

Basic Circuit Elements

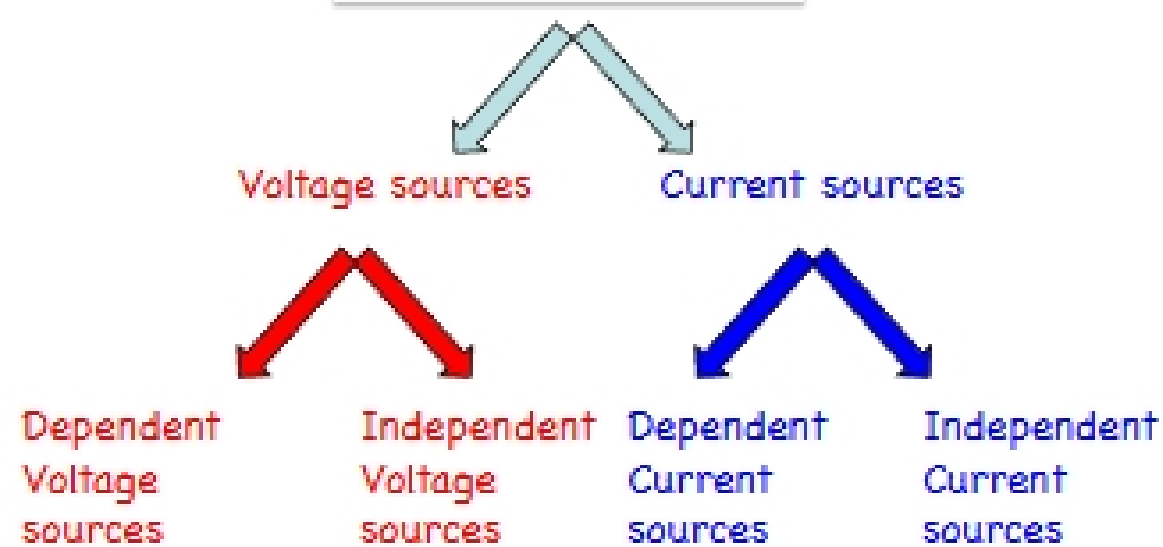
Sources

Devices which convert non electrical energy to electrical energy and vice versa

Examples

| | | | |
|--------------|------------|---|------------|
| Battery | Chemical | ↔ | Electrical |
| Generator | Mechanical | ↔ | Electrical |
| Photocell | Light | ↔ | Electrical |
| Thermocouple | Thermal | ↔ | Electrical |

Sources Classifications



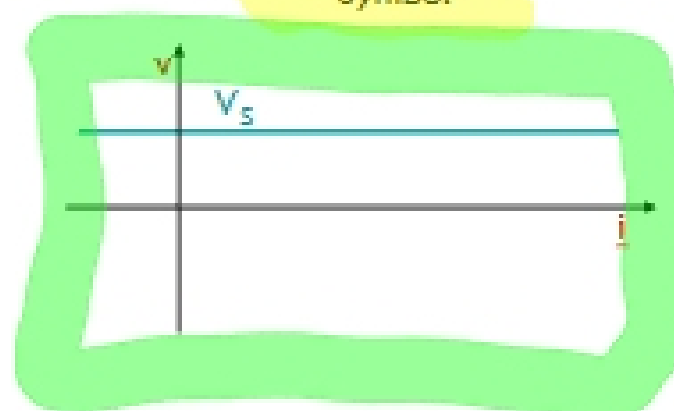
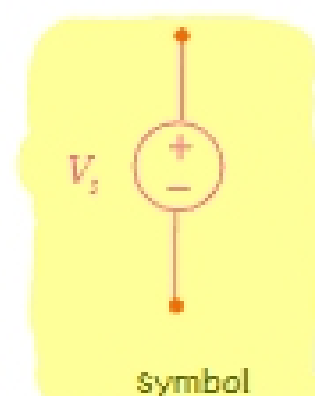
Independent Voltage Source

- ★ Maintain a prescribed voltage across its terminals regardless of the current flowing those terminals
- ★ Physical component of a voltage source : Battery

★ The (i-v) characteristics can not described mathematically

(i-v) characteristic

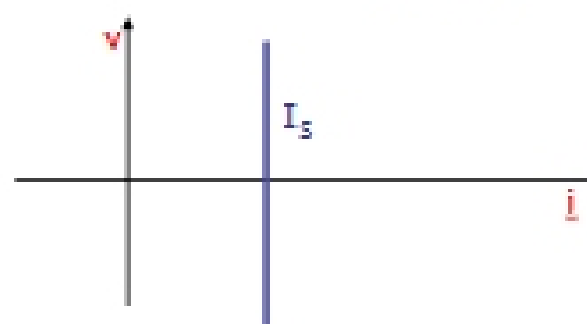
• Sources can deliver & absorb power



Independent Current Source

- ★ Maintain a prescribed current through its terminals regardless of the voltage across its terminals
- ★ Physical component of a current source : Photocell
- ★ The (i-v) characteristics can not described mathematically

(i-v) characteristic



Dependent Sources

(Controlled Sources)

Establishes a voltage or current whose value depends on the value of a voltage or current elsewhere in the circuit.

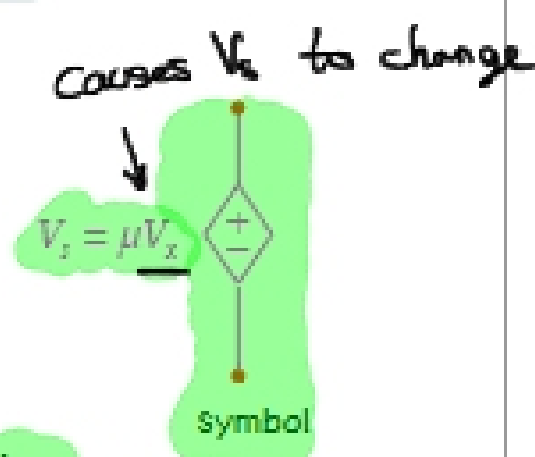
Dependent Sources Classification

◇ Voltage dependent voltage source

you can change this

V_x Controlling voltage

μ Multiplication constant (dimensionless)



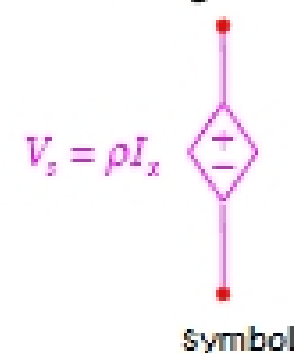
◇ Current dependent voltage source

Can change

I_x Controlling Current

ρ Multiplication constant (Ohm)

$V_s = \text{Voltage Source}$



V_s can be controlled by I_x or V_x