Lesson Plan: How Forces Affect Motion (CBSE Class IX 2026-27)

Teacher:

Class: IX

Subject: Science (Subject Code - 086)

Theme/Unit: Motion, Force and Work

Chapter: 6 – How Forces Affect Motion

Estimated Number of Periods: 13

---

1. Gist of the Lesson & Curricular Goals

- **Core Syllabus:** Force; balanced and unbalanced forces; force of friction; Newton's first law of motion; Newton's second law of motion; Newton's third law of motion.

- **Educational Aim:** To apply Newton's laws to explain the effect of forces (change in state of motion, displacement, direction, velocity, and acceleration) and to develop the capacity to design and implement plans for scientific inquiry by observing physical phenomena.

---

2. Teaching-Learning Plan & Pedagogy

Key Concepts	Competencies (C) & Learning Outcomes	Teaching-Learning Activities (Pedagogy)	Assessment Strategies
Concept of Force & Friction	**C-2.1:** Explains the role of friction on the motion of objects. • *Outcome:* Students will identify balanced and unbalanced forces and measure	• **Observation:** Use a spring balance to measure the weight of an object (gravitational force) vs. the force required to pull a wooden block across a table (frictional force).	• **[Demonstrate Knowledge - VSA]:** *Define* balanced forces and give one example. • **[Application - SA]:** *Explain* why it is difficult to walk on a wet or

	the magnitude of friction.	• **Discussion:** Explain why an object pushed on a floor eventually stops, connecting it to the opposing force of friction and the normal force.	polished floor using the concept of friction.
Newton's First Law (Inertia)	**C-2.1:** States and explains Newton's first law of motion. • *Outcome:* Students will recognize that a net force is required to change velocity.	• **Thought Experiment:** Discuss Galileo's thought experiment on a frictionless surface to introduce the concept of inertia (that an object in motion stays in motion). • **Graphical Mapping:** Draw position-time and velocity-time graphs for an object moving with a constant velocity (zero net force).	• **[Demonstrate Knowledge - Objective]:** *State* Newton's first law of motion. • **[Formulate & Analyze - Case-Based]:** *Interpret* a position-time graph to determine if an object is experiencing a net force.
Newton's Second Law ($F = ma$)	**C-2.1:** Explains Newton's second law in terms of mass and acceleration. • *Outcome:*	• **Scientific Inquiry (Activity 6.3):** Use a cart, pulley, and weights to demonstrate that acceleration increases when the applied force	• **[Application - SA]:** *Calculate* the acceleration of a 25 kg block if a net force of 5 N is applied.

	Students will calculate force using the mathematical expression $F = ma$.	increases (constant mass). • **Real-World Connection:** Discuss the physics behind airbags in cars or a cricketer pulling their hands back while catching a ball (increasing time reduces acceleration and force).	• **[Analyze & Evaluate - LA]:** *Evaluate* a velocity-time graph of a sports car to calculate the force acting on it during acceleration and braking phases.
Newton's Third Law (Action/Reaction)	**C-2.1:** States and explains Newton's third law of motion. • *Outcome:* Students will apply the law to explain everyday life events.	• **Kinesthetic Activity (Activity 6.5):** Have a student sit in a rolling chair and push away from a heavy desk to physically demonstrate equal and opposite forces. • **Visual Mapping:** Draw force arrows on a diagram of a person walking, showing the foot pushing the ground backward and the ground pushing the person forward.	• **[Demonstrate Knowledge - VSA]:** *State* Newton's third law of motion. • **[Application - SA]:** *Explain* the launch of a rocket using Newton's third law.

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., stating Newton's laws, defining the SI unit of force).

- **Application of Knowledge/Concepts (30%):** Assessed via questions asking students to *calculate, illustrate, show, adapt, explain, and distinguish* (e.g., calculating net force, explaining why a gun recoils).

- **Formulate, Analyze, Evaluate and Create (20%):** Assessed via questions asking students to *interpret, analyze, compare, contrast, examine, evaluate, discuss, and construct* (e.g., evaluating acceleration-mass graphs, analyzing the forces on a system of connected objects).

---

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

- **Subject Enrichment (Practical Work - 5 Marks):** Evaluated strictly on the execution of the cart and pulley experiment (Activity 6.3/6.4). Students will be assessed on their ability to accurately measure time, mass, and distance, and their ability to draw inferences confirming the $F=ma$ relationship in their practical records.

- **Digital Integration Strategy:** To reinforce how forces affect motion ahead of Periodic Assessments, utilize physics simulations (like PhET Interactive Simulations for Forces and Motion). Students can digitally adjust applied force and friction on various objects (crates, refrigerators) and instantly view the resulting acceleration vectors.
- **Portfolio Task (5 Marks):** Students will *examine* the role of friction in road safety. They will prepare a brief write-up identifying how factors like wet roads, worn-out tires, or vehicle mass affect braking distance and the required stopping force. They will design an evidence-based "Safe Distance" road safety poster, securely adding this real-world application to their academic portfolio.