SCIENCE - PHYSICS - STANDARD IX - UNIT 1 - MEASUREMENT - 6 PERIODS

Expected specific outcomes of learning	Content in Terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	No. of Periods allotted
1	2	3	4	5	6
Appreciates the use of Vernier scale for measurement of small lengths	1.1 S.I. Units - measurement of length and mass - Vernier Calipers.	Demonstrates with model the principle of Vernier calipers	Uses Vernier calipers to measure the diameters of a coin, a glass rod and a marble	What is the least count of Vernier Calipers? What is meant by zero error in Vernier Calipers?	2
Understands the working of the screw gauge.	1.2 Screw Gauge	Demonstrates screw gauge and explains the terms pitch, head scale and least count.	Uses a screw gauge to measure the thickness of a thin wire, sheet of paper.	What is the least count of a screw gauge? Define pitch of a screw	2
Appreciates the need for finding the mass of an object correct to a milligram	1.3 Physical Balance	Demonstrates the physical balance and explains the terms turning points, resting point and sensibility.	Lists out the precautions in handling the physical balance. Estimates the mass of an object correct to a milligram	To which pan of the physical balance are weights added? How will you increase or decrease the zero resting point of a physical balance?	2

SCIENCE - PHYSICS - STANDARD IX - UNIT 2 - MOTION AND FORCE - 6 PERIODS

1	2	3	4	5	6
Distinguishes distance and displacement	2.1 Distance and displacement	Explains distance and displacement with suitable examples vector and scalar	Tabulates with examples scalar and vector quantities Computes the resultant displacements.	What is meant by scalar quantity? Distinguish between distance and displacement	1
Understands the concepts of velocity and acceleration	Velocity and acceleration	Defines velocity and acceleration and their units.	Explains uniform and non-uniform velocity (average velocity). Illustrates with example, uniformly accelerated motion.	Distinguish between speed and velocity	1
Distinguishes uniform and accelerated motion Analysis the motion of bodies in terms of displacement velocity and acceleration.	2.2 Distance - time, Velocity - time graph for uniform and non- uniform accelerated motion.	Explains distance - time, velocity -time graph, to represent uniform motion and acceleration	Graphically represents distance - time, velocity-time for, i. Uniform velocity, and ii. uniform acceleration	A ball is vertically thrown upwards with a velocity of $15ms^{-1}$. How long will it take to fall back to starting portion? What distance has the ball travelled in this time?	2
Understands the equations of motion	2.3 Equations of uniformly accelerated motion.	Derives the equation of uniformly accelerated motion	Graphically represents the uniformly accelerated motion	In the equation $s=ut+(½)at^2$, identify the scalar and vector quantities.	2

SCIENCE - PHYSICS - STANDARD IX - UNIT 3 - NEWTON'S LAWS OFMOTION - 6 PERIODS

1	2	3	4	5	6
Appreciates the Newton's laws of motion and concept of inertia	3.1 Newton's laws of motion	Explains Newton's laws of motion. Defines Force and inertia and explains the concept of inertia.	Illustrates with examples inertia of rest, motion and direction.	State Newton's laws of motion. Why is it dangerous to step off moving bus or a train?	1
Understands momentum of a body	Momentum, force and acceleration	Obtains expression for force F=ma	Demonstrates the change in velocities of two masses when released from a compressed spring.	What do you understand by the term momentum? Why do we use safety belt in cars?	1
Appreciates action and reaction forces	Action and reaction forces. - Law of conservation of momentum	Explains and demonstrates Newton's third law through example - working of jet engine, rocket and balloons.	Demonstrates action and reaction by releasing an inflated balloon and jumping from / rowing a boat.	Give the examples of Newton's third law of motion. A bullet of mass 0.01kg fired from a gun of mass 20 kg with 100 ms^{-1} velocity. Calculate the velocity of recoil of gun.	1
Distinguishes mass and weight of a body	3.2 Mass and weight	Difference between mass and weight - their units.	Explains the variation of weight of a body at different places on the earth surface.	A body weights 98 N at a place. What is its mass?	1
Understands the motion of simple pendulum	3.3 Motion of simple pendulum - Laws of simple pendulum	Demonstrates the simple pendulum for experimental determination of `g'	Verifies the laws of simple pendulum	A girl swinging on a swing stands up and swings. What will happen to period of the swing?	2

SCIENCE - PHYSICS - STANDARD IX - UNIT 4 - FORCE, WORK, ENERGY AND POWER - 7 PERIODS

1	2	3	4	5	6
Appreciates work, power and energy	4.1 Work, power and energy - work done by a force.	Explains the meaning and units of work, power and energy	Tabulates the type of energy possessed by a wound spring, moving objects, bus moving up a hill and a simple pendulum in oscillation	A body of weight 500 N is raised up to a height of 12 m in 20s. Calculate the power exerted on the body.	1
Distinguishes between potential and kinetic energy	4.2 Potential and kinetic energy	Explains the quantitative measurement of PE and KE.	Tabulates the typical KE of a car, running sportsman, bullet and a rain drop	Give the expressions for PE and KE of a body.	1
Appreciates the law of conservation of energy	Transformation and conservation of energy (free fall)	Explains the transformation and conservation of energy for a freely falling body.	Proves that the total energy of a freely falling body is constant at any instant.	What is the total energy of a freely falling body when it is about to strike the ground?	1
Understands the tendency of a body to rotate as a result of couple of forces	4.3 Moment of force	Demonstrates moment of a force with Rod pivoted at a point, spanner and nut/bolt and door hinges.	Lists out some examples of moment of forces in daily life	Define moment of force. While riding a two wheeler, why do you hold the handle bar at the end rather than in the middle?	2
Recognises parallel forces Understands the principle of moment of force	4.4 Principles of moments - couple	Explains like parallel forces, unlike parallel forces and their resultant. Demonstrates an experiment to explain principle of moments using metre scale and weight	Illustrates with the aid of diagrams, like and unlike parallel forces Determines the weight of a stone using principle of moments. Illustrates, with examples and numerical problems,	What are like and unlike parallel forces? A knife edge is placed under 40 cm mark on a metre scale and 40 gm weight hung from 10 cm mark keeps the scale horizontal. What is the mass of scale?	2

1	2	3	4	5	6
			the principle of moments.		

SCIENCE - PHYSICS - STANDARD IX - UNIT 5 - HEAT AND TEMPERATURE - 11 PERIODS

1	2	3	4	5	6
Appreciates the construction and working of mercury thermometer and lower and upper fixed points.	5.1 Heat and temperature- measurement of temperature	Explains the construction and working of a mercury thermometer.	Lists out the reasons for using mercury as thermometric liquid.	Express the normal body temperature in Celsius and Kelvin scale.	2
Understands the principle of thermometers.	5.2 Thermometers - laboratory and clinical	Differentiates the laboratory and clinical thermometers.	Illustrates the working of a clinical thermometer with diagram.	Express the lower and upper fixed points in Celsius and Kelvin scale.	2
Relates the Celsius and Kelvin scale of temperatures	5.3 Temperature scales - Celsius, Kelvin.	Explains the conversion of Celsius scale to Kelvin and vice versa.	Lists out the freezing point and boiling points of alcohol, water and mercury in Kelvin and Celsius scales	Why is mercury used as a thermometric liquid?	2
Understands the kinetic theory of gases.	5.4 Kinetic theory of gases	Explains the postulates of kinetic theory of gases	Explains pressure of a gas in terms of kinetic theory of gases.	What is meant free path?	2
Relates pressure, volume and temperature of a gas.	5.5 Boyle's Law Charles's Law Gas Equations	Explains Boyle's Law and Charles's Law. Experimentally verifies Boyle's Law by Quill tube.	Derives gas equation.	A given amount of gas is compressed to one-fourth of its volume. What happens to the pressure of the gas?	2
Appreciates the applications of heat engines.	5.6 Heat Engines (steam engine, petrol and diesel engine)	Describes the working of four stroke heat engines.	Lists out the efficiency of different heat engines.	Compare the efficiency of diesel and petrol engine.	1

SCIENCE - PHYSICS - STANDARD IX - UNIT 6 - SOUND - 9 PERIODS

1	2	3	4	5	6
Understands the characteristics of wave motion.	6.1 Mechanical waves - transverse and longitudinal waves	Explains the Nature of sound waves in air with examples.	Demonstrates that medium is necessary for propagation of sound using an electric bell and a jar.	What is wave motion? Distinguish transverse and longitudinal waves. Does sound travel through vacuum?	1
Understands the concept of wavelength, frequency, velocity and their relationship.	6.2 Wavelength-frequency-time period - relation between frequency - wavelength and velocity.	Defines the terms amplitude, wavelength, frequency and time period	Derives the relation between frequency wavelength and velocity. Lists out the velocity of sound wave in water, air and steel.	The frequency of tuning fork is 512 Hz. What is the time period? Velocity of sound in air is $330ms^{-1}$ What is the range of wavelengths of audible sound?	2
Understands the type of vibrations and resonance.	6.3 Resonance	Explains the type of vibrations - free vibration, forced vibration and resonance	Illustrates with examples free, forced vibration and resonance	Name the types of vibrations. What are the conditions for producing forced vibration?	1
Recognizes the stationary waves produced due to super position of two waves.	6.4 Stationary waves	Demonstrates the stationary waves using loaded string or vibrator	Diagrammatically represents of stationery waves due to superposition of two waves	What are nodes and antinodes ?	1

1	2	3	4	5	6
Appreciates the vibration of air column	6.5 Vibration in air column	Explains the vibration in air columns using organ pipes (open & closed end)	Explains the wind instruments in which air acts as resonator.	How will you observe the position of node and antinode in organ pipes.	1
Appreciates the vibrations in strings	6.6 Vibrations in strings	Explains that the frequency of vibration of stretched string depends on length, tension and mass/unit length.	Verifies laws of stretched strings.	Name musical instruments with stretched strings.	1
Appreciates Doppler effect in sound	6.7 Doppler effect	Explains Doppler effect with examples.	Lists out the applications of Doppler effect	What is Doppler effect?	1
Appreciates the applications of ultrasonics in various fields	6.8 Ultrasonics	Explains the application of ultrasonics in daily life.	Lists out the applications of ultrasonics in field of medicine and industry.	What is the frequency range of ultrasonics?	1

SCIENCE - PHYSICS - STANDARD IX - UNIT 7 - LIGHT - 7 PERIODS

1	2	3	4	5	6
Appreciates and develops the skill in the formation of images by spherical mirrors.	7.1 Spherical mirrors - radius of curvature - focal length.	Demonstrates the image formation by concave mirror and convex mirror	Explains why convex mirrors are used in automobiles.	What are spherical mirrors? What are their applications?	2
Understands the relation between R and f and u,v and f	7.2 Relation between R and f. Relation between u, v, and f.	Determines the focal length of concave mirror by long distance and u-v methods.	Lists out the differences between the plane, concave and convex mirrors. Obtains the relation between R and f. Derives the relation between u, v, f in the case of concave and convex mirrors.	What is magnification ? Obtain the relation between u, v and f for a spherical mirror.	3
Appreciates the position and nature of images formed by spherical mirrors.	7.3 Positions and nature of images formed by convex and concave mirrors - uses of mirrors	Graphically constructs the images formed by a concave mirror.	Mention the linear magnification produced by the mirrors for different positions of objects.	Where do you keep the object in a concave mirror to produce a magnified image?	2

SCIENCE - PHYSICS - STANDARD IX - UNIT 8 - SOURCES OF ENERGY - 8 PERIODS

1	2	3	4	5	6
Appreciates energy usage as a parameter for development	8.1 Renewable and non-renewable energy sources	Tabulates renewable and non-renewable energy sources	Lists out renewable and non-renewable energy sources in daily life	Sun is a source of food energy, coal, oil, wind and hydroelectric power. Explain the process in each of these cases	2
Differentiates renewable and non-renewable sources.	8.2 Solar cell - wind energy-hydro energy (tidal, ocean, thermal, hydroelectric), geothermal,bio- gas, hydrogen and alcohol	Establishes sun as sources of energy. Explains production of energy using windmills, solar cells, tidal and ocean waves.	Tabulates the forms of energy obtained using sun's energy. Explains solar heating devices and solar cells.	What is basic principle of generation of hydro electricity? Name the forms in which energy is stored in oceans. Explain what is wind energy.	4
Appreciates the need for conserving fuel	8.3 Efficient use of fuel-Judicious use of energy	Explains the limited availability of fossil fuel and pollution caused by fossil fuels.	Lists out the uses of fossil fuels and nature of pollution caused by them.	Explain how will you judiciously use energy to meet out energy crisis.	2