# Definition

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# Form 4

#### **Chapter 1: Measurement**

Term	Definition
Physical quantity	quantity that can be measured
Derived quantity	physical quantity derived by combining base quantities thru multiplication/division/both
Base quantity	physical quantity which cannot be derived from another physical quantity
Scalar quantity	physical quantity that has only magnitude
Vector quantity	physical quantity that has both magnitude and direction

#### **Chapter 2: Force and Motion I**

Term	Definition
Distance	total length travelled by an object

Term	Definition
Displacement	shortest distance btw the initial position and the final position in a specific direction
Speed	rate of change of distance travelled
Velocity	rate of change of displacement
Acceleration	rate of change of velocity
Free fall motion	motion under force of gravity only
Inertia	the tendency of an object to resist change/to remain at its original state of motion
Momentum	- product of mass & velocity - quantity of motion
Principle of Conservation of Momentum in collision	total momentum before collision = total momentum after collision if x external force/in an enclosed system
Principle of Conservation of Momentum in explosion	an obj at rest breaks up into 2/+ parts & x external force/in an enclosed system
Newton's 2nd Law of Motion	the rate of change in momentum is directly proportional to the force and acts in the direction of the applied force
Impulse	change of momentum
Impulsive force	the rate of change of momentum in a collision/impact in a short period of time
Newton's 3rd Law of Motion	for every action, there is a reaction of equal magnitude but in the opposite direction
Weight	gravitational force acting on the object
gravitational field strength	force acting per unit mass caused by gravitational pull

# **Chapter 3: Gravitation**

Term	Definition
Newton's Universal Law of Gravitation	gravitational force btw two bodies is - directly proportional to the product of masses of both bodies - inversely proportional to the square of the distance btw the centers of the two bodies
centripetal force	a force acts on a body in circular motion in a direction towards the center of the circle

Term	Definition
Kepler's First Law (Law of Orbits)	all planets move in elliptical orbits w/ the Sun at the center
Kepler's Second Law (Law of Areas)	a line that connects a planet to the Sun sweeps out equal areas in equal times
Kepler's Third Law (Law of Periods)	the square of the orbital period of any planet $\propto$ the cube of the radius of its orbit
escape velocity	min. velocity needed by an obj on the surface of the Earth to overcome the gravitational force & escape to outer space
Geostationary satellite	satellite that orbits the Geostationary Orbit
Non-geostationary satellite	satellite that is above different geographical location

#### Chapter 4: Heat

Term	Definition
thermal equilibrium	net heat transfer between two objects = 0
heat capacity	the quantity of heat needed to raise the temp. of the obj by 1°C
specific heat capacity	the quantity of heat needed to raise the temp. of 1kg mass of substance by 1°C
Latent heat	heat that is absorbed during melting & boiling w/o change in temp.
specific latent heat	the quantity of heat needed to change the state of matter of an obj depends on the mass of the obj & its material
specific latent heat of fusion	- quantity of heat that is absorbed during melting - quantity of heat released during freezing of 1kg of the substance w/o change in temp.
specific latent heat of vaporisation	- quantity of heat that is absorbed during boiling - quantity of heat that is released during condensation of 1kg of the substance w/o change in temp.
Boyle's Law	pressure of gas is inversely proportional to the volume of gas if the temperature is constant
Charles' Law	volume of gas is directly proportional to the temperature of gas if the pressure is constant
Gay-Lussac's Law	pressure of gas is directly proportional to the temperature of gas if the volume is constant

#### **Chapter 5: Waves**

Term	Definition
progressive wave	wave profile propagate with time
stationary wave	wave profile x propagate with time
mechanical wave	wave that requires medium to transfer energy from 1 point to another
electromagnetic wave	wave that is made up of an electric field and magnetic field that oscillate perpendicular to each other
transverse wave	particles of the medium vibrate in the direction perpendicular to the direction of propagation of the wave
longitudinal wave	particles of the medium vibrate in the direction parallel to the direction of propagation of the wave
amplitude, A	max. displacement of a particle from its equilibrium position
equilibrium position	original position of the particle before a system oscillates
period, T	the time taken by a particle to complete an oscillation/by a source to produce 1 complete cycle of wave
frequency, f	no. of complete oscillations made by a particle no. of cycles of wave produced by a source in 1 second
wavelength, $\lambda$	distance btw 2 consecutive points in phase
wave speed, v	distance travelled per time by a wave profile
damping	the reduction in amplitude in an oscillating system due to loss of energy
external damping	loses energy to overcome friction/air resistance
internal damping	loses energy bc of stretching & compression of the vibrating particles in the system
resonance	a periodic force is applied to an oscillating system at its natural frequency
wavefront	line which joins the points in phase in a wave
refraction	the change in direction of propagation of waves when the waves propagate from one medium to another
diffraction	the spreading of waves when the waves propagate thru a slit/side of a barrier
interference	superposition of 2/+ waves from a coherent source of waves
constructive interference	2 crests/troughs are in superposition
destructive interference	a crest & a trough are in superposition to produce zero (0) combined displacement

Term	Definition
antinode	point where constructive interference occurs
antinodal line	line that connects antinodes
node	point where destructive interference occurs
nodal line	line that connects nodes

### Chapter 6: Light and Optic

Term	Definition
refraction OF LIGHT	occur due to the change in velocity of light when traveling thru mediums of diff. optical densities
refractive index	ratio of speed of light in vacuum to the speed of light in medium
critical angle	angle of incidence in the medium of high optical density when the angle of refraction in the medium of low optical density is 90°
total internal reflection	light travels from high optical density to low optical density with incidence angle more than critical angle
optical center	point at the center of the lens
principal axis	straight line thru the O & the centre of curvature of both surfaces of the lenses
axis of lens	straight line thru the optical center & perpendicular to the principal axis
focal point	point located on the principal axis that - for convex lens, refracted light rays converge at F - for concave lens, refracted light rays diverge at F
object distance	distance btw object and optical center
image distance	distance btw image and optical center
focal length	the distance btw F and O of a lens
linear magnification	the ratio btw image length & obj length
centre of curvature	centre of sphere which produces a concave/convex mirror
pole of s. mirror	the centre of reflecting surface of s. mirror

# Form 5

#### Chapter 1: Force and Motion II

Term

Definition

Term	Definition
resultant force	single force that represents the vector sum of two or more forces acting on an object
free body diagram	diagram that shows all the forces acting on the same time
resolution of forces	process of resolving a force into 2 components
forces in equilibrium	when forces acting on it produce a zero resultant force represented with a triangle of forces
elasticity	the property of material that enables an object to return to its original shape and size after the force applied is removed
Hooke's Law	the extension of spring is directly proportional to the force applied on the spring provided that the spring limit is not exceeded
spring limit	max force that can be applied onto the spring without breaking it
Elastic Potential Energy	Work done/energy required to stretch the spring

# **Chapter 2: Pressure**

Term	Definition
atmospheric pressure	pressure due to the weight of the layer of air acting on the surface of the earth
pascal (Pa)	- S.I. unit for pressure - used in the field of science
mm Hg	manometric unit of pressure - used in the fields of medicine, meteorology, aviation and science
m H2O	metric unit - pressures of water in the sea, water reservoirs and dams
millibar (mbar)	smaller metric unit - used in the field of meteorology 1 mbar = 1 hPa
Pascal's principle	pressure in an enclosed fluid is transmitted uniformly in all direction of the fluid
Archimedes' principle	object partially or fully immersed in a fluid will experience a buoyant force equal to the weight of fluid displaced
Buoyant force	force acting upwards on an object immersed in a liquid when there is a difference between the lower surface and the upper surface of the object
Bernoulli's principle	when the velocity of a fluid increases, the pressure in the fluid decreases and vice versa

# Chapter 3: Electricity

Term	Definition
electric field	a region around a charged particle where any electric charge in the region will experience an electric force a region where a charged body experience an electric force
electric field strength	electric force acting on a unit positive charge placed at one point
current	rate of flow of charge in a conductor
potential difference	work done to move one Coulomb of charge from one point to another
Ohm's law	the current flows in a circuit is directly proportional to the potential difference across the conductor
resistivity	a measure of a conductor's ability to oppose the flow of electric current
electromotive force	energy transferred/work done by an electrical source to move one Coulomb of charge in a complete circuit
internal resistance	the resistance caused by electrolyte in the dry cell

# Chapter 4: Electromagnetism

Term	Definition
catapult field	a resultant magnetic field produced by the interaction between the magnetic field from a current-carrying conductor and the magnetic field from a permanent magnet
electromagnetic induction	production of induced e.m.f. in a conductor when there is relative motion btw the conductor and a magnetic field / when the conductor is in a changing magnetic field
Lenz's law	the induced current always flow in a direction that opposes the change of magnetic flux that causes it
Faraday's law	magnitude of induced e.m.f. is directly proportional to the rate of cutting of magnetic flux
ideal transformer	a transformer that does not experience any loss of energy, that is the efficiency is 100%

# **Chapter 5: Electronics**

Term	Definition
thermionic emission	emission of free electrons from a heated metal surface
cathode ray	high velocity electron beam
semiconductor diode	an electronic component which allows electric current to flow in one direction only

Term	Definition
rectification	process of converting an alternating current into a direct current
full-wave rectification	a process where both halves of every cycle of an alternating current is made to flow in the same direction
half-wave rectification	a process where there is current flow during the positive half cycle of the alternating current and no current flow during the negative half cycle of the alternating current
transistor	an electric component that has three terminals, namely emitter, E, base, B, and collector, C

# **Chapter 6: Nuclear Physics**

Term	Definition
radioactive decay	a process in which an unstable nucleus becomes more stable by emitting radioactive radiation
alpha decay	decay which admits alpha particle
beta decay	decay which admits beta particle
gamma decay	decay which admits gamma ray
half-life	time taken for a sample of radioactive nuclei to decay to half of its initial number time taken for the number of unstable/undecay nuclei to reduce to half of its initial number
nuclear energy / atomic energy	released during nuclear reactions such as radioactive decay, nuclear fission, and nuclear fusion
nuclear fission	a nuclear reaction when a heavy nucleus splits into two or more lighter nuclei while releasing a large amount of energy
nuclear fusion	a nuclear reaction in which small and light nuclei fuse to form a heavier nucleus while releasing a large amount of energy
mass defect	loss of mass during nuclear reaction or radioactive decay
chain reaction	a process in which neutrons released in nuclear fission produce an additional fission in at least one further nucleus

# Chapter 7: Quantum Physics

Term	Definition
black body	idealized body that is able to absorb all electromagnetic radiation that falls on it
quantum	discreet energy

Term	Definition
quantum of energy	discreet energy packet and not a continuous energy
photon	light energy in the form of energy packet
wave-particle duality	electron exhibits wave characteristics such as diffraction and interference and also possesses particle properties such as momentum and kinetic energy
photoelectric effect	emission of electron from a metal surface when it is illuminated by a beam of light at certain frequency
photoelectron	electron emitted when a metal surface is illuminated by a beam of light at certain frequency
activation voltage	voltage required to activate the photocell
threshold frequency	minimum frequency required to produce photoelectric effect on a metal
work function	minimum energy required for a photoelectron to be emitted from a metal surface