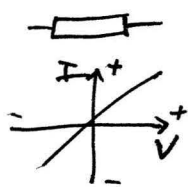
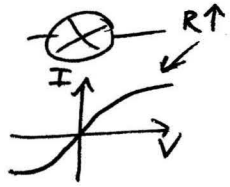
I-V characteristics

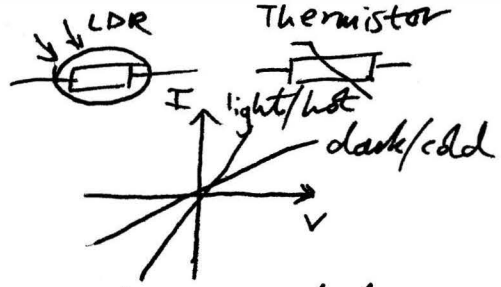


Resistor (Ohmic) constant R.

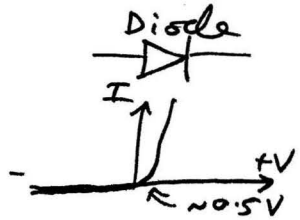


Filament (lamp) Non-ohmic

When current increased, frequency of collisions of electrons with ions in lattice increases, making them vibrate more, increasing temp, making collisions even more likely, so R↑.



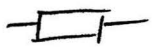
Both ohmic provided constant light intensity/temp.



'Lets current only flow in one direction'. V high R in one direction, V low in other.

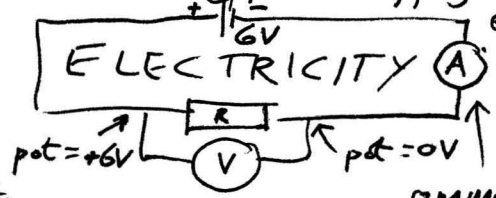
Power

$$P = IV = I^2R = \frac{V^2}{R}$$



Resistor converts electrical E into thermal, due to its Resistance (Symbol: R, Unit: Ω)

cell/battery/power supply → gives electrons energy



6V = 6J per coulomb of charge/electrons

Voltmeter goes 'across' component as it measures potential difference (p.d.) aka Voltage.

- Whole ℰ or V from battery must be 'used up' by circuit, so R gets all 6V.

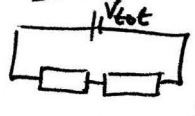
$$V = \frac{E}{Q} \qquad V = IR \text{ Ohm's law}$$

ammeter measures current (rate of flow of charge)

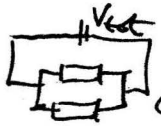
Symbol: I

Unit: A (amps)

$$I = \frac{Q}{t}$$

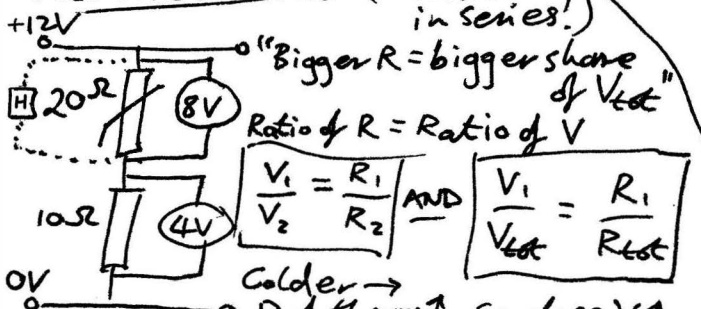


series (one loop) V_{tot} shared, same current.



Parallel (branches) Current shared, both have V_{tot}.

Potential Divider (2 resistors in series!)



"Bigger R = bigger share of V_{tot}"

Ratio of R = Ratio of V

$$\frac{V_1}{V_2} = \frac{R_1}{R_2} \text{ AND } \frac{V_1}{V_{tot}} = \frac{R_1}{R_{tot}}$$

Colder → R of therm↑, so does V↑ put heater across thermistor.

$$\frac{1}{R_{tot}} = \frac{1}{R_1} + \frac{1}{R_2}$$

* If same, R_{tot} is half!

Video

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