

CLASS – X
LESSON PLAN
CHAPTER-4: QUADRATIC EQUATIONS

Unit	Algebra (Chapter 4: Quadratic Equations)
Class Transaction	Total: 5 periods (approx. 40 min each)
Pre-requisite for the course	This lesson requires 1. Basic knowledge of polynomials. 2. Knowledge of the factorization of a polynomial of degree 2 3. Knowledge of factor theorem 4. Knowledge of different algebraic identities
Assessment of qualifying knowledge	1. Written test 2. Lab activity 3. HW notebook
Objective	The learner will be able to- • Identify the quadratic polynomials. • How and when a quadratic polynomial will become a quadratic equation? • Standard form of Quadratic equation ($ax^2 + bx + c = 0$). • Recognition of quadratic equation By critical thinking. • Solution of Quadratic Equation using methods (i) By factorization (ii) By Completing the Square (iii) Quadratic Formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ • Discriminant of Quadratic Equation • Nature of the Roots (knowledge) (i) Two distinct real roots, if $b^2 - 4ac > 0$ (ii) Two equal real roots, if $b^2 - 4ac = 0$ (iii) No real roots, if $b^2 - 4ac < 0$
Learning Outcomes	<u>KNOWLEDGE-</u> <i>Students will know and Comprehend</i> 1. How to recognize a quadratic polynomial 2. Difference between a quadratic polynomial and a quadratic equation 3. Methods to solve a quadratic equation 4. Application of the concepts towards everyday problems <u>SKILLS and COMPETENCIES Developed-</u> <i>Students would be able to</i> 1. Identify quadratic equations 2. Solve the given equation by Critically an appropriate method 3. Solve complex questions based on everyday situations through collaboration and apply an appropriate methodology.
Transaction	Transaction would proceed in the following manner-

Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Strategy Used: Brainstorming, Inductive Deductive Reasoning, Inquiry Based Learning, 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. 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. 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? <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: 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 the questions in their H.W notebooks as mentioned in the monthly planner. 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	Collaborative approach towards learning of Quadratic Polynomials will be assessed by 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 ASSESSMENT20 Marks • Periodical Test 10 Marks • Note Book Submission 05 Marks • Lab Practical (subject enrichment) 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> • Encouragement for referring other resources <i>For weak students:</i> • Buddy help to be provided • Provide grade-up and remedial 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	• Check whether $x = (-1)$ is a solution of equation $4x^2 - 3x - 1 = 0$ • Solve by completing square method: $6x^2 - 13x - 5 = 0$ • The product of roots of the equation $2x^2 + 7x - 4$ is _____ • Find k, if $2kx^2 + 6x + 5 = 0$ has equal roots. • The sum of the areas of two squares is 640 m^2. If the difference of their perimeters is 64m, find the sides of the two squares.
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DAY	ONE
Objective	The learner will be able to- • Identify the quadratic polynomials. • How and when a quadratic polynomial will become a quadratic equation? • Standard form of Quadratic equation ($ax^2 + bx + c = 0$). • Recognition of quadratic equation by comprehension skills.
Assessment of qualifying knowledge	Different polynomial based assignment will be provide to identify quadratic polynomials and analyzing their coefficients by converting them into the standard form.
Learning Outcomes	• <u>KNOWLEDGE</u>- <i>Students will know how to factorise the quadratic equations to get the roots or zeroes, how and when a quadratic polynomial will become a quadratic equation?</i> • Standard form of Quadratic equation ($ax^2 + bx + c = 0$). <u>SKILLS and COMPETENCIES</u> <i>Students will be able to Analyse effectively and will be able to critically explain the coefficients and zeroes of quadratic equations.</i>
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: Brainstorming Anticipatory Set: 10 min Facilitator will ask few questions to introduce the topic • What is a polynomial? • What is the degree of polynomial? • What is the equation select the types of polynomial from $2x + 1$, $3x^3 + 2$, $2x^2 + 2$ • How can you say the given polynomial is quadratic? 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 situations where quadratic equations can be used. 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 4.1 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 4.1 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 the given questions in their H.W. notebooks as mentioned by the teacher.
Assessments	Oral Test (5 minutes)
DAY	TWO
Objective	Students will be able to • Comprehend and Explain the zeroes of a polynomial $p(x)$ that are precisely the x-coordinates of the points, where the graph of $y = p(x)$ intersects the x-axis. • Analyse that a quadratic equation can have at most 2 zeroes and a cubic equation can have at most 3 zeroes. • Roots of quadratic equation. • Solution of Quadratic Equation using methods • By factorization
Assessment of qualifying knowledge	Worksheet based of finding the roots of quadratic equations will be assessed in a collaborative manner through group activity.
Learning Outcomes	<u>KNOWLEDGE</u>- Students will learn to find roots of quadratic polynomial and understand the relation between coefficients and roots of polynomials. <u>SKILLS and COMPETENCIES</u>- Students will be able to analyse how to split or factorize the middle term to get the two factors of quadratic equation(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: Brainstorming 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 coefficients of x and y and will be able to relate them with the roots of polynomial. Guided practice: 15 min The students, with the help of the facilitator, will solve the questions from NCERT book of Exercise – 4.2 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 remaining HW parts given in Exercise 4.2 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 the given questions in their H.W. notebooks as mentioned in the book.
Assessments	Oral quiz (5 minutes)
DAY	THREE
Objective	• Roots of quadratic equation. • Solution of Quadratic Equation using methods • (ii) By Completing the square method through critical approach to get factors of quadratic equations.
Assessment of qualifying knowledge	Worksheet based of finding the roots of quadratic equations will be assessed in a collaborative manner through group activity using completing the square method.
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will develop the ability to analyze that whether the given quadratic equation can be converted by using identities of $(a+b)^2$ and $(a-b)^2$.</i> <u>SKILLS and COMPETENCIES</u> - <i>Students would be able to critically apply the concept of completing the square method in given equations and collaboratively analyze and calculate the value of roots of the polynomial provided.</i>
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 NCERT book of Exercise 4.3 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 HW parts given in

	the Exercise 4.3 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 the given questions in their H.W. notebooks.
Assessments	Written test (5 minutes)
DAY	FOUR
Objective	Students would understand the Quadratic Formula to find roots of the given Quadratic Equation and apply it with 100 % accuracy.
Assessment of qualifying knowledge	Worksheet based of finding the roots of quadratic equations will be assessed in a collaborative manner through group activity using Quadratic formula.
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will know about discriminant and learn to calculate the zeroes of quadratic equation using the quadratic formula without factorisation.</i> Quadratic Formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ <u>SKILLS and COMPETENCIES</u> - <i>Students will critically analyse the value of discriminant to get the nature of roots.</i> <u>Nature of the Roots</u> (iv) Two distinct real roots, if $b^2 - 4ac > 0$ (v) Two equal real roots, if $b^2 - 4ac = 0$ (vi) No real roots, if $b^2 - 4ac < 0$
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 NCERT book of Exercise 4.4 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 HW parts given in the Exercise 4.4 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)
DAY	FIVE
Objective	Students would be able to apply The Quadratic Formula in given everyday situations.
Assessment of qualifying knowledge	An oral test on finding the roots of quadratic equations will be assessed in a collaborative manner through using Quadratic formula.
Learning Outcomes	<u>KNOWLEDGE</u>- <i>Students will apply the given Quadratic Formula to real life situations and analyze its use.</i> Quadratic Formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ <u>SKILLS and COMPETENCIES</u> - <i>Students will critically analyse the value of discriminant to get the nature of roots.</i> <u>Nature of the Roots</u> • Two distinct real roots, if $b^2 - 4ac > 0$ • Two equal real roots, if $b^2 - 4ac = 0$ • No real roots, if $b^2 - 4ac < 0$
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: <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) NCERT questions along with some 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 NCERT book of Exercise 4.4 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 HW parts given in the Exercise 4.4 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)