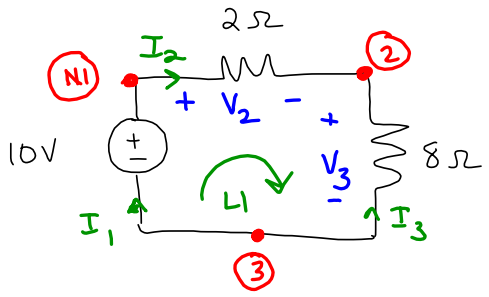


KCL

① $I_1 = I_2$

② $I_2 + I_3 = 0$

③ $0 = I_1 + I_3$

$I_1 = I_2 = -I_3$

KVL

$10 - V_2 - V_3 = 0$

$10 - (2I_2) - (-8I_3) = 0$

$10 - (2(-I_3)) - (-8I_3) = 0$

$10 + 2I_3 + 8I_3 = 0$

$10I_3 = -10$

$I_3 = -1A$

$I_2 = 1A$

$I_1 = 1A$

Ohm's Law

$V_2 = 2I_2$

$V_3 = -8I_3$

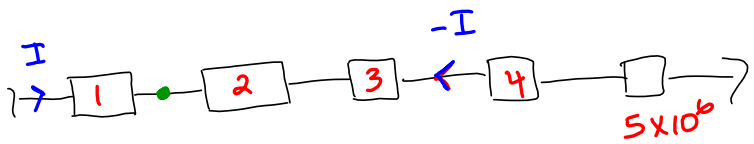
$V_2 = 2V$

$V_3 = 8V$

Series & Parallel Connections

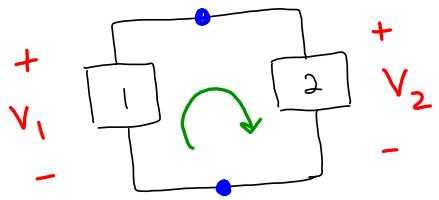
- when a node only has two element connected, we say those elements are connected in series.

- when element are in series, they experience the same current.



Parallel Connection

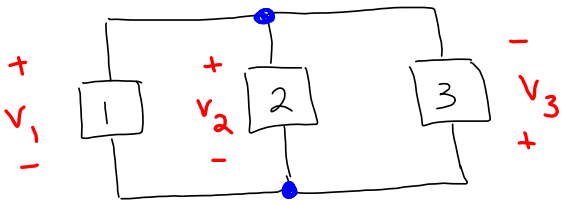
Elements that share the same two, nodes are in parallel & thus have the same voltage.



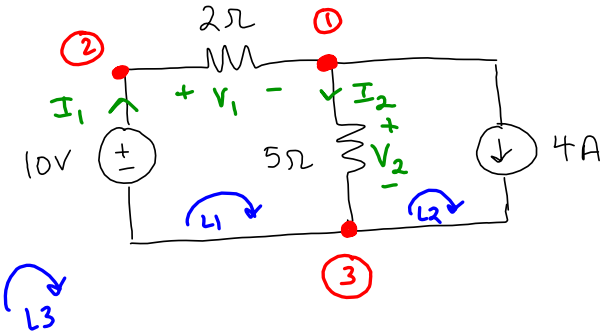
by KVL:

$$+V_1 - V_2 = 0$$

$$V_1 = V_2$$



$$V_1 = V_2 = -V_3$$



Use Brute Force to find all voltages & currents and powers.

KCL

① $I_1 = I_2 + 4$

③ $4 + I_2 = I_1$

KVL

L1 $10 - V_1 - V_2 = 0$

L3 $10 - V_1 - V_2 = 0$

Ohm's Law

$V_1 = 2I_1$

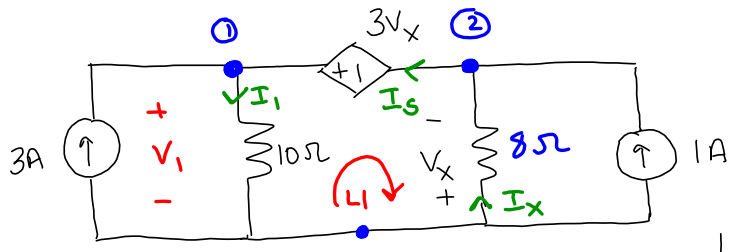
$V_2 = 5I_2$

$2I_1 + 5I_2 = 10$

$I_1 - I_2 = 4$

$I_1 = 4.29\,A$ $V_1 = 8.57\,V$

$I_2 = 0.29\,A$ $V_2 = 1.43\,V$



Find all currents, voltages & powers.

KCL

① $I_S + 3 = I_1$

② $I_x + 1 = I_S$

KVL

L1 $V_1 - 3V_x + V_x = 0$

Ohm's Law

$V_1 = 10\,I_1$

$V_x = 8\,I_x$

$$I_1 - I_S = 3$$

$$-I_x + I_S = 1$$

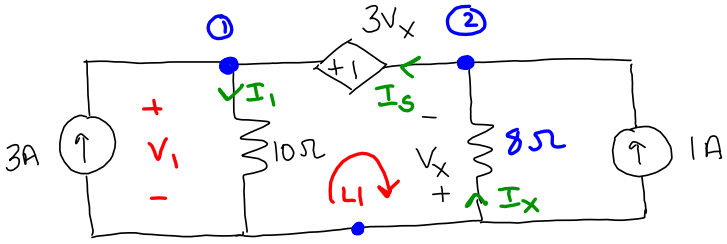
$$10\,I_1 - 16\,I_x = 0$$

$I_x = 3.33A$ $I_S = 2.33A$

$I_1 = 5.33A$

$V_1 = 53.33V$

$V_x = 26.67V$



$I_x = 3.33\,A$ $I_s = 2.33\,A$

$I_1 = 5.33\,A$ $V_x = 26.67\,V$

$V_1 = 53.33\,V$

Sources : $P = VI$

3A : $P = V_1(3) = 160\,W$, Del

1A : $P = V_x(1) = 26.67\,W$, Abs

or $= -26.67\,W$, Del

$3V_x$ = $P = (3V_x)(I_s) = 186.67\,W$, Del

Resistors : $P = I^2R$

10Ω : $P = I_1^2(10)$

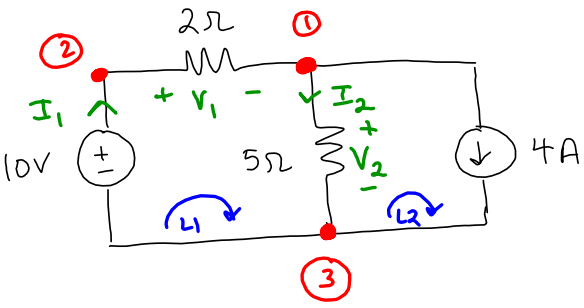
$= 284.44\,W$, Abs

8Ω : $P = I_x^2(8)$

$= 88.89\,W$, Abs

$\Sigma P_{del} = 373.33\,W$

$\Sigma P_{abs} = 373.33$



$I_1 = 4.29A$ $V_2 = 1.43V$

$I_2 = 0.29A$ $V_1 = 8.57V$

Sources $P = VI$

10V : $P = (10)I_1 = 42.86\ W$, D

4A : $P = (V_2)(4) = 5.71\ W$, A
$= -5.71\ W$, D

$\Sigma P_{Del} = 37.15\ W$

Resistors $\Rightarrow P = I^2R$

2Ω : $P = I_1^2(2) = 36.73\ W$, A

5Ω : $P = I_2^2(5) = 0.403\ W$, A

$\Sigma P_{abs} = 37.14\ W$

Linearly Independent

$$2x + 3y = 6$$

$$4x + 6y = 12$$