

Name: _____

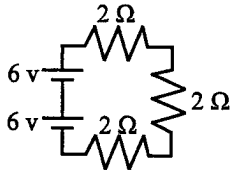
Period: _____

V, R, and I in Series Circuits

Total Voltage (V_T)

If the batteries are in series (in a line) then **add them together** to find the total voltage (V_T).

$$V_T = V_1 + V_2 + V_3 + \dots$$

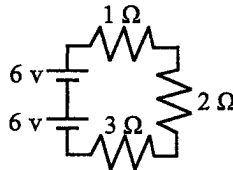


$$V_T = 6\text{ v} + 6\text{ v} = 12\text{ v}$$

Total Resistance (R_T)

If the resistors are in series then **add them together** to find the total resistance (R_T).

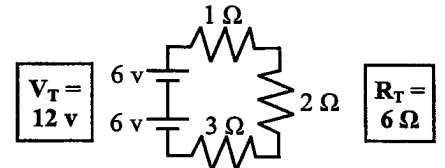
$$R_T = R_1 + R_2 + R_3 + \dots$$



$$R_T = 1\ \Omega + 2\ \Omega + 3\ \Omega = 6\ \Omega$$

Total Current (I_T)

Use **Ohm's Law** to calculate the total current from V_T and R_T .



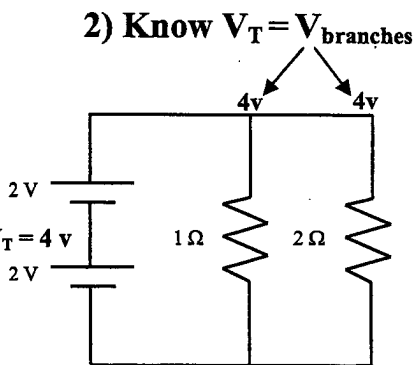
$$I = \frac{V}{R} = \frac{12\text{ v}}{6\ \Omega} = 2\text{ A}$$

V, R, and I in Parallel Circuits

1) Find V_T

These batteries are in series, so you add them together.

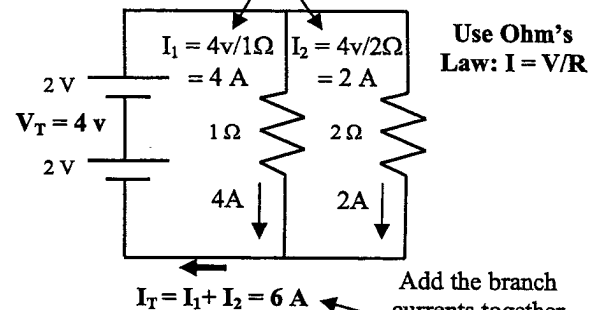
$$V_T = V_1 + V_2 = 4\text{ V}$$



2) Know $V_T = V_{\text{branches}}$

3) Find I in each branch:

Treat each branch as its own series circuit.



Use Ohm's Law: $I = V/R$

Add the branch currents together to get the total current.

Going farther 5) Finding Total Resistance (R_T)

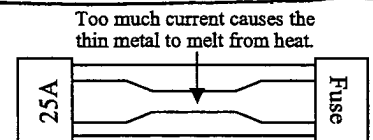
Once you know V_T and I_T , you can find R_T by Ohm's Law: If $V = IR$, then $R = V/I$. $R = 4\text{v}/6\text{A} = 2/3\ \Omega = 0.67\ \Omega$.

Or use Kirchoff's Law:
$$R_T = \frac{1}{1/R_1 + 1/R_2}$$

4) Find Total Current (I_T)

Fuses

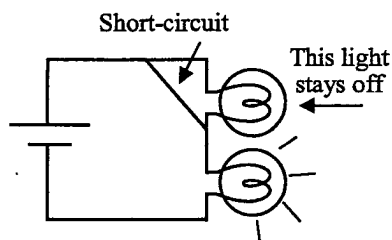
Electricity cause heat. **Fuses melt** (or break) when too much current passes through it, protecting expensive electronic equipment. Circuit breakers protect against too much current like fuses, but can be reset.



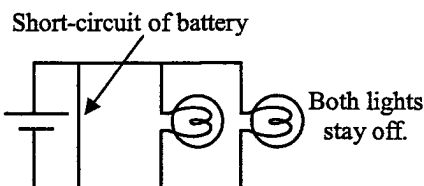
Short Circuits

A short-circuit is when a wire by-passes a device in a circuit.

Electricity always chooses the path of least resistance. Since wires have virtually no resistance, electricity will go thru a wire instead of a device or circuit. This causes a short-circuit.



Short-circuiting a device just by-passes it: it stays off. It is easier for the current to go thru the wire than the light bulb.



Short-circuiting a battery can be dangerous: it will drain the battery quickly and can lead to a melted wire or even a fire!