

Quadratic Equations - NCERT Examples

Examples 1-9 with independently verified solutions.

CHAPTER

Quadratic Equations

RESOURCE

NCERT Examples

SOURCE

NCERT Mathematics, Reprint 2026-27

PART 1

Verified NCERT questions and solutions

Verified NCERT questions and solutions

Solutions are checked independently and follow the supplied NCERT chapter edition.

NCERT EXAMPLE

Example 1

forming quadratic equations · word problems

Represent the following situations mathematically.

1. John and Jivanti together have 45 marbles. After each loses 5 marbles, the product of the numbers left is 124.
2. A cottage industry makes x toys in a day. The cost per toy is ₹ $(55 - x)$, and the total cost is ₹750.

Solution

1. Let John initially have x marbles; Jivanti has $45 - x$. After the losses:

$$(x - 5)(40 - x) = 124$$

$$-x^2 + 45x - 324 = 0 \Rightarrow x^2 - 45x + 324 = 0$$

2. Let x be the number of toys. Then:

$$x(55 - x) = 750$$

$$x^2 - 55x + 750 = 0$$

Final answer

The required equations are $x^2 - 45x + 324 = 0$ and $x^2 - 55x + 750 = 0$.

NCERT EXAMPLE

Example 2

quadratic equations · standard form

Check whether each equation is quadratic.

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

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

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

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

Solution

1. $x^2 - 4x + 5 = 2x - 3 \Rightarrow x^2 - 6x + 8 = 0$

Quadratic.

2. $x^2 + x + 8 = x^2 - 4 \Rightarrow x + 12 = 0$

Not quadratic.

3.

$$2x^2 + 3x = x^2 + 1 \Rightarrow x^2 + 3x - 1 = 0$$

Quadratic.

4.

$$x^3 + 6x^2 + 12x + 8 = x^3 - 4 \Rightarrow x^2 + 2x + 2 = 0$$

Quadratic after dividing by 6.

NCERT EXAMPLE

Example 3

factorisation · roots

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

Solution

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

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

$$2x - 3 = 0 \text{ or } x - 1 = 0$$

$$x = \frac{3}{2} \text{ or } x = 1$$

Substitution in the original equation gives zero for both roots.

Final answer

$$x = 1, \frac{3}{2}$$

NCERT EXAMPLE

Example 4

factorisation · roots

Find the roots of $6x^2 - x - 2 = 0$.

Solution

$$\begin{aligned}6x^2 - x - 2 &= 6x^2 + 3x - 4x - 2 \\&= 3x(2x + 1) - 2(2x + 1) = (3x - 2)(2x + 1)\end{aligned}$$

$$3x - 2 = 0 \text{ or } 2x + 1 = 0$$

$$x = \frac{2}{3} \text{ or } x = -\frac{1}{2}$$

Each value satisfies the original quadratic.

Final answer

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

NCERT EXAMPLE

Example 5

factorisation · equal roots · radicals

Find the roots of $3x^2 - 2\sqrt{6}x + 2 = 0$.

Solution

$$3x^2 - 2\sqrt{6}x + 2 = 3x^2 - \sqrt{6}x - \sqrt{6}x + 2$$

$$= (\sqrt{3}x - \sqrt{2})^2$$

$$\sqrt{3}x - \sqrt{2} = 0 \Rightarrow x = \sqrt{\frac{2}{3}}$$

The repeated factor gives the same root twice; substitution gives 0.

Final answer

$$x = \sqrt{\frac{2}{3}}, \sqrt{\frac{2}{3}}$$

NCERT EXAMPLE

Example 6

factorisation · word problem

Find the dimensions of a prayer hall whose breadth is x metres, length is $2x + 1$ metres, and area is 300 m^2 .

Solution

$$x(2x + 1) = 300 \Rightarrow 2x^2 + x - 300 = 0$$

$$2x^2 - 24x + 25x - 300 = 0$$

$$(x - 12)(2x + 25) = 0$$

$$x = 12 \text{ or } x = -\frac{25}{2}$$

Breadth cannot be negative, so -12.5 is rejected. The length is $2(12) + 1 = 25$ m.

Final answer

Breadth = 12 m and length = 25 m.

NCERT EXAMPLE

Example 7

discriminant · nature of roots

Find the discriminant of $2x^2 - 4x + 3 = 0$ and hence state the nature of its roots.

Solution

$$a = 2, \quad b = -4, \quad c = 3$$

$$D = b^2 - 4ac = (-4)^2 - 4(2)(3) = 16 - 24 = -8$$

Since $D < 0$, the equation has no real roots.

Final answer

$D = -8$; no real roots.

NCERT EXAMPLE

Example 8

quadratic formula · discriminant · word problem

A pole is to be placed on the boundary of a circular park of diameter 13 m so that its distances from diametrically opposite gates differ by 7 m. Determine whether this is possible and find the distances.

s should the pole be erected?

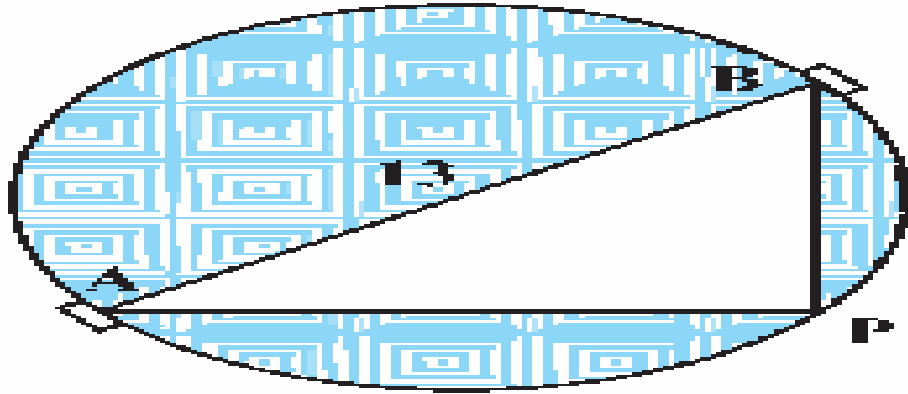


Fig. 4.2

Figure 4.2: the pole P and diametrically opposite gates A and B.

Solution

Let $BP = x$ m, so $AP = x + 7$ m. Since angle APB is 90° :

$$(x + 7)^2 + x^2 = 13^2$$

$$x^2 + 7x - 60 = 0$$

$$a = 1, \quad b = 7, \quad c = -60$$

$$D = 7^2 - 4(1)(-60) = 289$$

$$x = \frac{-7 \pm \sqrt{289}}{2} = 5 \text{ or } -12$$

Distance cannot be negative, so -12 is rejected. Thus $BP = 5$ m and $AP = 12$ m; $5^2 + 12^2 = 13^2$ verifies the geometry.

Final answer

Yes. The pole is 5 m from one gate and 12 m from the other.

NCERT EXAMPLE

Example 9

discriminant · equal roots

Find the discriminant and roots of $3x^2 - 2x + \frac{1}{3} = 0$.

Solution

$$a = 3, \quad b = -2, \quad c = \frac{1}{3}$$

$$D = (-2)^2 - 4(3)\left(\frac{1}{3}\right) = 0$$

$$x = \frac{-b}{2a} = \frac{2}{6} = \frac{1}{3}$$

$D = 0$, so this root is repeated; substitution in the original equation gives 0.

Final answer

$$x = \frac{1}{3}, \frac{1}{3}$$