CLASS – X
LESSON PLAN
CHAPTER-12: SURFACE AREAS AND VOLUMES

Unit	Mensuration (Chapter 12: Surface Areas and Volumes)
Class Transaction	Total: 12 periods (approx. 40 min each)
Pre-requisite for the course	This lesson requires 1. Basic knowledge of 3- D shapes. 2. Knowledge of the surface areas and volumes of different 3-D shapes. 3. Knowledge of the difference between curved surface area and total surface area. 4. Knowledge of frustum.
Assessment of qualifying knowledge	1. Written test 2. Lab activity 3. HW notebook
Objective	• Students would be able to calculate surface areas and volumes of differently combined solids, convert one solid form to other and calculate surface area and volume of frustum.
Learning Outcomes	KNOWLEDGE- *Students will know and understand* 1. Surfaces of combination of different solids. 2. Surface area of a combination of solids. 3. Volume of a combination of solids. 4. Conversion of solid from one shape to another. 5. Frustum of a cone. SKILLS- *Students would be able to* 1. Identify the 3-D shapes combined to form an object. 2. Understand the various surfaces of the resultant object. 3. Determine the surface area of an object formed by combining any 2 of the basic solids. 4. Find the volume of the objects formed by combining any of 2 of a cuboid, cone, cylinder, sphere and hemisphere. 5. Understand how the object of one shape is converted to another shape and calculate the dimensions of reshaped solid. 6. Understand how a portion of a cone is removed to form another shape- frustum of cone and different objects of this shape. 7. Calculate the surface area and volume of the frustum of cone.
Transaction Methodology (The teacher can use the mentioned techniques, wherever	Transaction would proceed in the following manner- **Strategies Used : Numbered Heads, Brain storming, Inquiry based Learning, Inductive and Deductive Reasoning** **Brain Storming:** In this activity, students are asked to generate ideas on a certain topic, category or question while facilitator facilitate and record the answers on the board. **Inquiry Based Learning:** Inquiry-based learning uses different approaches to learning, including small-group discussion and guided learning. Instead of memorizing facts and material, students learn by doing.

applicable, and can use any other too.)	This allows them to build knowledge through exploration, experience, and discussion. **Inductive and Deductive Learning:** In Inductive type students proceed from particular to general statement(example to formula) and in Deductive type students proceed from general to particular. Students are given formula and they solve problems using them. **Muddiest Point:** Check comprehension and identify confusion, what was most confusing about the material? **Numbered Heads:** Students are placed in groups and each person is given a number (from one to the maximum number in each group). The teacher poses a question and students "put their heads together" to figure out the answer. The teacher calls a specific number to respond as spokesperson for the group. *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 Case Studies Lab Activities Any Other
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT and Exemplar in their H.W notebooks. HW notebooks to be marked as per the given plan: *Assessment Parameters*: The total marks for the activity is 5 marks On time submission……1 mark Presentation/ Neatness……1 mark Content…….....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	**3 UNIT TESTS** (20, 30, 30) 80 Marks **MID TERM EXAMINATION** 80 Marks

	HALF YEARLY EXAMINATION 80 Marks **PRE BOARD-I EXAMINATION** 80 Marks **PRE BOARD-II EXAMINATION** 80 Marks **ANNUAL BOARD EXAMINATION** 80 Marks **PERIODIC TEST** Average of the best two tests to be taken that will have a weightage of 10 marks. Best 2 Tests out of: Units tests, Midterm examination, Half Yearly examination. **INTERNAL ASSESSMENT** 20 Marks • Periodical Test 10 Marks • Note Book Submission 05 Marks • Lab Practical 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:* • High order thinking questions from NCERT Exemplar • Encouragement for referring other resources *For weak students:* • Buddy help to be provided • Provide grade-up classes *For differently abled students:* • Ignore spelling mistakes and formulae, if not written • Call parents at regular intervals • Provide grade-up classes
Marks	The weightage would be given by CBSE.
Assessment Questions	**Q1** If two cubes of edge 3cm each are joined end to end, find the surface area of the resulting cuboid. **Q2** How many spherical bullets can be made out of a solid cube of lead whose edge measures 44 cm, each bullet being 4 cm in diameter? **Q3** An inverted cone of vertical height 12cm and radius of the base 9cm has water to a depth of 4cm. Find the area of the internal surface of the cone not in contact with water. **Q4** A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter l0cm of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid. **Q5** The barrel of a fountain pen, cylindrical in shape, is 7 cm long and 5 mm in diameter. A full barrel of ink in the pen is used up on writing 3300 words on an average. How many words can be written in a bottle of ink containing one fifth of a litre?

DAY	**ONE**
Objective	**Identify** different types of 3D shapes and their link to 2D
Assessment of qualifying knowledge	Quiz and knowledge testing on concepts of volume and surface area
Learning Outcomes	KNOWLEDGE- *Students will know and **identify*** the different shape and learn to **create** their own formulae SKILLS and COMPETENCIES *Students would be able to* **relate** 3D shapes to real life.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Brainstorming** **Anticipatory Set: 10 min** Facilitator will ask few questions to introduce the topic like: • What is a cylinder? • What is a cone? • What is a sphere? • What is the difference between TSA and CSA? The chapter will be co-related to the topic volumes and surface areas studied in class 9 and will be associated with some Geography based concepts also to enhance interest of students in finding surface areas and volumes of 3-D shapes. **Discussion of topic through Collaborative Learning: 15 min** **(**Critical Thinking and Problem Solving) Students would be given different shapes and asked to find volume and surface area by looking at them **Guided practice: 10 min** The students will practice in their notebook in the class with the help of their teacher, making formulae for combination solids **Independent Practice:** Students will go through the solved examples before Ex 13.1 of NCERT text book. **Closure: 5 min** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book 1. CBSE Exemplar 2. DPSG Spiral
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions in their H.W. notebooks.
Assessments	Oral Test (5 minutes)

DAY	**TWO**
Objective	**Identify** different ways of writing same formulae in different situations.
Assessment of qualifying knowledge	Quiz and knowledge testing on 3D shapes
Learning Outcomes	KNOWLEDGE- *Students will know and* ***identify*** the different shapes and their uses. SKILLS and COMPETENCIES *Students would be able to* **Relate** construction to real life.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Inductive Reasoning** **Anticipatory Set: 10 min** Recalling of the previous knowledge through questions ask from anticipatory sets. **Discussion of topic through Collaborative Learning: 15 min** **(**Critical Thinking and Problem Solving) Surface Area of cuboids and cubes, cylinders, cones and spheres would be explained with examples. **Guided practice: 10 min** The students will practice questions from NCERT Ex 13.1 **Independent Practice:** Students will go through the solved examples Ex 13.1 of NCERT text book. **Closure: 5 min** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**THREE**
Objective	**Identify** which surface area to be used in which situation.
Assessment of qualifying knowledge	Knowledge testing on surface area of solids
Learning Outcomes	KNOWLEDGE- *Students will know and* ***identify*** the cases of combination solids SKILLS and COMPETENCIES *Students would be able to* **Relate** mensuration to real life.

Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Think Pair and Share** **Anticipatory Set: <u>10 min</u>** Recalling of the previous knowledge through questions ask from anticipatory sets. **Discussion of topic through Collaborative Learning: <u>15 min</u>** **(**Critical Thinking and Problem Solving) Students would be given higher order examples from the content covered in Ex 13.1 **Guided practice: <u>10 min</u>** The students will practice questions from Ex 13.1 **collaboratively** **Independent Practice:** Students will go through the solved examples before Ex 13.1 of NCERT text book. **Closure: <u>5 min</u>** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**FOUR**
Objective	**Demonstrate** the ability to find capacity of various combination solids
Assessment of qualifying knowledge	Quiz and knowledge testing on volume
Learning Outcomes	<u>KNOWLEDGE</u>- *Students will know and **identify*** the different shapes and their volumes <u>SKILLS and COMPETENCIES</u> *Students would be able to* develop the **skill of relation**
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Story Boarding** **Anticipatory Set: <u>10 min</u>** Oral test of formulae of volumes **Discussion of topic through Collaborative Learning: <u>15 min</u>** **(**Critical Thinking and Problem Solving) Students would be asked to sit in groups and solve questions on

	combination solids. **Guided practice: <u>10 min</u>** The students will practice questions before Ex 13.2 **Independent Practice:** Students will go through the solved examples before Ex 13.2 of NCERT text book. **Closure: <u>5 min</u>** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**FIVE**
Objective	**Demonstrate** the ability to find capacity of various combination solids
Assessment of qualifying knowledge	Quiz and knowledge testing on volume
Learning Outcomes	<u>KNOWLEDGE</u>- *Students will know and **identify*** the different shapes and their volumes <u>SKILLS and COMPETENCIES</u> *Students would be able to* develop the **skill of relation**
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Muddiest point Discussion** **Anticipatory Set: <u>10 min</u>** Oral test of formulae of volumes **Discussion of topic through Collaborative Learning: <u>15 min</u>** **(**Critical Thinking and Problem Solving) Students would be asked to sit in groups and solve questions on combination solids. **Guided practice: <u>10 min</u>** The students will practice questions from Ex 13.2 **Independent Practice:** Students will go through the solved examples before Ex 13.2 of NCERT text book. **Closure: <u>5 min</u>** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book

	CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**SIX**
Objective	**Demonstrate** the ability to find capacity of various combination solids
Assessment of qualifying knowledge	Quiz and knowledge testing on volume
Learning Outcomes	KNOWLEDGE- *Students will know and* ***identify*** the different shapes and their volumes SKILLS and COMPETENCIES *Students would be able to* develop the **skill of relation**
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Numbered Heads** **Anticipatory Set: 10 min** Oral test of formulae of volumes **Discussion of topic through Collaborative Learning: 15 min** **(**Critical Thinking and Problem Solving) Students would be asked to sit in groups and solve questions on combination solids. **Guided practice: 10 min** The students will practice questions from Exexmplar **Independent Practice:** Students will go through the solved examples of Exemplar. **Closure: 5 min** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**SEVEN**
Objective	**Analyze** the situations where solids are melted and converted into different shapes.
Assessment of	Quiz and knowledge testing on converted solids and their dimensions and

qualifying knowledge	volumes
Learning Outcomes	KNOWLEDGE- *Students will know and* ***identify*** the cases and which formulae to use. SKILLS and COMPETENCIES *Students would be able to* **Relate** situations to real life.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Numbered Heads** **Anticipatory Set: 10 min** Recalling of the previous knowledge through questions ask from anticipatory sets. **Discussion of topic through Collaborative Learning: 15 min** **(**Critical Thinking and Problem Solving) Students would be given examples from Ex 13.3 and their appropriate writing style. **Guided practice: 10 min** The students will practice questions from ex 13.3 collaboratively. The facilitator would take rounds and solve queries as and when required. **Independent Practice:** Students will go through the solved examples before Ex 13.3 of NCERT text book. **Closure: 5 min** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions of NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**EIGHT**
Objective	**Analyze** the situations where solids are melted and converted into different shapes.
Assessment of qualifying knowledge	Quiz and knowledge testing on converted solids and their dimensions and volumes
Learning Outcomes	KNOWLEDGE- *Students will know and* ***identify*** the cases and which formulae to use. SKILLS and COMPETENCIES *Students would be able to* **Relate** situations to real life.
Transaction	Transaction would proceed in the following manner-

Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	**Strategies Used: Think pair and Share** **Anticipatory Set: <u>10 min</u>** Recalling of the previous knowledge through questions ask from anticipatory sets. **Discussion of topic through Collaborative Learning: <u>15 min</u>** **(**Critical Thinking and Problem Solving) Students would be given examples from Ex 13.3 and their appropriate writing style. **Guided practice: <u>10 min</u>** The students will practice questions from Ex 13.3 collaboratively. The facilitator would take rounds and solve queries as and when required. **Independent Practice:** Students will go through the solved examples before Ex 13.3 of NCERT text book. **Closure: <u>5 min</u>** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**NINE**
Objective	**Analyze** the situations where solids are melted and converted into different shapes.
Assessment of qualifying knowledge	Quiz and knowledge testing on converted solids and their dimensions and volumes
Learning Outcomes	<u>KNOWLEDGE</u>- *Students will know and* ***identify*** the cases and which formulae to use. <u>SKILLS and COMPETENCIES</u> *Students would be able to* **Relate** situations to real life.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Think Pair and Share** **Anticipatory Set: <u>10 min</u>** Recalling of the previous knowledge through questions ask from anticipatory sets. **Discussion of topic through Collaborative Learning: <u>15 min</u>** **(**Critical Thinking and Problem Solving)

	Students would be given examples from Exemplar and their appropriate writing style. **Guided practice: <u>10 min</u>** The students will practice questions from Exemplar collaboratively. The facilitator would take rounds and solve queries as and when required. **Independent Practice:** Students will go through the solved examples of Exemplar. **Closure: <u>5 min</u>** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**TEN**
Objective	**Identify** Frustum of a cone as a 3D shape and appreciate its use in daily situations.
Assessment of qualifying knowledge	Quiz and knowledge testing on frustum and cone
Learning Outcomes	<u>KNOWLEDGE</u>- *Students will identify and compare frustum and cone* <u>SKILLS and COMPETENCIES</u> *Students would be able to* **Relate** frustum to real life.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Brainstorming** **Anticipatory Set: <u>10 min</u>** Recalling of the previous knowledge about cone **Discussion of topic through Collaborative Learning: <u>15 min</u>** **(**Critical Thinking and Problem Solving**)** Students would be asked to imagine slicing of a cone and hence formation of a frustum. **Guided practice: <u>10 min</u>** The students will practice solved examples before Ex 13.4, while sitting in collaboration. **Independent Practice:** Students will go through the solved examples before Ex 13.4 of NCERT text book. **Closure: <u>5 min</u>** A short oral test would be taken to check proper assimilation of the topic discussed.

Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	**ELEVEN**
Objective	**Identify** Frustum of a cone as a 3D shape and appreciate its use in daily situations.
Assessment of qualifying knowledge	Quiz and knowledge testing on frustum and cone
Learning Outcomes	KNOWLEDGE- *Students will identify and compare frustum and cone* SKILLS and COMPETENCIES *Students would be able to* **Relate** frustum to real life.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Brainstorming** **Anticipatory Set: 10 min** Recalling of the previous knowledge about cone **Discussion of topic through Collaborative Learning: 15 min** **(**Critical Thinking and Problem Solving) Students would be asked to imagine slicing of a cone and hence formation of a frustum. **Guided practice: 10 min** The students will practice solved examples before Ex 13.4, while sitting in collaboration. **Independent Practice:** Students will go through the solved examples before Ex 13.4 of NCERT text book. **Closure: 5 min** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)

DAY	**TWELVE**
Objective	**Identify** Frustum of a cone as a 3D shape and appreciate its use in daily situations.
Assessment of qualifying knowledge	Quiz and knowledge testing on frustum and cone
Learning Outcomes	KNOWLEDGE- *Students will identify and compare frustum and cone* SKILLS and COMPETENCIES *Students would be able to* **Relate** frustum to real life.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Transaction would proceed in the following manner- **Strategies Used: Think pair and Share** **Anticipatory Set: 10 min** Recalling of the previous knowledge about cone **Discussion of topic through Collaborative Learning: 15 min** **(**Critical Thinking and Problem Solving) Students would be asked to imagine slicing of a cone and hence formation of a frustum. **Guided practice: 10 min** The students will practice of Ex 13.4, while sitting in collaboration. **Independent Practice:** Students will go through the solved examples before Ex 13.4 of NCERT text book. **Closure: 5 min** A short oral test would be taken to check proper assimilation of the topic discussed.
Resources	Text Book: NCERT text book for Mathematics Reference Book CBSE Exemplar
Self Study, Home Work, Assignments	**Independent Practice**: Students would do some questions from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)

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