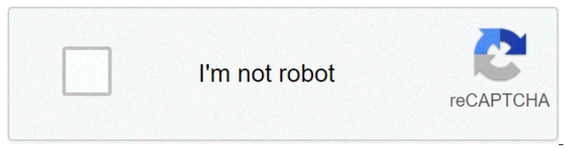

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Quadratic equation questions and answers class 10

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You can also Download Maths Revision Notes Class 10 to help you to revise complete Syllabus and score more marks in your examinations.CBSE Class 10 Maths Important Questions Chapter 4 – Quadratic Equations Important QuestionsNotesMCQ NCERT Solutions Sample Questions Sample Papers Class X MathHOTS for Arithmetic Progressions 1. Find the ‘6th’ term of the A.P.: 2. If the numbers a, b, c, d and e form an A.P., then find the value of a – 4b + 6c – 4d + e. 3. If is the arithmetic mean between ‘a’ and ‘b’, then, find the value of ‘n’. 4. If pth term of an A.P. is prove that the sum of the first ‘pq’ terms is 5. If are in A.P., prove that a2, b2, c2 are also in A.P. 6. Solve the equation: 1 + 4 + 7 + 10 + … + x = 287 7. Find three numbers in A.P. whose sum is 21 and their product is 231. 8. Find p and q such that: 2p, 2p, q, p + 4q, 35 are in AP 9. If are three consecutive terms of an AP, find the value of a. 10. For what value of p, are (2p – 1), 7 and three consecutive terms of an AP? Mathematics class 10 SSC solutions for Quadratic equations are given. Exercise 5.1, 5.2. 5.3 and 5.4 problems with solutions are given. Observe the solutions and try them in your own method. First you study the text book very well. Observe the example problems and solutions. You can also see the solutions for 1. Real numbers 2. Sets 3. Polynomials 4. Pair of linear equations in two variables 5. Quadratic Equations 6. Progressions 7. Coordinate geometry 8. Similar triangles 9. Tangents and Secants to a Circle 10. Mensuration 11. Trigonometry 12. Applications of trigonometry 13. Probability 14. 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Check whether the following are quadratic equations: (i) (x + 1)2 = 2(x - 3) (ii) x2 - 2x = (-2)(3 - x) (iii) (x - 2)(x + 1) = (x - 1)(x + 3) (iv) (x - 3)(2x + 1) = x(x + 5) (v) (2x - 1)(x - 3) = (x + 5)(x - 1) (vi) x2 + 3x + 1 = (x - 2)2 (vii) (x + 2)3 = 2x(x2 - 1) (viii) x3 - 4x2 - x + 1 = (x - 2)3 Answer (i) (x + 2)2 = 2(x - 3) ⇒ x2 + 2x + 1 = 2x - 6 ⇒ x2 + 7 = 0 It is of the form ax2 + bx + c = 0. Hence, the given equation is quadratic equation. (ii) x2 - 2x = (-2)(3 - x) ⇒ x2 - 2x = -6 + 2x ⇒ x2 - 4x + 6 = 0 It is of the form ax2 + bx + c = 0. Hence, the given equation is quadratic equation. (iii) (x - 2)(x + 1) = (x - 1)(x + 3) ⇒ x2 - x - 2 = x2 + 2x - 3 ⇒ 3x - 1 =0 It is not of the form ax2 + bx + c = 0. Hence, the given equation is not a quadratic equation. (iv) (x - 3)(2x + 1) = x(x + 5) ⇒ 2x2 - 5x - 3 = x2 + 5x ⇒ x2 - 10x - 3 = 0 It is of the form ax2 + bx + c = 0. Hence, the given equation is quadratic equation. (v) (2x - 1)(x - 3) = (x + 5)(x - 1) ⇒ 2x2 - 7x + 3 = x2 + 4x - 5 ⇒ x2 - 11x + 8 = 0 It is of the form ax2 + bx + c = 0. Hence, the given equation is quadratic equation. (vi) x2 + 3x + 1 = (x - 2)2 ⇒ x2 + 3x + 1 = x2 + 4 - 4x ⇒ 7x - 3 = 0 It is not of the form ax2 + bx + c = 0. Hence, the given equation is not a quadratic equation. (vii) (x + 2)3 = 2x(x2 - 1) ⇒ x3 + 8 + x2 + 12x = 2x3 - 2x ⇒ x3 + 14x - 6x2 - 8 = 0 It is not of the form ax2 + bx + c = 0. Hence, the given equation is not a quadratic equation. (viii) x3 - 4x2 - x + 1 = (x - 2)3 ⇒ x3 - 4x2 - x + 1 = x3 - 8 - 6x2 + 12x ⇒ 2x2 - 13x + 9 = 0 It is of the form ax2 + bx + c = 0. Hence, the given equation is quadratic equation. 2. Represent the following situations in the form of quadratic equations. (i) The area of a rectangular plot is 528 m2. The length of the plot (in metres) is one more than twice its breadth. We need to find the length and breadth of the plot. Answer Let the breadth of the rectangular plot = x m Hence, the length of the plot is (2x + 1) m. Formula of area of rectangle = length × breadth = 528 m2 Putting the value of length and width, we get (2x + 1) × x = 528 ⇒ 2x2 + x =528 ⇒ 2x2 + x - 528 = 0 (ii) The product of two consecutive positive integers is 306. We need to find the integers. Answer Let the first integer number = x Next consecutive positive integer will = x + 1 Product of both integers = x × (x +1) = 306 ⇒ x2 + x = 306 ⇒ x2 + x - 306 = 0 (iii) Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. We would like to find Rohan's present age. Answer Let take Rohan's age = x years Hence, his mother's age = x + 26 3 years from now Rohan's age = x + 3 Age of Rohan's mother will = x + 26 + 3 = x + 29 The product of their ages 3 years from now will be 360 so that (x + 3)(x + 29) = 360 ⇒ x2 + 29x + 3x + 87 = 360 ⇒ x2 + 32x + 87 - 360 = 0 ⇒ x2 + 32x - 273 = 0 (iv) A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. We need to find the speed of the train. Answer Let the speed of train be x km/h. Time taken to travel 480 km = 480/x km/h In second condition, let the speed of train = (x - 8) km/h It is also given that the train will take 3 hours to cover the same distance. Therefore, time taken to travel 480 km = (480/x + 3) km/h (x - 8)(480/x + 3) = 480 ⇒ 480 + 3x - 3840/x - 24 = 480 ⇒ 3x - 3840/x = 24 ⇒ 3x2 - 8x - 1280 = 0 Page No: 76 Exercise 4.2 1. Find the roots of the following quadratic equations by factorisation: (i) x2 – 3x – 10 = 0 (ii) 2x2 + x – 6 = 0 (iii) √2 x2 + 7x + 5√2 = 0 (iv) 2x2 – x + 1/8 = 0 (v) 100x2 – 20x + 1 = 0 Answer (i) x2 – 3x – 10 = x2 - 5x + 2x - 10 = x(x - 5) + 2(x - 5) = (x - 5)(x + 2) Roots of this equation are the values for which (x - 5)(x + 2) = 0 ⇒ x = 5 or x = -2 (ii) 2x2 + x – 6 = 2x2 + 4x - 3x - 6 = 2x(x + 2) - 3(x + 2) = (x + 2)(2x - 3) Roots of this equation are the values for which (x + 2)(2x - 3) = 0 ∴ x + 2 = 0 or 2x - 3 = 0 ⇒ x = -2 or x = 3/2 (iii) √2 x2 + 7x + 5√2 = √2 x2 + 5x + 2x + 5√2 = x (√2x + 5) + √2(√2x + 5)= (√2x + 5)(x + √2) Roots of this equation are the values for which (√2x + 5)(x + √2) = 0 ∴ √2x + 5 = 0 or x + √2 = 0 ⇒ x = -5/√2 or x = -√2 (iv) 2x2 – x + 1/8 = 1/8 (16x2 - 8x + 1) = 1/8 (16x2 - 4x -4x + 1) = 1/8 (4x(4x - 1) -1(4x - 1)) = 1/8(4x - 1)2 Roots of this equation are the values for which (4x - 1)2 = 0 ∴ (4x - 1) = 0 or (4x - 1) = 0 ⇒ x = 1/4 or x = 1/4 (v) 100x2 – 20x + 1 = 100x2 – 10x - 10x + 1 = 10x(10x - 1) -1(10x - 1) = (10x - 1)2 Roots of this equation are the values for which (10x - 1)2 = 0 ∴ (10x - 1) = 0 or (10x - 1) = 0 ⇒ x = 1/10 or x = 1/10 2. (i) John and Jivanti together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. Find out how many marbles they had to start with. Let the number of John's marbles be x. Therefore, number of Jivanti's marble = 45 - x After losing 5 marbles, Number of John's marbles = x - 5 Number of Jivanti's marbles = 45 - x - 5 = 40 - x It is given that the product of their marbles is 124. ⇒ x2 – 45x + 324 = 0 ⇒ x2 – 36x - 9x + 324 = 0 ⇒ x(x - 36) -9(x - 36) = 0 ⇒ (x - 36)(x - 9) = 0 Either x - 36 = 0 or x - 9 = 0 ⇒ x = 36 or x = 9 If the number of John's marbles = 36, Then, number of Jivanti's marbles = 45 - 36 = 9 If number of John's marbles = 9, Then, number of Jivanti's marbles = 45 - 9 = 36 (ii) A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was Rs 750. Find out the number of toys produced on that day. Answer Let the number of toys produced be x. ∴ Cost of production of each toy = Rs (55 - x) It is given that, total production of the toys = Rs 750 ⇒ x2 – 25x - 30x + 750 = 0 ⇒ x(x - 25) -30(x - 25) = 0 Either, x -25 = 0 or x - 30 = 0 ⇒ x = 25 or x = 30 Hence, the number of toys will be either 25 or 30. 3. Find two numbers whose sum is 27 and product is 182. Answer Let the first number be x and the second number is 27 - x. Therefore, their product = x (27 - x) It is given that the product of these numbers is 182. Therefore, x(27 - x) = 182 ⇒ x2 – 27x - 182 = 0 ⇒ x2 – 13x - 14x + 182 = 0 ⇒ x(x - 13) -14(x - 13) = 0 ⇒ (x - 13)(x -14) = 0 Either x = -13 = 0 or x - 14 = 0 ⇒ x = 13 or x = 14 If first number = 13, then Other number = 27 - 13 = 14 If first number = 14, then Other number = 27 - 14 = 13 Therefore, the numbers are 13 and 14. 4. Find two consecutive positive integers, sum of whose squares is 365. Answer Let the consecutive positive integers be x and x + 1. Therefore, x2 + (x + 1)2 = 365 ⇒ x2 + x2 + 1 + 2x = 365 ⇒ 2x2 + 2x - 364 = 0 ⇒ x2 + x - 182 = 0 ⇒ x2 + 14x - 13x - 182 = 0 ⇒ x(x + 14) -13(x + 14) = 0 ⇒ (x + 14)(x - 13) = 0 Either x + 14 = 0 or x - 13 = 0, ⇒ x = - 14 or x = 13 Since the integers are positive, x can only be 13. ∴ x + 1 = 13 + 1 = 14 Therefore, two consecutive positive integers will be 13 and 14. 5. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides. Answer Let the base of the right triangle be x cm. Its altitude = (x - 7) cm From Pythagoras theorem, we have Base2 + Altitude2 = Hypotenuse2 ∴ x2 + (x - 7)2 = 132 ⇒ x2 + x2 + 49 - 14x = 169 ⇒ 2x2 - 14x - 120 = 0 ⇒ x2 - 7x - 60 = 0 ⇒ x2 - 12x + 5x - 60 = 0 ⇒ x(x - 12) + 5(x - 12) = 0 ⇒ (x - 12)(x + 5) = 0 Either x - 12 = 0 or x + 5 = 0, ⇒ x = 12 or x = - 5 Since sides are positive, x can only be 12. Therefore, the base of the given triangle is 12 cm and the altitude of this triangle will be (12 - 7) cm = 5 cm. 6. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was Rs 90, find the number of articles produced and the cost of each article. Answer Let the number of articles produced be x. Therefore, cost of production of each article = Rs (2x + 3) It is given that the total production is Rs 90.∴ x(2x + 3) = 0 ⇒ 2x2 + 3x - 90 = 0 ⇒ 2x2 + 15x -12x - 90 = 0 ⇒ x(2x + 15) -6(2x + 15) = 0 ⇒ (2x + 15)(x - 6) = 0 Either 2x + 15 = 0 or x - 6 = 0 As the number of articles produced can only be a positive integer, therefore, x can only be 6. Hence, number of articles produced = 6 Cost of each article = 2 × 6 + 3 = Rs 15. Page No: 87 Exercise 4.3 1. Find the roots of the following quadratic equations, if they exist, by the method of completing the square: (i) 2x2 + x – 4 = 0 (iii) 4x2 + 4√3x + 3 = 0 (iv) 2x2 + x + 4 = 0 Answer (i) 2x2 – 7x + 3 = 0 ⇒ 2x2 – 7x = - 3 On dividing both sides of the equation by 2, we get ⇒ x2 – 7x/2 = -3/2 ⇒ x2 – 2 × x × 7/4 + (7/4)2 = (7/4)2 - 3/2 ⇒ (x - 7/4)2 = 49/16 - 3/2 ⇒ (x - 7/4)2 = 25/16 ⇒ (x - 7/4) = ± 5/4 ⇒ x = 7/4 ± 5/4 ⇒ x = 7/4 + 5/4 or x = 7/4 - 5/4 ⇒ x = 12/4 or x = 2/4 ⇒ x = 3 or 1/2 (ii) 2x2 + x – 4 = 0 ⇒ 2x2 + x = 4 On dividing both sides of the equation, we get ⇒ x2 + x/2 = 2 On adding (1/4)2 to both sides of the equation, we get ⇒ (x)2 + 2 × x × 1/4 + (1/4)2 = 2 + (1/4)2 ⇒ (x + 1/4)2 = 33/16 ⇒ x + 1/4 = ± √33/4 ⇒ x = ± √33/4 - 1/4 ⇒ x = ± √33-1/4 or x = -√33-1/4 (iii) 4x2 + 4√3x + 3 = 0 ⇒ (2x)2 + 2 × 2x × √3 + (√3)2 = 0 ⇒ (2x + √3)2 = 0 ⇒ (2x + √3) = 0 and (2x + √3) = 0 ⇒ x = -√3/2 or x = -√3/2 (iv) 2x2 + x + 4 = 0 ⇒ 2x2 + x = -4 On dividing both sides of the equation, we get ⇒ x2 + 1/2x = 2 ⇒ x2 + 2 × x × 1/4 = -2 On adding (1/4)2 to both sides of the equation, we get ⇒ (x)2 + 2 × x × 1/4 + (1/4)2 = (1/4)2 - 2 ⇒ (x + 1/4)2 = 1/16 - 2 ⇒ (x + 1/4)2 = -31/16 However, the square of number cannot be negative. Therefore, there is no real root for the given equation. 2. Find the roots of the quadratic equations given in Q.1 above by applying the quadratic formula. Answer (i) 2x2 – 7x + 3 = 0 On comparing this equation with ax2 + bx + c = 0, we get a = 2, b = -7 and c = 3 By using quadratic formula, we get x = -b±√b2 - 4ac/2a ⇒ x = 7±√49 - 24/4 ⇒ x = 7±√25/4 ⇒ x = 7±5/4 ⇒ x = 7+5/4 or x = 7-5/4 ⇒ x = 12/4 or 2/4 ∴ x = 3 or 1/2 (ii) 2x2 + x - 4 = 0 On comparing this equation with ax2 + bx + c = 0, we get a = 2, b = 1 and c = -4 By using quadratic formula, we get x = -b±√b2 - 4ac/2a ⇒x = -1±√1+32/4 ⇒x = -1±√33/4 ∴ x = -1+√33/4 or x = -1-√33/4 (iii) 4x2 + 4√3x + 3 = 0 On comparing this equation with ax2 + bx + c = 0, we get a = 4, b = 4√3 and c = 3 By using quadratic formula, we get x = -b±√b2 - 4ac/2a ⇒ x = -4√3±√48-48/8 ⇒ x = -4√3±0/8 ∴ x = -√3/2 or x = -√3/2 (iv) 2x2 + x + 4 = 0 On comparing this equation with ax2 + bx + c = 0, we get a = 2, b = 1 and c = 4 By using quadratic formula, we get x = -b±√b2 - 4ac/2a ⇒ x = -1±√1-32/4 ⇒ x = -1±√-31/4 The square of a number can never be negative. ∴There is no real solution of this equation. Page No: 88 3. Find the roots of the following equations: (i) x-1/x = 3, x ≠ 0 (ii) 1/x+4 - 1/x-7 = 11/30, x = -4, 7 Answer (i) x-1/x = 3 ⇒ x2 - 3x -1 = 0 On comparing this equation with ax2 + bx + c = 0, we get a = 1, b = -3 and c = -1 By using quadratic formula, we get x = -b±√b2 - 4ac/2a ⇒ x = 3±√9+4/2 ⇒ x = 3±√13/2 ∴ x = 3+√13/2 or x = 3-√13/2 (ii) 1/x+4 - 1/x-7 = 11/30 ⇒ x-7-x-4/(x+4)(x-7) = 11/30 ⇒ -11/(x+4)(x-7) = 11/30 ⇒ (x+4)(x-7) = -30 ⇒ x2 - 3x - 28 = 30 ⇒ x2 - 3x + 2 = 0 ⇒ x2 - 2x - x + 2 = 0 ⇒ x(x - 2) - 1(x - 2) = 0 ⇒ (x - 2)(x - 1) = 0 ⇒ x = 1 or 2 4. The sum of the reciprocals of Rehman's ages, (in years) 3 years ago and 5 years from now is 1/3. Find his present age. Answer Let the present age of Rehman be x years. Three years ago, his age was (x - 3) years. Five years hence, his age will be (x + 5) years. It is given that the sum of the reciprocals of Rehman's ages 3 years ago and 5 years from now is 1/3. ∴ 1/x-3 + 1/x-5 = 1/3 x+5+x-3/(x-3)(x+5) = 1/3 2x+2/(x-3)(x+5) = 1/3 ⇒ 3(2x + 2) = (x-3)(x+5) ⇒ 6x + 6 = x2 + 2x - 15 ⇒ x2 - 4x - 21 = 0 ⇒ x2 - 7x + 3x - 21 = 0 ⇒ x(x - 7) + 3(x - 7) = 0 ⇒ (x - 7)(x + 3) = 0 ⇒ x = 7, -3 However, age cannot be negative. Therefore, Rehman's present age is 7 years. 5. In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects. Answer Let the marks in Maths be x. Then, the marks in English will be 30 - x. According to the question, (x + 2)(30 - x - 3) = 210 (x + 2)(27 - x) = 210 ⇒ -x2 + 25x + 54 = 210 ⇒ x2 - 25x + 156 = 0 ⇒ x2 - 12x - 13x + 156 = 0 ⇒ x(x - 12) -13(x - 12) = 0 ⇒ (x - 12)(x - 13) = 0 ⇒ x = 12, 13 If the marks in Maths are 12, then marks in English will be 30 - 12 = 18 If the marks in Maths are 13, then marks in English will be 30 - 13 = 17 6. The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the sides of the field. Let the shorter side of the rectangle be x m. Then, larger side of the rectangle = (x + 30) m ⇒ x2 + (x + 30)2 = (x + 60)2 ⇒ x2 + x2 + 900 + 60x = x2 + 3600 + 120x ⇒ x2 - 90x + 30x - 2700 = 0 However, side cannot be negative. Therefore, the length of the shorter side will be 90 m. Hence, length of the larger side will be (90 + 30) m = 120 m. 7. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers. Let the larger and smaller number be x and y respectively. According to the question, x2 - y2 = 180 and y2 = 8x ⇒ x2 - 8x = 180 ⇒ x2 - 8x - 180 = 0 ⇒ x2 - 18x + 10x - 180 = 0 ⇒ x(x - 18) +10(x - 18) = 0 ⇒ (x - 18)(x + 10) = 0 ⇒ x = 18, -10 However, the larger number cannot be negative as 8 times of the larger number will be negative and hence, the square of the smaller number will be negative which is not possible. Therefore, the larger number will be 18 only. x = 18 ∴ y2 = 8x = 8 × 18 = 144 ⇒ y = ±√44 = ±12 ∴ Smaller number = ±12 Therefore, the numbers are 18 and 12 or 18 and - 12. 8. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train. Answer Let the speed of the train be x km/hr. Time taken to cover 360 km = 360/x hr.According to the question, ⇒ (x + 5)(360-1/x) = 360 ⇒ 360 - x + 1800-5/x = 360 ⇒ x2 + 5x + 10x - 1800 = 0 ⇒ x(x + 45) -40(x + 45) = 0 ⇒ (x + 45)(x - 40) = 0 ⇒ x = 40, -45 However, speed cannot be negative. Therefore, the speed of train is 40 km/h. 9. Two water taps together can fill a tank inhours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. Answer Let the time taken by the smaller pipe to fill the tank be x hr. Time taken by the larger pipe = (x - 10) hr Part of tank filled by smaller pipe in 1 hour = 1/x Part of tank filled by larger pipe in 1 hour = 1/x - 10 It is given that the tank can be filled in = 75/8 hours by both the pipes together. Therefore, 1/x + 1/x-10 = 8/75 x-10+x/x(x-10) = 8/75 ⇒ 2x-10/x(x-10) = 8/75 ⇒ 75(2x - 10) = 8x2 - 80x ⇒ 150x - 750 = 8x2 - 80x ⇒ 8x2 - 230x +750 = 0 ⇒ 8x2 - 200x - 30x + 750 = 0 ⇒ 8x(x - 25) -30(x - 25) = 0 ⇒ (x - 25)(8x -30) = 0 ⇒ x = 25, 30/8 Time taken by the smaller pipe cannot be 30/8 = 3.75 hours. As in this case, the time taken by the larger pipe will be negative, which is logically not possible. Therefore, time taken individually by the smaller pipe and the larger pipe will be 25 and 25 - 10 =15 hours respectively. 10. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speeds of the express train is 11 km/h more than that of the passenger train, find the average speed of the two trains. Answer Let the average speed of passenger train be x km/h. Average speed of express train = (x + 11) km/h It is given that the time taken by the express train to cover 132 km is 1 hour less than the passenger train to cover the same distance. ⇒ x2 + 44x -33x -1452 = 0 ⇒ x(x + 44) -33(x + 44) = 0 Speed cannot be negative. Therefore, the speed of the passenger train will be 33 km/h and thus, the speed of the express train will be 33 + 11 = 44 km/h. 11. Sum of the areas of two squares is 468 m2. If the difference of their perimeters is 24 m, find the sides of the two squares. Answer Let the sides of the two squares be x m and y m. Therefore, their perimeter will be 4x and 4y respectively and their areas will be x2 and y2 respectively. It is given that 4x - 4y = 24 x - y = 6 x = y + 6 Also, x2 + y2 = 468 ⇒ (6 + y2) + y2 = 468 ⇒ 36 + y2 + 12y + y2 = 468 ⇒ 2y2 + 12y + 432 = 0 ⇒ y2 + 6y - 216 = 0 ⇒ y2 + 18y - 12y - 216 = 0 ⇒ y(y +18) -12(y + 18) = 0 ⇒ (y + 18)(y - 12) = 0 ⇒ y = -18, 12 However, side of a square cannot be negative. Hence, the sides of the squares are 12 m and (12 + 6) m = 18 m. Page No: 91 Exercise 4.4 1. Find the nature of the roots of the following quadratic equations. If the real roots exist, find them; (i) 2x2 - 3x + 5 = 0 (ii) 3x2 - 4√3x + 4 = 0 (iii) 2x2 - 6x + 3 = 0 Answer (i) Consider the equation x2 - 3x + 5 = 0 Comparing it with ax2 + bx + c = 0, we get a = 2, b = -3 and c = 5 Discriminant = b2 - 4ac = (- 3)2 - 4 (2) (5) = 9 - 40 = - 31 As b2 - 4ac < 0, Therefore, no real root is possible for the given equation. (ii) 3x2 - 4√3x + 4 = 0 Comparing it with ax2 + bx + c = 0, we get a = 3, b = -4√3 and c = 4 Discriminant = b2 - 4ac = (-4√3)2 - 4(3)(4) = 48 - 48 = 0 As b2 - 4ac = 0, Therefore, real roots exist for the given equation and they are equal to each other. And the roots will be -b/2a and -b/2a.-b/2a = -(-4√3)/2×3 = 4√3/6 = 2√3/3 = 2/√3 Therefore, the roots are 2/√3 and 2/√3. Comparing this equation with ax2 + bx + c = 0, we get a = 2, b = -6, c = 3 Discriminant = b2 - 4ac = (-6)2 - 4 (2) (3) = 36 - 24 = 12 As b2 - 4ac > 0, Therefore, distinct real roots exist for this equation: 2. Find the values of k for each of the following quadratic equations, so that they have two equal roots. (i) 2x2 + kx + 3 = 0 (ii) kx (x - 2) + 6 = 0 Answer (i) 2x2 + kx + 3 = 0 Comparing equation with ax2 + bx + c = 0, we get a = 2, b = k and c = 3 Discriminant = b2 - 4ac = (k)2 - 4(2) (3) = k2 - 24 For equal roots, Discriminant = 0 k2 - 24 = 0 k2 = 24 k = ±√24 = ±2√6 (ii) kx(x - 2) + 6 = 0 or kx2 - 2kx + 6 = 0 Comparing this equation with ax2 + bx + c = 0, we get a = k, b = - 2k and c = 6 Discriminant = b2 - 4ac = (- 2k)2 - 4 (k) (6) = 4k2 - 24k For equal roots, b2 - 4ac = 0 4k2 - 24k = 0 4k (k - 6) = 0 Either 4k = 0 or k = 6 = 0 k = 0 or k = 6 However, if k = 0, then the equation will not have the terms 'x2' and 'x'. Therefore, if this equation has two equal roots, k should be 6 only. 3. Is it possible to design a rectangular mango grove whose length is twice its breadth, and the area is 800 m2? If so, find its length and breadth. Answer Let the breadth of mango grove be l. Length of mango grove will be 2l. Area of mango grove = (2l) (l)= 2l2 2l2 = 800 l2 = 800/2 = 400 l2 - 400 =0 Comparing this equation with al2 + bl + c = 0, we get a = 1, b = 0, c = 400 Discriminant = b2 - 4ac = (0)2 - 4 × (1) × (- 400) = 1600 Here, b2 - 4ac > 0 Therefore, the equation will have real roots. And hence, the desired rectangular mango grove can be designed. l = ±20 However, length cannot be negative. Therefore, breadth of mango grove = 20 m Length of mango grove = 2 × 20 = 40 m 4. Is the following situation possible? If so, determine their present ages. The sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48. Answer Let the age of one friend be x years. then the age of the other friend will be (20 - x) years. 4 years ago, Age of 1st friend = (x - 4) years Age of 2nd friend = (20 - x - 4) = (16 - x) years A/q we get that, (x - 4) (16 - x) = 48 16x - x2 - 64 + 4x = 48 - x2 + 20x - 112 = 0 x2 - 20x + 112 = 0 Comparing this equation with ax2 + bx + c = 0, we get a = 1, b = -20 and c = 112 Discriminant = b2 - 4ac = (-20)2 - 4 × 112 = 400 - 448 = -48 b2 - 4ac < 0 Therefore, there will be no real solution possible for the equations. Such type of condition doesn't exist. 5. Is it possible to design a rectangular park of perimeter 80 and area 400 m2? If so find its length and breadth. Answer Let the length and breadth of the park be l and b. Perimeter = 2 (l + b) = 80 l + b = 40 Or, b = 40 - l Area = l×b = l(40 - l) = 40l - l240l - l2 = 400 l2 - 40l + 400 = 0 Comparing this equation with al2 + bl + c = 0, we get a = 1, b = -40, c = 400 Discriminant = b2 - 4ac (-40)2 - 4 × 400 = 1600 - 1600 = 0 b2 - 4ac = 0 Therefore, this equation has equal real roots. And hence, this situation is possible. Root of this equation,l = -b/2a l = (40)/2(1) = 40/2 = 20 Therefore, length of park, l = 20 m And breadth of park, b = 40 - l = 40 - 20 = 20 m. Go Back To NCERT Solutions for Class 10th Maths NCERT Solutions for Class 10 Maths Chapter 4 Quadratic Equations An equation of the form ax2 + bx + c = 0, where a, b, c are real numbers, and a ≠ 0, is called a quadratic equation in the variable x. There are two total 5 sections in the chapter. There are very important topics in this chapter which you will get to know while solving Chapter 4 Quadratic Euqations Class 10 Maths NCERT Solutions. It will help you in solving problems in higher classes also. • Introduction: In Chapter 2 we discussed about polynomials in which one of the type was the quadratic polynomial of the form ax 2 + bx + c, a ≠ 0. When we equate this polynomial to zero, we get a quadratic equation. • Quadratic Equations: Definition, standard form of a quadratic equation. and real life examples of quadratic equation is given. • Solution of a Quadratic Equation by Factorisation: We will learn to obtain the real roots of a quadratic equation through Factorisation method. • Solution of a Quadratic Equation by Completing the Square: We will learn another method of obtaining roots of a quadratic equations that is by completing the square. • Nature of Roots: A quadratic equation ax 2 + bx + c = 0 has (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. There are 4 exercises in the chapter 4 class 10 maths which are important for examinations purpose as it will help you knowing how to use the method to solve the problems. Below, you will find the detailed solutions of every questions exercisewise. Exercise 4.1 Exercise 4.2 Exercise 4.3 Exercise 4.4 NCERT Solutions for Class 10 Maths Chapters: FAQ on Chapter 4 Quadratic Equations There are only 4 exercises in the chapter. The answers of every questions is provided in step by step manner so a student do not have to face difficulty in getting them. These NCERT Solutions for Chapter 4 Quadratic Equations Class 10 Maths will help you a lot in board exams. For equal roots, we have b2 − 4ac =0 ∴ b2 = 4ac. Since, 2 is a root of x2 + kx + 12 = 0 ∴ (2)2 + k(2) + 12 = 0 or 4 + 2k + 12 = 0 ⇒ 2k = −16 or k = − 8 Roots of x2 + kx + q = 0 are equal ∴ k2 − 4(1) (q) = 0 or k2 − 4q = 0 But k = −8, so (−8)2 = 4q or q = 16. A value x = α is said to be a root of ax2 + bx + c = 0 if it satisfies the equation.