

Lab5 Frequently Asked Questions

PART 1

Q: Can I use Circuit Construction Kit to do the simulation in Step 1?

A: You are going to need a professional simulator for this lab such as PSpice or CircuitLab. If you like to be able to view the flow of charges in a circuit, I recommend giving EveryCircuit a try. Details for students of this class on how to access the license are on the Lab 5 page on Canvas.

PART 2

General guidelines on constructing your circuit on a breadboard

- Remember, in order to connect two components together, insert the ends into the same 5-pin row. Adjacent rows are not electrically connected.
- It's a LOT easier to navigate your circuit if you lay out the resistors in the general orientation they appear in the schematic diagram. In other words, put R4 horizontal at the top, R2 vertical in the middle and so on.
- LAYOUT TIP – One way to help organize your breadboarding thoughts is to choose where to locate your nodes on the breadboard first. Notice for the problem circuit we are tackling, each node is at the junction of 3 components. This would be easily handled by a single 5-pin row. So for the lab problem circuit, you might first pick where to locate each node, such as in one of the two examples provided in Figure 1 below. Once you decide on a node layout, then plant the components between the nodes and use jumper wires if necessary to connect components to distant nodes. In this way you will have a nice organized layout that is easy to measure and debug.

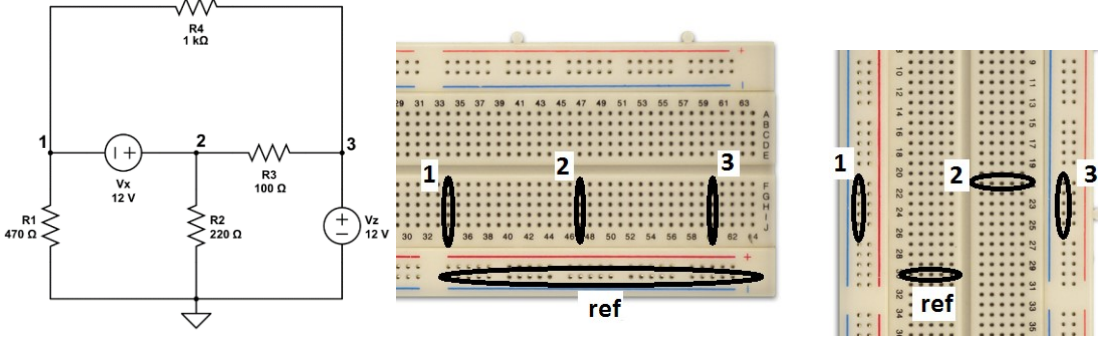


Fig 1 - Circuit Schematic and Two Possible Node Layouts for Implementing the Circuit

- If you mount a vertical resistor so that both ends are connected to the same 5-pin row, you have shorted out the two ends of the resistor. BUT you can put one end above the central channel that runs down the breadboard, and the other end below. The top and bottom halves are isolated from each other.

- You don't have to connect the power supplies to the rails (the long line of holes across the top and bottom of your breadboard), you can just bring the + and - wires from the screw terminal adapter for each voltage source to the points in the circuit where they need to go.

Q: Can you check my wiring before I power up the circuit?

A: If you are not confident about your breadboard wiring, you can wire the circuit on TinkerCAD first to verify it works before powering up your own. If you still have questions or issues, let me know by sending me a screen shot of your TinkerCAD circuit or a closeup photo of your breadboard.

Q: Is this the right way to measure current through R1 on my breadboard circuit?

A: You don't need to use the ammeter on your physical circuit although you may if you wish. If you do, you will have to break the current path you are trying to measure and use your Ammeter to reattach the broken connection – in other words, the “short circuit” of your ammeter bridges the gap you have created in your circuit. However, be aware that your meter may have a blown fuse from our earlier experiments (in which case it will only read 0A). So instead, you can just measure the voltage across the resistor with your multimeter set to DC Volts and connected in parallel to the resistor you are trying to determine the current for. Then divide the voltage you measure by the resistance you recorded in Table 2 to estimate current using Ohm's law. It should be pretty accurate.

Q: How do I measure the node voltage at node 1?

A: Connect the black (common) lead from the voltmeter to the reference node. The ref node is the point in the circuit where the 470 and the 220 ohm resistors and the (-) side of the Vz supply meet. Connect the red (positive) lead from the voltmeter to node 1, which is where the 470, 1k and the (-) side of the Vx supply meet.

Part 3

Q: Why does my voltage source read 0V on circuits.io?

A: If you've set the voltage to 12V and instead it reads 0V, that means you are shorting out your voltage source. Both ends are somehow finding a short circuit or direct path to each other. This could happen if you insert both ends into the same 5-pin row.

Q: How do I measure a node voltage in circuits.io?

A: Drag a multimeter component over and set it to voltmeter. Connect the black side to the reference node of your circuit, and the red side to the node you are trying to measure.

Q: How do I measure the current through a resistor in circuits.io in step 11?

A: you will need to break the circuit to run the current through the virtual ammeter. you may need to move one end of a resistor to separate it from the node that it is connected to so that you can use the ammeter to connect it to the node. In other words, the ammeter is a short circuit and will be used as the "wire" connecting the resistor to that node.