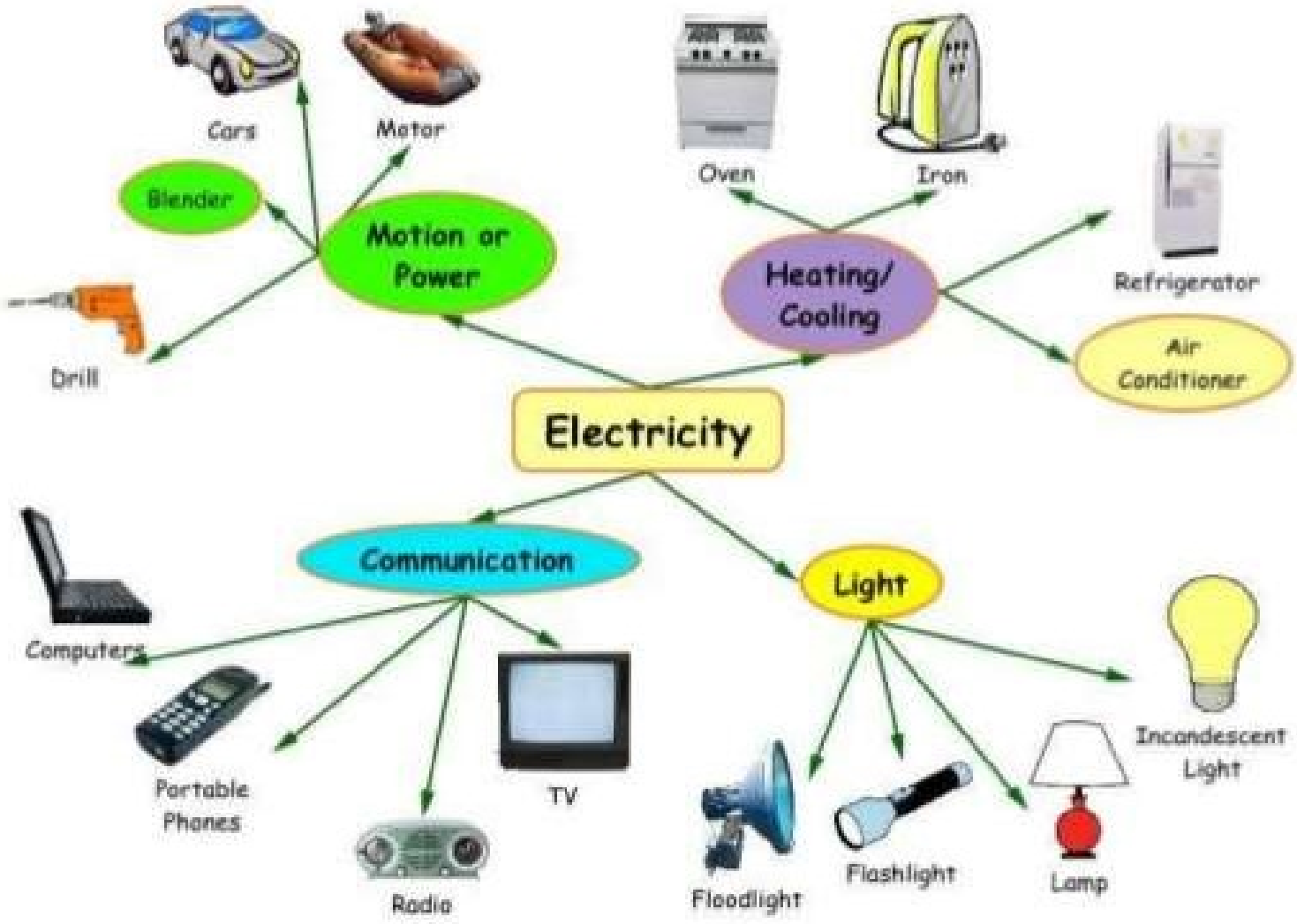
Basic Electronics, an Intro’

Electricity brainstorm



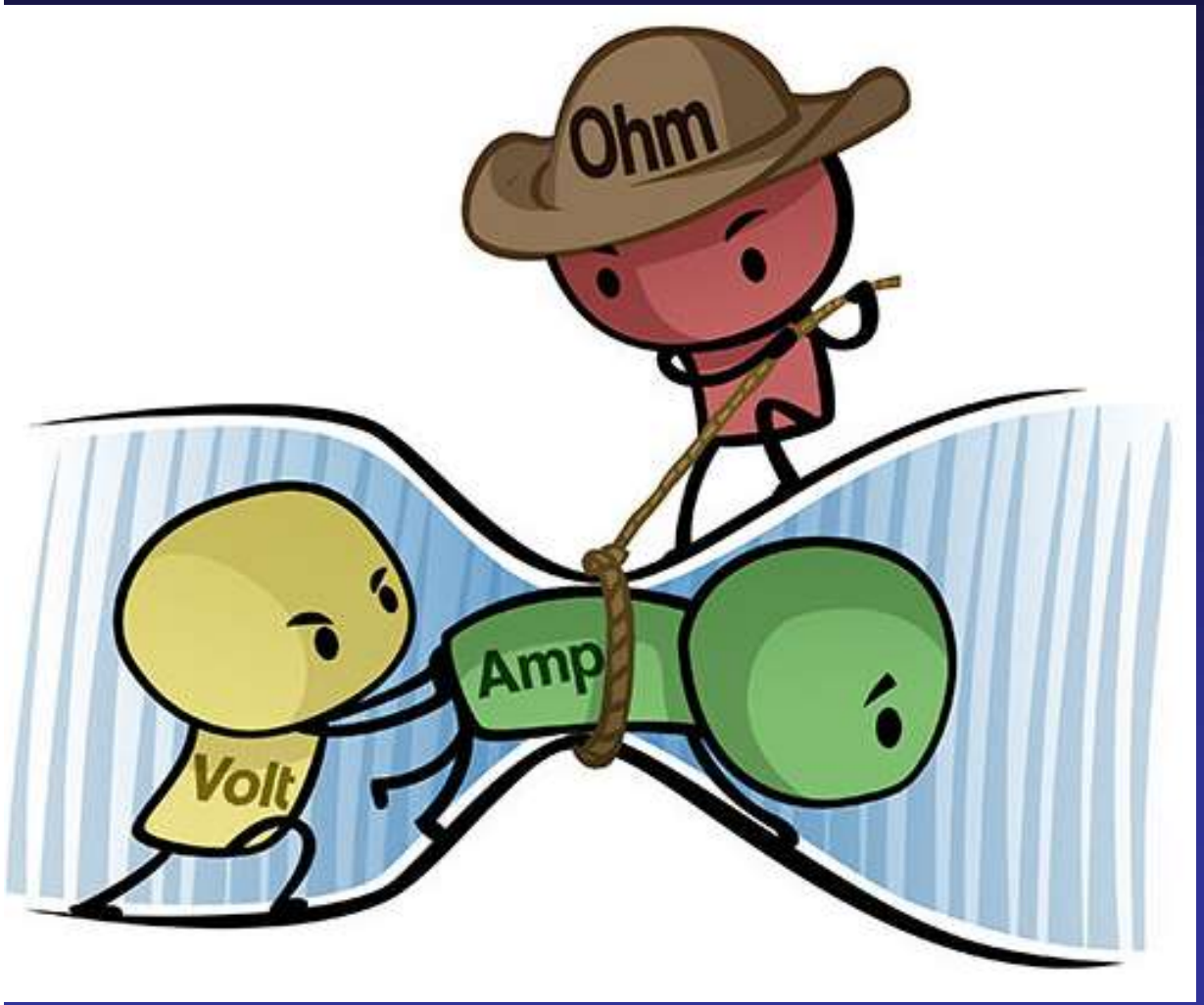
Electricity is one form of Energy

- Can't Create or Destroy ENERGY
- Can Transform Energy

  Form one form to another form, eg
  Electricity to Heat, Light to Heat

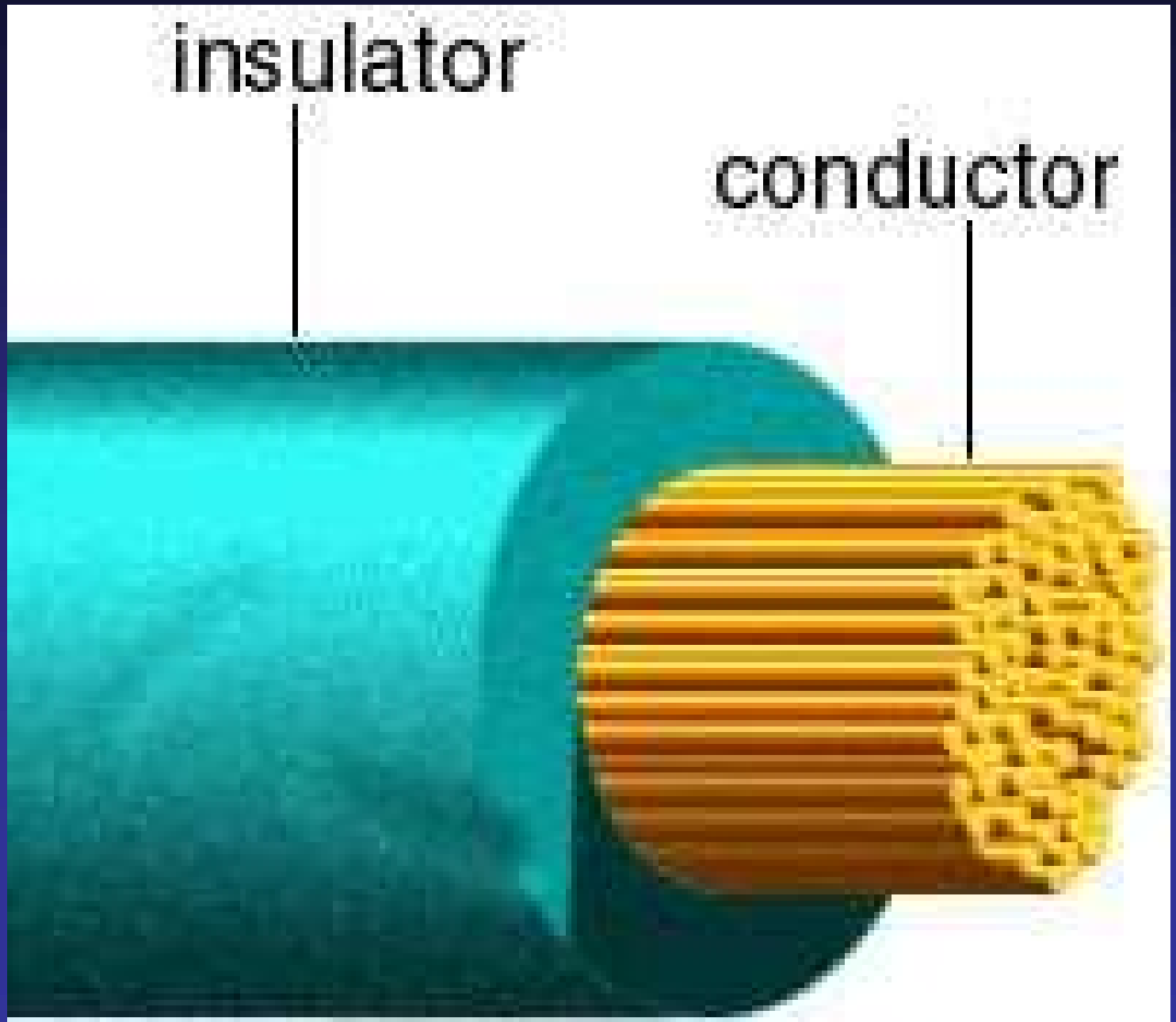
Electricity is Dangerous

Electricity can be Compared to WATER flowing in a PIPE

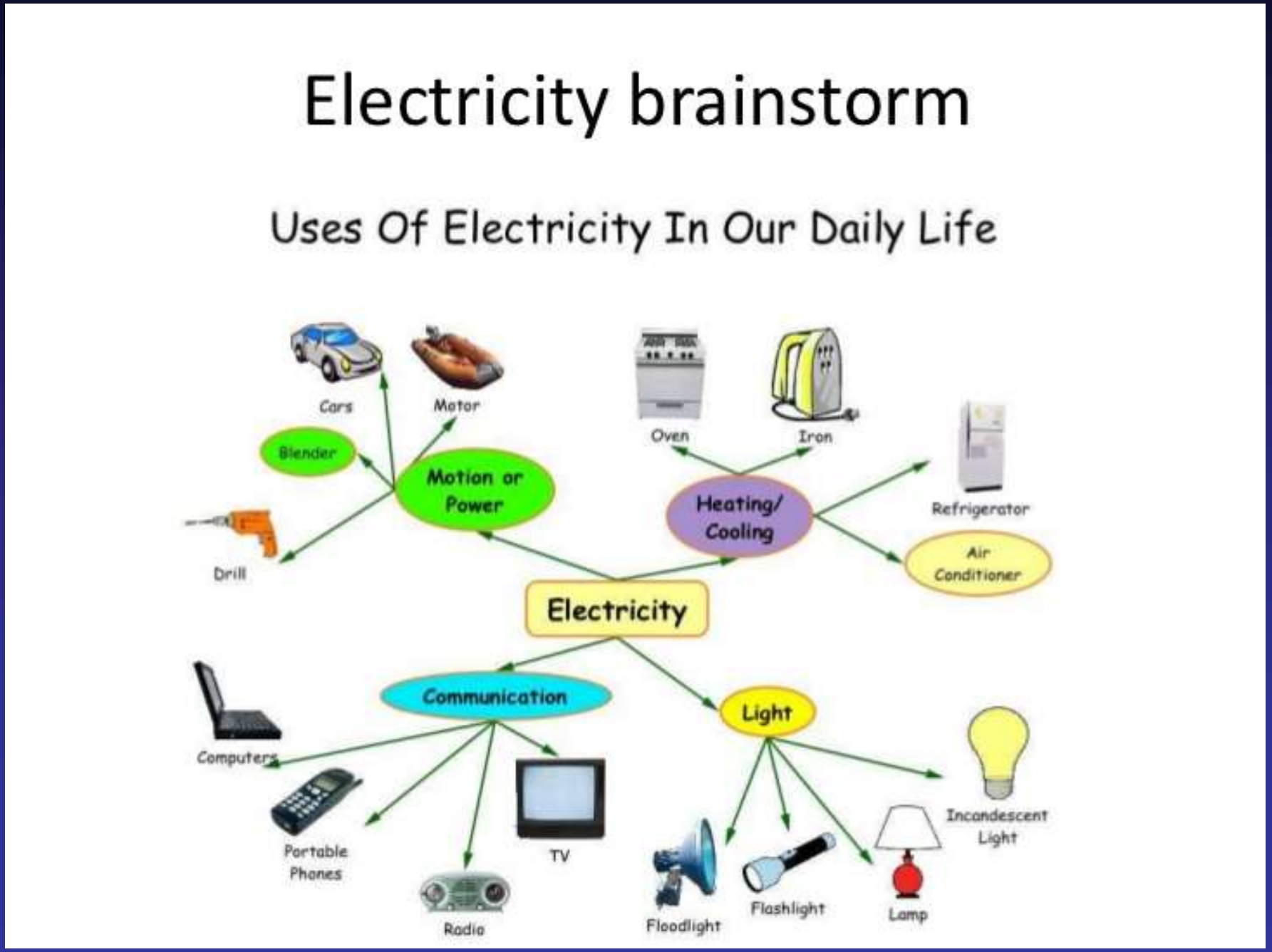


Volt is the Pressure
'Pushing'
The electric Current
'Amp'
around the Circuit
Ohm is an obstruction
'Resistance'
opposes Current Flow

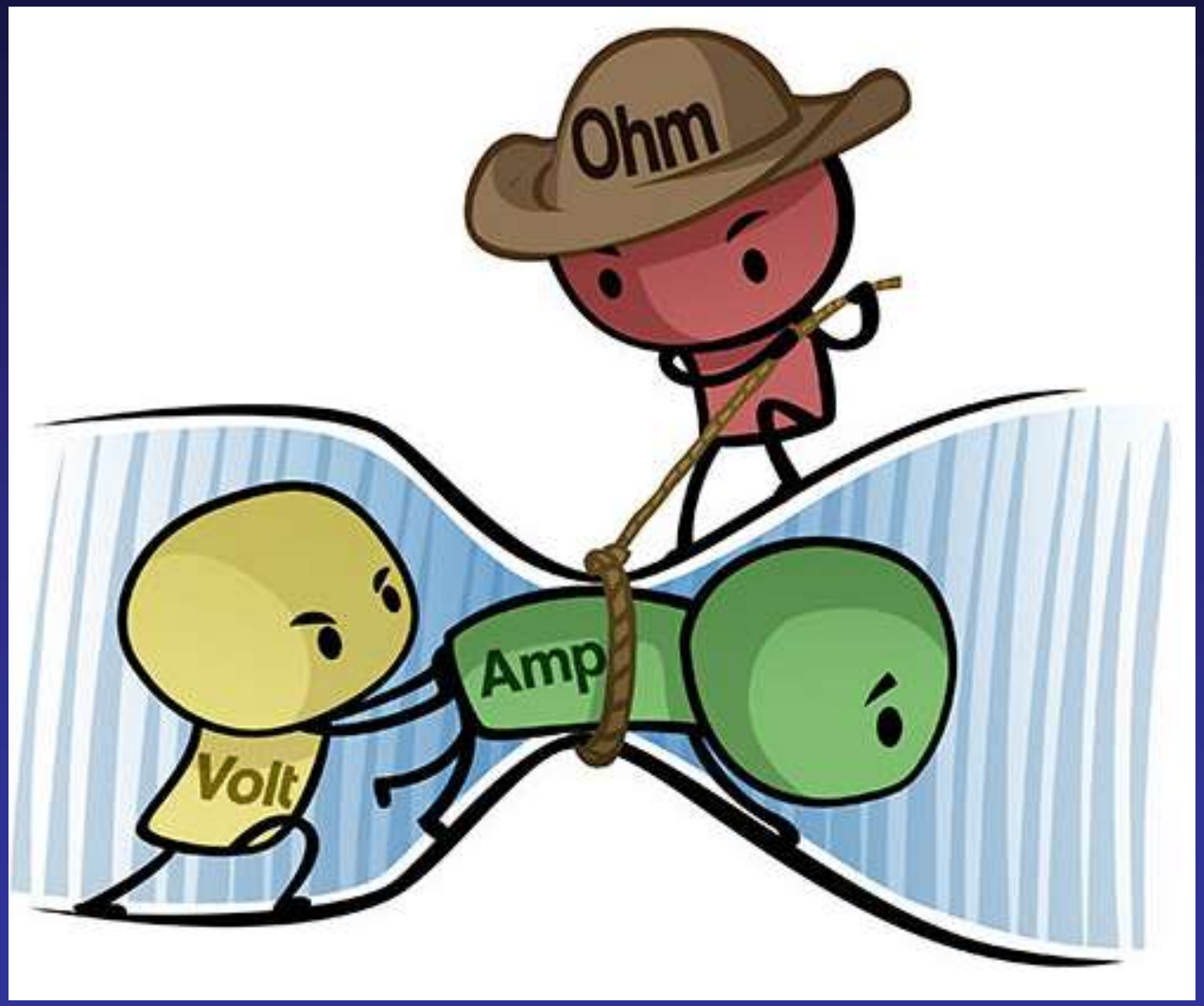
Conductors & Insulators



Electronics allows Control

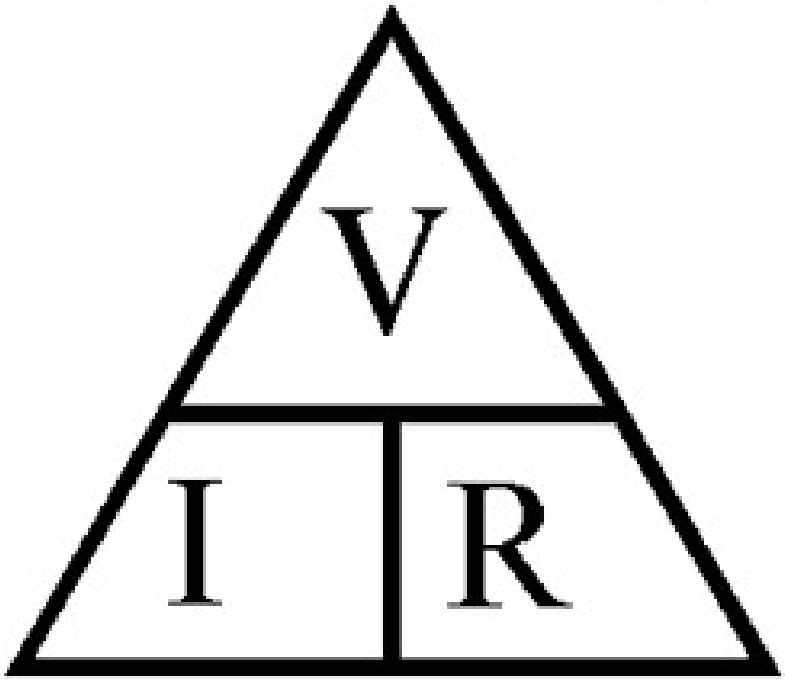


What causes Current to Flow ?



Voltage and Ohms Law

Ohm's Triangle



Cover the variable you want to find and perform the resulting calculation *(Multiplication/Division)* as indicated.

Example

Power Supply 5 V

Current required 2.5 mA 0.0025 A

Resistance required :

Cover **R**, 5 / 0.0025 = 2,000 R

Simply

5 / 2.5 = 2 kR

Volta

Alassandro
Volta
1745 – 1827
Italian

Ampere

Andre-Marie
Ampere
1775-1836
French

Ohm

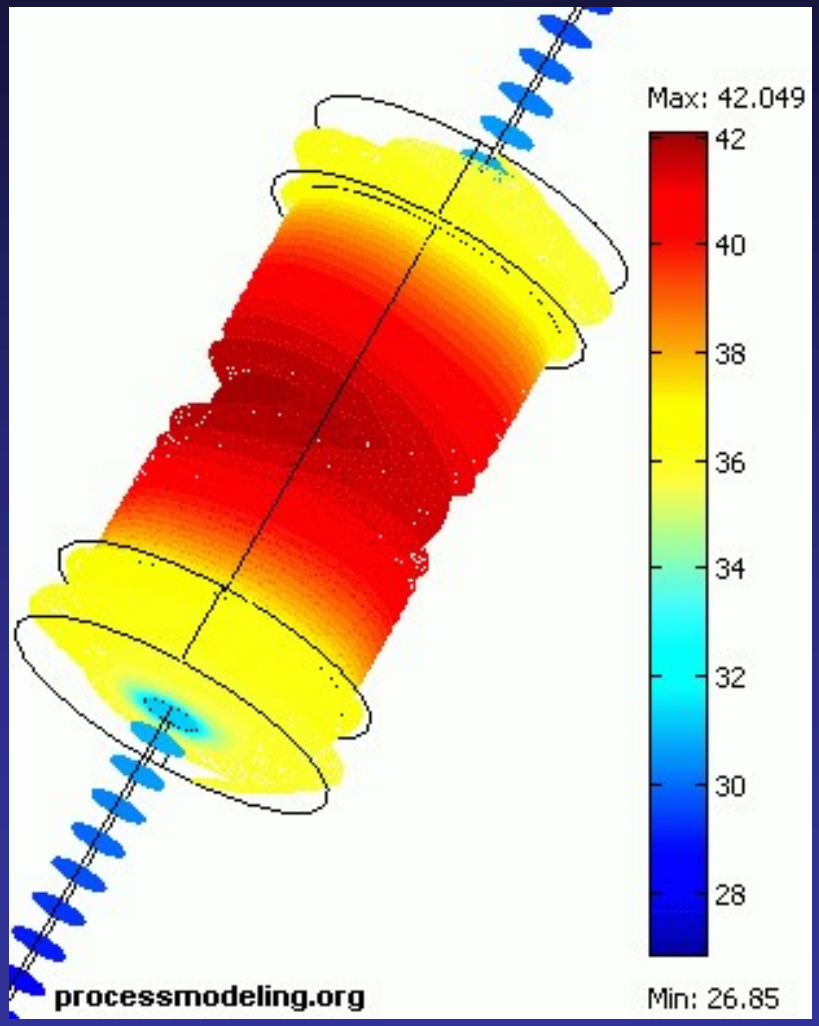
Georg Ohm
1789 – 1854
German

Watt

James Watt
1736-1819
Scottish

Resistors Regulate

- Limit Current Flow
- Dissipate Heat



Power Dissipation (Heat)

- Another Equation : ((
- Power is

  Voltage times Current, V x I

A Raspberry PI requires 5V at 1 A

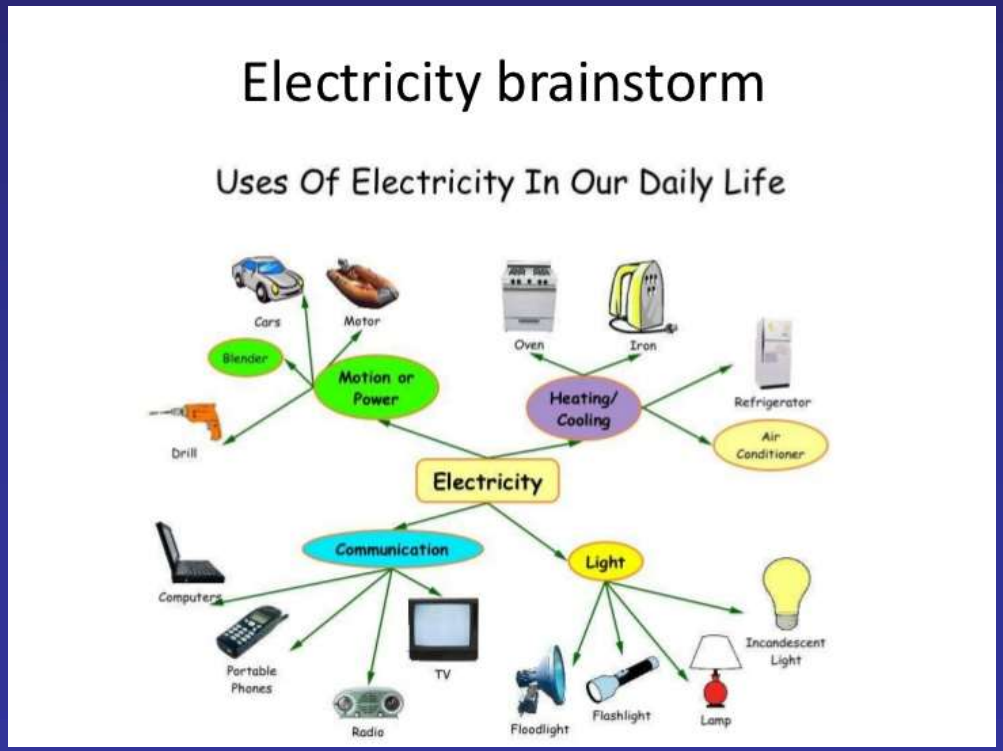
Power requirement is 5 x 1 = 5 W

Mathematics

Prefixes	Value	Standard form	Symbol
Tera	1 000 000 000 000	10^{12}	T
Giga	1 000 000 000	10^{9}	G
Mega	1 000 000	10^{6}	M
Kilo	1 000	10^{3}	k
deci	0.1	10^{-1}	d
centi	0.01	10^{-2}	c
milli	0.001	10^{-3}	m
micro	0.000 001	10^{-6}	μ
nano	0.000 000 001	10^{-9}	n
pico	0.000 000 000 001	10^{-12}	p

Electronic Components

- Electronics allows you to **Control**
- **Automate** repetitive processes
- **Schedule** processes at Time intervals

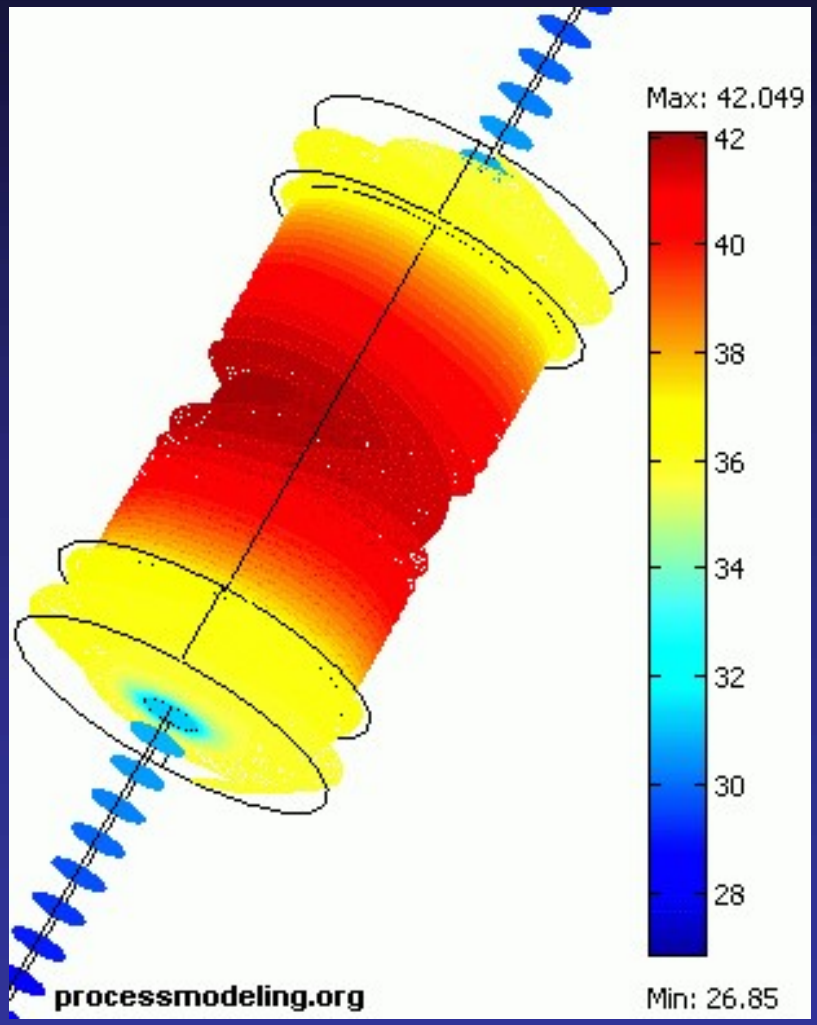


Electronic Components

- Resistors
- Diodes and Rectifiers
- Light Emitting Diodes LED's
- Capacitors
- Transistors
- Relays

Resistors


MADE IN U.S.A.


Max: 42.049
42
40
38
36
34
32
30
28
Min: 26.85
processmodeling.org

Diodes and Rectifiers

Light Emitting Diodes

Capacitors

Transistors

- Transistors in the context of PI's are:
- Electrically controlled switches

Where a small signal is able to allow a larger current to flow, in this mode the transistor is either ON or OFF i.e. a Switch

It is 'binary' either ON or OFF, no Halfway states

Relays

Are electrically operated switches

Allow your PI to Control Big Power devices

It is ‘binary’ either ON or OFF, no Halfway states

They are electro-mechanically operated switches

Sounders

- Sounders emit Acoustic energy

by applying a Voltage across a Crystal

- CAUTION

Never ever use a ‘Buzzer’ with your Raspberry Pi.

In addition to creating Sound they produce HIGH Voltages, can **Destroy your PI**

Electronics further reading

Reading

- Adventures in Raspberry PI
  Carrie Philbin
- Practical Electronics for GCSE 1989
  but still relevant
- Practical Electronics Complete Intro'
  Andy Cooper
- Electronics for Dummies
  Editorial Team
- Raspberry PI Cookbook
  Tim Cox