

List of definition for SPM Physics

Chapter 1: Introduction to Physics				
No	Terms	Definition	Related Formula	SI unit
1	Physics	A branch of science centred on the study of matter, energy and connection between them.		
2	Physical Quantity	The quantity that can be measured .		
3	Base Quantity	Physical quantity that cannot be defined.		
4	Derived Quantity	Physical quantity derived from base quantity by multiplication or division or both.		
5	prefix	A group of letter placed at the beginning of a word to modify its meaning.		
6	scalar quantity	The quantity which has only magnitude.		
7	vector quantity	The quantity that has both magnitude and direction.		
8	resultant vector			
9	systematic errors	cumulative error that can be compensated for if the error are known		
10	random errors	arise from unknown and unpredictable variations in condition will produce a different error every time you repeat the experiment		
11	parallax error	it's an error in reading an instrument because observer's eye and pointer are not in a line perpendicular to the plane of a scale		
12	consistency	the ability to register the same reading when a measurement is repeated		
13	accuracy	the degree of closeness to the actual value.		
14	sensitivity	The ability of an instrument to detect a small change in measurement.		

Chapter 2: Forces and motion.				
No	Terms	Definition	Related Formula	SI unit
15	Linear motion	a straight line motion.		
16	Distance, s	The length of the actual path travelled.	Area under graph v vs. t	m
17	Displacement, s	The shortest distance travelled in a specific direction.		m
18	Speed, v	1. The rate of distance changed. 2. The change of distance per unit time.	$v = \frac{\Delta s}{t}$, (gradient of graph S vs. t)	$m s^{-1}$
19	velocity, v	1. The rate of displacement changed. 2. The displacement change per unit time.	$v = \frac{\Delta s}{t}$, (gradient of graph s vs. t)	$m s^{-1}$
20	Acceleration, a	1. The rate of velocity changed. 2. The velocity change per unit time.	$a = \frac{v-u}{t}$, (gradient of graph v vs. t)	$m s^{-2}$
21	Frequency (f)	Number of complete oscillation made in a unit of time.	$f = \frac{1}{T}$	s^{-1} or Hz
22	Tick / time interval (T)	Time taken to produced two successive dots by a ticker timer.	$T = \frac{1}{f}$	s
23	Inertia	1. Is the tendency of an object to remain at rest, or keep moving at constant speed in a straight line.		

		2. Is the property of a mass which resists change from its state of rest or motion.		
24	Newton's First Law of motion	State that an object will remain at rest or continue with a constant speed in a straight line (i.e. constant velocity) unless acted on by an unbalanced force.		
25	Newton's Second Law of motion	State that the force acts on an object is directly proportional to the rate of change of momentum.	$F \propto \frac{mv - mu}{t}$	N
26	Newton's Third Law of Motion	State that an action force will produce a reaction force, with same magnitude by act in opposite direction.		
27	Momentum	The product of mass and velocity.	$p = m \times v$	$kg \ m \ s^{-1}$
28	Impulse	Change in momentum.	$mv - mu = Ft$	$kg \ m \ s^{-1}$
29	Principle of conservation of momentum	State that if there is no external force acting on the objects, the total momentum before collision is equal to the total momentum after the collision.	$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$	
30	Elastic collision	Collision of particles which its total kinetic energy is conserved. (particles does not stick together after collide)		
31	Inelastic collision	Collision of particles which its total kinetic energy is not conserved. (particle stick together after collide)		
32	Impulsive force	Force which only act within a very short duration.	$F = \frac{mv - mu}{t}; t \text{ is small}$	
33	Balanced forces	Do not affect an object's motion. The object will remain stationary, or continue to move at a constant velocity in a straight line.		
34	Unbalanced forces	Object will accelerates or decelerates in a straight line.		
35	Resultant force	The sum of forces which act on an object.		
36	Gravitational field	Region in which an object experiences gravitational attraction/pull towards the centre of the earth.		
37	Gravitational acceleration, g	Accelerate due to the pull of the gravitational force.	$g = 10 \ m \ s^{-2}$	
38	Gravitational field strength, g	gravitational force which acted on a unit of mass	$g = \frac{W}{m}$	$g = 10 \ N \ kg^{-1}$
39	Free fall	Fall due to the gravitational pull only.		
40	Weight	The product of mass and gravitational field strength.	$W = m \times g$	N
41	Mass	The amount of particles consist in an object		kg
42	Work	The product of force and displacement of an object in the direction of the applied force.	$W = F \times s$	J or Nm
43	Energy	An ability to do work.		J or Nm
44	Kinetic energy	Is the energy possessed by a body by virtue of its motion.	$E.K. = \frac{1}{2}mv^2$	J
45	Power, P	The rate of doing work or using energy.	$P = \frac{E}{t}$	W (Watt) $J \ s^{-1}$
46	Conservation of energy	The total amount of energy is unchanged during the transformation of energy from one form to another.		
47	Efficiency, ε	Is the percentage of useful energy transformed compared to total energy input.	$\varepsilon = \frac{\text{useful energy transformed}}{\text{Total energy input}} \times 100\%$	
48	Gravitational Potential Energy	Is the energy store by an object due to its position.	$G.P. = mgh$	J
49	Elastic Potential Energy	1. Energy that store in a spring which is compressed or stretched. 2. The work done to compress / stretch the spring.	$E.P. = \frac{1}{2}kx^2 \text{ or } \frac{1}{2}Fx$ (Area under graph F vs. x)	J
50	Elasticity	The characteristic of an object which can return to its original shape		

		after the applied force is removed.	
51	Extension, x	Difference in length of an elastic object compared to its original length.	$x = l - l_0$
52	Elastic limit	Is a limit when it is not exceeded, the spring cannot be able to return to its original length.	
53	Hooke's Law	States that the force, F , applied to a spring is directly proportional to the spring's extension or compression, x .	$F = kx, \text{ or}$ $F = k(l - l_0)$
54	Elastic constant, k	is the force required to produce a unit of extension or compression.	$k = \frac{F}{x}$, gradient of graph F vs. x $N m^{-1}$

Chapter 3: Forces and Pressure

No	Terms	Definition	Related Formula	SI unit
55	Pressure, P	The force acting normally on a unit of surface area.	$P = \frac{F}{A}$	$Pa \text{ or}$ $N m^{-2}$
56	Density, ρ	The mass consists in a unit volume.	$\rho = \frac{m}{v}$	$kg m^{-3}$
57	Pascal's Principle	State that in a fluid, an externally applied pressure is transmitted uniformly in all directions.	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$	Pa
58	Archimedes' principle	State that an object, whether completely or partially immersed in a fluid, is acted on by a buoyant force, which is equal to the weight of the displaced fluid.	$B = V\rho g$	N
59	Bernoulli's Principle	State that in a steady flow of a fluid, the pressure of the fluid decreases when the velocity of the fluid increases.		
60	Apparent weight	The weight of an object in a fluid.		
61	Real weight	The weight of an object in the air.		

Chapter 4: Heat

No	Terms	Definition	Related Formula	SI unit
62	Thermal equilibrium	The net rate of heat transfer between two bodies is zero.		
63	Thermal contact	Two objects are in thermal contact if heat can flow between them.		
64	Heat capacity	The amount of heat energy needed to increase the temperature of an object by 1 degree Celsius.	$C = \frac{Q}{\theta}$	$J ^\circ C^{-1}$
65	specific heat capacity	The quantity of heat energy required to increase the temperature by 1 kg of substance by 1 degree Celsius or 1 k.	$c = \frac{Q}{m \theta}$	$J kg^{-1} ^\circ C^{-1}$
66	latent heat	The total energy absorbed or released when a substance completely changed its physical state at a constant temperature.		
67	latent heat of fusion	The heat absorbed when a solid melts at constant temperature.		
68	latent heat of vaporisation	The heat absorbed when a liquid change into vapour at a constant temperature		
69	specific latent heat	Amount of heat required to change the phase of 1 kg of a substance at a constant temperature	$L = \frac{Q}{m}$	$J kg^{-1}$
70	specific latent heat of fusion	Amount of heat energy required to change 1 kg f a substance from a solid phase to a liquid phase without a change in temperature	$L = \frac{Q}{m}$	$J kg^{-1}$

71	specific latent heat of vaporisation	Amount of heat energy required to change 1 kg of a substance from liquid phase to the gaseous phase without a change in temperature at its boiling point.	$L = \frac{Q}{m}$	$J kg^{-1}$
72	Boyle's law	The relationship between the pressure and volume of a given mass of gas at a constant temperature	$P_1V_1 = P_2V_2$	
73	Charles' law	The relationship between temperature and volume of a given mass of gas at a constant pressure.	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$	
74	pressure law	The relationship between the pressure and temperature of a given mass of gas at a constant volume.	$\frac{P_1}{T_1} = \frac{P_2}{T_2}$	
75	Absolute zero	The lowest temperature can be achieved.	0 K = -273 °C	

Chapter 5: Light

No	Terms	Definition	Related Formula	Si Unit
76	Law of reflection	-angle of incidence, i , is equal to the angle of reflection, r , ($\angle i = \angle r$) -the incidence ray, normal, and reflected ray will all lie on the same plane.		
77	Refraction	is a bending of the path of light due to a change in speed as it enter a medium of different optical density		
78	Angle of incidence, i	The angle between normal and incident ray.		
79	Angle of reflection, r	The angle between normal and reflected ray.		
80	Refractive index, n	ratio of $\sin i$ to $\sin r$	$n = \frac{\sin i}{\sin r} = \frac{D}{d} = \frac{C}{v} = \frac{1}{\sin c}$	
81	Angle of refraction, r	The angle between normal and refracted ray.		
82	Snell's law	Ratio of $\sin i$ to $\sin r$ is a constant which the constant is called refractive index.		
83	Critical angle, c	Is the angle of incidence which produces an angle of refraction of 90 degree as light transmitted into a medium in which it travels at higher speed.		
84	total internal reflection	When light travel from higher dens medium to a lower dens medium, if the angle of incidence i is greater than the critical angle, c , and the light is no longer refracted but is internally reflected.		
85	concave lens	Is a lens which the middle is thinner than the edge.		
86	convex lens	Is a lens which the middle is thicker than the edge.		
87	magnification of image, M	The magnification of an image is given by the ratio of an image distance, v to object distance, u .	$M = \frac{v}{u}$	

Chapter 6: Wave

No	Terms	Definition	Related Formula	SI unit
88	Transverse wave	a wave in which the vibration of particle in the medium at right angle to the direction of a propagation of the wave		
89	Longitudinal wave	the wave in which the vibration of particle in the medium is parallel to the direction of a propagation of the wave		
90	wavelength, λ	the distance between two successive point of the same phase in a wave		

91	Amplitude, A	the maximum displacement from its equilibrium position		
92	Period, T	the time taken to complete an oscillation		
93	frequency, f	the number of complete oscillation made by a vibrating system in 1 second	$T = \frac{1}{f}$	
94	wave speed, v	the distance move by a wave in 1 second	$v = f\lambda$	
95	wave front	a imaginary line or plane on which the vibration of every point on it a in phase and are at the same distance from the source of a wave		
96	Damping	the decreases in the amplitude of an oscillating system		
97	Internal damping	the loss of the energy due to the extension and compression of the molecule in system		
98	External damping	the loss of energy to overcome frictional force		
99	Resonance	is occur when an oscillating system driven at its natural frequency by a periodic force		
100	Incident wave	the wave before its strike obstacle		
101	Reflected wave	the wave which has undergone a change in direction of propagation after reflection		
102	Reflection	the speed of a wave change as its move from one medium to another		
103	Diffraction	phenomenon in which wave spread out as they pass through an aperture or round small obstacle		
104	Principle of superposition	at any instant the wave displacement of a combine motion of any number of interacting wave at a point is a sum of the displacement of all component wave at the point		
105	Interference of wave	the superposition of two wave originating from two coherent sources	$\lambda = \frac{ax}{D}$	m
106	Sound wave	can be imagined as a series of compression and rarefaction of air molecules.		
107	Loudness	is a measurement of amplitude of sound		
108	Pitch	is a measurement of frequency of sound		
109	Electromagnetic wave	Consist of a combination of oscillating electric and magnetic fields perpendicular.		
110	Audio frequency	sounds of frequencies in the range of 20Hz to 20kHz, which can be heard by human.		
111	Electromagnetic spectrum	is a wide ranges of frequency of electromagnetic waves.		

Chapter 7: Electricity				
No	Terms	Definition	Related Formula	SI Unit
112	Current	(1) The rate of charges flow. (2) The amount of charge flow in a unit of time.	$I = \frac{Q}{t}$	$A \text{ or } J s^{-1}$
113	Potential Difference	Between two points of a conductor is the work done to move a Coulomb of charge between them.	$V = \frac{W}{Q}$	$V \text{ or } J C^{-1}$
114	Resistance	The ratio of potential difference across the material to the current.	$R = \frac{V}{I}$	$\Omega \text{ or } V A^{-1}$
115	Ohmic conductor	Any other conductors, other than metallic conductors, which obey Ohm's Law, are described as ohmic conductors.		

116	Electromotive force, e.m.f./ E	Is the energy supply by a source (of electric supply, such as cell, dynamo etc) in driving a unit charge around a complete circuit.	$e.m.f. = \frac{E}{Q}$ $E = V + Ir$ $E = IR + Ir$	V or $J C^{-1}$
117	Internal resistance, r	Of a source or cell is the resistance against the moving charge due to the electrolyte.		
118	Ohm's Law	The current flowing through an ohmic conductor is directly proportional to the potential difference across its end, provided that its temperature and the other physical conditions (such as temperature) remain constant.	$I \propto V$	
119	Electrical energy	The energy carried by electrical charges which can be transformed to other forms of energy by the operation of an electrical appliance.		$E = VIt$ J
120	Power	Is defined as the rate of energy dissipated or transferred.	$P = VI$	w or $watt$ or vA
121	Superconductor	conduct electricity without lost of energy.		
122	Critical temperature	(Highest) Temperature where a superconductor conducts electricity without lost of energy.		
123	Power rating of a bulb, 240 V, 30 W	is defined as 30 J of energy transferred / dissipated in a second, when the bulb is operates at normal voltage of 240 v, a.c..		
124	1 kWh	is the electrical energy used when the power of an electrical appliance is 1kW is used for 1 hour.		
125	Electric field	is a region which an electrical charge experienced a force.		
126	Effective resistance	sum of resistance in a circuit.	$R = R_1 + R_2 + R_3$ $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$	

Chapter 8: Electromagnetism

No	Terms	Definition	Related Formula	SI Unit
127	electromagnets	is a temporary magnet. it is made by winding a coil of insulated wire round a soft iron core.		
128	magnetic force	is exerted on a conductor carrying a current in magnetic field		
129	catapult field	the field from the current in conductor and the uniform external field combine to form resultant field known as a catapult field.the magnetic field line wrap round the conductor like the stretched catapult		
130	electromagnetic induction	when a wire moves and cut magnetic field line an e.m.f is induced across the wire.		
131	Lenz law	the direction of the induced current is such that the change producing it will be opposed		
132	Faraday law	the magnitude of the induce current is directly proportional to the rate of change or the rate of cutting of the magnetic flux		
133	direct current, d.c.	Generator produces a current which flow in one direction only.		

134	alternating current, a.c.	Generator produces a current which flow to and fro in two opposite direction in the circuit.		
135	transformer	made up of two coil wound on a soft iron core. The coil connected to a power supply is the primary coil while the other is the secondary coil	$\frac{V_s}{V_p} = \frac{N_s}{N_p}$	
136	step-up transformer	supplies an output voltage that is higher than the input voltage		
137	step-down transformer	supplies an output voltage that is lower than the output voltage		
138	efficiency	the percentage of power input compare to power output.	$\varepsilon = \frac{V_{out} I_{out}}{V_{in} I_{in}} \times 100\%$	
139	national grid network	is a network of mostly overhead cables supported on pylons. The network system receives power from power station and delivers to factory and home.		
140	Magnetic field	is the region where an object experienced magnetic force.		

Chapter 9: Electronics

No	Terms	Definition	Related Formula	SI unit
141	Thermionic emission	a process involving the emission of a electron from a hot metal surface		
142	Cathode ray	beams of fast-moving electrons		
143	The cathode-ray oscilloscope	a measuring and testing instrument used in the study of electricity and electronics		
144	Conductors	materials which allow current to flow through them easily		
145	Insulators	materials which do not conduct electrical current		
146	semiconductor	a materials whose resistant is between those of good conductor and those of good insulator		
147	doping	a process of adding a small amount of impurities into a crystalline lattice of semiconductor to increase their conductivity		
148	rectification	a diode can convert alternating current into direct current		
149	half-wave rectification	the process of rectification using a diode which allow current to flow in the half-cycle		
150	full-wave rectification	the process of rectification using 4 diode to allow current to flow in the complete cycle and in the same direction		
151	transistor	consist of a specially treated semiconductor crystal. it has 3 terminal instead of 2.	$I_E = I_B + I_c$	
152	n-p-n transistor	consist of a layer of p-type semiconductor sandwiched between two layer of n-type semiconductor		
153	p-n-p transistor	consist of a layer of n-type semiconductor sandwiched between two layer of p-type semiconductor		
154	logic gate	electronic switch with 1 or more input and 1 output only		
155	truth table	show the result of every possible output given every possible input		
156	Depletion layer	is form when there is the decrease free electrons and holes around the junction of a diod.		

Chapter 10: Radioactivity				
No	Terms	Definition	Related Formula	
157	Radioactivity	is the spontaneous disintegration of an unstable nucleus accompanied by the emission of energetic particles or rays (photons).		
158	Isotopes	are atoms/elements which have the same proton number but different nucleon numbers.		
159	proton number, Z	The number of protons in a nucleus.		
160	nucleon number, A	is the total number of protons and neutrons in a nucleus. It is also known as the mass number.		
161	Alpha ray	nucleus of helium atom.		
162	Beta ray	high-energy electron.		
163	Gamma ray	high-energy electromagnetic wave		
164	Background count	The background radiation is partly due to the presence of radioactive material in the earth and nearby surroundings and partly due to cosmic rays from outer space.		
165	Cosmic ray	is the gamma rays from outer space.		
166	Radioactive decay	refers to the process of an unstable nucleus of a radioactive element disintegrate (break-up) in order to become more stable.		
167	Half life	is the time taken for the number of atoms to decay to half its initial value.		
168	Nuclear fission	is the splitting of a heavy nucleus into two lighter nuclei.		
169	Chain reaction	is a self-sustaining reaction in which the products of a reaction can initiate another similar reaction.		
170	Nuclear fusion	is the combining of two lighter nuclei to form a heavier nucleus.		
171	Nuclear energy		$E = mc^2$	<i>eV or J</i>
172	Atomic mass unit, a.m.u./u	unit of mass for atom and subatomic particles such as proton, neutron and electron.	$1u = 1.66 \times 10^{-27} kg$	
173	1u	is $\frac{1}{12}$ of the mass of carbon-12 atom.		
174	Critical mass	Minimum mass required for a chain reaction to occur.		
175	Somatic effects	appear in the person exposed to radiation.		
176	Genetic effect	appear in the future generations of the exposed person as a result of radiation damage to reproductive cells.		