# Parallel Circuits

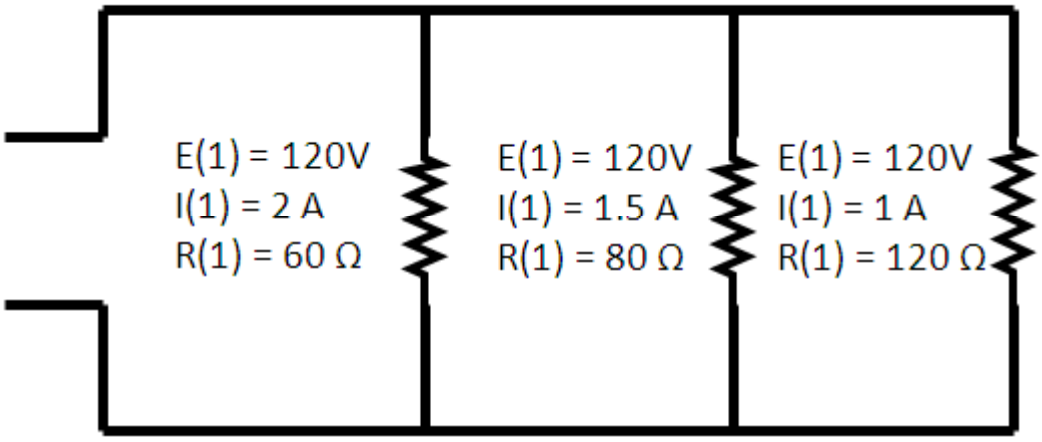
If the currents and voltages are <u>known</u>:

Rules:

1. The total current in a parallel circuit is equal to the sum of the currents in all the branches of the circuit.

   Total Current = I(1) + I(2) + I(3) and etc.

2. The total voltage across any branch in parallel is equal to the voltage across any other branch and is also equal to the total voltage.
3. The total resistance in a parallel circuit is found by applying ohm's law to the total values of the circuit.



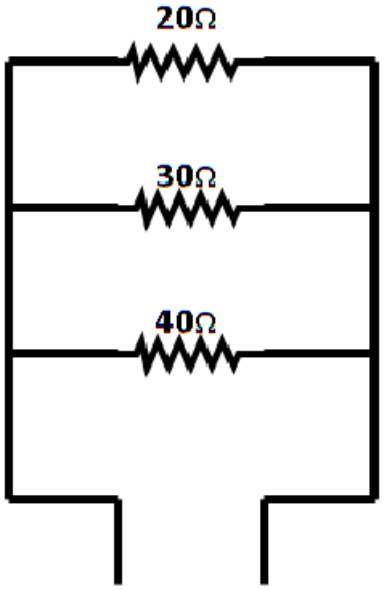

I (T) = I(1) + I(2) + I(3)
I (T) = 2 + 1.5 + 1
I (T) = 4.5

E (T) = E(1) = E(2) = E(3)
E(T) = 120 = 120 = 120
E(T) = 120

Ohm's law states R = E / I
R = 120 / 4.5
R = 26.66Ω

# Parallel Circuits

To determine the total resistance in a parallel circuit where the total current and total voltage are <u>unknown</u>:




$$\frac{1}{Total\ Resistance} = \frac{1}{R(1)} + \frac{1}{R(2)} + \frac{1}{R(3)} + \text{ETC}$$

$$\frac{1}{R(T)} = \frac{1}{40} + \frac{1}{30} + \frac{1}{20}$$

$$\frac{1}{R(T)} = \frac{3}{120} + \frac{4}{120} + \frac{6}{120}$$

FIND THE COMMON DENOMINATOR

$$\frac{1}{R(T)} = \frac{13}{120}$$

$$\frac{1}{R(T)} \text{ X } \frac{13}{120}$$

CROSS MULTIPLY

$$13R(T) = 120$$

$$\frac{13R(T)}{13} = \frac{120}{13}$$

TO GET RID OF THE 13 ON THE LEFT SIDE, DIVIDE BOTH SIDES BY 13

$$R(T) = 9.23\Omega$$