

TOPIC: Gravitation

Pre-Content/content Post-Content	Learning outcomes/Objectives	
	General	Specific
<u>Pre Content</u> Acceleration, force and three equations of motion. <u>Content</u> Gravitation, Universal Law of Gravitation, importance of Gravitation, Free fall, acceleration due to gravity. Mass, weight Thrust, Pressure, Buoyancy, Law of floatation, Archimedes principle and relative density, apparent weight and true weight.	Students will be able to: • develop understanding on the Universal Law of Gravitation. • comprehend the importance of Universal law of gravitation. • Illustrate the motion of a freely falling body. • apply the concept of pressure in everyday situations. • differentiate between pressure and thrust.	Students will be able to: • comprehend definition of Gravitation. • state the law of gravitation. • Express the law of gravitation mathematically. • differentiate between G and g. • solve numerical problems based on the mathematical formula for the law of gravitation. • list examples from nature to appreciate importance of gravitation. • define free fall. • solve numerical problems on free fall. • differentiate between mass and weight. • understand the concept of weightlessness. • develop definition for thrust and pressure. • express relation between thrust and pressure mathematically. • apply the concept of pressure in day to day life • perform an experiment to show the presence of buoyant force. • perform experiment to derive the laws of floatation. • develop statement for Archimedes' principle. • express relative density mathematically.

Post Content

Numerical problems based on: Gravitational force and free fall.

Numerical on relative density, apparent weight and true weight.

- **-solve** numericals on formula of Universal law of gravitation
- **understand** the concept of buoyancy in detail.

- **analyse** and apply the concept of Universal law of gravitation and free fall.
- **apply** the concept of relative density in solving numericals.

Home Work /Assignments

- Questions and examples to be discussed after completion of each topic.
- NCERT back exercise to be discussed after completion of the chapter in the class.
- Worksheets on the topics of Gravitation and floatation can be discussed and given as home task.

AND PROGRESS

Month- August/October

Class IX

Teacher's Activity	Student's Activity	Teacher's observation and Remedial
Teacher will: initiate the discussion by interacting students on: How do we stand, why things always fall down etc. then proceed with the discussion by asking "what gravitation is" and then from there will proceed towards the statement of Law of Gravitation and its mathematical expression. <u>Annexure 10 (A)</u> demonstrate an activity to show the effect of gravity on liquids and solids falling down. guide the students to identify the difference between G and g. explain the basic differences between the mass and weight. interact with the students to explain free fall and weightlessness. explain an experiment to calculate the density of an object immersed in water. explain laws of floatation and verify Archimedes principle after performing experiments in laboratory.	Students will: instantly answer: due to the gravity. identify gravitation as a force and then will discuss and analyse the factors on which this force must depend. This will lead to the Law of Gravitation. <u>Annexure 10 (a)</u> perform the activity and record their observations analyse that G is a universal constant whereas g is the acceleration due to gravitational force of earth. analyse that weight is actually a force acting due to gravity whereas mass is the amount of actual matter contained in our body actively discuss free fall and weightlessness. apply the concepts to solve the problems. perform the experiment and write the observations. 3/6	

Introduce relative density as a ratio which determines whether an object floats or sinks in water. provide students with the challenging numerical problems and conceptual problems from the NCERT book and worksheet booklet.	-solve numericals using the formula of relative density. solve numericals .	
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Teaching Aids: NCERT, Internet access, activity kits.

Methodology/Innovative Lecture, Enquiry, Discussion, Situation based interaction

Interdisciplinary Links: motion of satellites and planets.

HOD

Coordinator

Vice-Principal/Academic Supervisor

Principal

Annexure 10 A, (a)- Gravity wins everytime

Subject	Science
Class	IX
Chapter/Unit	Chapter 10- Gravitation
Topic	Universal law of gravitation
Time	20 Min
Nature of Activity	Pair work

What will I learn (Learning Outcome)?

To find the effect of gravity on solids and liquids .

Skills: Analyzing and Creating

What I have to do?

To demonstrate an activity to show the effect of gravity on liquids and solids falling down towards the Earth.

What do I require?

A plastic cup, a ball pen and water.

What do I need to know?

Newton's law of universal gravitation is usually stated as that every particle attracts every other particle in the universe with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.

➤ Teacher's Activity

Teacher will :

1. discuss the Universal Law of Gravitation.
2. will explain the steps of the activity.
3. make pairs and ensure that each participant in pair performs the activity .

How will I proceed?

➤ Students activity

1. Take a plastic cup and make a small hole on the side, near the bottom of the cup using the pen.
2. Fill the cup with water after closing the hole with a finger.
3. Remove the finger closing the hole and observe.
4. Again fill the glass with water closing the hole with finger and allow the cup to fall towards the ground.
5. Observe the falling cup carefully.

What have I observed?

S. No	Position of the cup	Water falls from the cup - Yes or No
1.	Held at a height	
2.	Made to fall freely towards ground	

What have I learnt?

1. The waterfrom the cup when it is held at a height.
2. The waterfall from the cup when it is falling freely towards ground.
3. From the above activity , we conclude thatforce was acting on water and the cup when it is falling down towards the ground.

What am I curious to learn?

- Let us drop a feather and a stone from the same height and observe if both reach the ground at the same time. Why or why not?

Let me evaluate myself

Q.1. What is the significance of Universal Law of gravitation?

Q.2. If gravitational force of attraction acts between Earth and the Moon, why Moon does not fall into Earth?

Q.3. If the distance between two objects is decreases by half, what happens to the Gravitational force?

Q.4. How is Earth able to retain its atmosphere?

Q.5. Is it possible to achieve weightlessness on Earth? Explain with an example.

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