

CLASS – IX
LESSON PLAN
CH- 10 Gravitation

Unit	Physics (Chapter 10: Gravitation)
Class Transaction	Total: 09 periods (approx. 40 min each)
Pre-requisite for the course	This lesson requires 1. Basic knowledge of Gravitational force 2. Basic knowledge of density
Assessment of qualifying knowledge	1. Written test 2. Lab activity 3. Group Discussion 4. HW notebook
Objective	Given the content (chapter) the students will be able to define and Explain universal law of gravitation, understand gravitational force, know the meaning of gravity or gravitational force of earth, define centripetal force, derive the unit and value of G, various applications of universal law of gravitation, understand free fall, know the meaning the acceleration due to gravity, derive the unit and value of g, distinguish between mass and weight, derive the relation $W_m = 1/6 W_e$, Distinguish between different terms, know the meaning of thrust and pressure, define 1 Pascal, understand buoyancy, understand why cork floats while the nail sinks To know Archimedes' principle, understand various applications of Archimedes' principle, define relative density
Learning Outcomes	KNOWLEDGE- Students will know and understand Students will be able to • Discuss the importance gravitation in our daily life • Define universal law of gravitation and appreciate its importance • Understand why things sink or float • Understand Archimedes principle and its applications SKILLS AND COMPETENCIES- Students would be able to • Critically analyse gravitation and its importance around us • Appreciate the importance of universal law of gravitation • Perform activities creatively to understand various • Answer knowledge, understanding, application and diagrammatic skill based questions based on the topic.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Active learning- Active learning- <i>Rally robin on the following question</i> It is seen that a falling apple is attracted towards the earth. Does the apple attract the earth? If so, we do not see the earth moving towards an apple. Why? (Critical thinking) Group learning- The class will be divided in the group of 5 students. Circle the Sage- The question will be asked by the teacher about the topics and students will be doing various activities in groups.(Communication, Collaboration) Questioning- Multiple level question- Teacher will prepare a list of question about the conservation of water resources and will ask these questions during discussions. (Critical thinking, Communication) Brain Storming-The class would start with a discussion on what the students have already learnt in the previous classes and hence what is it that they would learn now. They would also be told the significance of the topic that they would be studying. Introduction of the topic- PPT and Digital Content would be shared

	Guided practice followed by Independent Practice- NCERT questions to be discussed in the classroom. Techniques to be used: Quiz Daily Practice Problem MCQ Peer Assessment Student -teacher interaction, Wipro- G.O.s(web chart, flow chart and differentiation table,compare- contrast matrix), collaborative learning, Research work/surveys
Resources	Text Book: NCERT text book for Science. Reference Book 1. CBSE Exemplar
Self Study, Home Work, Assignments	Independent Practice: Students would do the questions in their H.W notebooks as mentioned in the monthly planner by which we can assess their critical thinking and creativity HW notebooks to be marked as per the given plan: <i>Assessment Parameters:</i> The total marks for the activity is 5 marks On time submission.....1 mark Presentation/ Neatness(creativity).....1 mark Content(critical thinking and creativity).....3 marks It is also advised that the students come to the class with proper background knowledge of the topic under discussion. They can refer to the resources stated above
Assessments	4 UNIT TESTS (20, 20,20, 20).....80 Marks HALF YEARLY EXAMINATION.....80 Marks ANNUAL EXAMINATION.....80 Marks PERIODIC TEST-By administering pen paper test we assess creativity and critical thinking. Half Yearly and Annual examination= Total of 80 marks each INTERNAL ASSESSMENT=20 Marks as follows (to be added at the end of the term) :- - Periodic Test (Unit Test) 10 Marks By administering pen paper test we assess creativity and critical thinking. - Subject Enrichment 05 Marks Poster making on the importance of gravitation in our life. (Critical thinking and creativity) - Note Book Submission 05 Marks
Addressing Classroom Diversity	Due to various social backgrounds and multiple intelligences, the classroom might be a diverse arena. The following techniques can be used for various groups: For gifted students: - Encouragement for referring other resources For weak students: - Buddy help to be provided - Provide grade-up classes For differently abled students: - Ignore spelling mistakes.

	• Call parents at regular intervals • Provide grade-up classes
Marks	The weightage would be given by CBSE. 1.State the universal law of gravitation and derive its expression 2. Give two points of difference between g and G. 3. A force of 20 N distributed uniformly over an area of 20 cm², find pressure in Pascal's. 4. State Archimedes principal and mention its applications. 5.Define Relative Density. The density of gold is 19300 kg/m³ and that of water is 1000 kg/m³. What is the relative density of gold?
Unit	PHYSICS (CH- 10 Gravitation)
Topic/sub-topic	Day 1 Gravitational Force
Class Transaction	approx. 40 min
Pre-requisite for the course	This lesson requires • Basic knowledge of Motion of objects • Basic knowledge of force as the cause of motion • Contact and non-contact force
Assessment of qualifying knowledge	Quiz
Objective	Students will be able to • Explain gravitational force • Define centripetal force • Understand universal law of gravitation or Newton's law of gravitation • Derive the unit and value of G • To know various applications of universal law of gravitation
DOL	D1, D2,D3
Learning Outcomes	KNOWLEDGE- <i>Students will know and understand</i> Students will be able to • Discuss and explain the concept of gravitation • Define centripetal force • Give applications of universal law of gravitation SKILLS AND COMPETENCIES- <i>Students would be able to</i> • Critically analyse why we do not really see the moon falling towards the earth • Appreciate the importance of universal law of gravitation • Understand centripetal force collaboratively • Communicate the importance of gravitation in our daily life. • Answer knowledge, understanding, application and diagrammatic skill based questions based on the topic.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Active learning- <i>Rally robin on the following question</i> It is seen that a falling apple is attracted towards the earth. Does the apple attract the earth? If so, we do not see the earth moving towards an apple. Why? (Critical thinking) Introduction of the topic by the teacher Group learning- The class will be divided in 5 differentiated groups. Each group will perform the following activity (Collaboration) Take a piece of thread. • Tie a small stone at one end. Hold the other end of the thread and whirl it round. • Note the motion of the stone. • Release the thread. • Again, note the direction of motion of the stone Questioning- <i>Multiple level question-</i> Teacher will prepare a list of questions based on the

	activity and will ask these questions during discussions. (Critical thinking, Communication) <i>Brain Storming</i>-The class would start with a discussion on what the students have already learnt in the previous classes and hence what is it that they would learn now. They would also be told the significance of the topic that they would be studying. <i>Introduction of the topic</i>- PPT and Digital Content would be shared <i>Guided practice followed by Independent Practice</i>- NCERT questions to be discussed in the classroom.
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	One minute paper- what was the most important thing they learnt, what they liked , importance of the concept in our daily life
Self Study, Home Work, Assignments	Link of video followed by questions

Topic	DAY 2- Universal law of gravitation
Class Transaction	40 min
Pre-requisite for the course	This topic requires knowledge of Gravitation, centripetal force
Assessment of qualifying knowledge	One sentence summary based on the learnings of Day 1
Objective	Student will be able to - Numerically derive the universal law of gravitation - List the importance of universal law of gravitation
DOL	D1, D2, D3
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will know and understand</i> - compare and contrast how gravitational force is negligible for less massive bodies. <u>SKILLS AND COMPETENCIES</u>- <i>Students would be able to</i> - Explain the derivation of universal law of gravitation using kepler laws of planetary motion collaboratively <i>Attitudes and beliefs- Students will be able to</i> Develop citizenship by visualizing and observing the given scenario in day to day lives .
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- - The students will be divided into 5 groups. - Each group will be provided with one problem sheet and they will derive expression of Universal law of Gravitation using Kepler's laws. - The students will then draw out the conclusion and record it in the problem sheet. (Collaboration and critical thinking)
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	Involving students in summarizing by asking them to prepare questions based on the topic.

Self Study, Home Work, Assignments	Independent Practice: NCERT Questions
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Topic	DAY 3 – Free fall
Class Transaction	40 min
Pre-requisite for the course	This topic requires Basic knowledge of universal law of gravitation , its importance and its formula
Assessment of qualifying knowledge	One minute paper based on the learning of DAY 3
Objective	Given the content (topic) the students will be able to understand the concept of free fall , and derive the expression of ‘g’.
DOL	D1, D2,D3,D4
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will know and understand</i> Students will be able to • Explain free fall theoretically and numerically • Compare and contrast between G and g <u>SKILLS AND COMPETENCIES</u>- <i>Students would be able to</i> • Critically analyse motion of objects under the influence of gravitational force of the earth • Answer knowledge, understanding, application based questions based on the topic.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Group learning- The class will be divided in the group of 5 students and perform the activity as follows and fill in their observations in the problem sheet. Take a stone. • Throw it upwards. • It reaches a certain height and then it starts falling down (Communication, Collaboration) • The students will then draw out the conclusion and record it in the problem sheet. • Based on observations, conclusions and examples derivation of expression for acceleration due to gravity. • Determination of value of g on board using peer teaching • Using problem solving by doing Group work Think Pair Square students will solve numerical based on free fall. Techniques to be used: Quiz Daily Practice Problem Student-teacher interaction, collaborative learning, Research work/surveys
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	Compare and contrast between G and g
Self Study, Home Work, Assignments	Draw a velocity time graph for an object falling under free fall in the downward direction.

Topic	DAY 4 (Mass and weight)
Class Transaction	approx. 40 min each

Pre-requisite for the course	This lesson requires basic knowledge acceleration due to gravity(g)
Assessment of qualifying knowledge	Muddiest point and sunny point based on day 3 learnings.
Objective	Given the content (topic) the students will be able to understand Mass , weight and its difference.
DOL	D1, D2,D3,D4
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will know and understand</i> Students will be able to - Distinguish between Mass and weight <u>SKILLS AND COMPETENCIES</u>- <i>Students would be able to</i> - Explain mass, weight and its difference and solve numerical based on it (critical thinking and communication)
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Questioning- <i>Multiple level question</i>- Teacher will prepare a list of question on the topic and will ask these questions during discussions. (Critical thinking, Communication) <i>Brain Storming</i>-The class would start with a discussion on what the students have already learnt in the previous classes and hence what is it that they would learn now. They would also be told the significance of the topic that they would be studying. <i>Introduction of the topic</i>- PPT and Digital Content would be shared <i>Guided practice followed by Independent Practice</i>- NCERT questions to be discussed in the classroom.
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	How can you say that Weight of the object on the moon = $(1/6) \times$ its weight on the earth.
Self Study, Home Work, Assignments	Independent Practice: Students would do the questions in their H.W notebooks as mentioned in the monthly planner.

Topic	DAY 5 (thrust and pressure)
Class Transaction	approx. 40 min
Pre-requisite for the course	This lesson requires basic knowledge of Force, area.
Assessment of qualifying knowledge	Why cutting tools have sharp edges? Followed by discussion- think , pair, share
Objective	Given the content (topic) the reasons of certain situation which they face/see in day to day lives based on pressure.
DOL	D1, D2,D3,D4
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will know and understand</i> Students will be able to - Explain Pressure - Solve numerical based on pressure <u>SKILLS AND COMPETENCIES</u>- <i>Students would be able to</i>

	- Answer knowledge, understanding, application based questions based on the topic(critical thinking) - Solve numerical collaboratively
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Active learning- Circle the sage- few reasoning question will be asked by the teacher and this strategy will be followed. Students will then be divided into groups of 5. Each group will be provided with a brick of dimension 40*20*10cm³. They will be asked to calculate the force in each case, when the brick is made to lie on the table top with its sides of dimensions (a) 20 cm*10 cm and (b) 40 cm*20 cm. (Critical thinking and collaboration) Based on their observation they will fill the observation sheet and each group will draw conclusion and explain (communication) Techniques to be used: Daily Practice Problem MCQ Student -teacher interaction, Wipro- G.O.s(web chart, flow chart and differentiation table,compare- contrast matrix), collaborative learning,
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	Cognitive closure- You stand on loose sand. Your feet go deep into the sand. Now, lie down on the sand. You will find that your body will not go that deep in the sand. What do you conclude?
Self Study, Home Work, Assignments	Independent Practice: link of video followed by questions

Topic	DAY 6 (Buoyancy)
Class Transaction	approx. 40 min
Pre-requisite for the course	This lesson requires basic knowledge of pressure in fluids, density
Assessment of qualifying knowledge	Give an example to show that pressure can be exerted by fluids
Objective	Given the content (topic) the reasons of certain situation which they face/see in day to day lives based on buoyancy
DOL	D1,D2,D3
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will know and understand</i> Students will be able to - The concept of buoyancy <u>SKILLS AND COMPETENCIES</u>- <i>Students would be able to</i> - Apply the concept of buoyancy in day to day life (critical thinking)
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Active learning- Circle the sage on the following few reasoning questions. - Have you ever had a swim in a pool and felt lighter? - Have you ever drawn water from a well and felt that the bucket of water is heavier when it is out of the water? - Have you ever wondered why a ship made of iron and steel does not sink in sea water, but while the same amount of iron and steel in the form of a sheet would sink? Students will then be divided into groups of 5. Each group will perform the following

	activity Take an empty plastic bottle. Close the mouth of the bottle with an airtight stopper. Put it in a bucket filled with water. You see that the bottle floats. Push the bottle into the water. You feel an upward push. Try to push it further down. You will find it difficult to push deeper and deeper (Critical thinking and collaboration) They will then discuss the answer of following questions What are the two forces acting on the plastic bottle in the upward and downward direction? Teacher will the Define buoyancy and explain the concept. Techniques to be used: Daily Practice Problem MCQ Student -teacher interaction, Wipro- G.O.s(web chart, flow chart and differentiation table,compare- contrast matrix), collaborative learning,
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	Cognitive closure- summarization by students, they will summarise the answer of the question posed at the beginning of the class.
Self Study, Home Work, Assignments	NCERT Questions

Topic	DAY 7 (Floatation and sinking)
Class Transaction	(approx. 40 min each)
Pre-requisite for the course	This lesson requires basic knowledge of pressure in fluids, density, buoyancy.
Assessment of qualifying knowledge	One minute paper- what do you mean by buoyancy?
Objective	Given the content (topic) the reasons of why do certain objects float or sink in liquids.
DOL	D1, D2,D3,D4
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will know and understand</i> Students will be able to - The concept of floatation <u>SKILLS AND COMPETENCIES</u>- <i>Students would be able to</i> - Critically analyse why do certain objects float or sink in liquids (Critical thinking and problem solving)
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Students will then be divided into groups of 5. Each heterogeneous group will perform the following activity - Take a beaker filled with water. - Take an iron nail and place it on the surface of the water. Observe what happens. (Critical thinking and collaboration) Now take a cork and place it on the surface of water, observe what happens? They will then discuss the answer of following questions Techniques to be used: Daily Practice Problem MCQ Student -teacher interaction, Wipro- G.O.s(web chart, flow chart and differentiation table, compare- contrast matrix), collaborative learning,

Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	Cognitive closure- summarization by students
Self Study, Home Work, Assignments	ncert Questions

Topic	DAY 8 (Archimedes Principle)
Class Transaction	approx. 40 min
Pre-requisite for the course	This lesson requires basic knowledge of pressure in fluids, weight, density, buoyancy.
Assessment of qualifying knowledge	Lab Activity One minute paper- what do objects float or sink in liquids?
Objective	Explain Archimedes principle
DOL	D1, D2,D3,D4
Learning Outcomes	<u>KNOWLEDGE</u> - <i>Students will know and understand</i> Students will be able to - Explain Archimedes principle and its applications <u>SKILLS AND COMPETENCIES</u> - <i>Students would be able to</i> - Apply Archimedes principle in daily life.(critical thinking)
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Students will then be divided into groups of 5. Each heterogeneous group will write their observation in the observation sheet. Observe the elongation of the rubber string due to the weight of a piece of stone suspended from it in air. (b) The elongation decreases as the stone is immersed in water. (Critical thinking and collaboration) They will then discuss the answer of following questions, followed by explanation by teacher. Techniques to be used: Daily Practice Problem MCQ Student -teacher interaction, Wipro- G.O.s(web chart, flow chart and differentiation table, compare- contrast matrix), collaborative learning,
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	Cognitive closure- working of lactometer and hydrometer
Self Study, Home Work, Assignments	Video on story of Archimedes. Students to summarize it in their own words.

Topic	DAY 9 (Relative Density)
Class Transaction	approx. 40 min
Pre-requisite for the course	This lesson requires basic knowledge of pressure in fluids, weight,density, buoyancy.
Assessment of qualifying knowledge	One minute paper- State Archimedes principle and one of its application.
Objective	Define relative density and solve numerical based on it.
DOL	D1,2,3
Learning Outcomes	<u>KNOWLEDGE</u> - <i>Students will know and understand</i>

	Students will be able to • Explain relative density and its applications <u>SKILLS AND COMPETENCIES</u>- <i>Students would be able to</i> • Apply relative density in daily life.(critical thinking)
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- Students will then be divided into groups of 5. Each heterogeneous group will write their observation in the observation sheet- numerical will be given. (Critical thinking and collaboration) They will then discuss the answer of following questions, followed by explanation by teacher. Techniques to be used: Daily Practice Problem MCQ Student -teacher interaction, Wipro- G.O.s(web chart, flow chart and differentiation table, compare- contrast matrix), collaborative learning,
Resources	Text Book: NCERT text book for Science. Reference Book CBSE Exemplar
Closure	Cognitive closure- The volume of 50 g of a substance is 20 cm³. If the density of water is 1 g cm⁻³, will the substance float or sink?
Self Study, Home Work, Assignments	Ncert Questions