



# MATHS

## NCERT - NCERT Maths(Tamil)

### QUADRATIC EQUATIONS

#### Example

1. Represent the following situations with suitable mathematical equations.

Sridhar and Rajendar together have 45

marbles. Both of them lost 5 marbles each, and the product of the number of marbles now they have is 124. We would like to find out how many marbles each of them had previously.



[Watch Video Solution](#)

2. Represent the following situations with suitable mathematical equations.

The hypotenuse of a right triangle is 25 cm.

We know that the difference in lengths of the

other two sides is 5 cm. We would like to find out the length of the two sides?



**Watch Video Solution**

**3.** Check whether the following are quadratic equation:

$$(x - 2)^2 + 1 = 2x - 3$$



**Watch Video Solution**

4. Check whether the following are quadratic equation:

$$x(x + 1) + 8 = (x + 2)(x - 2)$$



[Watch Video Solution](#)

5. Check whether the following are quadratic equation:

$$x(2x + 3) = x^2 + 1$$



[Watch Video Solution](#)

6. Check whether the following are quadratic equation:

$$(x + 2)^3 = x^3 - 4$$



[Watch Video Solution](#)

7. Find the roots of the equation  $2x^2 - 5x + 3 = 0$ , by factorisation.



[Watch Video Solution](#)

**8.** Find the roots of the equation

$$x - \frac{1}{3x} = \frac{1}{6} (x \neq 0)$$



**Watch Video Solution**

**9.** Find the width of the space for spectators discussed in section 5.1.



**View Text Solution**

**10.** Find the roots of the equation  $5x^2 - 6x - 2 = 0$  by the method of completing the square.



**Watch Video Solution**

**11.** Find the roots of  $4x^2 + 3x + 5 = 0$  by the method of completing the square.



**Watch Video Solution**

**12.** Find two consecutive positive odd integers, sum of whose squares is 290.



**Watch Video Solution**

**13.** A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the



breadth of the rectangular park and of altitude 12 m. Find its length and breadth.



[Watch Video Solution](#)

**14.** Find the roots of the following quadratic equations, if they exist.

$$x^2 + 4x + 5 = 0$$



[Watch Video Solution](#)

**15.** Find the roots of the following quadratic equations, if they exist.

$$2x^2 - 2\sqrt{2}x + 1 = 0$$



**Watch Video Solution**

**16.** Find the roots of the equation

$$x + \frac{1}{x} = 3, x \neq 0$$



**Watch Video Solution**

17. Find the roots of the equation

$$\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$$



[Watch Video Solution](#)

18. A motor boat whose speed is 18km/hr in still water takes 1hour more to go 24km upstream than to the return downstream to the same spot. Find the speed of the stream.



[Watch Video Solution](#)

**19.** Find the discriminant of the quadratic equation  $2x^2 - 4x + 3 = 0$ , and hence find the nature of its roots.



**Watch Video Solution**

**20.** A variable plane moves in such a way that the sum of the reciprocals of its intercepts on the coordinate axes is a constant. Show that the plane passes through a fixed point.



**Watch Video Solution**

21. Find the discriminant of the equation  $3x^2 - 2x + \frac{1}{3} = 0$  and hence find the nature of its roots. Find them, if they are real.



Watch Video Solution

Try This

1. Check whether the equations are quadratic or not?

$$x^2 - 6x - 4 = 0$$



[Watch Video Solution](#)

2. Check whether the equations are quadratic or not?

$$x^3 - 6x^2 + 2x - 1 = 0$$



[Watch Video Solution](#)

3. Check whether the equations are quadratic or not?

$$7x = 2x^2$$



[Watch Video Solution](#)

4. Check whether the equations are quadratic or not?

$$x^2 + \frac{1}{x^2} = 2(x \neq 0)$$



[Watch Video Solution](#)

5. Check whether the equations are quadratic or not?

$$(2x + 1)(3x + 1) = b(x - 1)(x - 2)$$



[Watch Video Solution](#)

6. Check whether the equations are quadratic or not?

$$3y^2 = 192$$



[Watch Video Solution](#)

7. Verify whether 1 and  $\frac{3}{2}$  are the roots of the equation  $2x^2 - 5x + 3 = 0$



[Watch Video Solution](#)



8. Explain the benefits of evaluating the discriminant of a quadratic equation before attempting to solve it. What does its value signify?



[Watch Video Solution](#)

9. Write three quadratic equations, one having two distinct real solutions, one having no real solution and one having exactly one real solution.



[Watch Video Solution](#)

## Do This

1. Find the roots of the equation using factorisation method.

$$x^2 + 5x + 6 = 0$$



[Watch Video Solution](#)

2. Find the roots of the equation using factorisation method.

$$x^2 - 5x + 6 = 0$$



**Watch Video Solution**

**3.** Find the roots of the equation using factorisation method.

$$x^2 + 5x - 6 = 0$$



**Watch Video Solution**

**4.** Find the roots of the equation using factorisation method.

$$x^2 - 5x - 6 = 0$$



**Watch Video Solution**

5. Solve the equations by completing the square

$$x^2 - 10x + 9 = 0$$



**Watch Video Solution**

6. Solve the equations by completing the square

$$x^2 - 5x + 5 = 0$$



**Watch Video Solution**

7. Solve the equations by completing the square

$$x^2 + 7x - 6 = 0$$



**Watch Video Solution**

**Exercise 5 1**

1. Check whether the following are quadratic equation:

$$(x + 1)^2 = 2(x - 3)$$



[Watch Video Solution](#)

2. Check whether the following are quadratic equation:

$$x^2 - 2x = (-2)(3 - x)$$



[Watch Video Solution](#)

3. Chek whether the following are quadratic equation:

$$(x - 2)(x + 1) = (x - 1)(x + 3)$$



**Watch Video Solution**

4. Chek whether the following are quadratic equation:

$$(x - 3)(2x + 1) = x(x + 5)$$



**Watch Video Solution**

5. Check whether the following are quadratic equation:

$$(2x - 1)(x - 3) = (x + 5)(x - 1)$$



[Watch Video Solution](#)

6. Check whether the following are quadratic equation:

$$x^2 + 3x + 1 = (x - 2)^2$$



[Watch Video Solution](#)



7. Chek whether the following are quadratic equation:

$$(x + 2)^3 = 2x(x^2 - 1)$$



[Watch Video Solution](#)

8. Chek whether the following are quadratic equation:

$$x^3 - 4x^2 - x + 1 = (x - 2)^3$$



[Watch Video Solution](#)

**9.** Represent the following situations in the form of quadratic equation:

The area of a rectangular plot is  $528 \text{ m}^2$ . The length of the plot is one metre more than twice its breadth. We need to find the length and breadth of the plot.



**Watch Video Solution**

**10.** Represent the following situations in the form of quadratic equation:

The product of two consecutive positive integers is 306. We need to find the integers.



[Watch Video Solution](#)

**11.** Represent the following situations in the form of quadratic equation:

Rohan's mother is 26 years older than him. The product of their ages after 3 years will be 360 years. We need to find Rohan's present age



[Watch Video Solution](#)

**12.** Represent the following situations in the form of quadratic equation:

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



**Watch Video Solution**

**Exercise 5 2**

1. Find the roots of the quadratic equations by factorisation:

$$x^2 - 3x - 10 = 0$$



[Watch Video Solution](#)

2. Find the roots of the quadratic equations by factorisation:

$$2x^2 + x - 6 = 0$$



[Watch Video Solution](#)

3. Solve the following quadratic equations by factorization method.

$$\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$$



[Watch Video Solution](#)

4. Find the roots of the quadratic equations by factorisation:

$$2x^2 - x + \frac{1}{8} = 0$$



[Watch Video Solution](#)

5. Find the roots of the quadratic equations by factorisation:

$$100x^2 - 20x + 1 = 0$$



[Watch Video Solution](#)

6. Find the roots of the quadratic equations by factorisation:

$$x(x + 4) = 12$$



[Watch Video Solution](#)

7. Find the roots of the quadratic equations by factorisation:

$$3x^2 - 5x + 2 = 0$$



[Watch Video Solution](#)

8. Find the roots of the quadratic equations by factorisation:

$$x - \frac{3}{x} = 2(x \neq 0)$$



[Watch Video Solution](#)



**9.** Find the roots of the quadratic equations by factorisation:

$$3(x - 4)^2 - 5(x - 4) = 12$$



**Watch Video Solution**

**10.** Find two numbers whose sum is 27 and product is 182.



**Watch Video Solution**

**11.** Find two consecutive positive integers, sum of whose squares is 613.



**Watch Video Solution**

**12.** The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.



**Watch Video Solution**

**13.** 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.



**Watch Video Solution**

**14.** Find the dimensions of a rectangle whose perimeter is 28 meters and whose area is 40 square meters.



**Watch Video Solution**

**15.** The base of a triangle is 4cm longer than its altitude. If the area of the triangle is 48 sq.cm then find its base and altitude.



**Watch Video Solution**

**16.** Two trains leave a railway station at the same time. The first train travels due west and the second train due north. The first train travels 5 km/hr faster than second train. If after two hours, they are 50 km apart, find the speed of each train.



**Watch Video Solution**

**17.** In a class of 60 students, each boy contributed rupees equal to the number of

girls and each girl contributed rupees equal to the number of boys. If the total money then collected was Rs. 1600. How many boys were there in the class?



[Watch Video Solution](#)

**18.** A motor boat heads upstream a distance of 24 km in a river whose current is running at 3 km per hour. The trip up and back takes 6 hours. Assuming that the motor boat

maintained a constant speed, what was its speed in still water?



[Watch Video Solution](#)

### Exercise 5 3

1. Find the roots of the following quadratic equations, if they exist.

$$2x^2 + x - 4 = 0$$



[Watch Video Solution](#)

2. Find the roots of the following quadratic equations, if they exist.

$$4x^2 + 4\sqrt{3}x + 3 = 0$$



[Watch Video Solution](#)

3. Find the roots of the following quadratic equations, if they exist.

$$5x^2 - 7x - 6 = 0$$



[Watch Video Solution](#)



4. Find the roots of the following quadratic equations, if they exist.

$$x^2 + 5 = -6x$$



[Watch Video Solution](#)

5. Find the roots of the following equations:

$$x - \frac{1}{x} = 3, x \neq 0$$



[Watch Video Solution](#)

6. Find the roots of the following equations:

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, x \neq -4, 7$$



[Watch Video Solution](#)

7. The sum of the reciprocals of Rehman's ages, (in years) 3 years ago and 5 years from now is  $\frac{1}{3}$ . Find his present age.



[Watch Video Solution](#)

**8.** In a class test, the sum of Moulika's marks in Mathematics and English is 30. If she got 2 marks more in Mathematics and 3 marks less in English, the product of her marks would have been 210. Find her marks in the two subjects.



**Watch Video Solution**

**9.** 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.



[Watch Video Solution](#)

**10.** 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



[Watch Video Solution](#)

**11.** 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.



**Watch Video Solution**

**12.** Two water taps together can fill a tank in  $9\frac{3}{8}$  hours. 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.



[Watch Video Solution](#)

**13.** An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangaluru (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11km/h more than that of

the passenger train, find the average speed of the two trains.



[Watch Video Solution](#)

**14.** Sum of the areas of two squares is  $468 \text{ m}^2$ .  
If the difference of their perimeters is 24 m,  
find the sides of the two squares.



[Watch Video Solution](#)

**15.** An object is thrown upwards with an initial velocity of 17 m/sec from a building with 12 m height. It is at a height of  $S = 12 + 17t - 5t^2$  from the ground after a flight of 't' seconds. Find the time taken by the object to touch the ground.



**Watch Video Solution**

**16.** If a polygon of 'n' sides has  $\frac{1}{2}n(n - 3)$  diagonals. How many sides are there in a



polygon with 65 diagonals? Is there a polygon with 50 diagonals?



[Watch Video Solution](#)

## Exercise 5 4

1. Find the nature of the roots of the quadratic equations. If real roots exist, find them

$$2x^2 - 3x + 5 = 0$$



[Watch Video Solution](#)

2. Find the nature of the roots of the quadratic equations. If real roots exist, find them

$$3x^2 - 4\sqrt{3}x + 4 = 0$$



[Watch Video Solution](#)

3. Find the nature of the roots of the quadratic equations. If real roots exist, find them

$$2x^2 - 6x + 3 = 0$$



 [Watch Video Solution](#)

4. Find the values of  $k$  for each of the quadratic equations, so that they have two equal roots.

$$2x^2 + kx + 3 = 0$$



[Watch Video Solution](#)

5. Find the values of  $k$  for each of the quadratic equations, so that they have two

equal roots.

$$kx(x - 2) + 6 = 0 (k \neq 0)$$



[Watch Video Solution](#)

6. Is it possible to design a rectangular mango grove whose length is twice its breadth, and the area is  $800 \text{ m}^2$ ? If so, find its length and breadth.



[Watch Video Solution](#)

7. The sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48. Is the above situation possible? If so, determine their present ages.



[Watch Video Solution](#)

8. Is it possible to design a rectangular park of perimeter 80 m and area  $400 \text{ m}^2$ ? If so, find its length and breadth. Comment on your answer.



[Watch Video Solution](#)

## Optional Exercise

1. Some points are plotted on a plane such that any three of them are non collinear. Each point is joined with all remaining points by line segments. Find the number of points if the number of line segments are 10.



[Watch Video Solution](#)

2. A two digit number is such that the product of its digits is 8. When 18 is added to the number they interchange their places. Determine the number



[Watch Video Solution](#)

3. A piece of wire 8 m. in length is cut into two pieces, and each piece is bent into a square. Where should the cut in the wire be made if

the sum of the areas of these squares is to be  $2m^2$ ?



[Watch Video Solution](#)

4. Vinay and Praveen working together can paint the exterior of a house in 6 days. Vinay by himself can complete the job in 5 days less than Praveen. How long will it take Vinay to complete the job.



[Watch Video Solution](#)



5. Show that the sum of roots of a quadratic equation  $ax^2 + bx + c = 0 (a \neq 0)$  is  $\frac{-b}{a}$ .



[Watch Video Solution](#)

6. Show that the product of the roots of a quadratic equation  $ax^2 + bx + c = 0 (a \neq 0)$  is  $\frac{c}{a}$ .



[Watch Video Solution](#)

7. If the sum of the fraction and its reciprocal is  $2\frac{16}{21}$ , find the fraction.



**Watch Video Solution**