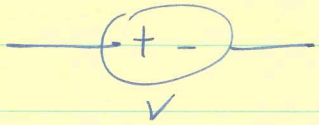
So far we have the following "circuit elements"

Resistor 


Voltage source 

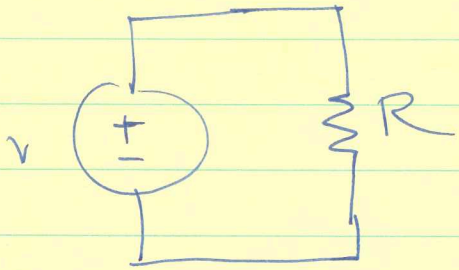

Current source 


Ammeter 

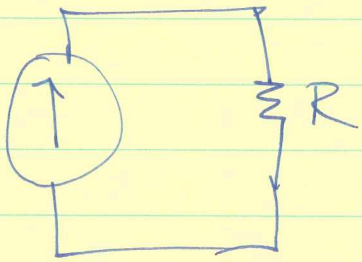

Voltmeter 


We can connect these together to make a circuit.

E.g.

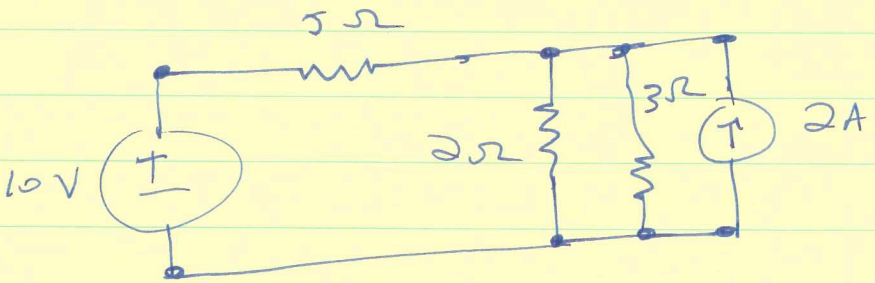


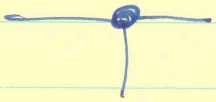

OR




Goal: Find I, V everywhere.

## More complex example



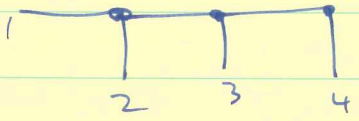



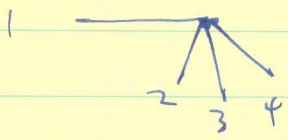
just means wires connected

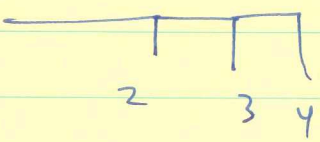
Same as 

V = same along wires (ideal metals)

Called node.

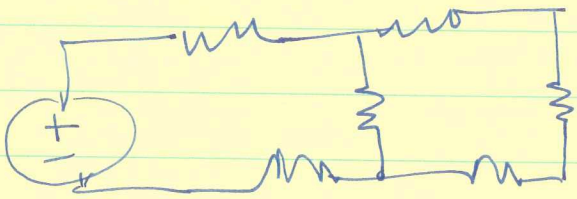
So 


Same as 

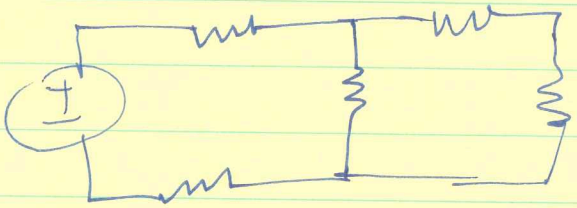

Same as 


Loop is any closed path in a circuit.

Example how many nodes



2nd Example

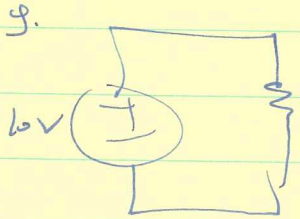


Want to know I, V everywhere in circuit.
Need to know V at each node only.
(Halfway there.)

e.g.

How many nodes?

e.g.



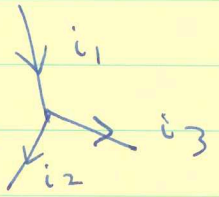

how many nodes?
easy 2 know Vab = 10V

# KCL

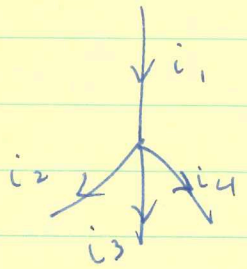
algebraic sum of currents entering a node is zero.

$$\sum_{n=1}^{N} i_n = 0$$

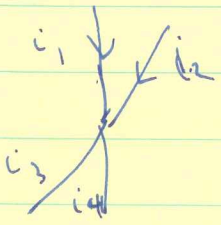
enter node: positive
leave node: negative



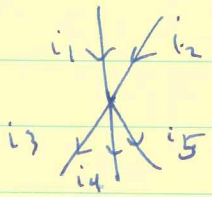

$$i_1 = i_2 + i_3$$




$$i_1 = i_2 + i_3 + i_4$$




$$i_1 + i_2 = i_3 + i_4$$




$$i_1 + i_2 = i_3 + i_4 + i_5$$

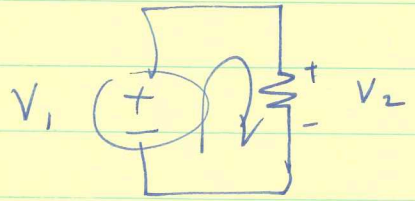
Very useful
Very intuitive.

KVL

Algebraic sum of all voltages around a closed loop = 0.

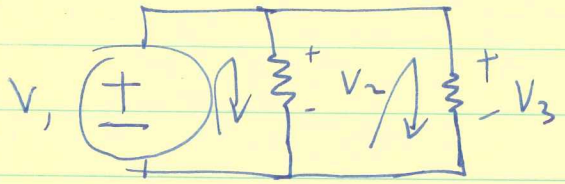
$$\sum_{m=1}^{M} v_m = 0$$

e.g.

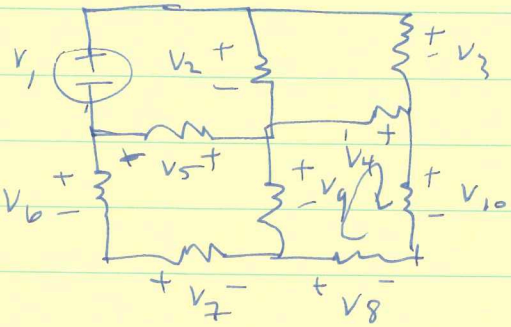



$$-V_1 + V_2 = 0$$

e.g.




$$-V_1 + V_2 = 0$$
$$-V_2 + V_3 = 0$$




Pick a loop apply KVL.

$$-V_8 - V_9 - V_4 + V_{10} = 0$$

etc.

stop here