MATHS

BOOKS - AGRAWAL PUBLICATION

QUADRATIC EQUATIONS

Example

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1. Which of the following equations has two distinct real roots?

A. $2x^2 - 3\sqrt{2}x + \dfrac{9}{4} = 0$

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

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

D. $5x^2 - 3x + 1 = 0$

Answer:

2. $\left(x^2 + 1\right)^2 - x^2 = 0$ has

(i) four real roots (ii) two real roots

(iii) no real roots (iv) one real root

A. four real roots

B. two real roots

C. no real root

D. one real root

Answer:

3. Fill in the blanks

The quadratic equation $2x^2 + px_3 = 0$ has two equal roots if p=..............

4. Fill in the blanks

Equation $ax^2 + bx + c = 0$ represents a quadratic

equation if and only if..........

5. Fill in the blanks

Sum of roots of quadratic equation $x^2 - 4x + 20$ is

.... Of product of roots.

6. Fill in the blanks

The quadratic equation $2x^2 + x + 4$ has ....real

roots.

7. Fill in the blanks

The roots of $x + \dfrac{1}{x} = 2$ are ....

8. Fill in the blanks

The sum of the roots of the quadratic equation $2x^2 + 14x + 24 = 0$ is................

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9. Find the values of 'k' for which x=2 is a solution of the equation $kx^2 + 2x - 3 = 0$.

10. Find the value/s of k for which the quadratic equation $3x^2 + kx + 3 = 0$ has real and equal roots.

11. Find the values of k for which the quadratic equation $4x^2 - 12x - k = 0$ has real and equal roots.

12. Find the nature of the roots of the quadratic equation $2x^2 - 4x + 3 = 0$.

13. is 0.2 a root of the equation $x^2 - 0.4 = ?$ justify

14. For what vkues of k, the roots of the equation $x^2 + 4x + k = 0$ are real?

15. If x=2 and m=3, the equation is $3x^2 - 2kx + 2m = 0$, find k.

16. if one root of the quadratic equation $6x^2 - x - k = 0 is \frac{2}{3}$, then find the value of 'k'.

17. For what value of 'a' does the quadratic equation $x^2 - ax + 1 = 0$ not have real roots?

18. if x=3 is one root of the quadratic equation 1x62-2kx-6=0`, then find the value of k.

19. Find the value of k for which the roots of the quadratic equation $2x^2 + kx + 8 = 0$ will have equal value.

20. For what positive values of k, does the quadratic equation $3x^2 - kx + 3 = 0$ not have real roots?

21. If $\alpha, \beta(\alpha < \beta)$ are the roots of the equation $6x^2 + 11x + 3 = 0$, then which of the following are real ?

22. Solve for x: $8x^2 - 2x - 3 = 0$

23. Solve the following quadratic equation:

$$6a^2x^2 - 7abx - 3b^2 = 0$$

24. Solve for x: $\sqrt{3}x^2 + 10x - 8\sqrt{3} = 0$

25. A quadratic equation with integral coefficient has integral roots. Justify your answer.

26. Does there exist a quadratic equation whose coefficients are rational but both of its roots are irrational? Justify your answer.

27. Solve for x: $\dfrac{x + 3}{x + 2} = \dfrac{3x - 7}{2x - 3}, x \neq -2, \dfrac{3}{2}$

28. Find the roots of the quadratic equation

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

29. If b =0 and c<0, is it true that the roots of $x^2 + bx + c = 0$ are numerically equal and opposite in sign? Justify.

30. Find the value of $x^2 + k(2x + x + 1) + 2 = 0$ has real and equal roots.

31. If $x = \dfrac{2}{3}$ and x= -3 are roots of the quadratic equation $ax^2 + 7x + b = 0$, find the values of a and b.

32. If a and b are the roots of the equation $x^2 + ax - b = 0$, then find a and b.

33. Solve for x: `sqrt(2x+9) + x = 13

34. Solve the following quadratic equation for x

$$4x^2 + 4bx - (a^2 - b^2) = 0$$

35. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other.

36. Find the roots of the quadratic equation by using the quadratic formula in each of the following:

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

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37. Find the roots of the quadratic equation by using the quadratic formula in each of the following:

$$5x^2 + 13x + 8 = 0$$

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38. Find the roots of the quadratic equation by using the quadratic formula in each of the following:

$$-3x^2 + 5x + 12 = 0$$

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39. Find the roots of the quadratic equation by using the quadratic formula in each of the following:

$$-x^2 + 7x - 10 = 0$$

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40. Find the roots of the quadratic equation by using the quadratic formula in each of the following:

$$x^2 + 2\sqrt{2}x - 6 = 0$$

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41. Find the roots of the quadratic equation by using the quadratic formula in each of the following:

$$x^2 - 3\sqrt{5}x + 10 = 0$$

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42. Find the roots of the quadratic equation by using the quadratic formula in each of the following:

$$\frac{1}{2}x^2 - \sqrt{11}x + 1 = 0$$

43. Find the roots of the following quadratic equations by the factorisation method:

$$2x62 + \frac{5}{3}x - 2 = 0$$

44. Find the roots of the following quadratic equations by the factorisation method:

$$\frac{2}{5}x^2 - x - \frac{3}{5} = 0$$

45. Find the roots of the following quadratic equations by the factorisation method:

$$3\sqrt{2}x^2 - 5x - \sqrt{2} = 0$$

46. Find the roots of the following quadratic equations by the factorisation method:

$$3x^2 + 5\sqrt{5}x - 10 = 0$$

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47. Find the roots of the following quadratic equations by the factorisation method:

$$21x^2 - 2x + \frac{1}{21} = 0$$

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48. Solve for x : $\dfrac{1}{x+4} - \dfrac{1}{x-7} = \dfrac{11}{30}, x \# -4, 7.$

49. Detemine the condition for one root of the quadratic equation $ax^2 + bx + c = 0$ to be thirce the order.

50. The sum of the areas of two squares is `157 m^2. if the sum of their perimeters is 68 m, Find the sides of the two squares.

51. Write all the values of p for which the quadratic equation $x^2 + px + 16 = 0$ has equal roots. Find the roots of the equation so obtained.

52. Solve for x: $\dfrac{x + 3}{x + 2} = \dfrac{3x - 7}{2x - 3}, x \neq -2, \dfrac{3}{2}$

53. The product of two successive integral multiples of 5 is 1050. Determine the multiples.

54. The length of the a line segment AB is 2 units. It is divided into two parts at the point C such that $AC^2 = AB \times CB$. What is the length of CB ?

55. Show that it the roots of the following quadratic equation are equal then ad=bc

$$x^2(a^2 + b^2) + 2(ac + bd)x + (c^2 + d^2) = 0$$

56. If the equation

$$\left(1 + m^2\right)x^2 + 2mcx + c^2 - a^2 = 0 \text{ has equal roots}$$

then show that $c^2 = a^2\left(1 + m^2\right)$.

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57. If the roots of the equation

$$\left(a^2 + b^2\right)x^2 - 2(ac + bd)x + \left(c^2 + d^2\right) = 0 \quad \text{are}$$

equal, prove that $\dfrac{a}{b} = \dfrac{c}{d}$

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58. Solve the given quadratic equation for x: `9x^2 -9(a+b)x + (2a^2 + 5ab +2b^2) =0`

59. If the roots of the quadratic equation $(a - b)x^2 + (b - c)x + (c + a) = 0$ are equal , prove that b+c =2a.

60. 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.

61. Solve for x:

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}, \, a \neq b \neq 0, x \neq -(a = b)$$

62. Find a natural number whose square diminshed by 84 is equal to thrice of 8 more than the given number.

63. A natural number, when increased by 12, equals 160 times its reciprocal. Find the number.

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64. A plane left 30 minutes later than the scheduled time and in order to reach the destination 1500 km away in time, it had to increase the speed by 250 km/h from the usual speed. Find its usual speed.

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65. Find the dimensions of a rectangular park whose perimeter is 60 m and area 200 `m^2.

66. If Zeba were younger by 5 years than what she reallyis, then the square of her age (in years) would have been 11 more than five times her actual age. What is her age now?

67. At present, Asha's age (in years) is 2 more than the square of her daughter Nisha's age .When Nisha grows to her mother's present age,Asha's age woul be one year less than 10 times the present age of Nish. Find the present ages of both Asha and Nisha.

68. In a class test, the sum of Arun's marks in Hindi and English is 30. Had he got 2 marks more in Hindi and 3 marks less in English, the product of the marks would have been 210. Find his marks in the two subjects.

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

70. A train travels at a certain average speed for a distance of 63 km and then travels at a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete total journey, what is the original average speed?

71. The altitude of a right-angled triangled is 7 cm less than its base. If the hypotenuse is 13 cm, Then find the other two sides.

72. Solve for x:

$$\frac{x+3}{x-2} - \frac{1-x}{x} = \frac{17}{4}, x \neq 0, 2$$

73. Find two consecutive odd natural numbers, the sum of whose squares is 394.

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74. A and B working together can do a work in 6 days. If a takes 5 days less than B to finish the work, in how many days can B can do the work alone?

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75. Find x in terms of a, b and c.

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76. Solve for x:

$$\frac{x-1}{2x+1} + \frac{2x+1}{x-1} = 2, where x! + -\frac{1}{2}, 1.$$

77. At t minutes past 2 pm, the time neded by the minutes hand of a clock to show 3 pm was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find t.

78. Solve for x:

$$\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0, \, x \neq 3, \, -\frac{3}{2}$$

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