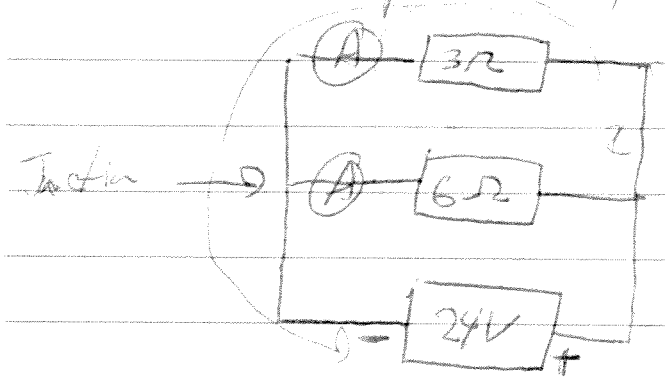
Parallel Circuit

Parallel Circuits have more than 1 current path

Result: if part of the circuit is interrupted, the entire circuit may not fail. (Ex. Light bulb burns out at home

Junction - Point at which current separates into more than 1 path



-Each resistor comprised a indept. path

$V_T = V_1 = V_2 = V_3$

$I_T = I_1 + I_2 + I_3$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

Solve for I $\quad V = IR \quad \frac{V}{R} \quad \frac{IR}{R}$

$I_1 = \frac{V}{R} = \frac{24}{3\Omega} = 8A$

$I_2 = \frac{V}{R} \quad \frac{24V}{6\Omega} = 4A$

$I_T = 8A + 4A = 12A$

Solve for Resistance $\quad \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{3\Omega} + \frac{1}{6\Omega} = \frac{1}{2}$

$R_T = 2\Omega$

By cross multiplication

Note: Overall resistance is less than resistance at any single point.

-When you add resistors, you are adding new paths,

Use highway example - Add more Roads, easier to get around

From $V = IR$ More highway choices ↑ Current

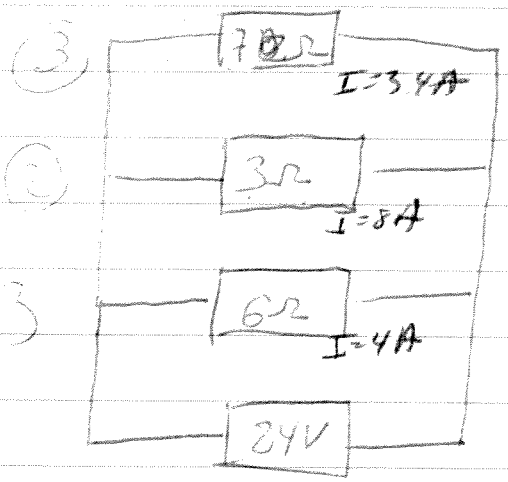
- ↑ b

In Parallel Circuits	Overall Resistance ↓	Overall Current ↑
Add resistors	(Decrease)	

Ex 2

① Find the current across each resistor and the overall resistance

Add 7Ω Resistor



$V_T = V_1 = V_2 = V_3 = 24V$

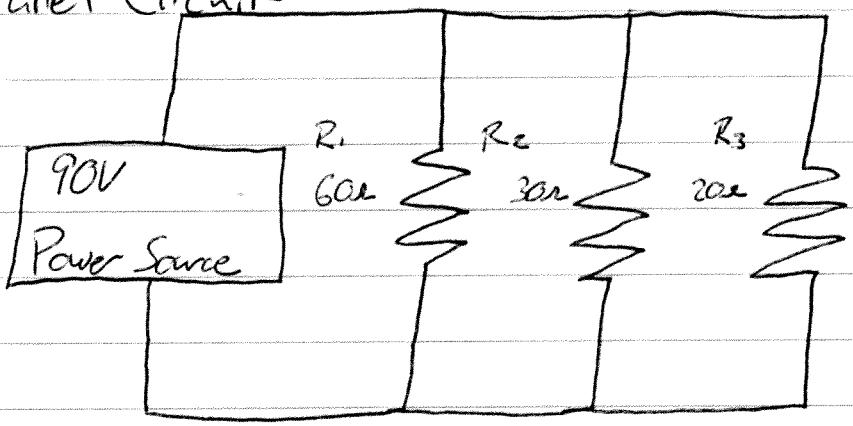
$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ $\frac{1}{R_T} = \frac{1}{6\Omega} + \frac{1}{3\Omega} + \frac{1}{7\Omega} = \frac{1}{1.5\Omega}$

$\frac{1}{R_T} = \frac{1}{.6428}$ (by Calc)

$R_T = .6428\Omega$ or $\frac{9}{14}$ 1.5Ω

$I_T = \frac{V_T}{R_T} = \frac{24V}{.6428} = 37.33A$

Parallel Circuits



1) Find the equivalent Resistance of the circuit

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \qquad \frac{1}{R_T} = \frac{1}{60\Omega} + \frac{1}{30\Omega} + \frac{1}{20\Omega}$$

$$\frac{1}{R_T} = \frac{6}{60\Omega} \qquad R_T = 10\Omega$$

2) Find the Current in the entire Circuit

$$V_T = I_T R_T \qquad I_T = \frac{V_T}{R_T} \qquad I_T = \frac{90V}{10\Omega} = 9A$$

3) Find the current through each branch

$$I_1 = \frac{V}{R_1} = \frac{90V}{60\Omega} \quad 1.5A$$

$$I_2 \quad \frac{V}{R_2} = \frac{90V}{30\Omega} = 3A$$

$$I_3 \quad \frac{V}{R_3} = \frac{90V}{20\Omega} = 4.5A$$