

CBSE 10th Maths 2024-2025
Chapter - 4 Quadratic Equations
Competency-Based Questions

Multiple Choice Questions

Q.1 Which of these quadratic equations has equal roots?

1. $3x^2 + 9x + 3 = 0$
2. $x^2 - x + 1 = 0$
3. $x^2 + 2x + 1 = 0$
4. $4x^2 + 8x - 4 = 0$

Answer. 3

Q.2 The quadratic equation $x^2 - 7x + 10 = 0$ can also be written as _____.

1. $(x - 5)(x - 2) = 0$
2. $(x + 5)(x + 2) = 0$
3. $(x - 7)(x - 10) = 0$
4. $(x + 7)(x + 10) = 0$

Answer. 1

Q.3 The quadratic equation $x^2 + 8x + h = 0$ has equal roots.

Which of these is the value of h ?

1. 8
2. 0
3. 4
4. 16

Answer. 4

Q.4 The sum of a number z and its reciprocal is 4. Which of these correctly represents the above statement?

1. $z^2 + 1 = 4$
2. $z^2 + z = 4$
3. $z^2 + 1 = 4z$
4. $z^2 + 1 = -4z$

Answer. 3

Q.5 Which among the following equations can be categorized as a quadratic equation?

1. $x(x + 2)^2 = 50$
2. $4x^2 = (2 + x)(4x - 7)$
3. $3x^2 + 5x = 9x(x - 3)$
4. $x^2 + 1/x = 0$

Answer. 3

Q.6 Look at the quadratic equation below:

$$-y^2 + 8y - 18 = 0$$

Which of these can be said about the nature of roots of the above quadratic equation?

1. Real and unequal roots
2. Real and equal roots
3. No real roots
4. Cannot say

Answer. 3

Q.7 Which of these equations will definitely have NO real roots, for any value of a and b other than zero?

- i) $2x^2 - bx - b^2 = 0$
- ii) $a^2x - ax + 2 = 0$
- iii) $x^2 + ax + b = 0$

1. only i
2. only ii
3. only iii
4. both i and ii

Answer. 2

Q.8 In the quadratic equation $6x^2 - gx + 2 = 0$, the sum of the roots is equal to three times their product. What is the value of g ?

1 -6

2 $-\frac{1}{6}$

3 1

4 6

Answer. 4

Free Response Questions

Q.9 Given below is an equation, where p is a real number.

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

For what value of p will this equation not be a quadratic equation? Justify your answer.

Answer.

Mentions that for $p = 0$, the equation will not be a quadratic equation.

Reasons that as $p = 0$ will make the term with degree 2 zero, the equation will turn into a linear equation.

Q.10 Frame a quadratic equation with roots that add up to 15 and has a product of 28.

Answer. Frames a quadratic equation using $x^2 - (\alpha + \beta)x + \alpha\beta = 0$ where α and β are roots of the quadratic equation

For example, $x^2 - 15x + 28 = 0$.

Q. 11 Gate 3 has been placed exactly opposite to gate 1 on the boundary of the park. The distance between gate 3 and gate 2 is 1 m more than the distance between gate 3 and gate 2.

The shortest distance between gates 1 and 2 is 29 m, find the width of the park. Show your work.

Answer. Takes the distance between gates 1 and 3 as ' x ' m. Writes that the distance between 1 gates 2 and 3 is $(x + 1)$ m.

Applies Pythagoras theorem to the triangle formed by gates 1, 2 and 3 and frames a quadratic equation as:

$$x^2 + (x + 1)^2 = 29^2 \text{ or } x^2 + x - 420 = 0$$

Solves the above quadratic equation and finds the value of x as 20m.

Concludes that the width of the park is 20m.

Q.12 The caretaker of the park is attempting to plant saplings in the form of a square. That is, number of rows of saplings is the same as the number of columns of saplings. On arranging the saplings, he found that 24 saplings were still left with him. When he increased the number of rows and columns by 1, he found that he was short of 25 saplings.

Find the number of saplings available with him. Show your work.

Answer. Takes the former number of rows and columns of saplings as x and finds the number of saplings available as $x^2 + 24$.

Takes the latter number of rows and columns of saplings as $(x + 1)$ and finds the number of saplings available as $(x + 1)^2 - 25$.

Equates the above two quadratic expressions and solves for x as:

$$\begin{aligned}x^2 + 24 &= x^2 + 1 + 2x - 25 \\ \Rightarrow x &= 24\end{aligned}$$

Case Study based Questions

Answer the questions based on the information given below.

A construction company PQR pvt. ltd. signed a contract to construct a hostel building having a total of 135 rooms. The manager of company called up a meeting to decide on the design of building in an efficient way. Two employees put forward their ideas.

Employee 1 said, "the number of rooms on a floor should be 2 less than thrice the number of floors in the building."

Employee 2 said, "the number of rooms on a floor should be 3 less than double the number of floors in the building."

Q.13 Represent the design suggested by employee 1 in the form of a quadratic equation. Show your work.

Answer. Assumes the number of floors in the building to be x.
Hence, writes the number of rooms on a floor as $(3x - 2)$.

Frames the quadratic equation as:

$$x(3x - 2) = 135$$

$$\Rightarrow 3x^2 - 2x - 135 = 0$$

Q.14 Represent the design suggested by employee 2 in the form of a quadratic equation. Show your work.

Answer. Assumes the number of floors in the building to be x .

Hence, writes the number of rooms on a floor as $(2x - 3)$.

Frames the quadratic equation as:

$$x(2x - 3) = 135$$

$$\Rightarrow 2x^2 - 3x - 135 = 0$$

Q.15 Which employee suggested the practical design to construct the building? How many floors should be constructed according to that employee? Show your work and give valid reason.

Answer. Solves the quadratic equation $2x^2 - 3x - 135 = 0$ to get the values of x as 9 and (-7.5) .

Rejects (-7.5) as number of floors cannot be negative.

Solves the quadratic equation $3x^2 - 2x - 135 = 0$ to get the values of x as

$7\frac{1}{25}$ and $(-6\frac{19}{50})$.

Writes that since number of floors cannot be in fraction or negative, employee 2's design is practical to construct the building.

Writes that the number of floors that should be constructed is 9.