

1.1 - Series Circuits

About series circuits

The most common arrangement of resistors in our projects is in series. Series circuits are useful precisely because there is only one path for current to flow through. When two or more components are connected in series, one component is able to sense or control the flow of current through the other, 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 CHRP 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.

$E_T =$

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

$E_{R1} =$

$E_{R2} =$

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 multimeter to the DC current range, plug the red meter lead into the current jack, and measure the total circuit 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. Again, use any three resistor values from your kit of CHRP parts.

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

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

13. Calculate the following parameters for the series circuit.

$$R_T =$$

$$I_T =$$

$$E_{R1} =$$

$$E_{R2} =$$

$$E_{R3} =$$