MARKING SCHEME PHYSICS MODEL PAPER CLASS 9

SCORING KEYS SECTION: A (MCQs)

Key- MCQs			
1.	d-5	7.	c-weight
2.	a-5 m/s^2	8.	b-360 watt
3.	c-3 m/s	9.	a- Kinetic energy
4.	d- unit less	10.	b- Pascal law
5.	a-$\sum$ T=0	11.	c- 98.6^0
6.	d-90^0	12.	a- Radiation

RUBRICS

SECTION-B

Item no 1	Question (description)	Reference
i.	Describe at least **Four** crucial roles of Physics in daily life? **Possible answers** 1. Physics is the science that helps us understand various natural phenomena that are embedded in our reality. (01) 2. Help in daily life activities (walking, cutting, watching, listening, operating machines etc. (01) 3. Provide understanding for developing new instruments in field of heath science (CT-Scan, MRI etc.). (01) 4. Help us in information technology (computer, cells, internet, etc.). (01)	Text book KPTBB For Grade 9 Book page 03
Marking	1+1+1+1	4
ii.	Differentiate scalars and vectors with suitable examples? **Possible answers** 1. Scalar is a physical quantity that has only magnitude, but no direction.eg mass, density, speed, power, etc. (01) Vector is a physical quantity that has magnitude and direction.eg displacement, velocity, acceleration, force, etc. (01) 2. Scalar quantity is one dimensional whereas Vector quantity can be one, two or three dimensional. (01) 3. Scalars are added by arithmetic ordinary rules, whereas vectors are added by head to tail rule, graphical method. (01) 4. Scalars have simple presentation whereas boldface letter/ arrow above or below the letter is used for vectors. (01)	Text book KPTBB For Grade 9 Book page 32
Marking	1+1+1+1	4
iii	Define momentum along with its mathematical form and unit? Also write at least **Two** factors on which it depends? **Possible answers** 1. It is quantity of motion in body and defined as **product of the mass of a particle and its velocity**. (01) 2. It is denoted by P and mathematically written as Momentum = mass x velocity P = mv (01) 3. Its unit is N-m/s, and it is a vector quantity. (01) 4. It depends on mass and velocity of body. (01)	Text book KPTBB For Grade 9 Book page 69
Marking	1+1+1+1	4
iv.	Define friction and write at least **Three** methods to reduce friction? **Possible answers** 1. Friction is a force **between two surfaces** that are sliding, or trying to slide, across each other. For example, when you try to push a book along the floor, friction makes this	Text book KPTBB For Grade 9 Book page 79-80

	difficult. Friction always works in the direction **opposite** to the direction in which the object is moving or trying to move. Friction always **slows** a moving object down. (01) 2. Make the surfaces smooth. (01) 3. Lubrication like oil, grease, etc. (01) 4. Make the object more streamlined/ sharp or Use of ball bearings etc. (01)	
	1+1+1+1	4
v.	Calculate the mass of earth by using Newton's law of gravitation? **Possible answers** Step **1**: (01) **Data:** g=9.8m/s G=6.673 × 10^{-11} Nm^2/kg^2 Re=6.4 ×10^6 m Me=? Step **2**: (01) $F = \frac{GM_e m}{Re^2}$ ➊ $F = w = mg$ ➋ $F = \frac{GM_e m}{Re^2}$ ➌ $\cancel{m}g = \frac{GM_e \cancel{m}}{Re^2}$ $g = \frac{GM_e}{Re^2}$ Step **3**: (01) $M_e = \frac{g{R_e}^2}{G}$ Step **4**: (01) $M = \frac{9.8\times(6.4\times10^6)^2}{6.673\times10^{-11}}$ $M = 6 \times 10^{24} kg$	Text book KPTBB For Grade 9 Book page 133-134
Marking	1+1+1+1	4
vi.	Define heat and temperature. Write at least two differences between heat and temperature? **Possible answers** 1. Heat is the total energy of the motion of the molecules of a substance. OR The amount of energy flow from hot body to cold body. (01) 2. Temperature is average kinetic energy of molecule in a body. (01) 3. The heat of an object is the total energy of all the molecular motion inside that object. Whereas Temperature is the measure of the thermal energy or average heat of the molecules in a substance. (01) 4. The unit of heat is Joule whereas temperature unit is kelvin OR Heat has the ability to do work whereas temperature is used to measure the degree of heat etc. (01)	Text book KPTBB For Grade 9 Book page 203-204
Marking	1+1+1+1	4

vii.	Derive K. E= ½ mv^2 **Possible answers** Derivation of the equation for kinetic energy: Step **1**: (01) Consider a body of mass "m" starts moving from rest. After a time, interval "t" its velocity becomes V. If initial velocity of the body is Vi = 0, final velocity vf = V and the displacement of body is "d". Then Step **2**: (01) First of all, we will find the acceleration of body. Using equation of motion $2aS = V_f^2 - V_i^2$ ⟶ ❶ Putting the above-mentioned values in eq ❶ $2ad = V^2 - 0$ $a = V^2/2d$ ⟶ ❷ Step **3**: (01) Now force is given by $F = ma$ ⟶ ❸ Putting the value of acceleration from eq ❷ in eq ❸ $F = m(V^2/2d)$ As we know that Work done = f.d Step **4**: (01) Putting the value of F Work done = $(\frac{mv^2}{2d})(d)$ Work done = $\frac{mv^2}{2}$ OR Work done = $\frac{1}{2}$ mv^2 Since the work done is motion is called "Kinetic Energy" i.e., K.E. = Work done OR K.E. =$\frac{1}{2}mv^2$.	Text book KPTBB For Grade 9 Book page 153-154 Unit -6
viii.	Define power along with its mathematical form and unit. Is it is a scalar or vector quantity? **Possible answers** 1. Rate of doing work, is called power OR Product of force and velocity of the body is called power, and it is the amount of energy consumed per unit of time. (01) 2. It can be calculated by dividing work done by time. The formula for power is given below. Power = work/time i.e., P= w/t here, P is the power, W is the work done and t is the time taken. (01) 3. The SI unit of power is Joules per Second (J/s), which is termed as Watt. Watt can be defined as the power needed to do one joule of work in one second. The unit Watt is dedicated in honor of Sir James Watt. (01) 4. As power doesn't have any direction, it is a scalar quantity. (01)	Text book KPTBB For Grade 9 Book page 164165 Unit -6
Marking	1+1+1+1	4
ix.	State Pascal 's Law and also write **<u>Three</u>** applications in daily life? **Possible answers** 1. Pascal's Law states that the pressure applied to a fluid in a closed container is transmitted equally to all points in the fluid and act in all directions of the container. Pascal's Law is applicable to both solids and liquids. (01) 2. A hydraulic lift operates on Pascal's law. It has a hydraulic apparatus which is used to lift heavy objects. (01) 3. Hydraulic jacks, which works on principle of Pascal's Law. (01)	Text book KPTBB For Grade 9 Book page 169-170 Unit -7

	4. Hydraulic press brakes also work on principle of Pascal's Law. (01)	
Marking	1+1+1+1	4
x.	Define pressure? show that liquid pressure p=ρgh. **Possible answers** 1. Pressure due to the weight of a liquid of constant density is given by **p=ρgh**, where p is the pressure, h is the depth of the liquid, ρ is the density of the liquid, and g is the acceleration due to gravity. (01) 2. Consider a liquid in container of mass m and density p (rho), having depth h, the pressure exerted by liquid is $P = \frac{F}{A}$ (01) 3. $F = mg$ $A = \frac{V}{A}$ Putting these values into the Pressure equation and we have, (01) 4. $p = \frac{mgh}{V}$ and of course, m/v gives us the density p (rho) $P = mph$ (01)	Text book KPTBB For Grade 9 Book page 180-181 Unit -7
Marking	1+1+1+1	4
xi.	Define transfer of heat by convection; give three examples from daily life? **Possible answers** 1. Convection is **the transfer of heat by the movement of molecules of liquids and gases**. Convection happens in liquids and gases because, unlike in a solid, molecules are able to freely move. For example, the air molecules in your living room continually move around, all moving at about the same speed. 2. Examples: i. Breeze. The formation of sea and land breeze form the classic examples of convection. ... ii. Boiling Water. ... iii. Blood Circulation in Warm-Blooded Mammals. ... OR Air-Conditioner etc.	Text book KPTBB For Grade 9 Book page 180-181 Unit -7
Marking	1+1+1+1	4
	SECTION-C	
Q2	i. State Newton's second law of motion. ii. Prove that time rate of linear momentum is equal to net force acting on body. iii. The momentum of bullet fired from gun is 0.732 Ns and velocity is 62m/s. Find the mass of bullet? **Possible answers** 1. According to Newton's second law if a body is moving with acceleration 'a' and mass of a body is 'm' then the force on the body will be equal to F=ma.(02) 2. Consider a body of mass m moving with velocity v_i, after time t, its velocity becomes v_f, then **Steps: (**0.5 Marks For each Step**)** F = ma ⟶ ❶ a= $\frac{\Delta v}{t}$ ⟶ ❷ put in equation ❶ F= $m\frac{\Delta v}{t}$ where $\Delta v = v_f - v_i$	Text book KPTBB For Grade 9 Book page 65-67 Unit -3

	$F=\frac{mvf-mvi}{t}$ $F=\frac{\Delta P}{t}$ 3. Data:(01) P = 0.732 Ns v= 62 m/s m=? Solution: (01) m = P/v = 0.732/62=0.012kg	
Marking	2+3+2	7
Q3	i. Define and explain turning effect of force by relating it to everyday life? ii. The force applied to open door is 12 N at 30^0. Find the horizontal and vertical components of force? **Possible answers** **1.** The turning effect of a force is called the **moment of the force or torque**. Mathematically it can be written as Torque = force x moment arm (01) ***T* = f x r its unit is N-m** (01) • A person pushing a swing will make the swing rotate about its pivot. OR (01) • A worker applies a force to a spanner to rotate a nut. • A person removes a bottle's cork by pushing down the bottle opener's lever. OR • A force is applied to a doorknob and the door swings open about its hinge. OR • A driver can turn a steering wheel by applying a force on its rim. 2. Given data F = 12 N, F_x =?, F_y =? (01) θ = 30^0 **Solution** F_x = F cos θ **(01)** $F_x = 12\cos 30^0$ F_x = 12 x 0.866 F_x = 10.4 N so horizontal component of force is 10.4 N (**01**) F_y = F Sin θ $F_y = 12\text{Sin } 30^0$ F_y = 12x 0.5 F_y = 6 N so vertical component of force is 6 N (**01**)	Text book KPTBB For Grade 9 Book page 112,106 Unit-4
Marking	4+3	7
Q4.	i. Define work and its units? **ii.** A Girl is pulling trolley school bag by applying a force of 15 N at 45^0 and covers a distance of 100 m. Calculate the work done. Possible answers 1. Work done by a force acting on an object is equal to the magnitude of the force multiplied by the distance moved in the direction of the force. We define work to be equal to the product of the force and the displacement. (01) 2. Work done = force × displacement W= F Cos θ x S W= FS Cos θ **(01)**	Text book KPTBB For Grade 9 Book page 149 Unit -6

	When **1 N** forced is applied on a body and it covers distance of **1m** the work done is **1 Joule**. (01) where Joule (J) is the unit of work. Work is independent of path **3.** **Data:** (01) F = 15 N S= 100 m Angle θ= 45^0 W=? **Solution:** As we know that W= FS Cos θ (01) W= 15. 100 Cos 45 W= 15 x100x 0.707 (01) W = 1060 joules	
Marking	4+3	7
Q5.	i. Describe the thermal expansion of solid? ii. Explain why evaporation causes cooling? **Possible answers** 1. When matter is heated, its particles gain energy (**01**), which is exerted as kinetic energy. (**01**) In solids, the particles vibrate harder and faster, creating more space between the particles, causing them to expand. (**01**) This is most visible in metals. This process is thermal expansion. (**01**) 2. When a molecule at the surface uses enough energy to exceed the vapor pressure(**01**), the liquid particles will typically escape and enter the surrounding air as a gas. (**01**) The energy taken from the vaporized liquid during evaporation lowers the temperature of the liquid, resulting in cooling. (**01**)	Text book KPTBB For Grade 9 Book page 205 Unit -8
Making	3+ 4	7