# Parallel Circuits

### Resistors In Parallel (Parallel Circuits)



### In Parallel

• Overall resistance of the circuit is less than the resistance of any one of the branches.

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots$$



**Ex:** Find the total resistance of the three resistors connected in parallel.



## In Parallel



• Voltage is the same across each resistor

$$V_1 = V_2 = V_3$$

• Ohm's Law applies across each individual device

$$V_1 = I_1 R_1$$
  $V_2 = I_2 R_2$   $V_3 = I_3 R_3$ 

 Total current in the circuit equals the sum of the currents in its parallel branches

$$I_{total} = I_1 + I_2 + I_3$$

• For the entire circuit:

$$V_{total} = IR_{eq}$$

### Example 1: Parallel

• Find the current through the 2 ohm resistor.



### Example 2: Parallel

• Three resistors are connected in parallel. If placed in a circuit with a 12volt power supply. Determine the equivalent resistance, the total circuit current, and the voltage drop across and current in each resistor.

