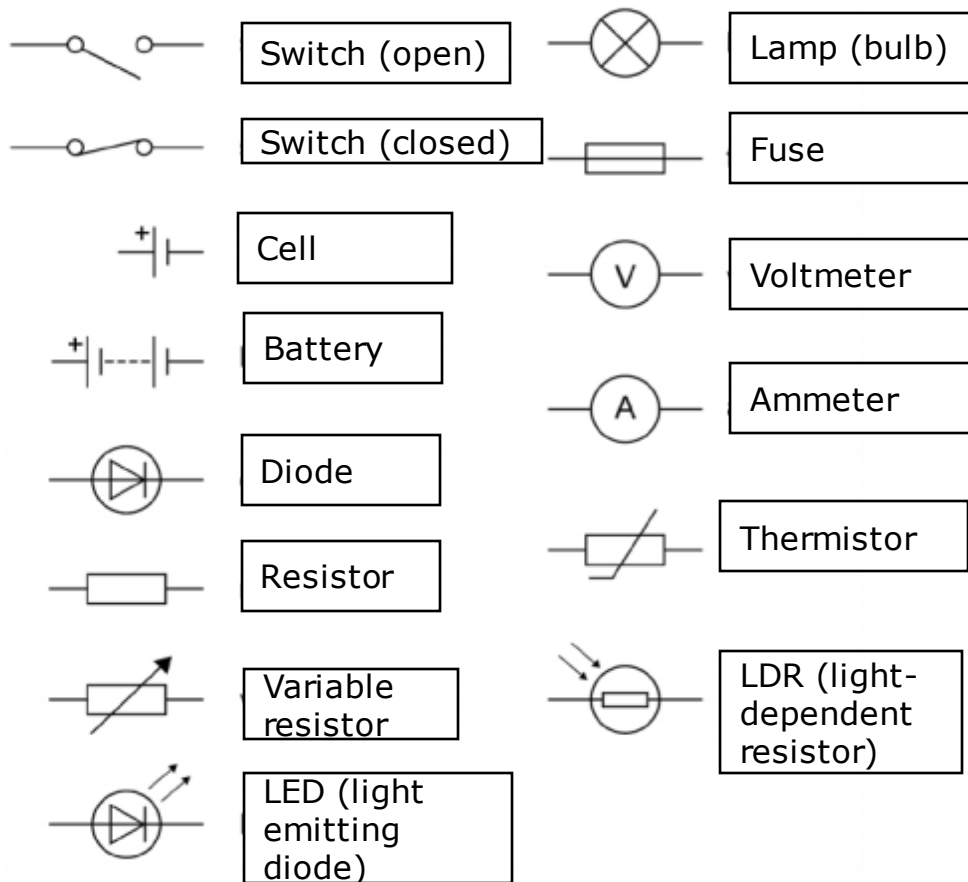


# Physics Topic P4: Electric Circuits.

## Standard circuit diagram symbols



## Resistance

Potential difference = current x resistance

$$V = I \times R$$

$V$  = **Potential difference/voltage** (in volts V)

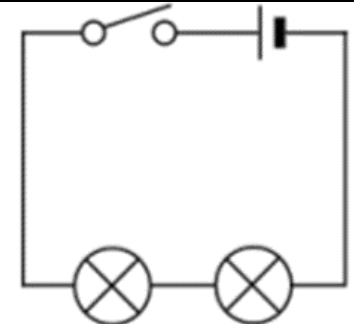
$I$  = **Current** (in amps A)

$R$  = **Resistance** (in ohms  $\Omega$ )

## Types of circuits

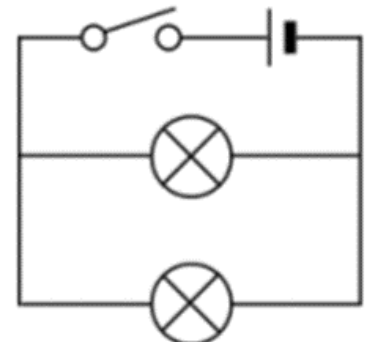
### Series Circuits

- The current does not split and is the same everywhere
- The voltage is shared
- $R_{TOTAL} = R_1 + R_2 + R_3$



### Parallel Circuits

- The current splits at the junction.
- The voltage is not shared. It remains the same.

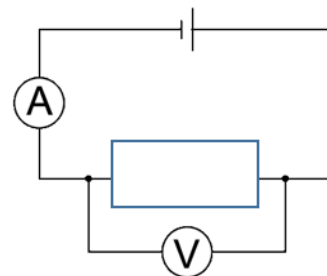


## Electrical charge and current

**Charge flow** = current x time

$$Q = I \times t$$

$Q$  = Charge (in coulombs C)  
 $I$  = Current (in amps A)  
 $t$  = Time (in seconds s)

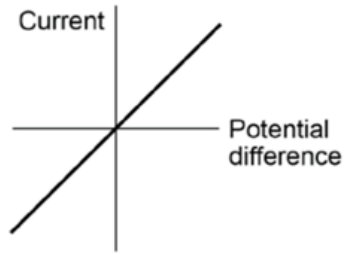


## Symbols and their units

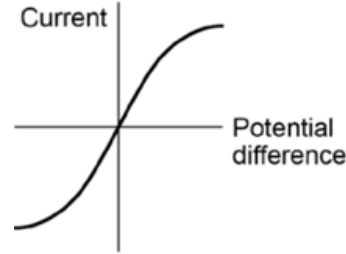
Symbol	Meaning	Unit	Meaning
V	Potential difference	V	Volts
I	Current	A	Amps
R	Resistance	$\Omega$	Ohms
Q	Charge	C	Coulombs
P	Power	W	Watts
E	Energy	J	Joules

# Physics Topic P4: Electric Circuits

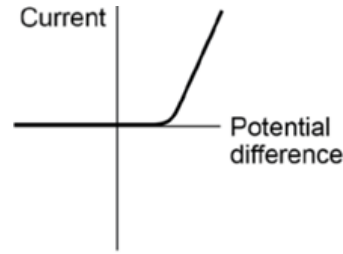
## Electricity required practical VI components



Ohmic resistor



Filament bulb

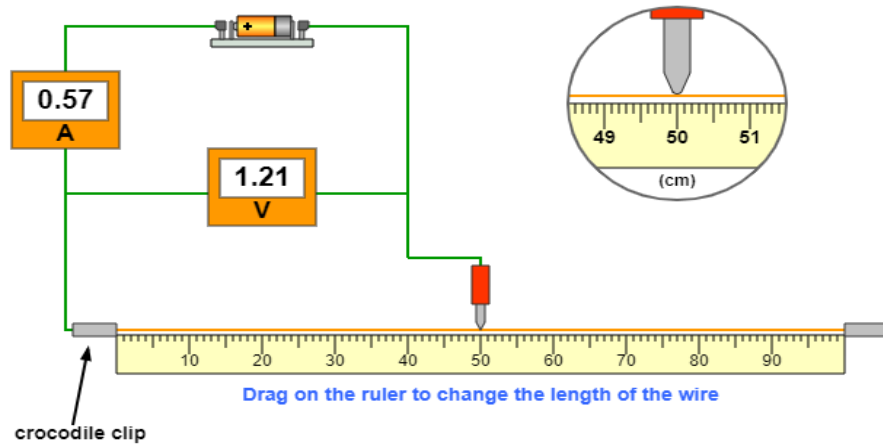


Diode

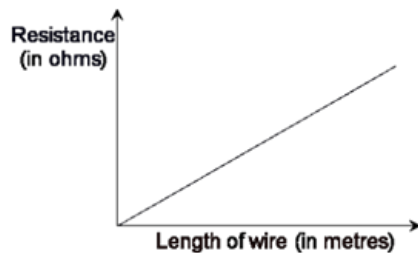
Investigate how the current flowing through a component is related to the voltage across the component. This is called the current-voltage characteristic. There's a choice of three components: **a resistor (ohmic conductor), a light bulb and an LED.**

## Electricity required practical resistance

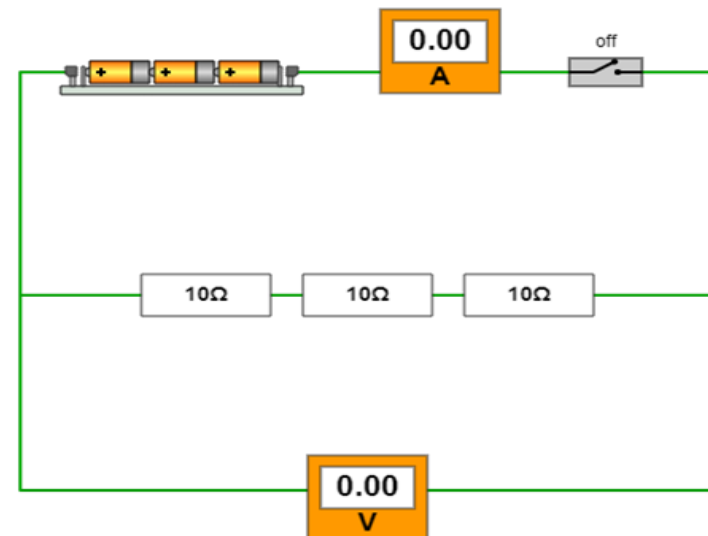
Resistance of a wire



**Resistance** increases with the length of the wire.



Series and parallel circuits



**Resistance** increases in series when resistors are added  
**Resistance** decreases in parallel when resistors are added

# Physics Topic P4: Electric Circuits - Triple content

Static electricity keywords (TRIPLE ONLY)		Electrostatic force rules (TRIPLE ONLY)		
Insulator	Material which holds electrical charge and does not conduct it	Charges	Force	Diagram
Friction	Force which transfers electrons from one insulator to the other	- and -	repel	(a)
Electrons	Negatively charged particles in atoms. They are the only charges that can move	+ and -	attract	(b)
Electrostatic force	The force between two charges	+ and +	repel	(a) But with positive charges
Van der Graaff generator	Machine used to generate static electricity			

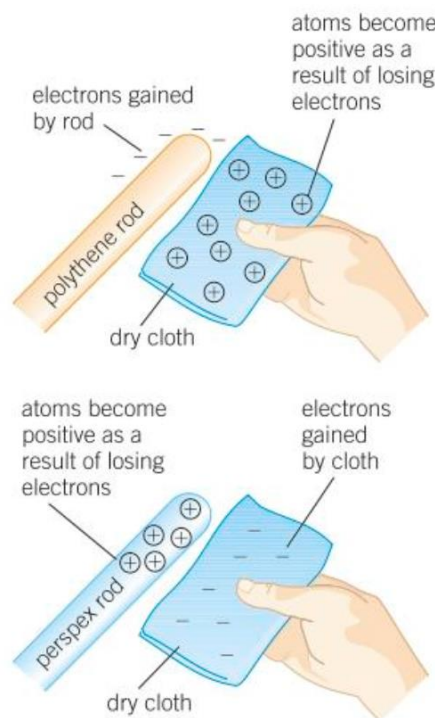


Figure 2 Charging by friction

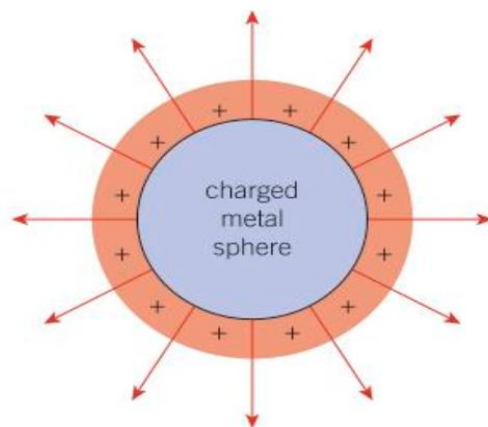


Figure 3 The electric field near a positively charged sphere

