Lesson Plan: Describing Motion Around Us (CBSE Class IX 2026-27)

Teacher:

Class: IX

Subject: Science (Subject Code - 086)

Theme/Unit: Motion, Force and Work

Chapter: 4 – Describing Motion Around Us

Estimated Number of Periods: 13

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1. Gist of the Lesson & Curricular Goals

- **Core Syllabus:** Motion, displacement, velocity, acceleration; Graphical representation of motion (straight line with constant velocity and constant acceleration); Kinematic equations for motion in a straight line (by graphical method); Elementary idea of uniform circular motion.

- **Educational Aim:** To explore the physical world and understand scientific principles based on observation and analysis (CG-2), developing the capacity to represent real-life events using geometric, mathematical, and graphical models.

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2. Teaching-Learning Plan & Pedagogy

Key Concepts	Competencies (C) & Learning Outcomes	Teaching-Learning Activities (Pedagogy)	Assessment Strategies
Distance, Displacement, Speed & Velocity	**C-2.1:** Differentiates between distance/displacement and speed/velocity. • *Outcome:* Students will	• **Visual Mapping:** Use the example of an athlete running on a straight track (moving from origin O to A, then back to B) to physically map positive and negative coordinates.	• **[Demonstrate Knowledge - VSA]:** *Define* displacement and state its SI unit. • **[Application - SA]:** *Calculate* the average speed and

	express displacement and average velocity in proper SI units.	• **Numerical Practice:** Calculate average speed vs. average velocity using the swimming pool example (Sarang swimming 50m and back in 50s) to prove average velocity can be zero.	average velocity of a postman walking between two villages.
Acceleration	**C-2.1:** Defines acceleration and plots/interprets graphs. • *Outcome:* Students will calculate average acceleration (a = (v-u)/t).	• **Real-World Connection:** Discuss the "jolt" felt when a bus suddenly starts or brakes to introduce the rate of change of velocity. • **Data Analysis (Activity 4.2):** Research the 0 to 100 km/h times for various cars online and calculate their average acceleration in m/s^2.	• **[Application - Objective]:** *Calculate* the acceleration of a bus increasing its velocity from 36 km/h to 54 km/h in 10 seconds. • **[Formulate & Analyze - SA]:** *Interpret* why an object dropped from a height has an acceleration of 9.8 m/s^2.
Graphical Representation of Motion	**C-8.2:** Represents data in multiple modes and draws inferences. • *Outcome:*	• **Mandatory Practical (Activity 4.3):** Use graph paper to plot positions of a vehicle at 1s intervals. Interpret	• **[Demonstrate Knowledge - VSA]:** *State* what the slope of a velocity-time graph represents.

	Students will plot position-time (s-t) and velocity-time (v-t) graphs.	straight vs. curved lines. • **Geometrical Derivation:** Teach how to calculate velocity from the slope of an s-t graph, and displacement from the area under a v-t graph.	• **[Analyze & Evaluate - LA]:** *Examine* a given velocity-time graph to calculate the total displacement by finding the area of the enclosed rectangle and triangle.
Kinematic Equations	**C-2.1:** Derives kinematic equations by graphical method. • *Outcome:* Students will apply equations to solve for unknown physical quantities.	• **Board Work:** Step-by-step graphical derivation of $v = u + at$, $s = ut + \frac{1}{2}at^2$, and $v^2 = u^2 + 2as$. • **Case Study:** Discuss vehicle-to-vehicle (V2V) communication and calculate safe braking distances based on initial velocity and road conditions.	• **[Application - SA]:** *Illustrate* the graphical derivation of the first equation of motion. • **[Formulate & Analyze - Case-Based]:** *Evaluate* the braking distance of a truck traveling at 54 km/h when applying a constant deceleration.
Uniform Circular Motion	**C-2.1:** Defines uniform circular motion. • *Outcome:* Students will derive	• **Hands-On (Activity 4.5):** Spin a marble inside a tape ring. Lift the ring to observe the marble move in a straight, tangential	• **[Demonstrate Knowledge - Objective]:** *Identify* the direction of velocity of an object in uniform circular motion.

	the expression for speed (v = 2πR / T).	line. • **Concept Mapping:** Trace the path of an athlete on a square, hexagon, and eventually a circle to show continuous change in direction.	• **[Analyze & Evaluate - Assertion-Reasoning]:** *Evaluate* why uniform circular motion is considered accelerated motion even if the speed is constant.

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3. Assessment Structure & Weightage

Assessments are strictly modeled on the CBSE 2026-27 Theory Question Paper Design (80 marks):

- **Demonstrate Knowledge and Understanding (50%):** Assessed via questions asking students to *state, name, list, identify, define, suggest, describe, outline, and summarize* (e.g., defining acceleration, identifying scalar vs vector properties conceptually).
- **Application of Knowledge/Concepts (30%):** Assessed via questions asking students to *calculate, illustrate, show, adapt, explain, and distinguish* (e.g., calculating average velocity, illustrating the area under a graph).
- **Formulate, Analyze, Evaluate and Create (20%):** Assessed via questions asking students to *interpret, analyze, compare, contrast, examine, evaluate, discuss, and construct* (e.g., analyzing braking distances based on road conditions, evaluating complex v-t graphs).

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4. Digital Integration & Portfolio Enrichment (Internal Assessment - 20 Marks)

- **Subject Enrichment (5 Marks):** Students will plot the data for a speeding vehicle (from Table 4.4) on physical graph paper using two entirely different sets of X and Y scales. They will analyze and document how the choice of scale affects the visual steepness and appearance of the curve.
- **Digital Integration Strategy:** To reinforce data collection techniques (C-8.2), students

will use smartphone accelerometer apps (like *Phyphox*) to detect tiny accelerations when the phone is held in an outstretched palm versus resting on the floor, connecting digital sensors to real-world physics.

- **Portfolio Task (5 Marks):** Students will *investigate* the real-world physics of road safety. They will interview a local driver or motor mechanic to discuss how braking distance is affected by worn-out tires, wet roads, and driver reaction time. They will prepare a short write-up of their findings and design an evidence-based "Safe Distance" road safety poster to be securely added to their academic portfolio.