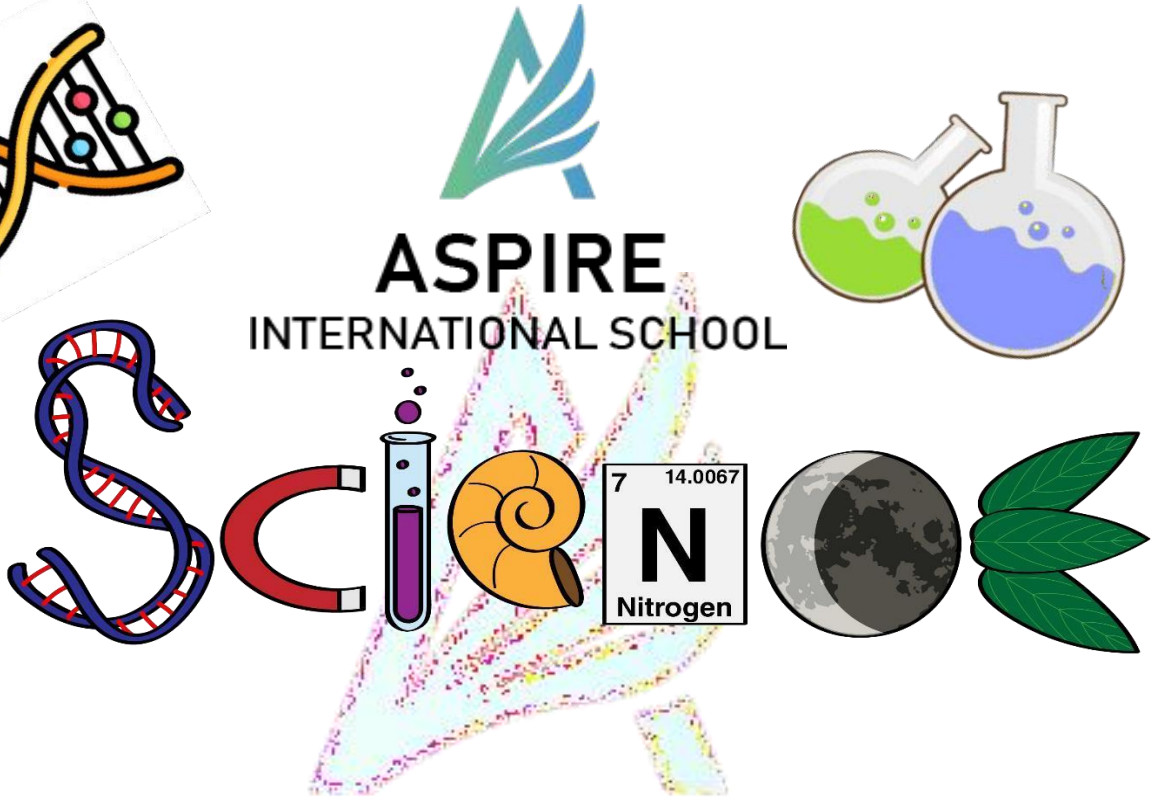


Science Department

2023/2024

Year 8

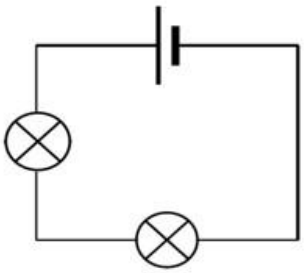
Summary notes unit 9 & 3 book 8

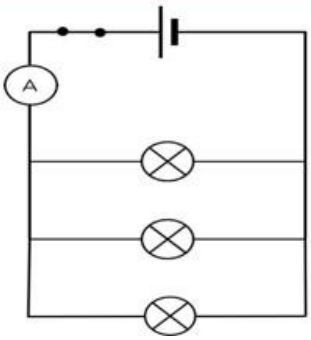
Name: ……

Class: ……

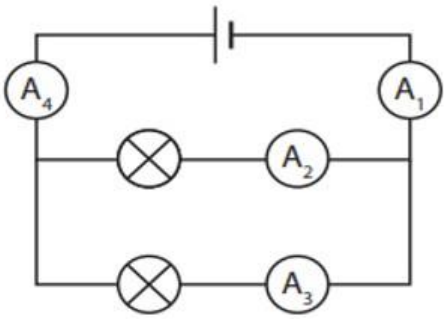
Electricity
9.1 Parallel circuits

Series circuit	Parallel circuit
All components are connected end to end or one after the other. All components are connected in series.	The components are connected side to side. All the components are connected in parallel
There is only one path for current to flow	There is more than one path for current to flow called branches
If one component stop working all the components will stop working.	If one component stop working the other components will not get affected and will work.





✓In this circuit, the readings on ammeters A1 and A4 are equal.
✓The readings on ammeters A2 and A3 will add up to the reading on A1 (and A4).
✓This rule still works even when the current in the branches is different



- Components in a parallel circuit can be switched on and off separately by having switches on each branch.
- The components can also be all switched on or off together if the switch is between the cell and the branches.

ADVANTAGES OF PARALLEL CIRCUITS

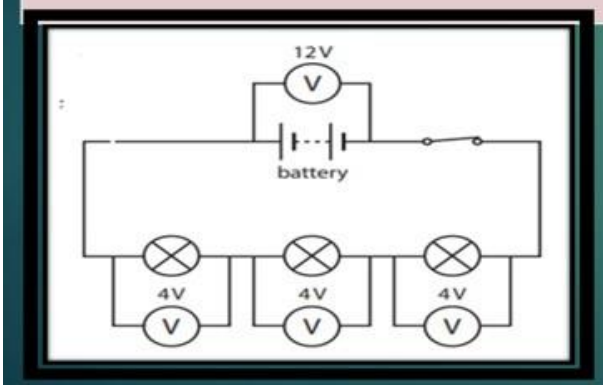
- In a parallel circuit, the current through a branch can keep flowing, even if the current stops flowing in the other branches.
- This means:
- Components in the same circuit can be switched on and off independently
- If a component in one branch stops working, the other branches are not affected.

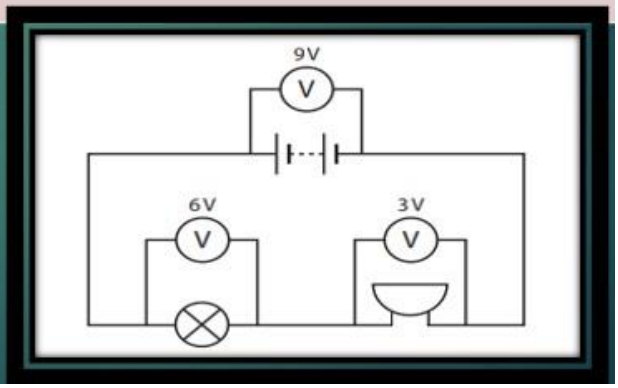
9.2 Current and voltage in parallel circuits

Voltage	Current
➢ Measures the electric push that power supply gives it to the electrons. ➢ Measures the energy changed by components in a circuit.	Measures the flow of electrons
Measured by voltmeter	Measured by ammeter
Voltmeter must be connected in parallel way in the circuit	Ammeter must be connected in series way in the circuit
The symbol of voltage is V	Symbol of current is I
The Unit of voltage is volt	Unit of current is Amps/ Ampere

- The Voltage rating tells us the maximum voltage that can be used.
- Main Voltage is an electrical supply that comes from a power station or generator of some kind

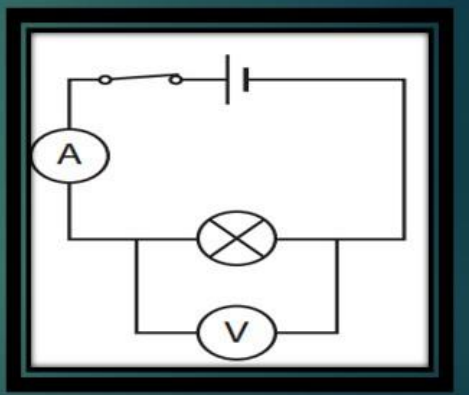
When all the components are identical	When the components are different
All three lamps are identical.	the lamp is changing more energy than the buzzer, so the voltage across the lamp is higher than the buzzer.
They change the same quantity of energy, so have the same voltage.	The voltages across the lamp and buzzer add up to the voltage of the battery.
The voltage across all the lamps adds up to the voltage from the battery.	The voltages across all the components in a series circuit add up to the voltage of the supply.





Ammeter	Voltmeter
• Measures the current flowing through a component,	• Measures the energy difference either side of a component, so the voltmeter is connected in parallel with the component.
• Ammeter is connected in series with the component.	• Voltmeter should be connected in parallel with components in a circuit.

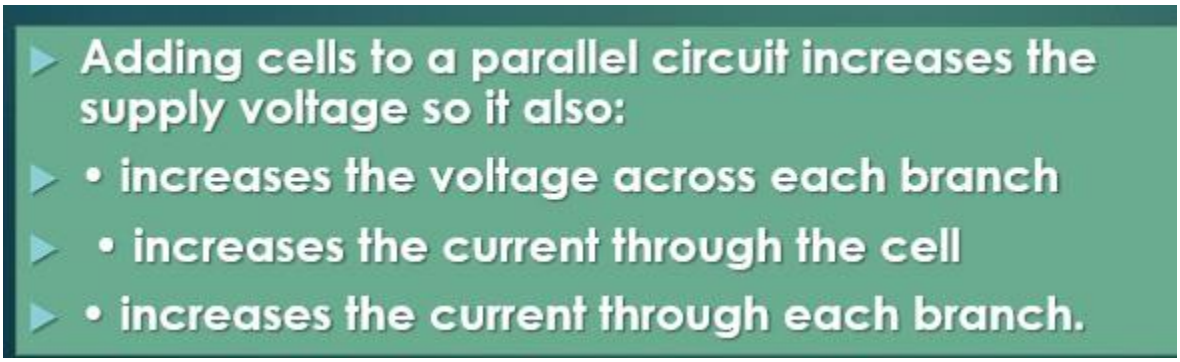
Write down the differences between ammeter and voltmeter



	Current	Voltage
Series	Same	Shared
Parallel	Shared	Same

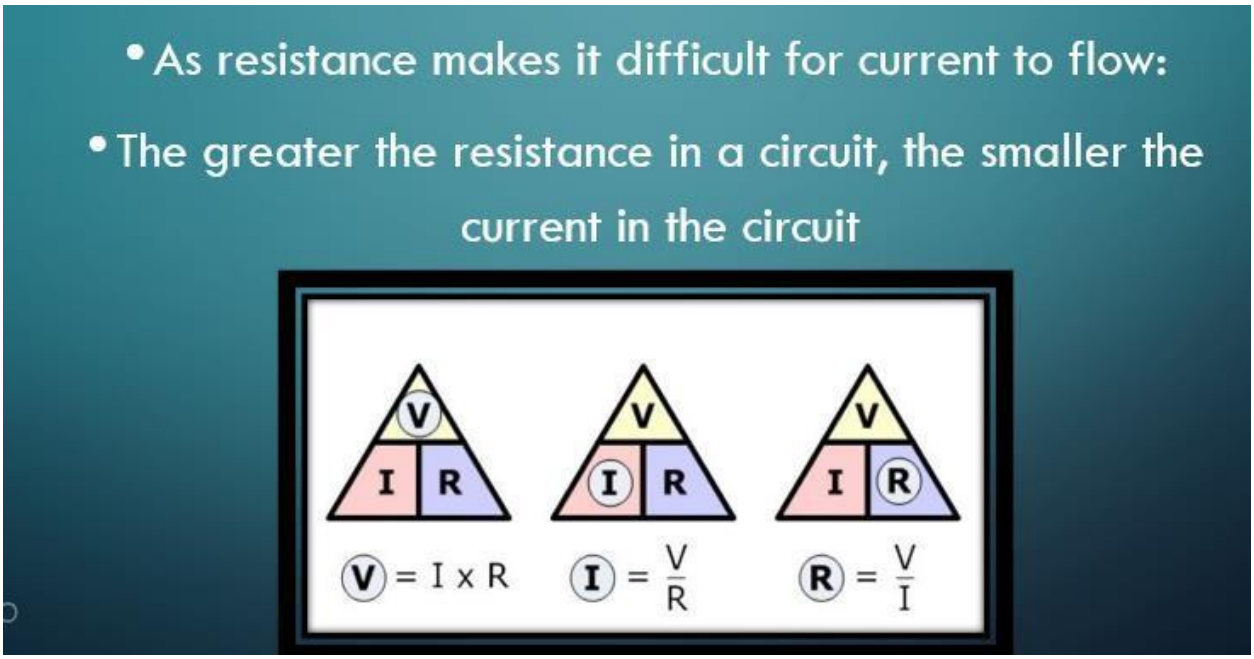
What happens to voltage by adding new components	
In Series circuit	**In Parallel circuit**
Decrease : **each component will get a smaller share of the voltage.**	**They have the same difference in voltage across their ends.**

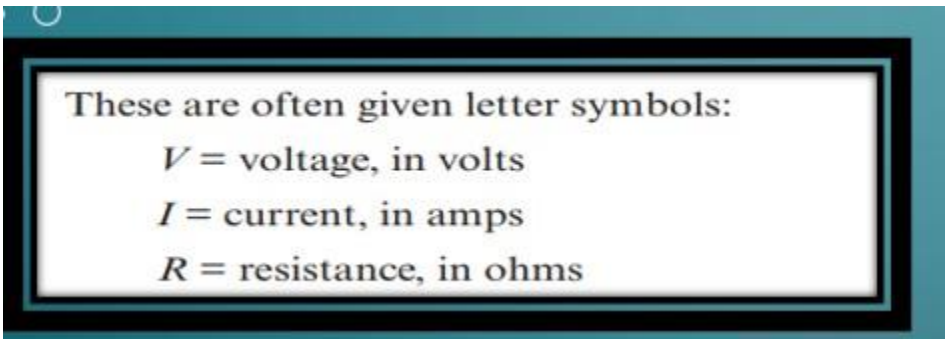
What happen to Current by adding new components	
In series circuit	**In parallel circuit**
Decreases : **As components are added, it becomes more difficult for the power supply to push the electrons around the circuit.**	**Increases:** **Adding more branches to a parallel circuit gives more paths for the current to flow through.** **The more paths there are for current to flow through, the easier it becomes.**

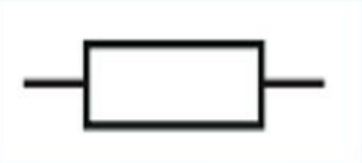


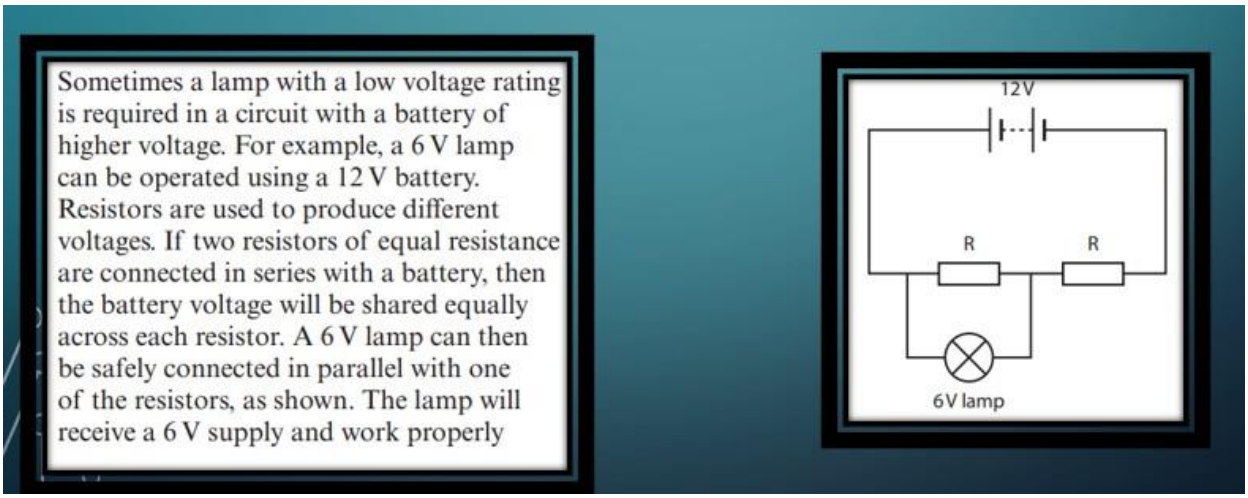
9.3 Resistance

- Resistance is a measure of how easy or difficult it is for electrons to move though a material.
- Conductors, such as copper, have very low resistance.
- Insulators, such as most plastics, have very high resistance.
- Resistance is measured in units called ohms. Ohms have the symbol which is the Greek letter omega Ω
-





Variable Resistor.	Fixed Resistor.
it is useful to be able to change the resistance.	It is useful to fix and control the value of resistance.
• For example, in a dimmer switch for a lamp, or in the volume control of a music player. In this case, the word volume means loudness of sound. • As the resistance of the variable resistor is increased, the current in the circuit decreases. A smaller current flowing through the lamp makes the lamp dimmer. • As the resistance of the variable resistor is decreased, the current in the circuit increases. A larger current flowing through the lamp makes the lamp brighter.	



Unit 3: Forces and Energy

Lesson 1: Forces and Motion

A force is a push or pull that causes an object to move, stop, or change direction and speed , measured in newton and represented by arrows

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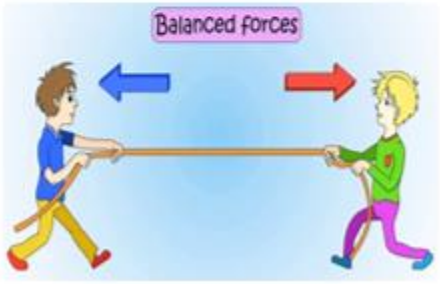
The differences between balanced and unbalanced forces

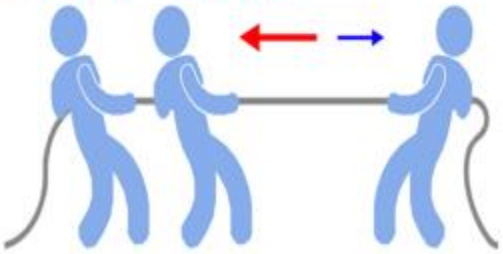
Balanced force

- forces acting on an object are balanced if the sizes of the forces are equal, and they are in opposite directions.



Unbalanced force

- forces acting on an object are unbalanced if the effects of the forces do not cancel, are not equal
- Unbalanced forces can change direction and speed of an object.

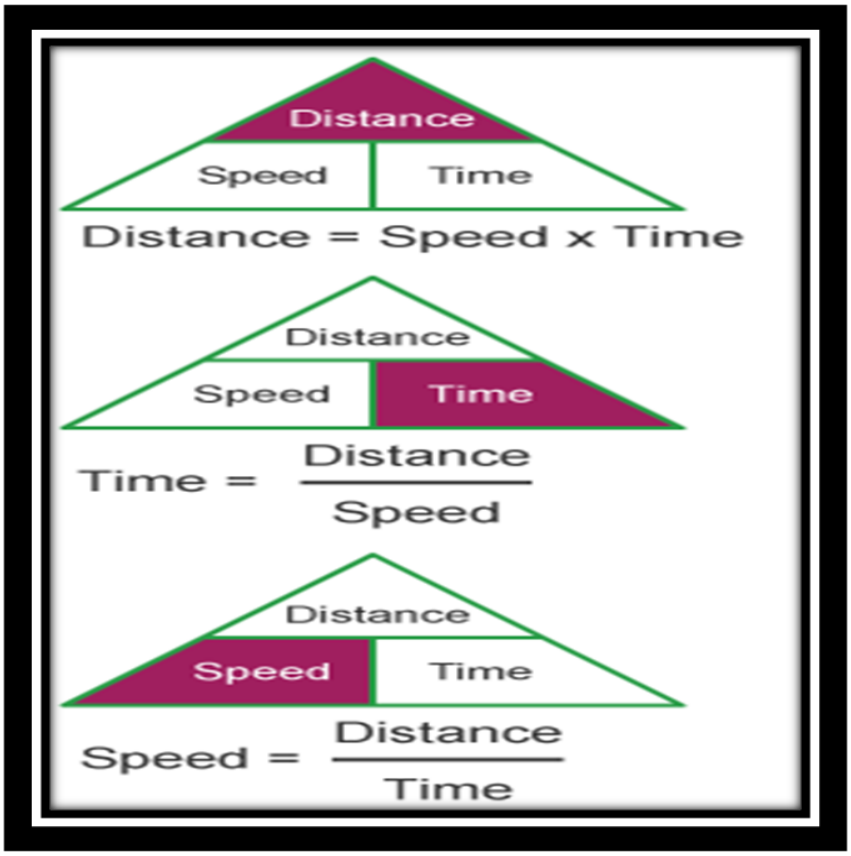


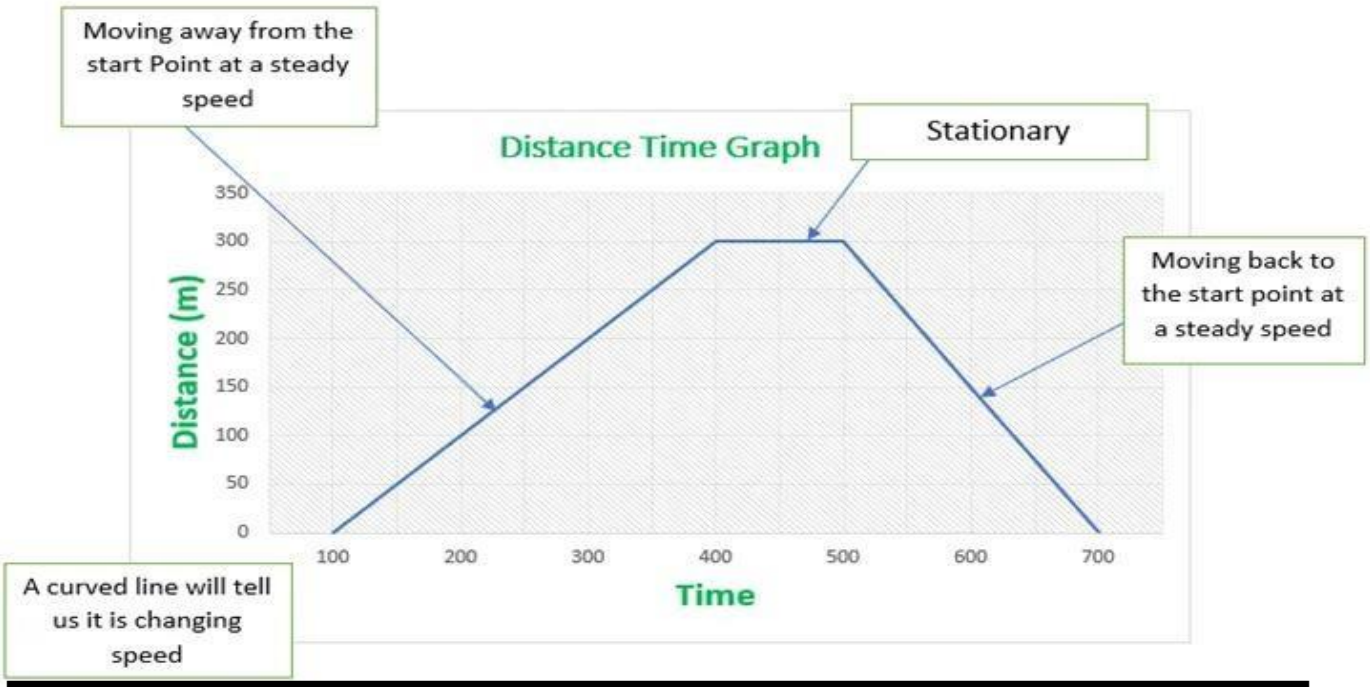
Size of forces	Direction of forces	Balanced or unbalanced	Change in movement
Equal	Opposite	Balanced	None
Equal	Not opposite	unbalanced	Change of direction
Not equal	opposite	unbalanced	Increase or decrease speed
Not equal	Not opposite	unbalanced	Increase or decrease speed and change in direction

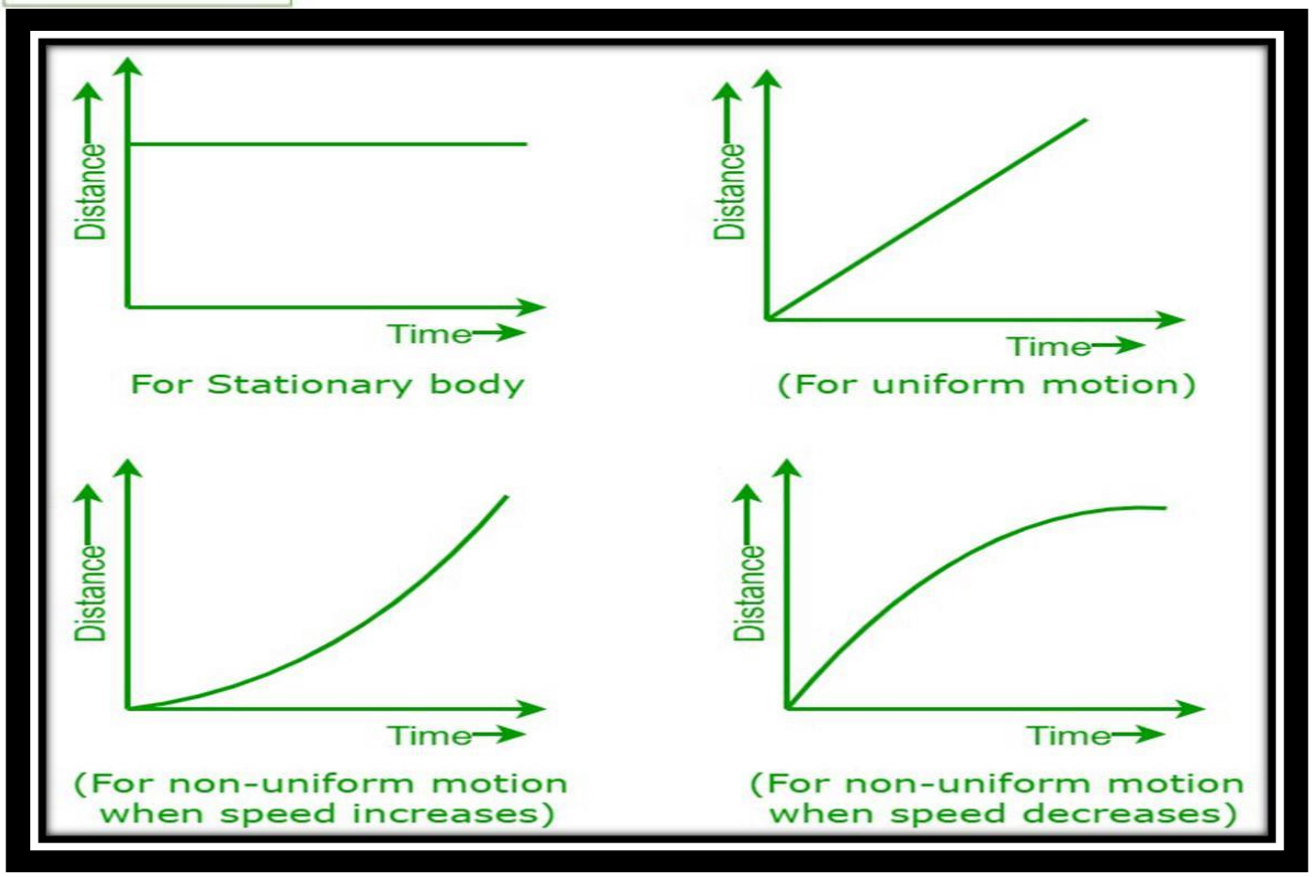
Keep in Mind

- Remember these facts about balanced forces:
- • If an object is not moving and there are forces acting, then these must be balanced.
- • If an object is moving at a constant speed and in a straight line and there are forces acting, then these must be balanced.
- Remember these facts about unbalanced forces:
- • If an object is changing speed (getting faster or slower), there must be unbalanced forces acting.
- • If an object is changing direction (moving in a circle or along a curved path) there must be unbalanced forces acting

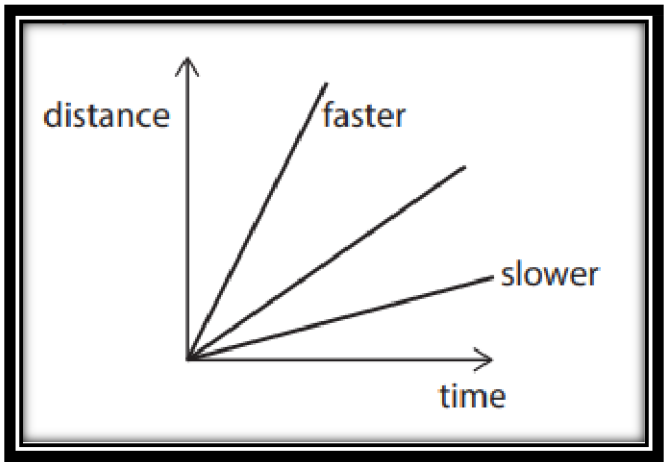
Lesson 2: Speed

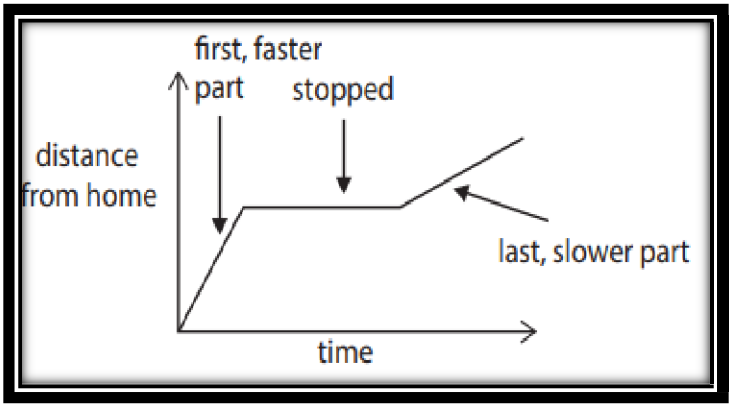



Moving away from the start Point at a steady speed
Distance Time Graph
Stationary
Moving back to the start point at a steady speed
Distance (m)
350
300
250
200
150
100
50
0
100
200
300
400
500
600
700
Time
A curved line will tell us it is changing speed


Distance
Time
For Stationary body
Distance
Time
(For uniform motion)
Distance
Time
(For non-uniform motion when speed increases)
Distance
Time
(For non-uniform motion when speed decreases)

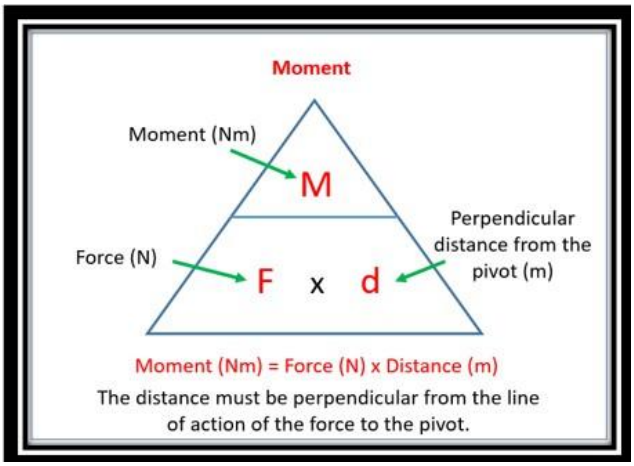
Lesson 3: Describing Movement





lesson 4: turning forces

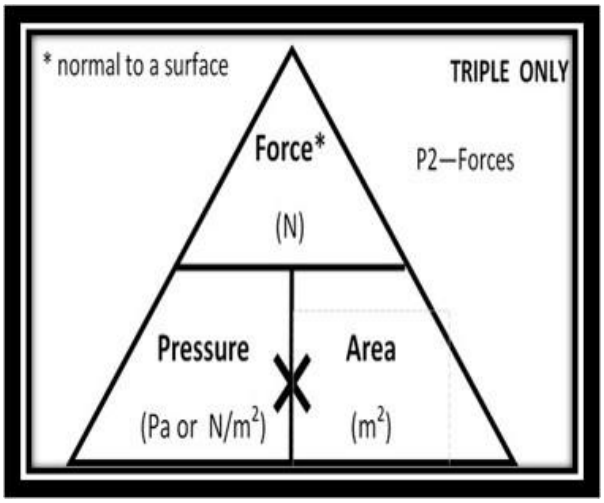
- The moment of a force describes its the turning effect of a force.
- The moment of a force depends on:
- The size of the force (the bigger the force, the bigger the moment)
- The distance between the position where the force acts and the pivot (the greater the distance, the greater the moment)



- A seesaw is a type of lever.
- People sit on either side of the pivot of a seesaw and make the lever turn one way and then the other. The result is that each person moves up and down.
- A seesaw will be balanced when the moments on both sides of the pivot are equal and opposite.

Lesson 5: Pressure between solids

- There is inverse relationship between pressure and area
- Direct relationship between pressure and force.
- So we can calculate the pressure by the following equation:
- Pressure = $\frac{Force}{Area}$

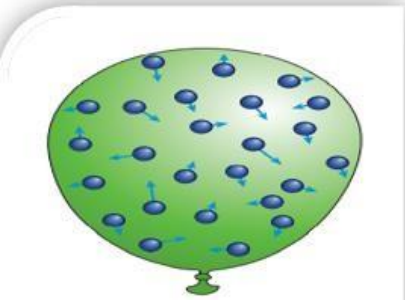


lesson 6: Pressure in liquids and gases

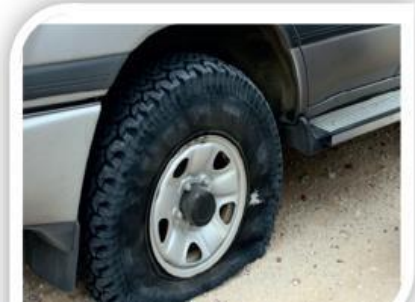
PRESSURE AND DEPTH IN LIQUIDS

- The pressure in a liquid increases with depth, but why?
- As you go deeper in a liquid, there is more liquid above your position.
- The weight of this liquid, caused by gravity, pushes on the particles of the liquid.
- When the particles of the liquid are pushed, they move with more force

- As the particles in a liquid are moving randomly in all directions, then the pressure in the liquid is equal in all directions



Particles in a gas move randomly and collide with the walls of the container causing pressure.



PRESSURE IN GAS

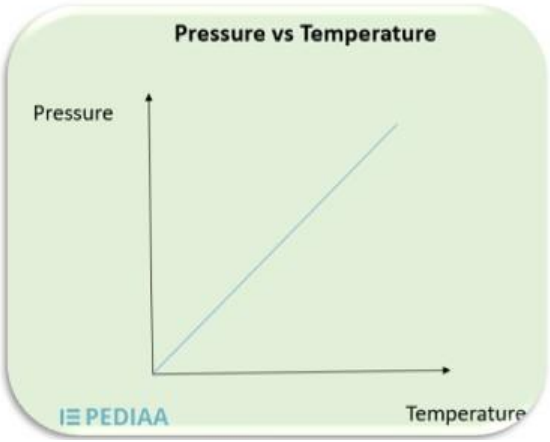
- Gas move randomly in the balloon and colloid with the walls of the balloon and causing pressure
- The air inside the tyre is at low pressure. The pressure is not enough to support the weight of the vehicle.
- If more air is put inside the tyre, the pressure will increase.
- More collisions will happen with the inside walls of the tyre, pushing the tyre outward and supporting the vehicle.

PRESSURE AND DEPTH IN GASES

- As with liquids, the pressure in a gas increases with depth.
- Most people on Earth live at low altitude.
- Altitude is height above sea level.
- The Earth's atmosphere, which we call air, is made from gases.
- The atmosphere extends to a height of about above sea level. Sea level is, therefore, where the atmosphere is at its deepest.
- So, at sea level, atmospheric pressure is highest. As you go higher in the atmosphere, two variables that affect atmospheric pressure change:
- The number of particles in of air decreases, so the concentration of gas particles decreases
- The weight of air above your current position decreases

GUESS THE RELATIONSHIP BETWEEN PRESSURE AND TEMPERATURE

- As the temperature of a gas increases, the speed of the particles in the gas increases.
- When particles are travelling faster, their collisions exert more force.
- This means that increasing the temperature of a gas will increase the pressure of the gas



Lesson 7: Particles on the move

Diffusion: the random movement of particles from areas where they are more concentrated to areas where they are less concentrated

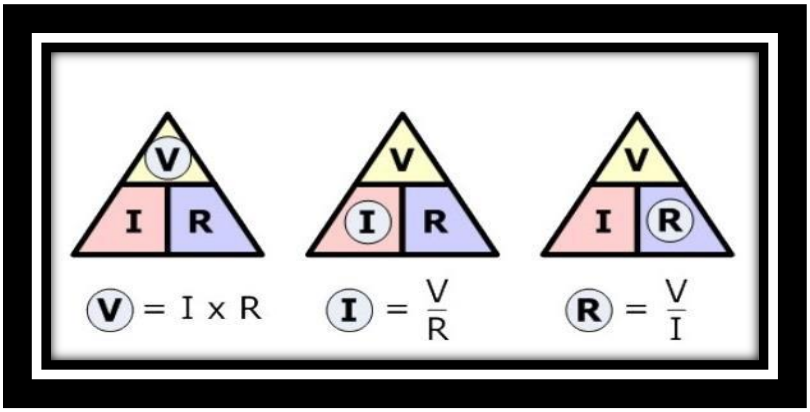
- The speed of diffusion depends on:
- the difference in concentration of the particles
- temperature.
- The bigger the difference in the concentrations of the particles, the faster the diffusion.
- The higher the temperature, the faster the diffusion. Higher temperature makes particles move faster, so the particles can spread out faster.

Important Rules :

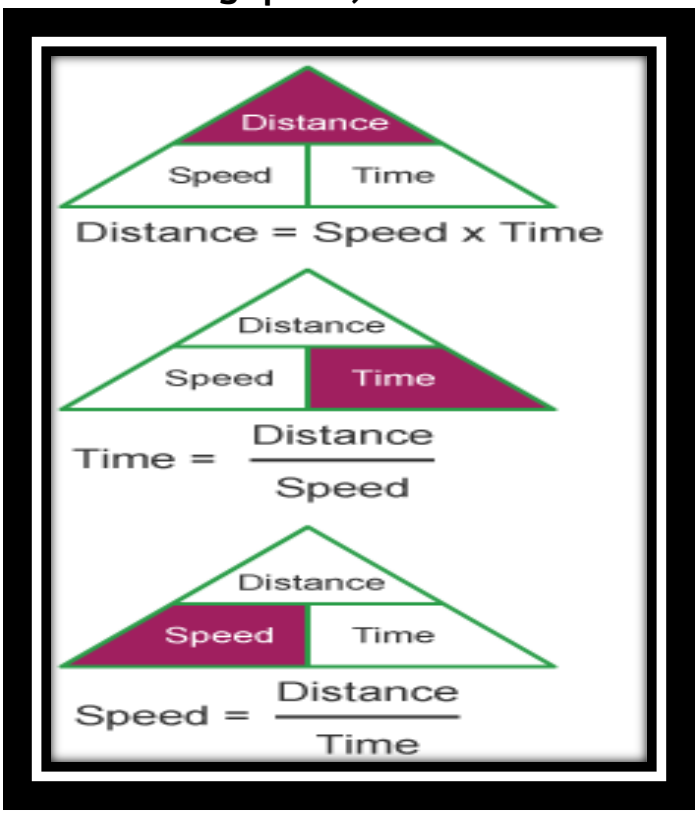
1-Calculating current in series circuit:

$A_{total}=A_1+ A_2+A_3$

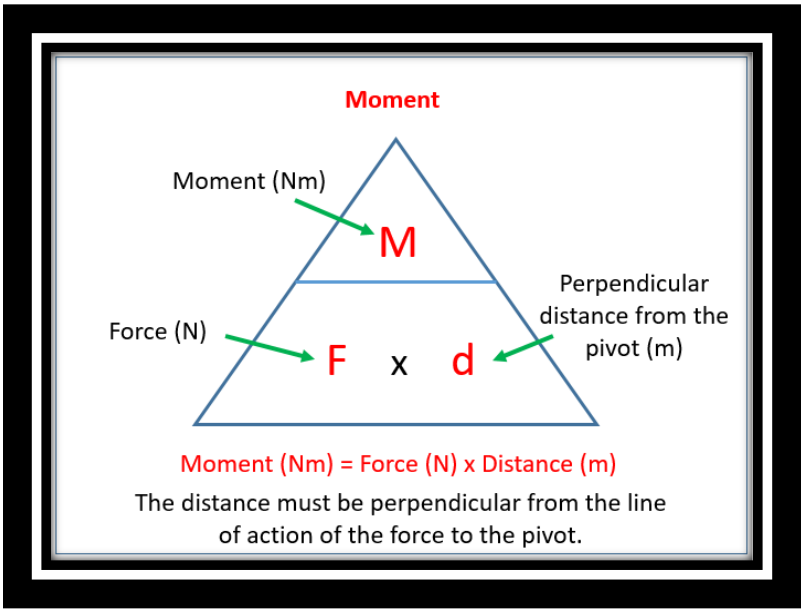
2-Ohm's law to calculate Voltage , current and resistance:



3-Calculating speed, distance and time:



4- Calculating Moment:



5- Calculating Pressure: