



X

In The Service of Student Community

SECOND TERM

NAME: **MATHEMATICS WORKSHEET – QUADRATIC EQUATIONS***Don't forget:-*

- An equation of the form $ax^2+bx+c=0$, where $a \neq 0$, a, b, c are real numbers, is called **Quadratic equations**.
- Equation of type $ax^2+c=0$, is known as **pure quadratic equation**.
- The values of variable satisfying the given quadratic equation are called its **roots / Solution**.
- Quadratic formula :- the roots of a quadratic equation $ax^2+bx+c=0$, where $a \neq 0$, is given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \text{ provided } b^2 - 4ac \geq 0.$$

- Nature of roots of a quadratic equation:- $b^2 - 4ac$ is called **discriminant** of the Quadratic equation.
- 1) if $b^2 - 4ac > 0$. two distinct real roots.
- 2) if $b^2 - 4ac = 0$. two equal real roots.
- 3) if $b^2 - 4ac < 0$. no real roots.

1. In each of the following, determine whether the given values are solution of the given equation or not.

a) $x^2 - 3x + 2 = 0$, $x = 2$, $x = -1$.

b) $x^2 + x + 1 = 0$, $x = 0$, $x = 1$.

c) $x^2 - 3\sqrt{3}x + 6 = 0$, $x = \sqrt{3}$, $x = -2\sqrt{3}$.

d) $x + \frac{1}{x} = \frac{13}{6}$, $x = \frac{5}{6}$, $x = \frac{4}{3}$.

2. Solve the following quadratic equations by factorization.

a) $(x - 4)(x + 2) = 0$.

b) $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$

c) $\left(x - \frac{1}{2}\right)^2 = 4$.

d) $\frac{x+3}{x+2} = \frac{3x-7}{2x-3}$

e) $\frac{2x}{x-4} + \frac{2x-5}{x-3} = \frac{25}{3}$.

f) $\frac{x+1}{x-1} - \frac{x-1}{x+1} = \frac{5}{6}$.

g) $3x^2 - 14x - 5 = 0$

h) $abx^2 + (b^2 - ac)x - bc = 0$

i) $a^2b^2x^2 - b^2x - a^2x - 1 = 0$.



In The Service of Student Community

3. Use completing the square method to find the roots:-
- a) $9x^2 - 15x + 6 = 0$. b) $4x^2 + 4bx - (a^2 - b^2) = 0$ c) $2x^2 - 7x + 3 = 0$.
d) $3x^2 + 11x + 10 = 0$. e) $4x^2 + 4\sqrt{3}x + 3 = 0$. f) $\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$.
4. In each of the following, determine whether the given Q.E have real roots and if so, find the roots:-
- a) $16x^2 = 24x + 1$. b) $x^2 - 2x + 1 = 0$. c) $2x^2 + 5\sqrt{3}x + 6 = 0$.
d) $3x^2 + 2\sqrt{5}x - 5 = 0$. e) $x^2 + x + 1 = 0$. f) $3x^2 + 2x - 1 = 0$.
5. Solve for x:- $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$; $x \neq 2, 4$.
6. Determine the nature of the roots of the following:-
- a) $x^2 - 4x + 4 = 0$. b) $2x^2 + 5x + 5 = 0$. c) $3x^2 + 13x + 10 = 0$.
7. Find the values of k for which the roots are real and equal in each of the following equations.
- a) $kx^2 + 4x + 1 = 0$. b) $kx^2 - 2\sqrt{5}x + 4 = 0$. c) $3x^2 - 5x + 2k = 0$.
d) $4x^2 + kx + 9 = 0$. e) $4x^2 - 2(k+1)x + (k+4) = 0$. f) $x^2 - 2(k+1)x + k^2 = 0$.
g) $k^2x^2 - 2(2k-1)x + 4 = 0$. h) $(k+1)x^2 - 2(k-1)x + 1 = 0$. i) $9x^2 - 24x + k = 0$.
8. Find the values of k for which the roots are real and distinct in each of the following equations.
- a) $kx^2 + 2x + 1 = 0$. b) $kx^2 + 6x + 1 = 0$. c) $x^2 - kx + 9 = 0$.
9. If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$, are equal, then prove that $2b = a + c$.
10. If the equation $(1+m^2)x^2 + 2mcx + (c^2 - a^2) = 0$, has equal roots, prove that $c^2 = a^2(1+m^2)$.
11. The sum of two numbers is 15. If the sum of their reciprocals is $\frac{3}{10}$, find the numbers.
12. Seven years ago Varun's age was five times the square of Swati's age. Three years hence Swati's age will be two fifth of Varun's age. Find their present ages.
13. The area of a right angled triangle 600cm^2 . If the base of the triangle exceeds the altitude by 10cm , find the dimension of the triangle.
14. The length of a rectangle exceeds its width by 8cm and the area of the rectangle is 240cm^2 . Find the dimensions of the rectangle.
15. The side of a square exceeds the side of another square by 4cm and the sum of the areas of the two squares is 400cm^2 . Find the dimensions of the squares.
16. Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. If one pipe takes 3 minutes more than the other to fill it, find the time in which each pipe would fill the cistern.
17. A person on tour has ₹360 for his expenses. If he extends his tour for 4 days, he has to cut down his daily expenses by ₹3. Find the original duration of the tour.



The No. 1 CBSE Math Website In The World

In The Service of Student Community

18. ₹6500 were divided equally among a certain number of persons. Had there been 15 more persons, each would have got ₹30 less. Find the original number of persons.
19. Find two consecutive numbers whose squares have the sum 85.
20. Two squares have sides x cm and $(x+4)$ cm. The sum of their areas is 656cm^2 . Find the sides of the squares.
21. The difference of two numbers is 4. If the difference of their reciprocals is $\frac{4}{21}$, find the numbers.
22. The sum of two numbers is 16. The sum of their reciprocals is $\frac{1}{3}$. Find the numbers.
23. A plane left 40 minutes late due to bad weather and in order to reach destination, 1600km away in time, it had to increase its speed by 400km/hr from its usual speed. Find its usual speed.
24. Some students planned a picnic. The budget for food was ₹480. But eight of them failed to go and thus the cost of food for each member increased by ₹10. How many students attended the picnic?
25. If the list price of a toy is reduced by ₹2, a person can buy 2 toys more for ₹360. Find the original price of toy.
26. Two numbers differ by 3 and their product is 504. Find the numbers.
27. Two numbers differ by 4 and their product is 192. Find the numbers.
28. Some students planned a picnic. The budget for food was ₹500. But 5 of them failed to go and thus the cost of food for each member increased by ₹5. How many students attended the picnic?
29. If two pipes function simultaneously, a reservoir will be filled in 12 hours. One pipe fills the reservoir 10 hours faster than the other. How many hours will the second pipe take to fill the reservoir?
30. A train covers a distance of 90km at a uniform speed. Had the speed been 15km/hr more, it would have taken 30 minutes less for the journey. Find the original speed of the journey.
31. In a class test, the sum of the marks obtained by P in Mathematics and Science is 28. Had he got 3 marks more in Mathematics and 4 marks less in Science, the product of their marks would have been 180. Find his marks in the two subjects.
32. Sum of the areas of 2 squares is 640m^2 . If the difference of their perimeters is 64m , find the sides of 2 squares
33. The sum of two numbers is 18. The sum of their reciprocals is $\frac{1}{4}$. Find the numbers.
34. The sum of two numbers a and b is 15, and the sum of their reciprocals $\frac{1}{a}$ and $\frac{1}{b}$ is $\frac{3}{10}$. Find the numbers a and b .

Prepared BY: ABDURAHIMAN K

**AI-HIJAS INTERNATIONAL SCHOOL, JEDDAH(IGCSE). rahman2ark@gmail.com,
0096650107904**