

1.1 - Ohm's Law

About Ohm's Law

Ohm's Law describes the relationship between potential, resistance, and current in a closed circuit. The Ohm's Law relationship can also be described mathematically, and governs the operation of all electrical and electronic circuits.

Ohm's Law circuit activity

1. Draw a schematic diagram of a single resistor connected to a 6 V power supply. Choose either the 330 Ω or 470 Ω resistor, and label all the parts of your diagram.

2. Calculate what you expect the circuit current should be.

$$I_T =$$

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

4. Measure the resistance of your resistor.

$$R_1 =$$

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

$$V_T =$$

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

$$V_{R1} =$$

7. Using a calculator, **calculate** expected circuit current from your measured values.

$$I_T =$$

Teacher Check

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. How close was your measured current to your calculated current in step 2?
11. Predict what will happen to the current if you double the power supply potential to 12V.

12. Set the power supply to 12V. Measure the circuit potential across the resistor.

$$V_{R1} =$$

13. Measure the total circuit current again. Does the current match your prediction in 11?

$$I_T =$$

14. Turn off the power supply and replace your resistor with either the 1.8k Ω or 2.2k Ω resistor. Predict the effect you think this resistor change will have on the circuit current.

15. Set the power supply to 12V. Measure the potential across the resistor.

$$V_{R1} =$$

16. Measure the total circuit current again. Does the current match your prediction in 14?

$$I_T =$$

Teacher Check

Ohm's Law analysis

17. Ohm's Law provides valuable analysis tools to find parameters in any circuit. Using Ohm's Law, calculate the resistance needed to produce a current flow of 10 mA at 5 V of potential.

18. Calculate the potential that would produce 18 mA of current flow through a 910 Ω resistor.

19. Calculate the current flow through a 10 k Ω resistor with 5.1 V applied to it.