

General Science Physics Notes PDF

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Basic Physics up to Class X level is asked in Competitive Exams such as Indian Railways –ALP and Group D exams and SSC exams. Cracku brings to you the capsule – One Liners covering exam specific topics in Physics.

IMPORTANT SCIENTISTS RELATED TO PHYSICS

A German Theoretical Physicist who developed the theory of relativity and often referred to as one of the Fathers of Modern Physics	Albert Einstein
English Theologian considered as one of the Fathers of Modern Physics for his groundbreaking law of Motion and Gravitation	Isaac Newton
Italian Scientist considered as the Father of Scientific Revolution	Galileo Galilei
Danish Physicist who made tremendous contributions to the understanding of Atomic Structure and Quantum Theory Received Nobel Prize in Physics in 1922	Niels Bohr
German Physicist and winner of Nobel Prize in Physics in 1918 for discovering “Energy Quanta”	Max Planck
German Physicist considered as one of the Pioneers of the Quantum Mechanics	Werner Heisenberg
British Physicist referred to as the Father of Nuclear Physics	Ernest Rutherford
American Physicist – the creator of the World’s first nuclear reactor – Chicago Pile-1, known as “Architect of the Nuclear Age”	Enrico Fermi

English Scientist whose contribution to Electromagnetism and Electrochemistry is considered crucial discoveries	Michael Faraday
French Physicist and Nobel Laureate, considered to be the first person to discover evidence of radioactivity	Antoine Henry Becquerel
English Physicist awarded the Nobel Prize in Physics for the discovery of Neutron	James Chadwick
English Physicist and Nobel Laureate credited with the discovery of Electron	J J Thomson
Dutch Physicist and Nobel Laureate in 1902 for the discovery and explanation of Zeeman Effect	Hendrik Lorentz
American Physicist and the only Person to win Nobel Prize in Physics twice in 1956 and 1972	Jon Bardeen
German Astronomer known for his laws of Planetary Motion	Johannes Kepler
Indian Physicist and Nobel Laureate in 1930 for his research in the field of Light Scattering	C V Raman
American Physicist who won Nobel prize in 1927 for the discovery of Crompton effect which demonstrated the particle nature of Electromagnetic radiation	Arthur Crompton
American Physicist known for the significant contribution to LASER and founder of MASER	Charles H Townes
Irish Physicist often credited as the first person to artificially split an atom	Ernest Walton

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Italian Inventor Pioneer in the field of radio and transmission and development of Radio Telegraph System	Guglielmo Marconi
Austrian Physicist whose contribution to the field of Nuclear Physics is groundbreaking, often credited with the first discovery of Nuclear Fission of an Uranium	Lise Meitner
German chemist and pioneer in the field of radioactivity, considered as the father of Nuclear Chemistry	Otto Hann
German Physicist credited with the founding of X-RAYS	Wilhelm Rontgen
Irish Physicist considered as the father of Modern Chemistry	Robert Boyle
German Physicist and Nobel Laureate for the discovery of Diffraction of X-RAYS	Max Von Laue
Greek Philosopher considered as the father of Western Philosophy	Aristotle
Italian Physicist credited with the Invention of Electrical Battery and discovery of Methane	Alessandro Volta
American Physicist who is credited as the "Father of the Atomic Bomb"	J Robert Oppenheimer
SCIENTISTS WHO DISCOVERED SOME IMPORTANT ELEMENTS	
Phosphorous	Hennig Brand
Hydrogen	Henry Cavendish
Helium	Pierre Janssen Norman Lockyer

Boron	Joseph Louis Gay Lussac Humphry Davy Louis Jacques Thénard
Nitrogen	Daniel Rutherford
Oxygen	Joseph Priestley Carl Wilhelm Scheele
Fluorine	Henri Moissan

IMPORTANT ONE-LINERS IN PHYSICS FOR RRB EXAMS – ALP AND GROUP D, SSC EXAMS AND UPSC EXAMS

PROPERTIES OF MATTER

- π The fundamental Principle in Physics: Matter can neither be destroyed nor created but it can be transformed from one state to another.
- π The smallest Unit of an element is called Atom.
- π The simplest form of matter which can retain complete physical and chemical Properties
- π The force of attraction between similar kind of molecules is called Force of cohesion
- π The force of attraction between different kind of molecules is called Force of adhesion
- π Solids have a definite shape and size because of high Intermolecular forces as the Intermolecular space is very little.
- π Liquids have only definite volume but no definite shape as the Intermolecular forces are less as the Intermolecular space is large
- π Gases have no definite shape and volume as the Intermolecular forces are negligible as the Intermolecular spaces are very large

Elasticity	The property of the body by virtue of which it tends to regain its Original Shape and Size when the applied
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	force is removed
Plasticity	The Property of the body that has no tendency to regain its original shape and size and remain in the deformed state after removing the applied pressure.

π Stress is defined as the restoring force per Unit Area

π The restoring force is equal in magnitude and opposite in direction to the applied force also known as deforming force

π Surface Tension is defined as the tension of the surface film of a liquid caused by the attraction of the particles in the surface layer by the bulk of the liquid, which tends to minimize surface area.

Temperature Increases	Surface Tension Decreases
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π Viscosity is defined as the state of being thick, sticky, and semi-fluid in consistency, due to internal friction

Temperature Increases	Viscosity Decreases
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UNITS AND MEASUREMENT

π Basically there are two types of Quantities in Physics

- Fundamental Quantities: Which form the basis for measurement in Physics like length, mass, time etc...
- Derived Quantities: which are derived from the base/fundamental quantities and that are expressed as the combination of base/fundamental units.

The combined system of both Fundamental and Derived Quantities is called system of units

π There are at present seven fundamental quantities internationally accepted as the International System of Units

Fundamental Quantity	Name of the SI Unit	Symbol of the SI Unit
Length	Metre	m
Mass	Kilogram	kg
Time	Second	s

Electric Current	Ampere	A
Thermodynamic Temperature	Kelvin	K
Amount of Substance	Mole	Mole
Luminous	Candela	Cd
Other Important Units of Measurement		
Wavelength of Light	Angstrom	Å
Electric Charge	Faraday	F
Magnetic Induction	Gauss	Gs
Electric Resistance	Ohm	Ω
Electric Potential	Volt	V
Power	Watt	W
Atmospheric Pressure	Bar	bar
Magnetic Flux	Maxwell	Mx
Electric Charge	Coulomb	C
Force	Dyne	Dyn (1 Dyn = 0.00001 Newton)

Energy	Joule	J
Pressure	Pascal	Pa
Luminous Flux	Lumen	lm

π There are three types on nuclear radiation:

Alpha Particles	Positively Charged	Lowest Energy
Beta Particles	Negatively Charged	Medium Energy
Gamma Particles	Neutral Charge	Highest Energy

LIGHT

- π The speed of light in vacuum is 299,792,458 meters per second
- π The medium through which light can pass easily is transparent medium
- π The medium through which light can pass partially is translucent medium
- π The medium through which light cannot pass is opaque medium

Incident Ray	The ray of light which strikes the surface of a medium before reflecting back
Reflected Ray	The ray of light which strikes back from the medium after reflection is called reflected ray
Refracted Ray	The ray of light which that is transmitted into the second medium and travels in a different direction than the incident ray
Two Laws of Reflection	Angle of Incidence is equal to the angle of reflection Incident Ray, Reflected Ray and the

	Normal drawn to the point of incidence all lie in the same plane
Diffused Reflection	When all parallel incident rays reflected from a plane surface are not parallel, it is diffused reflection



Images are of two types

Real Image	Virtual Image
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- π An image which can be obtained on a screen is called a real image.
- π An image which cannot be obtained on a screen is called a virtual image.
- π Mirror whose spherical surface is curved inwards is called a concave mirror
- π Mirror whose spherical surface is curved outwards is called a convex mirror
- π The center of curvature of a concave mirror is not a part of the mirror but lies in front of the mirror
- π The center of curvature of a convex mirror is not a part of the mirror but lies behind the mirror
- π Convex Lens is called a converging lens
- π Concave Lens is called a divergent lens
- π Total internal reflection is complete reflection of a ray of light within a medium such as water or glass from the surrounding surfaces back into the medium. The phenomenon occurs if the angle of incidence is greater than a certain limiting angle, called the critical angle.
- π Phenomenon of splitting of a beam of white light into its constituent colors on passing through prism is called Dispersion of Light

HEAT

- π Heat is the form of energy transferred between two (or more) systems or a system and its surroundings by virtue of temperature difference.
- π SI unit of Heat is Joule and SI unit of Temperature is Kelvin/ Celsius/ Fahrenheit

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π Absolute zero, temperature at which a thermodynamic system has the lowest energy. It corresponds to $-273.15\text{ }^{\circ}\text{C}$ on the Celsius temperature scale and to $-459.67\text{ }^{\circ}\text{F}$ on the Fahrenheit temperature scale

π Heat flows from one object to another in three ways:

Conduction	Convection	Radiation
<ul style="list-style-type: none"> □ The process by which heat is transferred from the hotter end to the colder end of an object □ Conduction happens generally in Solids □ The materials which allow heat to pass through them easily are conductors of heat. Ex: Aluminum □ The materials which do not allow heat to pass through them easily are poor conductors of heat and are called Insulators Ex: Wood 	<ul style="list-style-type: none"> □ Convection is the heat transfer due to bulk movement of molecules within fluids such as gases and liquids □ Convection happens in Liquids and Gases 	<ul style="list-style-type: none"> □ The emission of energy as electromagnetic waves or as moving subatomic particles, especially high-energy particles which cause ionization

Specific Heat Capacity of the substance	The amount of heat energy required to raise the temperature of 1gram of a substance through 1° is called
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SOUND

- π Sound is a longitudinal wave, in which the individual particles of the medium move in a direction parallel to the direction of propagation of the disturbance. The particles do not move from one place to another but they simply oscillate back and forth about their position of rest.
- π The two important properties of sound are:

Amplitude	Frequency
The maximum displacement or distance moved by a point on a vibrating body or wave measured from its equilibrium position.	Frequency is the number of occurrences of a repeating event per unit of time
Determines the loudness of the sound. Larger the amplitude – louder the sound	Determines the pitch of the sound – higher the frequency, higher the pitch

- π One Important note to make, the speed of sound in a gaseous medium is inversely proportional to the square root of the density of the gas.
- π Speed of sound increases with the increase in temperature of the medium
- π Minimum distance of the obstacle from source of sound for hearing distinct echo is 17.2 m at 22 degrees Celsius with speed of sound in air at 344 m/s
- π Reverberation is the phenomenon of prolongation of sound due to successive reflection of sound from surrounding objects
- π Audible Ranges of Sound:

< 20 Hz (Less than 20 Hz)	Infrasonic Sound	Animals like Elephants, Whales
20 Hz to 20000 Hz	Audible Sound	Audible range for Huma Beings
> 20000 Hz (Greater than 20000 Hz)	Ultrasonic Sound	Animals like Bats, Dolphins

- π SONAR which stands for Sound Navigation and Ranging is a device that uses ultrasonic waves to measure the distance, direction and speed of underwater.

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- π If the speed of the aircraft is more than the speed of sound, then the aircraft is said to have achieved supersonic speed

WORK POWER AND ENERGY

FUNDAMENTAL LAW OF CONSERVATION OF ENERGY – ENERGY CAN NEITHER BE CREATED NOR DESTROYED, CAN ONLY BE TRANSFORMED FROM ONE FORM TO ANOTHER

- π **Work** is done when a force that is applied to an object moves that object. Technically, Work done on an object is defined as the magnitude of the force multiplied by the distance moved by the object in the direction of the applied force.
- π Unit of Work is Joule – J
- π **Power** is defined as the rate of doing work. SI unit of Power is Watt
- π **Energy** is the capacity of a physical system to do work. There are two types of Energy.

Potential Energy	Kinetic Energy
The energy possessed by a body due to its change in position or shape is called the potential energy	The energy which a body possesses by virtue of being in motion

- π Pressure is defined as the force acting per unit area
- π The mass per unit volume of a substance is called Density
- π The relative density of a substance is the ratio of the density of the substance to the density of the water

ELECTRICITY

- π A form of energy resulting from the existence of charged particles (such as electrons or protons), either statically as an accumulation of charge or dynamically as a current
- π Substances can be categorized into three types based on conductivity

Conductors	Insulators	Semiconductors
a conductor is an object or type of material that	An electrical insulator is a material whose	A material that is neither a good conductor of

allows the flow of an electrical current in one or more directions	internal electric charges do not flow freely; very little electric current will flow through it under the influence of an electric field	electricity nor a good insulator, but has properties of electrical conductivity somewhere between the two
Silver, Copper, Iron	Glass, Wood	Germanium, Silicon

π The potential difference between two conductors is equal to the work done in conducting a unit positive charges from one conductor to the other conductor through a metallic wire

π Electric Current is the rate at which electric charges pass through a conductor

π There are two main types of current in our world.

Direct Current	Alternating Current
which is a constant stream of charges in one direction	Which is a stream of charges that reverses direction

π The obstruction offered to flow of current by the conducting wire is called its resistance

MAGNETISM

π A magnet is a piece of metal with a strong attraction to another metal object

π Magnet produces Magnetic field around itself

π Every magnet has two poles, called the north and south poles. Magnetic poles exert forces on each other in such a way that like poles repel and unlike poles attract each other

π Important Properties of Magnet

A magnet attracts magnetic materials towards itself

Unlike poles attract each other and like poles repel each other

A freely suspended bar magnet always aligns in the north-south direction

If a magnet is cut into two pieces each piece will behave like an independent

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magnet, with a north pole and a south pole

A magnet with a single pole does not exist

- π The phenomenon due to which an un-magnetized magnetic substance behaves like a magnet, due to the presence of some other magnet, is called magnetic induction.
- π The branch of physics which deals with the relationship between electricity and magnetism is called electromagnetism.
- π Whenever current is passed through a straight conductor it behaves like a magnet. The magnitude of magnetic effect increases with the increase in the strength of current.

MECHANICS

- π The action or process of moving or being moved is called motion.
- π Important Terms in Mechanics:

Speed	The rate at which someone or something is able to move or operate This is the scalar quantity of Velocity
Velocity	The distance covered by an object in a specified direction in unit time interval is called velocity
Acceleration	Acceleration, in physics, is the rate of change of velocity of an object with respect to time
Acceleration Due to Gravity	The acceleration which is gained by an object because of gravitational force is called its acceleration due to gravity. The acceleration due to gravity at the surface of Earth is represented as g .

Force	Something that causes a change in the motion of an object
There are two types of Forces	<p>Centripetal Force: a force which acts on a body moving in a circular path and is directed towards the center around which the body is moving.</p> <p>Centrifugal Force: a force, arising from the body's inertia, which appears to act on a body moving in a circular path and is directed away from the center around which the body is moving.</p>
<p>Mass: the quantity of matter in a body regardless of its volume or of any forces acting on it and is an independent Quantity.</p> <p>SI Units of Mass : Kg</p>	<p>Weight: the force exerted on a body by gravity and is dependent quantity. The value of weight changes on earth, moon, mars etc...however the mass of the body remains constant everywhere.</p> <p>SI Unit of Weight : Newton</p>

IMPORTANT INSTRUMENTS AND DEVICES IN PHYSICS

Electricity Meter	Device used to measure energy directly in kilowatt hours
Gas Meter	Device used to measure energy indirectly by recording the volume of gas used
Speedometer	A gauge that measures and displays the instantaneous speed of a vehicle

Tachometer	An instrument used to measure the rotation speed of a shaft or disk, as in a motor or other machine
Tachymeter	Scale used to compute a speed based on travel time or measure distance based on speed
Variometer	one of the flight instruments in an aircraft used to inform the pilot of the rate of descent or climb
Planimeter	A device used to determine the area of an arbitrary two-dimensional shape
Accelerometer	Is a device that used to measure proper acceleration
Anemometer	a device used for measuring the speed of wind
Barometer	Is a scientific instrument used in meteorology to measure atmospheric pressure
Dynamometer	is a device for measuring force, torque, or power
Ammeter	a measuring instrument used to measure the current in a circuit
Galvanometer	an electromechanical instrument used for detecting and indicating electric current
Voltmeter	an instrument used for measuring electrical potential difference between two points in an electric circuit

Ohmmeter	an electrical instrument that measures electrical resistance, the opposition to an electric current
Actinometer	instrument used to measure the heating power of radiation
Pyranometer	Similar to Actinometer designed to measure the solar radiation flux density
Pyrometer	remote-sensing thermometer used to measure the temperature of a surface
Viscometer	an instrument used to measure the viscosity of a fluid
Tensiometer	an instrument used to measure the surface tension of liquids or surfaces
Seismometer	an instrument that measures motion of the ground caused by activities like an earthquake, a volcanic eruption etc...
Densitometer	a device for measuring the density of a material.
Spectrometer	a scientific instrument originally used to split light into an array of separate colors.
Hygrometer	an instrument used for measuring the water vapor in the atmosphere, in soil, or in confined spaces
Spirometer	an apparatus for measuring the volume of air inspired and expired by the lungs
Calorimeter	an apparatus for measuring the amount of heat involved in a chemical reaction

	or other process.
Fathometer	depth finder for determining depth of water or a submerged object by means of ultrasound waves
Hydrometer	an instrument for measuring the density of liquids.

Physics 20 Important One Liners

American Physicist – The creator of World's first Nuclear Reactor	Enrico Fermi
British Physicist referred to as the Father of Nuclear Physics	Ernst Rutherford
With Increase in Temperature the viscosity of a Fluid	Decreases
SI Unit of Luminous Intensity	Candela
The category of Nuclear Radiation which has lowest Energy	Alpha Particles
The center of curvature of convex Mirror lies	Behind the Mirror
Frequency bandwidth of Audible Sound Waves	20 Hz to 20000 Hz
Mass per Unit Volume of a Substance is	Density
The Planet nearest to the earth	Mars
A moving electric Charge Produces	Both Magnetic and Electric Field around it

Effect on water level by the melting of Ice Cube floating on water	Water level will remain the same
Splitting of light into Seven different colors (VIBGYOR) when white light is incident on Prism called	Dispersion of Light
Volume of a given mass of water when heated from Zero Degrees Celsius to Four Degrees Celsius	First Decreases then Increases
Type of Nuclear reaction involved in Nuclear Reactors for generation of electricity	Nuclear Fission
Substance with Highest Heat Capacity	Hydrogen (14.3 KJ/KG °C)
The phenomenon due to which an un-magnetized magnetic substance behaves like a magnet, due to the presence of some other magnet	Magnetic Induction
An instrument used to measure the rotation speed of a shaft or disk, as in a motor or other machine	Tachometer
American Physicist and the only Person to win Nobel Prize in Physics twice in 1956 and 1972	John Bardeen
Law in Physics that defines the concept of Inertia	Newton's First Law
SI Unit of Pressure	Pascal

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