O LEVEL PHYSICS

DEFINITIONS,EXPERIMENTS AND LAWS

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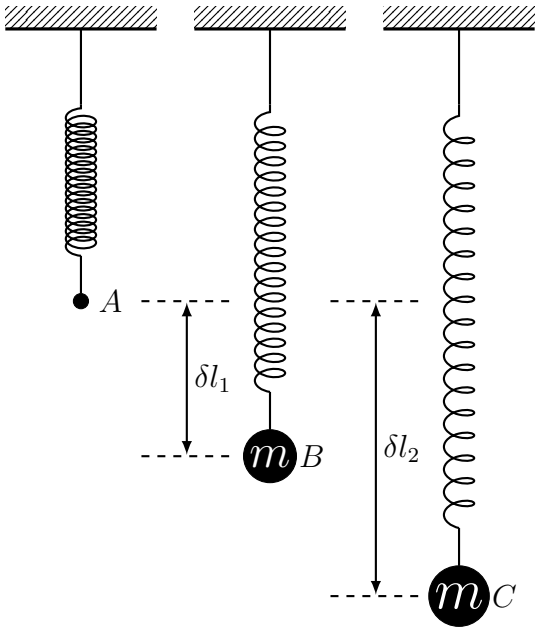

Figure 1: Extension of a spring when loaded(Hooke's law).

This book contains the common definitions,laws,experiments,and explanations in the following topics

- *NEWTONIAN MECHANICS*
- *HEAT*
- *LIGHT*
- *WAVES*
- *ELECTRICITY AND MAGNETISM*
- *MODERN PHYSICS*

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The illiterates of the future are not those who are not able to read and write,but those who are unwilling to learn,unlearn and re learn

NEWTONIAN MECHANICS

1. **Scalar Quantities**: These are quantities that have only magnitude but no direction.e.g mass,length ,time,distance, temperature,pressure,Power,work,Energy, Speed,Temperature,area,Density, Volume ,Current,Potential difference
2. **Vector Quantities**: These are quantities that have both magnitude and direction. .e.g velocity,acceleration,displacement, momentum,force,magnetic field,Impulse, electric field,Weight, Tension,Up-thrust, Friction, Magnetic flux density ,Magnetic field intensity,Viscous drag, Electric field Intensity
3. **Length**: This is the distance between two points irrespective of the path taken.SI units **metre (m)**
4. **Matter**: This is anything that occupies space and has weight.
5. **Mass**: This is the quantity of matter contained in an object.SI units **kilogram(kg)**
6. **Density**: This is mass per unit volume of an object.SI units $\mathbf{kgm^{-3}}$
7. **Relative Density**: This is the ratio of density of a substance to density of an equal volume of water.
8. **Volume**:Is the amount of space occupied by matter.SI units $\mathbf{m^3}$
9. **Fundamental quantities**: These are quantities which can't be expressed in terms of any other quantities by using any mathematical equation.e.g mass,length and time
10. **Derived quantities**: These are quantities which can be expressed in terms of fundamental quantities of mass, length and time.e.g velocity,acceleration,force
11. **Force**: This is a push or a pull that changes a bodys state of rest or uniform motion in a straight line.SI units **N or newton**
12. **Friction**: This is the force that opposes relative motion between two surfaces in contact.SI units **N or newton**
13. **Static friction**: This is the frictional force between bodies tending to slide against one another.
14. **Dynamic friction**: This is the frictional force between two bodies moving relative to one another.
15. **Centripetal force**: This is the force that keeps a body to move in a circular path and is directed towards the centre of the circle.
16. **Gravitational force**: This is the force that pulls bodies towards the centre of earth.
17. **Pressure**: This is the force acting normally per unit area .SI units $\mathbf{Nm^{-2}}$ **or Pa(pascal)**
18. **Atmospheric pressure**: This is the force acting normally per unit area exerted against a surface by the weight of the air above that surface.

LINEAR MOTION

19. **Linear motion**:This is motion in a straight line
20. **Distance**: This is the length between two fixed points.SI units **metre(m)**
21. **Displacement**: This is the distance moved in a specificied direction.SI units **metre(m)**
22. **Speed**: This is the rate of change of distance moved with time.SI units $\mathbf{ms^{-1}}$
23. **Uniform speed**: This is the constant rate of change of distance moved with time.SI units $\mathbf{ms^{-1}}$
24. **Velocity**: It is the rate of change of displacement .SI units $\mathbf{ms^{-1}}$
25. **Uniform velocity**: This is the constant rate of change of displacement .OR it is the constant rate of change of distance moved with time in a specified direction

. SI units $\mathbf{ms^{-1}}$

26. **Acceleration**: This is the rate of change of velocity.SI units $\mathbf{ms^{-2}}$

27. **Uniform acceleration**: Is the constant rate of change of velocity .SI units $\mathbf{ms^{-2}}$

28. **Deceleration**: This is the rate of decrease of velocity .SI units $\mathbf{ms^{-2}}$

29. **Uniform deceleration**: This is the constant rate of decrease of velocity .SI units $\mathbf{ms^{-2}}$

30. **Acceleration due to gravity**: This is the rate of change of velocity for an object falling freely under gravity.SI units $\mathbf{ms^{-2}}$

31. **Projectile**: Is any body that is given an initial velocity and then follows a path determined by the effects of gravitational acceleration and air resistance.

32. **Inertia**: This is the tendency of a body to remain at rest or keep moving with uniform motion.OR Inertia is the reluctance of a body to start moving once its at rest or to stop moving if its already in motion.

33. **Momentum**: This is the product of mass of a body and its velocity.SI units $\mathbf{kgms^{-1}}$

34. **Linear Momentum**:This is the product of mass and velocity of a body moving in a straight line.SI units $\mathbf{kgms^{-1}}$

35. **Impulse**:Is the product of force and the time of action of the force on the body OR This is the product of the force and time for which the force acts on a body.SI units $\mathbf{kgms^{-1}}$ **or Ns**

36. **Elastic collision**: This is the type of collision where the colliding bodies separate after collision and both momentum and kinetic energy are conserved.e.g collision between atoms,collision between two billiard balls,when we throw a ball on the floor,it bounces back

37. **Inelastic collision**: This is the type of collision where the colliding bodies stay together after collision and move with a common velocity, momentum is conserved but kinetic energy is not conserved.e.g collision between a bullet and a block of wood,car crush(car crashing against th tree).

38. **Moment**: This is the turning effect of the force about the fixed point.

39. **Moment of a force**: This is the product of the magnitude of force and the perpendicular distance of its line of action from the point.SI units **Nm**

40. **Centre of gravity**: This is the point of application of the resultant force due to the earths attraction on it.OR is the point where its resultant weight acts

41. **Neutral Equilibrium**: This is when a body is slightly displaced its Centre of gravity doesnot change position relative to the ground.

42. **Stable equilibrium**: This is when a body is slightly displaced its Centre of gravity is raised and the body returns to its original position.

43. **Un-Stable equilibrium**: This is when a body is slightly displaced its Centre of gravity is lowered and the body does not return to its original position.

44. **Work**: This is the product of force and distance moved in the direction of force.OR Is the product of force and its displacement. SI units **joules or J**

45. **Energy**: This is the ability to do work.OR is the capacity to perform work.SI units **J**

46. **Potential energy**: This is the energy possessed by a body by reason of its position in the field of force.SI units **joules or J**

47. **Kinetic energy**: This is the energy possessed by a body by reason of its motion.SI units **joules or J**

48. **Mechanical energy**: This is the energy possessed by a body by virtue of its mo-

tion and its position in the gravitational field.SI units **joules or J**

49. **Weight**: This is the force acting on a body due to gravitational attraction on it.SI units **N or newton**

50. **Renewable sources of energy(Non exhaustible)**: These are sources of energy that can be re-used to produce other forms of energy.e.g wind.water(HEP),solar(sun)

51. **Non-renewable(Exhaustible) sources of energy**: These are sources of energy that cannot be re used to produce other forms of energy.e.g kerosene,coal,biogas, petroleum

52. **Power**: This is the rate of doing work.OR is the rate of transfer of energy.SI units **W (watt)**

53. **Mechanical advantage**: This is the ratio of load to effort.

54. **Velocity ratio**: This is the ratio of the distance moved by the effort to the distance moved by the load in the same time interval

55. **Efficiency**: This is the ratio of useful work done by the machine to work put into a machine expressed as a percentage.Or Its the ratio of work output to work input expressed as a percentage.

56. **Pitch in machines** : This is the distance between two successive threads of the screw.

57. **Surface tension**: This is the force acting normally per unit length on an imaginary line drawn tangentially on the surface of the liquid.OR Is the force on the liquid surface that causes it to behave as if it is covered with a thin stretched elastic membrane.

58. **Cohesion**: This is the force of attraction between molecules of the same substance.

59. **Adhesion**: This is the force attraction between molecules of different substances.

60. **Viscous drag(fluid friction)**: This is the force that opposes motion of a body falling in a fluid.

61. **Terminal velocity**: This is the maximum constant velocity a body attains when it falls through a fluid

62. **Up-thrust**: This is the upward force acting on a body immersed in a fluid. SI units **N or newton**

63. **Capillarity**: This is the action by which the surface of a liquid where it is in contact with a solid is elevated or depressed depending on the adhesive and cohesive properties of the liquid.

64. **Capillary action**: This is the rising of aliquid in a narrow tube

65. **Diffusion**: This is the spreading of molecules from a region of higher concentration to a region of lower concentration.

66. **Brownian motion**: This is the random motion of molecules of the fluid.

MECHANICAL PROPERTIES OF MATTER

67. **Elasticity**: This is the ability of a substance to regain its original shape, size and length when the tensile force applied on it is removed.

68. **Elastic deformation**: This is when a material can recover its original length and shape when the deforming load has been removed

69. **Elastic material**: This is a material which regains its original shape and size when the deforming load has been removed.E.g. Rubber band, spring.

70. **Elastic limit**: This is the maximum load which a material can experience and still regain its original size and shape once the load has been removed.

71. **Plasticity**:This is the ability of a material to remain permanently deformed when a deforming force has been removed.

72. **Toughness**:This is the ability of a material to resist wearing e.g. rubber

73. **Strength**: This is the ability of the material to withstand the applied force before breaking.

74. **Stiffness**: This is the ability of the material to resist change in size or shape.OR Its the ability of a material to resist being bent.

75. **Strength**:This is the ability of a material to withstand or to resist an applied force before it brakes.

76. **Ductility**: This is the ability of a material to be hammered, moulded, bent, stretched and rolled into different shapes without breaking.

77. **Brittleness**: This is the ability of a material to break just after elastic limit is reached.

78. **Hardness**:This is the ability of a material to resist wearing

79. **Stiff material**: This is the material that resists change of size or shape.

80. **Ductile material**: This is the material that can be hammered, moulded, bent, stretched and rolled into different shapes without breaking.e.g copper, steel, iron, lead,plasticine

81. **Brittle material**: These are materials that can not be permanently stretched.It breaks as soon as the elastic limit has been reached e.g. glass, chalk, rocks and cast iron

82. **Plastic material**: This is the material that cannot regain its original size or shape when the applied force has been removed.

83. **Proportional limit**: This is the point beyond which force applied is not directly proportional to the extension.

84. **Yield point**: Is a load of material beyond which the material stops undergoing plastic deformation and instead undergoes auntil rapid increase in its extension when loaded beyond this point until the material breaks

85. **Plastic deformation**: This is the type of deformation in which the material cannot regain its original shape or size.

86. **Tensile Stress**: This is the ratio of force applied to cross sectional area of the material. **SI units** Nm^{-2} or Pa

87. **Tensile Strain**: This is the ratio of extension to original length of the material.

88. **Young's modulus**: This is the ratio of tensile stress to tensile strain. **SI units** Nm^{-2} or Pa

89. **A girder**: This is a piece of material that strengthens a structure.

90. **Strut**: This is the girder under compression.

91. **Tie**: This is the girder under tension.

92. **Notch**: This is a cut or a weak point in a given material.

93. **Concrete**: This is a stone like material which is obtained by proportionate mixture of cement, sand, gravel and water and is left to harden.

HEAT DEFINITIONS:

94. **Heat**: This is the form of energy which is transferred from one place to another owing to a temperature difference between them.SI units **joules or J**

95. **Temperature**:Is a number which expresses its degree of hotness or coldness on some choosen scale.S.I units **kelvin or K**

96. **Fundamental interval**:Is the difference between the two fixed points

97. **Thermometric property**: This is a physical property which changes continuously and linearly with change in temperature.

98. **Fixed point**: This is temperature at which a physical change is expected to occur.

99. **Lower fixed point(ice point)**: This is the temperature at which pure ice can exist in dynamic equilibrium with pure water at standard atmospheric pressure of 760mmHg.OR is the temperature of pure melting ice

100. **Upper fixed point(steam point)**: This is the temperature at which steam and water exist in equilibrium.OR Is the temperature of steam from water boiling under standard atmospheric pressure of 76ommHg

101. **Gas**: This is the state of a substance above its critical temperature.

102. **Ideal gas**: Is one which obeys all the three gas laws perfectly.OR This is a gas whose intermolecular forces are negligible and its molecules undergo perfectly elastic collision.

103. **Real gas**: This is a gas whose intermolecular forces attraction or repulsion are not negligible.

104. **Equation of state of a gas(ideal gas equation)**: Is one which relates pressure P,volume V and temperature T of a given mass of a gas.

105. **Anomalous expansion of water**:This is the unusual expansion of water when cooled below 4^0C

106. **Heat transfer**: This is the transition of heat from a hot region to a cold region.

107. **Conduction**: This is the transfer of heat through matter from a region of high temperature to a region of low temperature without the movement of matter as a whole.

108. **Convection**: This is the transfer of heat through fluids from a region of high temperature to aregion of low temperature b with the movement of the fluid as a whole.

109. **Radiation**: This is the transfer of heat through a vacuum by means of electromagnetic waves.

110. **Heat capacity**: This is the heat required to raise the temperature of a body by one kelvin.SI units $\mathbf{JK^{-1}}$

111. **Specific heat capacity**: This is the heat required to raise the temperature of a unit mass of a body by one kelvin.S.I units $\mathbf{Jkg^{-1}K^{-1}}$

112. **Latent heat**: This is the heat required to change the state of a substance without change in temperature.SI units **J**

113. **Latent heat of fusion**: This is the heat required to change the state of a substance from solid to liquid without change in temperature.SI units **J**

114. **Latent heat of vaporization**: This is the heat required to change the state of a substance from liquid to vapour without change in temperature.SI units **J**

115. **Specific latent heat**: This is the heat required to change the state of one kilogram mass of substance without change in temperature.SI units $\mathbf{Jkg^{-1}}$

116. **Specific latent heat of fusion**: This is the heat required to convert the state of a unit mass of a substance from solid to liquid at constant temperature.SI units $\mathbf{Jkg^{-1}}$

117. **Specific latent heat of vaporization**: This is the heat required to convert the state of a unit mass of a substance from liquid to vapour without change in temperature.SI units $\mathbf{Jkg^{-1}}$

118. **Absolute zero temperature**: This is the temperature at which the molecules of the gas have minimum kinetic energy.

119. **Triple point of water**: This is the tem-

perature at which pure water, pure melting ice and saturated vapour exist in equilibrium.

120. **Saturated vapour**: This is the vapour which is in dynamic equilibrium with its own liquid.

121. **Unsaturated vapour**: This is the vapour which is not in dynamic equilibrium with its own liquid.

122. **Evaporation**: This is the escape of molecules of the liquid from its surface.

123. **Boiling**: This is the process which occurs when the saturated vapour pressure is equal to external pressure.

124. **Boiling point**: This the temperature at which the saturated vapour pressure is equal to external pressure(atmospheric pressure).

125. **Freezing**: This is the process that occurs when a substance changes from liquid state to solid state at constant temperature.

126. **Freezing point**: This is the temperature at which a substance changes from liquid state to solid state.

127. **Melting**: This is a process which occurs when a substance changes from solid state to liquid state at constant temperature.

128. **Melting point**: This is the temperature at which a substance changes from solid state to liquid state.

LIGHT DEFINITIONS:

129. **Light:** This is a form of energy which is responsible for the sense of sight.

130. **Luminous bodies**: These are bodies which produce their own light.e.g .sun, fire worms, firefly .

131. **Nonluminous bodies**: These are bodies which dont produce their own light.

132. **Incandescent bodies**: These are bodies which give off light when hot.

133. **Fluorescent bodies**: These are bodies that produce light without being hot.

134. **Transparent medium**: This is the type of medium which allows almost all the light to pass through it and objects are seen clearly.

135. **Translucent medium**: This is the type of medium which allows some of the light to pass through it and objects are not seen clearly.

136. **Opaque medium**: This is the type of medium which does not allow any light to pass through it and objects are not seen at all.

137. **A ray of light**: This is the direction or the path along which light travels.

138. **A beam**: This is a collection of light rays.

139. **Convergent beam**: This is the collection of light rays originating from different directions but meeting at one point.

140. **Divergent beam**: This is the collection of light rays originating from one point but travel in different directions.

141. **Rectilinear propagation of light**: This is the process by which light travels in straight lines when produced from its source.

142. **Shadow**: This is an area or space where light cannot reach.

143. **Umbra**: This is the region of the shadow where no light reaches at all.

144. **Penumbra**: This is the region of the shadow where some light reaches.

145. **Eclipse**: This occurs when the sun, the moon and the earth appear in a straight line.

146. **Solar eclipse**: This occurs when the moon is between the sun and the earth.

147. **Lunar eclipse**: This occurs when the earth is between the moon and the sun.

148. **Annular eclipse**: This occurs when the sun is far away from the earth and the moon is between the sun and the earth.

149. **Magnification**: This is the ratio of size of the image to size of the object.

150. **Reflection of light**: This is the bouncing off of light from the reflecting surface.

151. **Regular (Specular) reflection**: This is the type of reflection when a parallel beam incident on a smooth surface is reflected as a parallel beam.

152. **Irregular (Diffuse) reflection**: This is the type of reflection when a parallel beam incident on a rough surface is scattered in different directions.

153. **Paraxial rays**: These are rays nearly parallel to the principal axis and make small angles with the mirror axis.

154. **Marginal rays**: These are rays furthest from the principal axis of the mirror.

155. **Centre of curvature of the mirror**: This is the center of the sphere of which the mirror forms apart.

156. **Radius of curvature of the mirror**: This is the distance between the center of curvature and the pole of the mirror.SI units **m**

157. **Pole of the mirror**: This is center point of the mirror.

158. **Focal length the mirror**:This is the distance between the principal focus and the pole of the mirror.SI units **metre(m)**

159. **Aperture of the mirror**: This is the width of the mirror.

160. **Principal axis of the mirror**: This is the straight line joining the center of curvature to the pole of the mirror through its principal focus.

161. **Principal focus(Focal point) of the mirror**: This is the point on the principal axis to which al rays parallel and close to the principal axis converge and appear to diverge after reflection from the mirror.

162. **Principal focus (focal point)of a converging mirror**: This is the point on the principal axis to which all rays parallel and close to the principal axis converge after reflection from the mirror.

163. **Principal focus (focal point)of a diverging mirror**: This is the point on the principal axis to which all rays parallel and close to the principal axis appear to diverge after reflection from the mirror.

164. **Virtual image**: This is the image formed by apparent intersection of rays.

165. **Real image**: This is the image formed by actual intersection of rays.

166. **Refraction**: This is the bending of light ray as it moves from one medium to another medium of different optical densities.

167. **Refractive index**: This is the ratio of sine of angle of incidence to sine of angle of refraction for light moving from air to any other given medium.

168. **Total internal reflection**: This is a phenomenon which occurs when light is moving from a denser medium to a dense medium and the angle of incidence is greater than the critical angle.

169. **Critical angle**: This is the angle of incidence in a denser medium for which its angle of refraction in a dense medium is ninety degrees.

170. **A perture of lens**:This is the width of the lens

171. **Principal axis of the lens**: This is the line joining the principal focus to the optical center of the lens.

172. **Optical center of the lens**: This is the center point between the poles of the lens.

173. **Centre of curvature of a lens**: Is the centre of a sphere of which the spherical surface of the lens is part.

174. **Principal focus(focal point) of the lens**: This is the point on the principal axis to which all rays parallel and close to the principal axis converge and appear to diverge after refraction from the lens.

175. **Principal focus of a converging lens**: This is the point on the principal axis to which rays parallel and close to the principal axis converge after refraction from the lens.

176. **Principal focus of a diverging lens**: This is the point on the principal axis to which rays parallel and close to the principal axis appear to diverge after refraction from the lens.

177. **Focal length of the lens**: This is the distance between the principal focus and the optical center of the lens.

178. **Power of the lens**: This is the reciprocal of its focal length measured in metres.SI units **Dioptre(D)**

179. **Accommodation**: This is the ability of the eye to view objects at different position by changing the focal length of the eye lens.

180. **Short sightedness (Myopia)**: This is a defect of the eye whereby a person cannot see far objects clearly but can only see nearby objects clearly.

181. **Long sightedness (Hypermetropia)**: This is the defect of the eye whereby a person cannot see nearby objects clearly but can see far objects clearly.

182. **Dispersion**: This is the splitting or spreading of white light into its constituent component colours by an optical prism.

183. **Primary colours**: Are those colours of light that cannot be obtained by mixing any other colours.e.g blue,red, green

184. **Secondary colours**: Are those colours of light that can be obtained by mixing two primary colours.e.g yellow,magenta,cyan

185. **Complementary colours**: These are primary and secondary colours which when added together white light is produced.e.g Red and cyan,Green and Magenta,Blue and yellow

WAVES DEFINITIONS:

186. **A wave**: This is a disturbance in the medium which transfers energy from one point to another without causing any permanent displacement of medium itself.

187. **Frequency**: This is the number of oscillations made per second.S.I units **hertz(Hz)**

188. **Velocity of a wave**:Is the distance covered by the wave profile per second in the direction of travel of the wave.S.I units $\mathbf{ms^{-1}}$

189. **Period**: This is the time taken to complete one oscillation.S.I units **s**

190. **Amplitude**: This is the maximum displacement of the particles of the wave from their rest position

191. **Wave length**: This is the distance between two successive crests or troughs.OR is the distance covered by the wave profile in a periodic time. SI units **m**

192. **Interference** : This is the effect which occurs when two waves of the same speed, frequency and wavelength moving in the same direction meet.OR Is the superposition of two coherent waves giving rise to bright and dark bands

193. **Constructive interference**: This is the type of interference which occurs when a crest of one wave meets a crest of another wave.

194. **Destructive interference**: This is the

type of interference which occurs when a crest of one wave meets a trough of another wave.

195. **Electromagnetic waves**: These are waves made up of electric and magnetic vibrations of high frequency.

196. **Progressive waves**:It is a wave in which the disturbance moves from the source to the surrounding places and energy is transferred from one point to another along the wave form .e.g Water waves, All electromagnetic waves

197. **Transverse wave**: This is a wave where the direction of travel of the particles is perpendicular to the direction of travel of the wave.

198. **Longitudinal wave**: This is a wave in which the direction of travel of the particles is the same as the direction of travel of the wave.

199. **Stationary wave(Standing wave)**: This is the wave formed when two identical progressive waves of the same speed,frequency and wavelength moving in opposite direction meet.OR This a wave formed as a result of superposition of two progressive waves of equal amplitude and frequency but travelling at same speed in opposite direction.

200. **Nodes**: This is a point on a stationary wave in which particles are always at rest (zero displacement).OR is a position of zero displacement of a particle of a wave.

201. **Antinodes**: These are points on a stationary wave where particles have maximum displacement.

202. **Wave front**: This is the surface of the wave form on which every particle transmitting the wave is at the same distance from the source of the wave and in the same state of disturbance.

203. **Reflection of the waves**: This is the bouncing off of the waves when they meet a barrier.

204. **Refraction of waves**: This is the change of direction or speed of the waves when they move from one medium to another of different optical densities.

205. **Diffraction of waves**: This is the spreading of the waves of the same speed, frequency and wavelength around a corner or barrier.

206. **Sound**: This is a form of energy produced when particles of the medium are set into vibrations.

207. **Echo**: This is the reflected sound.

208. **Reverberation**: This is the prolonged sound produced when the echo joins its original sound.OR This is the effect which occurs when the original sound produced appears prolonged due to reflections from neighbouring objects

209. **Ultrasonic sound**: This is the sound of very high frequency which cannot be detected by the human ear.

210. **Music**:This is an organized sound produced by regular vibrations.

211. **Noise**: This is a disorganized sound produced by irregular vibrations.

212. **Pitch of sound**: This is the sharpness or mildness of the musical note.OR This is the loudness or softness of sound.

213. **Loudness of sound**: This is the sensation of the musical note in the mind of an individual.

214. **Fundamental note**: This is the lowest musical note produced by any musical instrument.

215. **Fundamental frequency**: This is the lowest predominat frequency note produced by any musical instrument on which other notes are derived from.

216. **Resonance**: This occurs when a body is set into vibrations with its own natural frequency as a result of vibrations received from another body vibrating with the same frequency.

ELECTROSTATICS DEFINITIONS:

217. **Electrostatics**: This is the study of electric charges at rest.

218. **A conductor**: This is a material in which electrons are free to move and conducts heat and electricity easily.e.g All metals ,copper,Iron,zinc

219. **An insulator**: This is a substance in which electrons are not free to move and does not conduct heat and electricity easily.e.g Dry wood,Rubber,Dry cloth

220. **Electrostatic induction**: This is the method of charging a conductor using the charged body without touching it.OR This is the making of a conductor acquire charge by the presence of a near by inducting charge.

221. **Surface density**:This is the quantity of charge per unit area of the surface of the conductor.

222. **Electric field**: This is an area around a charged body where an electric force is experienced.

223. **An electrolyte**: This is a substance when in solution or molten form conducts electricity.

224. **Cell**:This is a chemical device that causes electric current to flow

225. **Primary cells**: These are chemical cells which cannot be recharged when they are used up e.g simple cell,Dry lechlanche cell,wet lechlanche cell

226. **Secondary cells**: These are cells which can be recharged when they are used up by passing current backwards through it.e.g Lead acid accumulator,Nickel alkaline(Nickel cadmium)cell

227. **Polarization**: This is the accumulation of hydrogen bubbles around the copper plate.

ELECTRICITY DEFINITIONS:

228. **Current electricity**: This is the study of electric charges in motion.

229. **Charge**: This is the quantity of electricity that passes any section of a conductor.

230. **Charge density**: This is the charge per unit area.

231. **Current**: This is the rate of flow of charge.SI units **ampere or A**

232. **Electrical Resistance**: This is the opposition to the flow of current with in a conductor.SI units **ohm or Ω**

233. **Potential difference (p.d)**: this is the work done to move one coulomb of charge from one to another.

234. **Electromotive force (e.m.f)**: This is the work done to move one coulomb of charge from one point to another in a circuit in which a cell is connected.OR is the total workdone in joules per ccoulomb of electricity conveyed in a circuit in which the cell is connected.SI units **volts(V)**

235. **Electromotive force of a cell** :This is the energy supplied by the cell to transfer 1C of charge round a complete circuit in which the cell is connected.SI units **ohm or Ω**

236. **Internal resistance of a cell**: This is the opposition to the flow of current with in the cell.OR Is the opposition to current flow offered by the battery itself.SI units **ohm or Ω**

237. **Electrical power**: This is the rate of change of electrical energy.SI unit **watt or W**

238. **A Fuse**: Is a wire of low melting point which heats up and melts to break the circuit when current exceeds the recommended value

239. **Short circuit**: This occurs when the positive terminal is connected to the negative terminal.

MODERN(NUCLEAR) PHYSICS DEFINITIONS:

240. **An atom**: This is the smallest particle of an element that can take part in a chemical reaction.

241. **Atomic number**: This is the number of protons in the nucleus of an atom.

242. **Atomic mass**: This is the number of protons and neutrons in the nucleus of an atom.

243. **Isotopes**: These are atoms of the same element with the same atomic number but different mass number.e.g Neon,hydrogen, chlorine,carbon

244. **Radioactivity**: This is the spontaneous disintegration of unstable nucleus to form a stable nucleus with emission of radiations.

245. **Radioactive decay**: This is a spontaneous break down of radioactive nuclide with emission of radiations.

246. **Nuclear fusion**: This is the process by which two light nuclei combine to form a heavy nucleus with a release of energy.

247. **Nuclear fission**: This is the process by which a heavy nucleus splits into two light nuclei with release of energy.

248. **Activity**: This is the number disintegrations per second.

249. **Half-life**: This is the time taken for a radioactive substance to decay to a half its original value.

250. **Thermionic Emission**: This is a process by which electrons are emitted from the metal surface by application of heat energy.OR Is the process by which hot metals emit electrons from thin surfaces.

251. **Photoelectric Emission**: This is a process by which electrons are emitted from the metal surface when exposed to an electomagnetic radiation of given frequency.

252. **Work function**:This is the minimum energy required to remove an electron from a metal surface.

253. **Diode**: This is an electrical device that conducts electricity in only one direction.

254. **Rectification**: This is a process of changing alternating current to direct current by use of a diode.

255. **Cathode rays**: These are streams of electrons moving at a very high speed.

256. **Radio isotope**:Are nuclides which are unstable and undergo radioactive decay emitting alpha,or beta particles or gamma rays during return to stable form.OR Radioisotope is an isotope which undergoes spontaneous decay (radioactivity) with emission of radiations.OR This is an element which can undergo radioactive decay by emitting alpha, beta and gamma rays.e.g Uranium 235.

257. **X-Rays**: These are electromagnetic radiations of short wavelength produced when cathode rays are stopped by a heavy metal.

258. **Soft X-Rays**: These are produced when a low potential difference is applied a cross the x-ray tube.

259. **Hard X-Rays**: These are produced when a high potential difference is applied a cross the x-ray tube.

MAGNETISM DEFINITIONS:

260. **A magnet**: This is a piece of metal that attracts other metals.

261. **Pole of a magnet**:This is a place in a magnet where the resultant attractive force appears to be concentrated.

262. **Ferro magnetic substances**: These are substances which are strongly attracted by a magnet.e.g Iron,Nickel,cobalt

263. **Non-Ferro magnetic substances**: These are substances which are not attracted by a magnet at all.e.g copper,silver,carbon, wax,glass,wood,plastics,brass

264. **Soft magnetic materials**:Is a magnetic material that is easy to magnetize and demagnetize

265. **Hard magnetic materials**:Is a magnetic material which are difficult to magnetize but retain their magnetism for a long time

266. **Diamagnetic materials** : These are magnetic materials that are slightly repelled by a magnetic field .

267. **Paramagnetic materials**: These are materials that are slightly attracted by a magnetic field and the material does not retain the magnetic properties when the external field is removed.

268. **Magnetic field**: This is the area around a magnet where the magnetic force is experienced.OR Is the region a round a magnet where a magnetic force is experienced

269. **Uniform Magnetic field**:Is one whose flux lines are equally spaced and parallel to each other.

270. **Magnetic screening (shielding)**: This is where the magnetic field lines are prevented from crossing(going through) a given space OR This is protecting a delicate instrument from the magnetic fields using a soft iron ring.

271. **Magnetic saturation**: This is the point where a magnetic substance cannot be magnetized any more.

272. **Neutral point**: This is a point with in the magnetic field where the resultant magnetic flux density is zero.

273. **Angle of dip or Inclination**: This is the angle between the direction of the earths magnetic flux and the horizontal.

274. **Electro magnet**: This is a piece of soft iron that becomes magnetized when an electric current passes through the coil surrounding it.OR This is the magnet produced when an electric current flows in a solenoid with soft iron core.

275. **Electromagnetic induction**: This is the process by which an electric current is induced in coil due to the change in magnetic flux linking the coil.

276. **Self-induction**: This is a process by which an emf is induced due the change of current in the coil itself.

277. **Mutual induction**: This is the process by which emf is induced in coil due to change of current in the nearby coil.

278. **Step up transformer**: This is the type of transformer in which the number of turns in the secondary coil is greater than the number of turns in the primary coil.

279. **Step down transformer**: This is the type of transformer in which the number of turns in the secondary coil is less than the number of turns in the primary coil.

Definitions for S.I units

280. **newton(N)**: This is a force that gives a body of unit mass an acceleration of one metre per second squared.

281. **joule(J)**: This is the work done when a force of one newton moves a body through a distance of one metre in the direction of force.

282. **watt(W)**: This is the rate of transfer of energy of one joule in one second.

283. **Pascal(Pa)**: This is the pressure exerted

when a force of one newton is acting normally on an area of one metre squared.

284. **coulomb(C)**: This is the quantity of electric charge which passes any point in an electric circuit in one second when a steady current of one ampere is flowing through the conductor.

285. **Ampere(A)**: This is a constant current which when flowing in two long straight pallel conductors placed one metre apart in a vacuum produces a force of $2x10^{-7}$ N per metre length between them.

286. **Hertz(Hz)**: This is the frequency of one oscillation made in one second.

287. **Kilowatt hour(kwh)**: This is the rate of working of one thousand watts(1000W) for one hour(1 hour).

288. **ohm(Ω)**: This is the resistance of a conductor in which a current of one ampere flows when a potential difference of one volt is applied across its ends.

289. **A volt (V)**: This is the potential difference between two points when one joule of work is done to move one coulomb of charge from one point to another.

COMMON SCIENTIFIC LAWS ,THEOREMS AND PRINCIPLES

1. **Newton's laws of motion**:

1^{st} Law : It states that everybody continues in its state of rest or uniform motion in a straight line unless compelled by some external force to act otherwise.

2^{nd}Law :The rate of change of momentum of a body is directly proportional to the force applied and takes place in the direction of the force.

$3^{r}d$ Law :To every Action there is an equal and opposite reaction.

2. **Principle of moments**:
It states that when abody is in equilibrium the sum of clockwise moments about any point is equal to the sum of anticlockwise moments about the same point.

3. **The principle/Law of conservation of energy**: It states that energy can neither be created nor destroyed but it only becomes transferred to a different form of energy.

4. **Archimedes' principle**: It states that when a body is wholly or partially immersed in a fluid ,the fluid exerts an upward force on the body equal to the weight of the fluid that is displaced by the body.

5. **The law of floatation**: It states that a floating body displaces its own weight of the fluid in which it floats.

6. **Laws of friction**

(i) Frictional force is directly proportional to the normal reaction.

(ii) Frictional force between two surfaces opposes their relative motion.

(iii) Frictional force is independent of the relative velocity of the two surfaces in motion.

(iv) Frictional force is independent of the area of contact of the given surfaces when the normal reaction is constant.

7. **The principle of transmission of pressure in fluids (Pascal's principle)**: It states that pressure applied at any point of an enclosed fluid is transmitted equally throughout the whole fluid.

OR

Pressure applied to an enclosed fluid is transmitted undiminished to every portion of the fluid and the walls of the containing

vessel

8. **Hooke's law**: It states that the extension of a an elastic material is directly proportional to the applied force provided the proportional limit is not exceeded

9. **Kinetic theory of matter**: It states that matter consists of molecules which are in constant vibratios for solids and continous random motion for gases and liquids.

10. **Kinetic theory of Gases**:Gases consist of molecules which are always in continous random motion colliding with each other and with the wall of the container and the higher the temperature,the higher the kinetic energy of the gas molecules

11. **The principle of conservation of linear momentum**: It states that ,for a system of colliding objects,their total linear momentum in a given direction remains constant provided no external force acts on them.OR when two or more bodies collide the total momentum remains constant provided no external forces act on a system of colliding bodies

12. **Laws of reflection of light**:

    1st **law**:The incident ray, the reflected ray and the normal to the mirror at the point of incidence all lie in the same plane.

    2nd **law**: The angle of incidence is always equal to the angle of reflection.

13. **Laws of refraction of light**:

    1st **law**: The incident and refracted rays, and the normal at point of incidence all lie in the same plane.

    2st **law(Snell's Law)** The ratio of sine of angle of incidence to the sine of angle of refraction is a constant for a ray of light moving from one medium to other medium of different optical density.

    OR

    For two given media , $\frac{\sin i}{\sin r}$ is a constant,where i is the angle of incidence and r is the angle of refraction

14. **The law of reversibility of light**: It states that light will follow exactly the same path if its direction of travel is reversed.OR It states that the path of light rays are reversible.

15. **Boyle's law**: It states that the pressure of a given mass of a gas at constant temperature is inversely proportional to its volume.

16. **Charles' law**: It states that the volume of a fixed mass of gas is directly proportional to the absolute temperature provided pressure is kept constant.

17. **Pressure law**: It states that pressure of a fixed mass of a gas at constant volume is directly proportional to its absolute temperature.

18. **The law of charges(law of electrostatics)**: It states that like charges repel and unlike charges attract each other.

19. **The law of conservation of charge**: Tt states that charge can neither be created nor destroyed but it is transferred from one body to another.

20. **Ohm's law**: It states that current flowing through a conductor is directly proportional to the potential difference across its ends provided temperature and other physical factors are kept constant.

21. **The law of magnetism**: It states that like poles repel and unlike poles attract each other

22. **Domain theory of magnetism**: It states that all magnetic materials are made up of tiny magnets called dipoles which are grouped into regions called domains such that their magnet effects cancel out in unmagnetized materials.

23. **Principle of super position of waves**:It

states that for two wave travelling in the same region, the total displacement at any point is equal to the vector sum of their displacement at that point when the two waves over lap

24. **Lenz's law**: It states that the direction of the induced e.m.f in a coil or closed circuit acts in such a way as to oppose the change that caused it.

25. **Faraday's law**: It states that the magnitude of the emf induced in a coil or circuit is directly proportional to the rate of magnetic flux linked with it.

Common explanations

1. Explain

   (a) why one feels more pain when pricked with a needle(pin) than when pricked with a nail.
   The needle has a tip with a smaller area compared to the nail hence under the same force, the needle ex- erts more or a much higher pressure compared to the nail, therefore causing more pain.

   (b) An elephant is able to walk on a soft ground where as a goat can not
   An elephant has toes made of flat surface area thus exerts less pressure on the ground while a goat has pointed toes thus a small surface area hence exerts much pressure on the ground.Therefore it sinks in the soft ground and the elephant doesnot sink

2. Explain why a long jumper bends knees.
   • The force exerted on a long jumper on coming to rest is F=$\frac{\text{change in momentum}}{\text{time taken}}$
   • As the high jumper flexes his knees, he takes longer time to come to rest.
   • The rate of change of momentum is therefore lowered which leads to a small force to be exerted on his body.
   • He is therefore not hurt(less pain felt).

3. Why is a burn from steam more harmful than one due to boiling water
   When steam makes contact with the body, it condenses on the body thus it loses its hidden (latent) heat to the body.The condensed water also looses heat to the body from 100^0C to the body temperature.The total heat lost by the body by steam is thus greater than that lost by boiling water only.This results into a more burning

4. The specific heat capacity of water is 4200Jkg^{-1}k^{-1}.What does the statement mean.
   It means that one unit mass(1kg) of water requires 4200J of heat energy to raise its temperature by 1K

5. An electric appliance is rated 12V,24W.Explain what is meant by this statement. **It means that when the appliance is connected to a 12V main supply consumes or supplies energy of 24J every second.It means when the appliance is connected to a power source of 12V, it converts energy (electrical) to other source (heat) at a rate of 2000 joules every second**

6. State why the efficiency of a machine is always less than 100%

   - **Some energy is used to overcome friction.**
   - **some energy is used to lift the useless parts of the machine.**

7. State the ways of improving efficiency of the machine

   - **Using light strings and pulleys**
   - **Lubricating the moving parts of the machine**

8. A radio station broadcast on 12metre band. what is meant by the above statement
   It means that the radiowaves used by

that radio station have a wavelength of 12metre

9. Describe an experiment to show diffusion in liquids.

   - **Place clean water in a clean beaker**
   - **Using a capillary tube, place a crystal of potassium permanganate(purple) at the bottom of the beaker**
   - **leave it to stand for some time and observe**
   - **it is observed that the crystals dissolve and spreads throught out the water in the beaker forming a purple solution.**

10. Describe an experiment to determine the centre of gravity of an irregular lamina(object)

    - **Three small holes are made at well spaced intervals round the edge of the irregular object(card board)**
    - **A stout pin is then put through one of the holes and held firmly by a clamp and stand so that the card can swing freely on it.**
    - **A pendulum bob fixed on a string is suspended on the pin**
    - **When the cardboard stops swinging,two marks are made on the cardboard where the string passes**
    - **A plumbline is drawn through the points marked**
    - **The procedure is repeated with the other holes**
    - **The point of intersection of the plumblines is the centre of gravity for the irregular object**

11. An experiment to determine the acceleration due to gravity using a pendulum bob

    - **Apendulum bob is fixed on one end of the string and then suspended on a retort stand.**
    - **The initial length l of the string is measured using a metre rule and recorded**
    - **The bob is displaced through a small angle and released**
    - **The time t ,for 20 oscillations is noted using a stopclock.**
    - **The period T for one oscillation is calculated from $T = \frac{t}{10}$**
    - **The procedure is repeated with different values of the length l of the string**
    - **The measured values are tabulated in a table including values of l, t,T,T^2,**

l(m)	t(s)	T(s)	$T^2(s^2)$

    - **A graph of T^2 against l is plotted giving a straight line through the origin**
    - **The slope M of the graph is calculated**
    - **The acceleration due to gravity g is determined from g=$\frac{4\pi^2}{M}$**

12. Describe an experiment to estimate the thickness of an oil molecule

    - **Dissolve a known volume of oil in a known volume of aliquid to make a solution V**
    - **Fill a clean beaker with water and sprinkle lycopodium powder on the surface of water**
    - **A drop of known volume V is carefully dropped on the water surface with lycopodium powder**

- **Measure and record the diameter d of the oil patch formed**
- **The thickness t of the oil drop is determined from t=$\frac{4V}{\pi d^2}$**

13. Explain why evaporation causes cooling
The liquid is made up of molecules that are in continous random motion moving at different speed.When the temperature of the liquid increases the average kinetic energy of the vapour molecules and hence their mean speed increases.The more energetic molecules escape from the liquid surface leaving behind the less energetic molecules. The average kinetic energy of the molecules reduces and since kinetic energy is directly proportional to temperature,the temperature reduces hence causing cooling

14. **Describe the structure of a gold leaf electroscope**

- **It consists of a metal case with glass windows to protect it from draught.**
- **The metal cap is joined to the metal rod which is supported by an insulator so that charges are not conducted to the metal case.**
- **The rod is joined to agold leaf on a plate and the metal case is earthed by a wire.**

15. State the uses of a gold leaf electroscope

- **To detect the presence of charge on a body**
- **To test the sign of the charge on the body**
- **To test for insulation and conduction properties**
- **To measure potential difference between two points**

16. Sound is clearer at night than during day. Explain this phenomenon.
During day the air near the earth surface is warm thus less dense than the one above it. Sound produced during the day travels from less dense medium to a denser medium and is therefore refracted upwards thus sound is not clear during the day. At night, air is colder thus its more dense than during the day. The air nearer the atmosphere is denser than the one above it. The sound produced in the lower dense air will then be totally internally reflected within the lower denser air, without wastage in the atmosphere.

17. Use the kinetic theory of matter to explain the gas laws
Boyle's law:
When the volume of the fixed mass of a gas is reduced at constant temperature the speed of the gas molecules increases hence the rate of collision with the walls of the container increases thus the pressure of the gas increases since the temperature is constant(pressure is inversely proportional to volume. However increasing the volume reduces the pressure of the gas since the speed of the molecules of the gas reduces hence reducing on the rate of collision with the walls of the container.
Charles' law:
When the temperature of the fixed mass of a gas is increased at constant pressure the speed of the molecules of a gas increases and the rate of collision with the walls of a container increases hence the volume of the gas increases to keep the pressure constant.
Pressure law:
When the temperature of the fixed mass of a gas is increased at constant

volume the speed of the molecules of a gas increases and the rate of collision with the walls of a container increases hence the pressure of the gas increases to keep the volume constant

18. Explain why a ship made of steel can float on water of lower density. **A ship made of steel floats because it is made hollow and contains air so the average density of the ship is less than that of water.**

19. Describe an experiment to verify the law of floatation

    - A measuring cylinder is half filled with water and the reading, V_1 is noted.
    - An ordinary test tube with cotton loop attached is then placed in the measuring cylinder.
    - Lead shots are added to the test tube little at a time until the test tube floats upright.
    - The new water level reading V_2 of the measuring cylinder is noted .
    - The difference between the final volume V_2 and initial volumeV_1 (V_2 -V_1)is calculated and gives the volume of water displaced by the test tube.
    - The mass of water displaced is equal to its volume since the density of water is $1gcm^{-3}$.
    - The test is removed from the cylinder ,dried and then weighed,using the cotton loop to attach it to the balance hook
    - The experiment is repeated several times,each time adding a little extra lead shot and the results are tabulated.
    - It is noted from the table that the weight of the test tube with lead shots is equal to the weight of water displaced, hence verifying the law of floatation.

Dos and Don'ts(535/1 and 535/2)

1. Force diagrams to have arrows(directions)
2. Include conditions for some Laws and principles e.g provided no external force $\cdots$
3. Stating a formula earns you a mark
4. Diagrams must be working,Do not label what you are not sure about.No marks for correct explanations coming from a wrong diagram
5. Cathode rays travel in straight lines but not in a straight line
6. Always start with the questions you know most to gain confidence
7. spend a maximum of 25 minutes on each question for paper 2
8. Do not answer more than the required number of questions
9. Always label your diagrams since they normally take any four correctly labelled parts
10. For electricity numbers that require calculation of costs must include the units e.g Shs or UGX
11. Unless when insructed to draw the diagram but otherwise donot draw when not asked because any error made on the drawing makes everything wrong
12. Avoid using symbols that are not scientifically known .for example D for density instead of using ρ
13. Questions that require describing,and explaining ,candidates should give their observations,why it happens by explainig the hidden physics concept and then make their conclusion.
14. mention the use of each part of the diagram in an experiment.

535/3 Physics Practical

Nature of the practical examination

1 The paper is divided into three main parts. Mechanics,heat and light,and eletricity.The paper is done for $2\frac{1}{4}$hours

2 Candidates are required to attempt two questions of which one is a compulsory number (mechanics) and one optional question either from light and electricity

3 The Paper is marked out of 60 marks were each number is carrying 30 marks.

DOS AND DON'TS

1. Data must be presented in column form , both horizontal and vertical lines should be drawn.Related values should be next to each other and carefully written using a blue or black ink.E.G

L(m)	$L^2(m^2)$	t(s)	T(s)	$T^2(s^2)$	$\frac{1}{T^2}$ (s^{-2})

2. The units written should be in brackets ( ) i.e In closed brackets.e.g (kg),(m),(s),(N)
3. Candidates must use the best handwriting possible that is legible to the examiner in order to maximise the marks in the table.
4. Letter construction is still challenging to candidates therefore they should polish their handwriting .e.g 2,7,m,kg

   Treatment of values
   This is the gist of the practical ,that candidates should be familiar with.understanding the treatment of values,puts a candidate at higher chances of scoring good grades in practicals.
5. Significant figures.
   The rules for S.Fs should be very clear to candidates.
   - All non zero digits in a variable (number) are significant.e.g 4321(4 S.F),26(2

S.F)

- All zeros occuring between non zero digits are significant figures.e,g 1.004(4 S.F),1002(4 S.F)
- All zeros to the right of the last non zero digit are not significant if its obtained as a result of rounding off e.g 6259=6260(3 S.F).
  But if the trailing zero is not obtained as a result of rounding off , then it is significant.e.g 72x10=720(3S.F)
- All zeros to the right of a non zero digit in the decimal part are significant e.g 1.4750(5 S.F),1.02(3S.F)
- Zero's before non zero digits are not significant e.g 0.06(1 S.F),0.0054(2 S.F)

SI Units

6. Units that are named after scientists must have their symbols written in capital letters.e.g

Name	Formula	symbol
amperes		A
Volts		V
newtons	Mg	N
Omega	$\frac{V}{I}$	Ω
Grammes		g
watts	VI	W
centimetres		cm
joules		J
metres		m

7. Division and multiplication of variables .Candidates must be very careful when dealing with quantities that involve products and quotients.
   When multiplying two digits consider the least number of significant figures.
   e.g(1 S.F) X(2 S.F)= 1S.F. When dividing variables consider the least number of significant figures.e.g $\frac{(1S.F)}{(2S.F)}$=1S.F
8. For two varying variables in the table, when multiplying and dividing first carry out a test for the two quantities which yield the largest product and quotient respectively,take into account the least significant numbers of the two quantities and maintain the rest of the variables to that number of decimal places .
9. In case the given values are not written to the accuracy of the instrument being used then take this into consideration.
   E.V >G.V>C.V>F.V
10. use of Appropriate scale:The scale used should be a multiple of 1,2, 5 and at worst a sub multiple of 2.5.The scale mustnot be written on the graph paper since it doesnot carry any mark but if the candidate wishes to write it he/she can write it in the answer booklet.
11. Graph work.Axes must be well labelled,the graph must have a centred title and the starting values must be a multiple of the scale used.
    The vertical slope line should cover atleast 12cm and the horizontal line slope should cover atleast 10cm thereby making a Right Angled Triangle(RAT).
12. Slope:marks are given for correct substitution,arithmetic and Accuracy (value and correct units).
13. Trigonometric functions of sin, cos, tan, *log* should be written to 3 d.ps

REFERENCE BOOKS

1 Sears.zemansky.young ,6th edition ,college physics ,Addison wesley publishing company

2 A.F ABBOTT ,3rd edition ,ordinary level physics,

3 M.NELKON and M.PARKER ,5th edition A dvanced level physics ,East African educational publisher

WISDOM CORNER

1. *Our greatest weakness lies in giving up.The way to success is trying one more time*
2. *We must accept finite dissappointments but never loose infinite hope*
3. *Procrastination makes easy things hard and hard things harder*
4. *The people who achieve incredible success in the world aren't always the most naturally brilliant but are rather the hardest workers*
5. *The road to success is often a lonely one*
6. *you are braver than you believe,stronger than you seem and smarter than you think*
7. *The more that you read,the more things you will know,the more that you learn,the more places you will go.*
8. *Every successful person has a painful story. Every painful story has a successful ending.Accept the pain and get ready for success*
9. *Successful people have two things on their face silence (to avoid problems) and smile (to solve problems)*
10. *The problem is most people give up during the struggle · Never knowing how close they were to victory!!The only way you'll fail is if you QUIT. NEVER QUIT*

For any inquiries,corrections and additions you can reach me on the following addresses:
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THE TEN COMMANDMENTS OF EDUCATION

1. THOU SHALT NOT HAVE ANY PPRIORITY BEFORE ME AS LONG AS YOU ARE STILL IN SCHOOL.
2. THOU SHALT NOT BOW DOWN TO ANY LAZINESS OR WORSHIP SLEEP FOR I EDUCATION THE KEY TO YOUR FUTURE WILL PURNISH YOU WITH ALL KINDS OF FAILURE.
3. DONOT USE MY KNOWLEDGE OR MATERIALS FOR ANY EVIL PURPOSES LIKE BURGLARY, THEFT CORRUPTION OR EMBLEZZLEMENT.
4. OBSERVE ALL CLASS DAYS AND KEEP YOURSELF BUSY BY SEEKING ME (EDUCATION)
5. RESPECT YOUR CLASS LEADERS, AUTHORITY IN SCHOOL.
6. DONOT MURDER YOUR TEACHERS' EFFORTS. READ HARD AND PASS WITH FLYING COLOURS
7. DONOT COMMIT CRIMES WITH YOUR PARENTS' SCHOOL FEES BY USING IT FOR DANCES, DRUGS, GAMBLING, DRINKING OR SEX.
8. DONOT STEAL EXAMS OR EVEN TEST PAPERS OR ENGAGE IN ANY FORM OF EXAMS MALPRACTICES.
9. THOU SHALT NOT BEAR FALSE WITNESSES WHEN THOU LAST BEEN CAUGHT IN WRONG. TAKE RESPONSIBILITY FOR YOUR ACTIONS AND SUFFER THE PURNISHMENT.
10. THOU SHALT NOT DESIRE ANOTHER MAN'S GOOD MARKS AND END UP STEALING THEM, BOOKS OR EVEN PRAYING FOR THEIR DOWN FALL.

BY M .G. GRAHAM UNIVERSITY OF LONDON UNITED KINGDOM (UK)