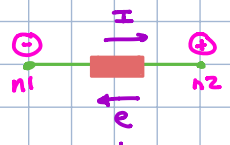
OHMS LAW = $V = I \cdot R$



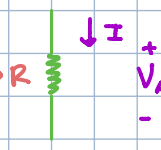
Current is the flow of electrons.

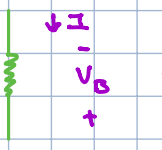
↳ For passive sign convention, current goes in the opposite direction of flow of electrons.

n1: electrons flow towards n1, therefore n1 is more negative.
n2: electrons flow away. Therefore more positive.

Getting the sign convention correct.

resistor stops the flow of current @ rate defined as I.





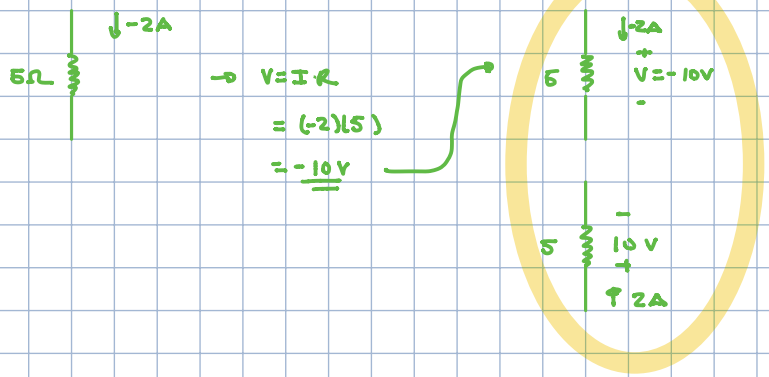
→ Power = $|I \cdot V_B|$

↳ load always dissipate power.

BE CAREFUL ABOUT the SIGN CONVENTION

- ppl scores can go from 8/10 to 1/10 just because of sign convention.
  ↳ Don't Pull a Lamar Jackson 🤦. Pull a Derrick Henery. 🙂

$V_A = -V_B$
$V_B = -V_A$
} look @ plus and minus terminal.



Note.

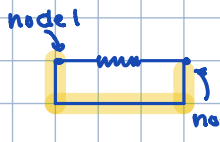
direction of current determine your ⊕ terminal

$V_A = I_A \cdot R$
$V_B = I_B \cdot R$
$\therefore V_A = -V_B$

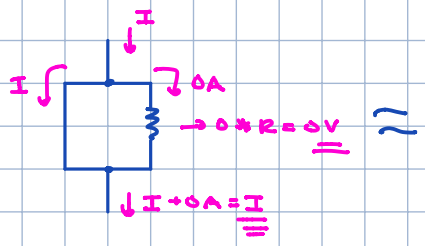
Node: Terminal ends of a load.

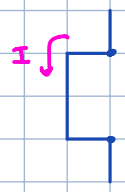
ex.

- The R is the load
- node1 and node 2 are the ends.

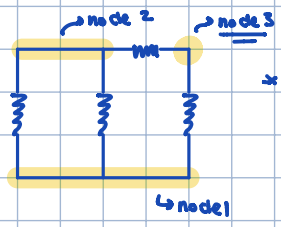


↳ Both are the same node because a wire will always have a potential of 0 ⇒





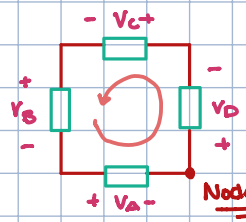
*Acts as if a load does not exists.



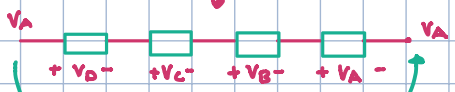
*Note: All Nodes have different voltage potential
If 2 nodes have the same potential, then it is the same node.

Kirchoff's law: Voltage potential of loop equals to 0.

Why?



Node 1 Voltage = V_A

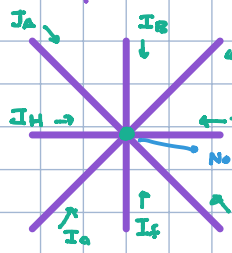


*Notice All the ⊕ terminals facing the same direction.

- These are the same node
- Voltage of the same node have the SAME Voltage Potential.

$\therefore V_A + V_B + V_C + V_D = 0V \rightarrow V_A - V_A = 0$

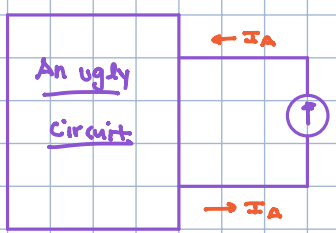
Nodal Analysis.



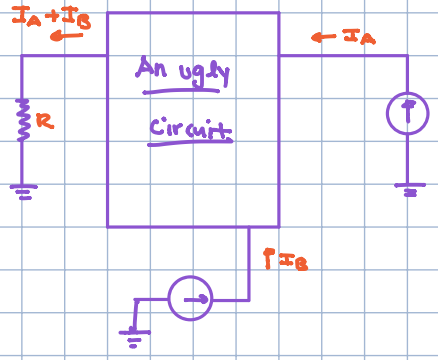
$I_A + I_B + I_C + I_D + I_E + I_F + I_G + I_H = 0$

Why? Because current that comes in must come out!!

$\therefore I_A, I_B, I_C, I_D, I_E, I_F, I_G$, or I_H must be negative (At least 1).

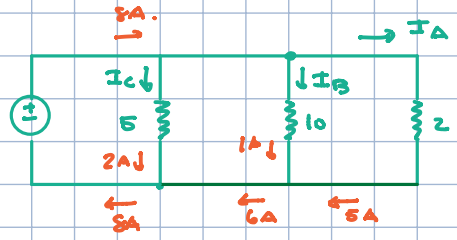


*Notice the same apply to a circuit network.



* current input must come out.

How does this connect to nodal analysis?



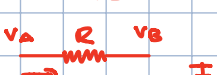
$I_A + I_B + I_C = 0$

$I_A = \frac{10V - 0}{2} = 5A$

$I_B = \frac{10 - 0}{10} = 1A$

$I_C = \frac{10}{5} = 2A$

Note current

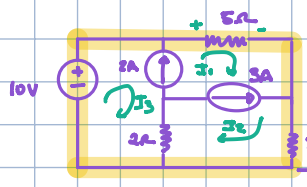


$I = \frac{V_A - V_B}{R}$

THINK V_A to V_B

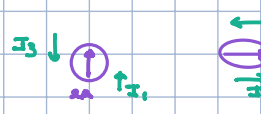
Mesh Analysis: You perform NVL (let's go straight to an example).

ex.



* Find voltage of 3A current source.

$10 - V_{5\Omega} - V_{3\Omega} = 0$



$I_1 - I_3 = 2$

$I_2 - I_1 = 3$

$I_2 = 3 + I_1$

$I_3 = I_1 - 2$

$= \frac{1}{2} - \frac{4}{2} = -\frac{3}{2}$

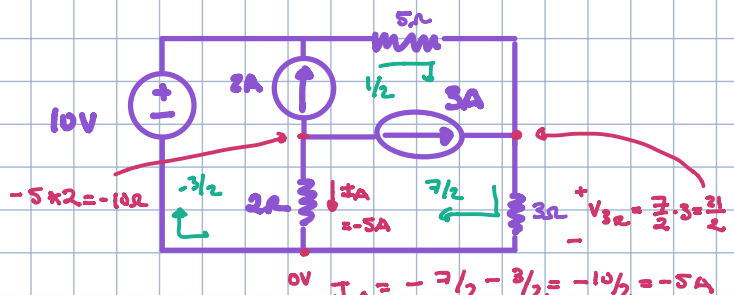
$10 - 5I_1 - 3I_2 = 0$

$10 - 5I_1 - 3(3 + I_1) = 0$

$10 - 5I_1 - 6 - 3I_1 = 0$

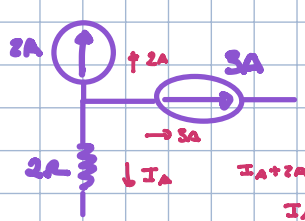
$4 - 8I_1 = 0 \rightarrow I_1 = \frac{1}{2}$

$I_2 = 3 + \frac{1}{2} = \frac{7}{2}$



$I_A = -7/2 - 3/2 = -10/2 = -5A$

Voltage $= \frac{21}{2} - (-10) = \frac{21}{2} + \frac{20}{2} = \frac{41}{2} V$



$I_A + 2A + 3A = 0$

$I_A = -5A$