Class 9 Science Chapter 6: How Forces Affect Motion - Notes, Important Questions and MCQs (2026-27)

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These Class 9 Science Chapter 6 notes cover “How Forces Affect Motion” from the new NCERT textbook Exploration (2026-27): the concept and measurement of force, balanced and unbalanced forces, friction, Newton’s three laws of motion and forces on a system of connected objects – with solved numericals, 10 MCQs and a free PDF.

Use the table of contents below to jump to the part you need, or read top to bottom for a complete revision of the chapter.

Table of Contents

- Chapter Overview
- Important Topics and Concepts
- Solved Numericals
- Balanced vs Unbalanced Forces
- Newton’s Laws at a Glance
- Important Definitions and Terms
- Short Answer Questions
- Long Answer Questions
- MCQs with Answers
- Quick Revision Points
- Chapter Summary
- Exam Tips and PYQ Pattern
- Frequently Asked Questions
- Conclusion

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Chapter Overview

Chapter 4 described motion; this chapter explains what causes changes in motion. A force is a push or pull resulting from interaction between objects. It can start or stop motion, change speed or direction, or change shape.

Newton’s three laws connect force and motion: an object keeps its state unless a net force acts (first law), net force equals mass times acceleration (second law), and forces always come in equal and opposite pairs acting on different objects (third law).

Important Topics and Concepts

Concept and Measurement of Force

- Force is a push or a pull due to interaction between two objects.
- Force has magnitude and direction; SI unit newton (N).
- A spring balance measures force – not only weight but any pull applied to it.
- Weight is the gravitational force with which the Earth pulls an object.

Balanced and Unbalanced Forces

- When forces on an object cancel out, the net force is zero – the forces are balanced and the state of motion does not change.
- When the net force is not zero, the forces are unbalanced and the object accelerates.
- Example: a tug-of-war with equal pulls stays still; when one side pulls harder, the rope moves.

Friction

- Friction opposes relative motion between surfaces in contact; it is always present but often overlooked.
- It depends on the nature of surfaces; rough surfaces have more friction.
- Friction makes a rolling ball slow down and stop; without it the ball would keep moving.
- It can be reduced by lubricants, wheels and ball bearings and increased by treads and grips.

Newton’s Laws of Motion

- First law: an object at rest stays at rest, and an object in motion keeps moving with constant velocity, unless a net force acts on it (law of inertia).
- Second law: net force = mass × acceleration, $F = ma$; 1 N = 1 kg m s^{-2}.
- For the same object, a larger force gives a larger acceleration; for the same force, a larger mass gives a smaller acceleration.
- Momentum $p = mv$; the more complete form of the second law says force equals the rate of change of momentum.
- Third law: to every action there is an equal and opposite reaction; the two forces act on different objects, so they do not cancel.

Forces on a System of Objects

- For boxes of masses m_1 and m_2 joined by a string and pulled by force F on a frictionless surface, treat them as one system: $a = F/(m_1 + m_2)$.
- The string tension pulling the rear box: $T = m_2 \times a$.
- On the front box: $F - T = m_1 \times a$.
- The same method works for trains, trucks with trailers and people pulling sledges.

Solved Numericals

Board-pattern problems.

- A force gives a 2 kg mass an acceleration of 3 m/s^2. Find the force. $F = ma = 2 \times 3 = 6$ N.
- A 1000 kg car accelerates at 2 m/s^2. Find the net force. $F = 1000 \times 2 = 2000$ N.
- Boxes of 2 kg and 4 kg are joined by a string and pulled with 12 N. $a = 12/6 = 2$ m/s^2; tension on the 4 kg box $T = 4 \times 2 = 8$ N; check on 2 kg box: $12 - 8 = 2 \times 2$ ✓.

- Forces of 5 N and 4 N act on an object in opposite directions. Net force = 1 N in the direction of the 5 N force – unbalanced, so the object accelerates.

Balanced vs Unbalanced Forces

Balanced	Unbalanced
Net force zero	Net force not zero
No change in state of motion	Causes acceleration
Object at rest stays at rest	Object starts, stops or changes direction
e.g. book resting on a table	e.g. kicking a football

Newton’s Laws at a Glance

Law	Statement	Example
First	No net force → no change in velocity	Passengers lurch forward when a bus stops
Second	F = ma	Heavier cart needs more force for same acceleration
Third	Action = − reaction, on different bodies	Pushing off a table moves your wheeled chair back

Important Definitions and Terms

Term	Meaning
Force	Push or pull arising from interaction between objects
Newton (N)	Force that gives 1 kg an acceleration of 1 m s^{-2}
Net force	Resultant of all forces on an object
Balanced forces	Forces whose resultant is zero
Friction	Force opposing relative motion between surfaces
Inertia	Tendency of an object to resist change in its state of motion
Momentum	Product of mass and velocity, p = mv
Tension	Force transmitted through a string or rope

Short Answer Questions

Q1. State Newton’s first law of motion.

An object at rest remains at rest and an object in motion continues with constant velocity unless a net force acts on it.

Q2. Why do passengers fall forward when a moving bus stops suddenly?

Their bodies tend to keep moving due to inertia while the bus stops, so they lurch forward.

Q3. Calculate the force needed to accelerate a 5 kg object at 4 m/s^2.

F = 5 × 4 = 20 N.

Q4. Why do action and reaction forces not cancel each other?

Q5. What instrument measures force?

A spring balance.

Q6. Two forces 5 N and 4 N act in opposite directions on an object. Is the object in equilibrium?

No. The net force is 1 N, so the forces are unbalanced and it accelerates.

Q7. How does friction affect a rolling ball?

Friction opposes its motion and gradually brings it to rest.

Q8. If the same force acts on masses 2 kg and 4 kg, compare their accelerations.

$a \propto 1/m$, so the 2 kg mass has twice the acceleration of the 4 kg mass.

Long Answer Questions

Q1. State Newton's second law and describe an activity to show that a larger force gives a larger acceleration.

Second law: net force on an object equals mass × acceleration ($F = ma$).

Make a light cart on wheels pulled by a thread over a pulley with a cup holding coins.

Adding more coins increases the pulling force (weight of coins).

Measure the time to cover a fixed distance; more force gives less time, i.e. more acceleration.

Keeping mass constant, acceleration is directly proportional to force; friction causes small deviations.

Q2. Explain Newton's third law with three everyday examples.

Every action has an equal and opposite reaction acting on a different object.

Kicking a ball: the foot pushes the ball and the ball pushes back on the foot.

Sitting on a wheeled chair and pushing a heavy table – the chair moves backwards.

A swimmer pushes water backwards and moves forward; a rocket pushes gases down and rises.

The forces are equal in magnitude, opposite in direction and act simultaneously.

Q3. Two boxes of 3 kg and 2 kg on a frictionless surface are tied with a string; a 15 N force pulls the 3 kg box. Find the acceleration and tension.

Treat both as one system: total mass = 5 kg.

$a = F/(m_1 + m_2) = 15/5 = 3\ m/s^2$.

Tension pulling the 2 kg box: $T = 2 \times 3 = 6$ N.

Check on the 3 kg box: $15 - 6 = 9 = 3 \times 3$ ✓.

Acceleration 3 m/s^2, tension 6 N.

MCQs with Answers

1. SI unit of force is(a) joule (b) newton (c) watt (d) pascalAnswer: (b) newton

3. F = ma is the(a) first law (b) second law (c) third law (d) law of gravitationAnswer: (b) second law

4. Action and reaction act on(a) the same body (b) different bodies (c) no body (d) only moving bodiesAnswer: (b) different bodies

5. A force of 10 N on 2 kg gives acceleration(a) 5 m/s² (b) 20 m/s² (c) 12 m/s² (d) 8 m/s²Answer: (a) 5 m/s²

6. Balanced forces(a) change velocity (b) do not change state of motion (c) always cause motion (d) increase speedAnswer: (b) do not change state of motion

7. Friction acts(a) along motion (b) opposite to relative motion (c) perpendicular always (d) only in liquidsAnswer: (b) opposite to relative motion

8. Momentum is(a) m/v (b) mv (c) ma (d) m + vAnswer: (b) mv

9. Boxes 2 kg and 4 kg pulled by 12 N have acceleration(a) 2 m/s² (b) 3 m/s² (c) 6 m/s² (d) 1 m/s²Answer: (a) 2 m/s²

10. A spring balance measures(a) mass (b) force (c) volume (d) densityAnswer: (b) force

Quick Revision Points

- Force = push/pull; unit N; measured by spring balance.
- Balanced → no change; unbalanced → acceleration.
- Friction opposes relative motion.
- 1st law (inertia); 2nd law F = ma; 3rd law action–reaction.
- Momentum p = mv.
- Connected bodies: $a = F/(m_1 + m_2)$, $T = m_2a$.

Chapter Summary

A force is a push or pull due to interaction. When forces are balanced, motion does not change; unbalanced forces produce acceleration. Friction always opposes relative motion.

Newton’s first law describes inertia, the second law gives F = ma (or rate of change of momentum), and the third law says forces come in equal and opposite pairs on different objects. The laws also apply to systems of connected objects, where $a = F/(m_1 + m_2)$.

Exam Tips and PYQ Pattern

- F = ma numericals are very common – keep units in SI.
- Explain everyday examples using the correct law.
- Remember that action–reaction forces act on different bodies.
- Practise connected-body (tension) problems step by step.
- Draw free-body diagrams showing forces with arrows.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the new NCERT Class 9 Science textbook “Exploration” (first edition 2026), prescribed for the 2026-27 session.

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Yes. Use the free PDF link at the top of this page – no signup needed.

What are Newton’s three laws of motion?

Inertia (first law), F = ma (second law) and action–reaction (third law).

What is the difference between balanced and unbalanced forces?

Balanced forces have zero net force and do not change motion; unbalanced forces cause acceleration.

Conclusion

How Forces Affect Motion turns motion into cause and effect. Learn the three laws with examples, practise the numericals here and save the free PDF for revision.

More Notes: Class 9 Science Chapter 5: Exploring Mixtures and their Separation notes | Class 9 Science Chapter 7: Work, Energy and Simple Machines notes | All Class 9 Science notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE science educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 9 Science textbook, Exploration (First Edition 2026, NCF-SE 2023), and the CBSE syllabus for the 2026-27 session. Last checked on 17 November 2026.