

CLASS – X
LESSON PLAN
CHAPTER-9: SOME APPLICATIONS OF TRIGONOMETRY

Unit	Algebra (Chapter 9: Applications Of Trigonometry)
Class Transaction	Total: 6 periods (approx. 40 min each)
Pre-requisite for the course	This lesson requires 1. Knowledge of Trigonometric Ratios 2. Knowledge of Trigonometric formulae and identities
Assessment of qualifying knowledge	1. Written test 2. Lab activity 3. HW notebook
Objective	To help the students acquire knowledge about Trigonometric Ratios at different angles of $0^{\circ}, 30^{\circ}, 45^{\circ}, 60^{\circ}, 90^{\circ}$, their derivations and their application in daily life problems though creatively designing them in mathematical figures and calculating the unknown dimensions.
Learning Outcomes	<u>KNOWLEDGE</u>- Students will know and understand • The angle of elevation. • The angle of depression. • the application of Trigonometry in various fields such as Physics, Engineering, Navigation, Seismology and Art. <u>SKILLS</u>- Students would be able to 1. Identify and apply Trigonometric ratios in various situations of daily life. 2. Use different trigonometric angles values to find the required dimensions by analytical 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- Strategy Used: Inductive and deductive reasoning, Brainstorming, graphic organizer, think pair and share Think Pair and Share: In this activity, students think about a particular question individually, then they form pairs to discuss their answers. Following this, the results are shared in a large classroom discussion. Alternatively, two pairs of students can pair up to compare and discuss answers. This process forces students to think individually, and then allows them to analyze and clarify their response collaboratively. 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 Graphic Organizers: Graphic organizers are some of the most effective visual learning strategies for students and are applied across the curriculum to enhance learning and understanding of subject matter content. 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. <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. Techniques to be used: Numbered Heads 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: <i>Assessment Parameters:</i> 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 EXAMINATION80 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: <i>For gifted students:</i> - High order thinking questions from NCERT Exemplar - Encouragement for referring other resources <i>For weak students:</i> - Buddy help to be provided - Provide grade-up classes <i>For differently abled students:</i> - 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 the length of the shadow of a man is equal to the height of man. Then find the angle of elevation Q2 Find the angle of depression of a boat from the bridge at a horizontal distance of 25m from the bridge, if the height of the bridge is 25m. Q3 The height of a tower is 50 m. When angle of elevation changes from 45° to 30°, the shadow of tower becomes x metres more, then find the value of x Q4 A circus artist is climbing a 20m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole, if the angle made by the rope with the ground level is 30°. Q5 A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8m. Find the height of the tree.

DAY	ONE
Objective	Students will be able to recapitulate the concept of the relationship between angle of triangles and its sides. They will be able to comprehend the concept by creatively involving themselves to apply it using trigonometric ratios.
Assessment of qualifying knowledge	Different situation based questions will be given where angle of right triangle and one of the sides be given and to calculate the unknowns by analyzing the conditions applications through T-ratios.
Learning Outcomes	<u>KNOWLEDGE</u>- Students will know and identify the particular ratio to be used while calculating the unknowns in given right triangle <u>SKILLS and COMPETENCIES</u> Students will be able to • Create different mathematical figures to explain the situations. • To find the unknown dimensions (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- Strategy Used: Think pair and share, Numbered Heads Anticipatory Set: 10 min Facilitator will ask few questions to introduce the topic • Have you observed the given angles and side of right triangle • Do you find T –Ratios of different angles? Discussion of topic through Collaborative Learning: 15 min <u>Inquiry based learning (Critical Thinking and Problem Solving)</u> Students would be asked to analyze and write the ratio which they are supposed to use to find unknowns. The facilitator would take rounds and ensure that each learner is engaged. Guided practice: 10 min The students will solve the different questions in their notebook in the class with the help of their facilitator. The facilitator would take rounds and help the students in solving the questions. Independent Practice: Students will go through the variety of questions 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	TWO
Objective	Students will be able to understand the concept of angle of elevation towards the top of the buildings window , top of the pole etc. They will be able to

	comprehend the concept by creatively involving themselves to apply it using trigonometric ratios.
Assessment of qualifying knowledge	Different situation based questions will be given as word problems to draw the figure to calculate the unknowns by analyzing the conditions applications through T-ratios.
Learning Outcomes	<u>KNOWLEDGE</u>- Students will know and identify the angle of elevation towards the top of different heights of towers and buildings. <u>SKILLS and COMPETENCIES</u> Students will be able to • Create different mathematical figures to explain the situations. • To find the unknown dimensions (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- Strategy Used: Think pair and share Anticipatory Set: 10 min Facilitator will ask few questions to introduce the topic • Have you observed the angle of elevation towards sun? • Do you find T –Ratios of different angles? Discussion of topic through Collaborative Learning: 15 min <u>Inquiry based learning (Critical Thinking and Problem Solving)</u> Students would be asked to write different real life situations in which they are supposed to analyse the number of triangles involved. The facilitator would take rounds and ensure that each learner is engaged. Guided practice: 10 min The students will solve the questions from NCERT book, solved examples before Ex 9.1 in their notebook in the class with the help of their facilitator. The facilitator would take rounds and help the students in solving the questions. Independent Practice: Students will go through the solved examples before Ex 9.1 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 from NCERT in their H.W. notebooks.
Assessments	Oral Test (5 minutes)
DAY	THREE
Objective	Students will be able to understand the concept of angle of depression towards the bottom of the buildings foot, bottom of the pole etc. They will be able to comprehend the concept by creatively involving themselves to apply it using trigonometric ratios.

Assessment of qualifying knowledge	Different situation based questions will be given as word problems to draw the figure to calculate the unknowns by analyzing the conditions applications through T-ratios.
Learning Outcomes	<u>KNOWLEDGE</u>- Students will know and identify the angle of depression towards the bottom of different heights of towers and buildings. <u>SKILLS and COMPETENCIES</u> Students will be able to • Create different mathematical figures to explain the situations. • To find the unknown dimensions (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- Strategy Used: Inductive and deductive reasoning Recapitulation: 5 min Brainstorming on the previously taught concept would be done. Discussion of topic through Collaborative Learning: 15 min (Critical Thinking, Collaboration) An oral quiz will be taken and students will be asked to identify the angles involved. Guided practice: 15 min The students, with the help of the facilitator, will solve the questions from NCERT book of Exercise – 9.1 contd. in their notebook in the class with the help of their teacher. The teacher would ensure that each student tries to be independent at the work as well as be under the teacher’s guidance. Independent Practice: Students will complete the some parts of Exercise 9.1 in their Math HW notebook. Students who would difficulty in solving the problem would solve with the help of their buddies. 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 quiz (5 minutes)
DAY	FOUR
Objective	Students will be able to understand the concept of angle of elevation and depression towards the top and bottom of the buildings window , top and bottom of the pole etc. They will be able to comprehend the concept by creatively involving themselves to apply it using trigonometric ratios.
Assessment of qualifying knowledge	Different situation based questions will be given as word problems to draw the figure to calculate the unknowns by analyzing the conditions applications through T-ratios.

Learning Outcomes	<u>KNOWLEDGE</u>- Students will know and identify the angle of elevation and depression towards the top and bottom of different heights of towers and buildings. <u>SKILLS and COMPETENCIES</u> Students will be able to • Create different mathematical figures to explain the situations. • To find the unknown dimensions (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- Strategy Used: Inductive and deductive reasoning, Brainstorming Recapitulation: 5 min Oral test on the previous concept would be taken up. Discussion of topic through Collaborative Learning: 15 min (Critical thinking) Exemplar questions will be discussed and students will be able to solve different questions per group and then the questions will be crosschecked. Digital content will be used. The facilitator will take rounds and help students with their doubts. Guided Practice: 15 min The students will solve the questions from Exemplar in their notebook in the class with the help of their teacher. The teacher will ensure that each student tries to be independent at the work as well as be under the teacher's guidance. Independent Practice: Students will complete the some parts in their Math HW notebook. 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	Written test (5 minutes)
DAY	FIVE
Objective	Students will be able to understand the concept of angle of elevation and depression towards the top and bottom of the buildings window , top and bottom of the pole etc. They will be able to comprehend the concept by creatively involving themselves to apply it using trigonometric ratios.
Assessment of qualifying knowledge	Different situation based questions will be given as word problems to draw the figure to calculate the unknowns by analyzing the conditions applications through T-ratios.
Learning Outcomes	<u>KNOWLEDGE</u>- Students will know and identify the angle of elevation and depression towards the top and bottom of different heights of towers and buildings. <u>SKILLS and COMPETENCIES</u> Students will be able to

	• Create different mathematical figures to explain the situations. • To find the unknown dimensions (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- Strategy Used: Think pair and share Recapitulation: 5 min Oral test on the previous concept would be taken up. Discussion of topic through Collaborative Learning: 15 min (Critical thinking) Exemplar questions will be discussed and students will be able to solve different questions per group and then the questions will be crosschecked. Digital content will be used. The facilitator will take rounds and help students with their doubts. Guided Practice: 15 min The students will solve the questions from Exemplar Contd. in their notebook in the class with the help of their teacher. The teacher will ensure that each student tries to be independent at the work as well as be under the teacher's guidance. Independent Practice: Students will complete some questions of Exemplar in their Math HW notebook. 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	Written test (5 minutes)
DAY	SIX
Objective	Demonstrate the ability to solve questions with 90% accuracy
Assessment of qualifying knowledge	Different situation based questions will be given as word problems to draw the figure to calculate the unknowns by analyzing the conditions applications through T-ratios.
Learning Outcomes	<u>KNOWLEDGE-</u> <i>Students will know and identify the angle of elevation and depression towards the top and bottom of different heights of towers and buildings.</i> <u>SKILLS and COMPETENCIES</u> <i>Students will be able to</i> • Create different mathematical figures to explain the situations. • To find the unknown dimensions (critical thinking).
Transaction Methodology (The teacher can use	Transaction would proceed in the following manner- Strategy Used: Inductive and deductive reasoning, graphic organiser

the mentioned techniques, wherever applicable, and can use any other too.)	Recapitulation: <u>5 min</u> Oral test on the previous concept would be taken up. Discussion of topic through Collaborative Learning: <u>15 min</u> (Critical thinking) Exemplar questions will be discussed and students will be able to solve different questions per group and then the questions will be crosschecked. Digital content will be used. The facilitator will take rounds and help students with their doubts. Guided Practice: <u>15 min</u> The students will solve the questions from Exemplar in their notebook in the class with the help of their teacher. The teacher will ensure that each student tries to be independent at the work as well as be under the teacher's guidance. Independent Practice: Students will complete the remaining parts of Exemplar in their Math HW notebook. 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 the given questions in their H.W. notebooks.
Assessments	Written test (5 minutes)