DC source, switch, fuse if available, $330\ \Omega$ resistor, and red LED in one series path.
3. **Check polarity and values.** Confirm LED orientation, source voltage, resistor value, and an open switch.
4. **Place meters correctly.** Voltmeter probes go across two points. The ammeter becomes part of the series path.
5. **Start the simulation.** Close the switch only after the visual check.
6. **Record values.** Do not replace your hand calculation with simulator readings.
7. **Compare.** Use percent difference for each non-zero quantity.
8. **Explain.** Name a cause of discrepancy and a limitation of the model.

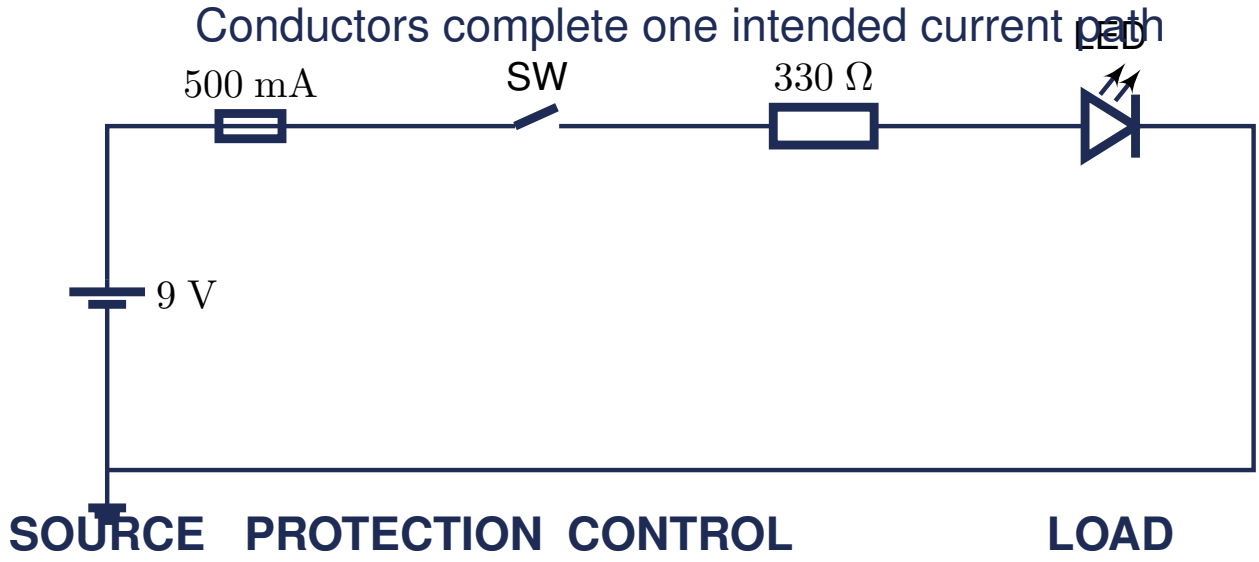


Figure 1: Protected classroom circuit.

Meter placement check

Meter	Correct placement	Common unsafe or invalid placement
Voltmeter	In parallel across the LED or resistor	In series with the load
Ammeter	In series after opening the path	Directly across the source
Ohmmeter	Across an isolated component with power off	Across an energized component

Comparison table

Quantity	Hand calculation	Tinkercad	Percent difference
LED current			
Resistor voltage			
LED voltage			

$$\% \text{ difference} = \frac{|\text{simulated} - \text{calculated}|}{|\text{calculated}|} \times 100\%$$

Required explanation

One discrepancy: _____

One simulation limitation: _____

Possible limitations include idealized wires, fixed temperature, simplified LED behaviour, limited source and fuse modelling, and no physical lead or jack hazards.

Submission

- ☐ GUESS calculation completed before simulation
- ☐ component values visible
- ☐ voltmeter in parallel
- ☐ ammeter in series
- ☐ comparison table complete
- ☐ discrepancy explained
- ☐ simulation limitation stated
- ☐ screenshot or share link included

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