

1.2 - Series Circuits

About series circuits

Series circuits form the most common arrangement of resistors and other components in our projects. Series circuits are useful because they link components through a shared current path. When two or more components are connected in series, one component is able to sense or control the flow of current through the other component, forming the basis of all input and output circuits.

Series circuit activity

1. Draw a schematic diagram showing two resistors connected in series to a 6 V power supply. Use any two values of resistors from your kit of parts.

2. Build the circuit that you drew, above, on a breadboard. Do not connect the power supply yet.

3. Measure the resistance of each resistor.

$R_1 =$

$R_2 =$

4. Using a calculator, **calculate** the total series resistance.

$R_T =$

5. Set a power supply to 6 V. Measure the potential of the power supply.

$V_T =$

6. Connect the power supply to the circuit and measure the potential drop across each resistor.

$V_{R1} =$

$V_{R2} =$

7. **Calculate** the total current flow (using the measured potential and resistances).

$I_T =$

8. Disconnect one power supply lead from your circuit. Switch the red meter lead to the current jack, and insert the multimeter in series with the power supply lead to measure the DC current.

$I_T =$

9. Did your measured current, in step 8, agree with your calculated current in step 7?

10. Being able to conceptually understand the operation of circuits is very important. Going back to your measurements of potential drop, in step 6, identify which resistor exhibited the largest drop in potential. Was it the smaller one, or the larger one? Explain why.

Teacher Check

Series circuit analysis

11. Draw a schematic diagram showing three resistors connected in series to a 10 V source. Use any three resistor values from your kit of parts.

12. Do not build this circuit. Instead, **predict** how the circuit will behave.

- Which resistor will exhibit the highest potential drop across it?
- Which resistor will exhibit the lowest potential drop across it?

13. Calculate the following parameters for the series circuit to verify the circuit parameters.

$$R_T =$$

$$I_T =$$

$$V_{R1} =$$

$$V_{R2} =$$

$$V_{R3} =$$