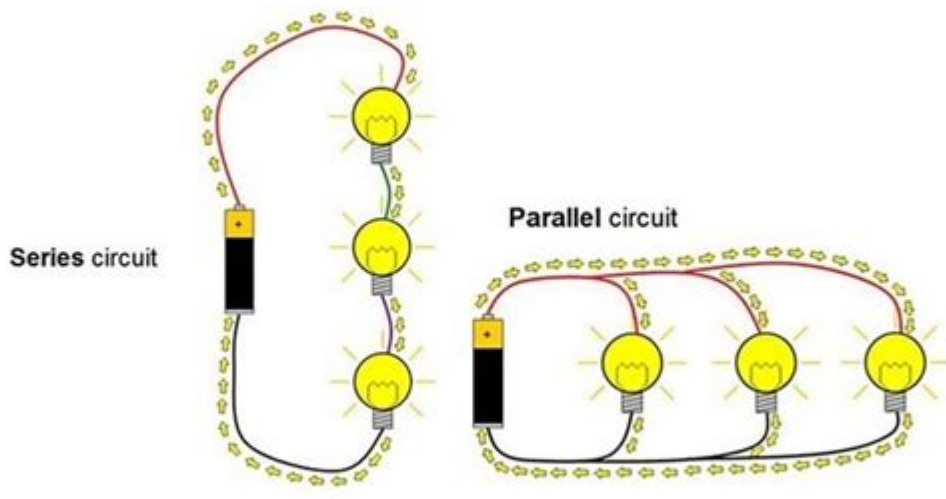
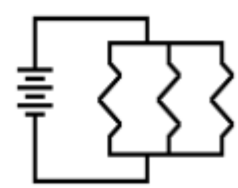
Parallel





- ➔ A parallel circuit has 2 or more pathways for the current to flow
- ➔ The current through each pathway depends on the resistance of that pathway (the greater the resistance, the lower the current)
- ➔ The sum of the current in the branches is equal to the current flowing into the junction.
  - $I_0 = I_1 + I_2 + I_3$
- ➔ The same voltage drop across parallel branches is the same in each branch
  - $V_1 = V_2 = V_3$
- ➔ The total resistance of a parallel section is calculated by:
  - $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} +$
    - *solve for R_p

$$\frac{1}{R_p} = \frac{R_2R_3 + R_1R_3 + R_1R_2}{R_1R_2R_3}$$

$$1 = \frac{R_p(R_2R_3 + R_1R_3 + R_1R_2)}{R_1R_2R_3}$$

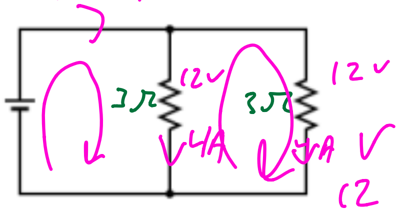
$$\frac{R_1R_2R_3}{R_2R_3 + R_1R_3 + R_1R_2} = R_p$$

Determine I_0, V_1, V_2, I_1, and I_2.
Battery = 12 V, $R_{1,2}$ = 3 Ω,

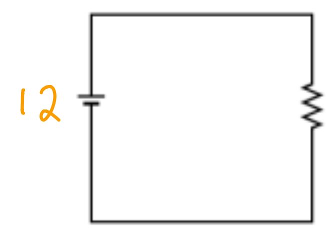
1) Solve via Voltage loop
2) Solve via Thevenin Equivalence

1) $V = IR$
$12 = I(3)$
$4 = I$

$I_0 = 8A$



$V = IR$
$12 = I\,3$
$\frac{12}{3} = I$
$4 = I$



$R_p = 1.5\,\Omega$

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$

$= \frac{1}{3} + \frac{1}{3}$

$\frac{1}{R_p} = \frac{2}{3}$

$1 = \frac{2R_p}{3}$

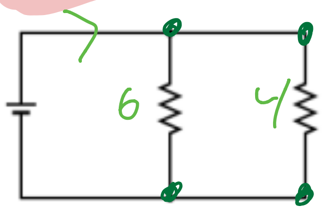
$3 = 2R_p$

$\frac{3}{2} = R_p$

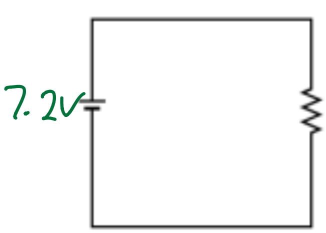
$R_p = \frac{3}{2} = 1.5\,\Omega$

$V = IR$
$12 = I\,1.5$
$\frac{12}{1.5} = I$
$8A. = I$

$I = 3A$



Determine V_{Total}, $I_{1,2}$
I_0 = 3 A, R_1 = 6 Ω, R_2 = 4 Ω



$\frac{1}{R_p} = \frac{1}{6} + \frac{1}{4} = \frac{2+3}{12} = \frac{5}{12}$

$R_p = \frac{12}{5} = 2.4\,\Omega$

$V = IR$
$V = 3(2.4)$
$= 7.2$

$V_1 = I_1 R_1$	$V_2 = I_2 R_2$
$7.2 = I_1\,6$	$7.2 = I_2\,4$
$\frac{7.2}{6} = I$	$\frac{7.2}{4} = I_2$
$1.2A = I$	$1.8A = I_2$