MATHS

BOOKS - VK GLOBAL PUBLICATION MATHS (HINGLISH)

QUADRATIC EQUATIONS

Very Short Answer Questions

1. What will be the nature of roots of quadratic

equation $2x^2 + 4x = 0$?

2. If $\dfrac{1}{2}$ is a root of the equation $x^2 + kx - \dfrac{5}{4} = 0,$ then find the value of k.

3. If $ax^2 + bx + c = 0$ has equal roots, find the value of c.

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

5. Show that $x = -2$ is a solution of $3x^2 + 13x + 14 = 0$

6. Find the discriminant of the quadratic equation $4\sqrt{2}x^2 + 8x + 2\sqrt{2} = 0$

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Short Answer Questions I

1. State whether the following quadratic equations have two distinct real roots. Justicy your answer:

$(x + 1)(x - 2) + x = 0$

2. Is 0.3 a root of the equation $x^2 - 0.9 = 0$?

Justify.

3. For what value of k, is 3 a root of the equation $2x^2 + x + k = 0$?

4. Find the values of k for which the quadratic equation $9x^2 - 3kx + k = 0$ has equal roots.

5. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k.

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

7. Write the set of values of k for which the quadratic equation has $2x^2 + kx - 8 = 0$ has real roots.

8. Solve each of the following quadratic equations:

$$2x^2 + ax - a^2 = 0$$

9. Find the value of p for which the quadratic equation $4x^2 + px + 3 = 0$ has equal roots

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

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

12. A two digit number is four times the sum of the digits. It is also equal to 3 times the product of digits. Find the number.

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Short Answer Questions Ii

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

(i) $\qquad \sqrt{2}x^2 + 7x + 5\sqrt{2} = 0 \qquad$ (ii)

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

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2. Find the roots of the following quadratic equations, if they exist, by the method of completing the square:(i) $2x^2 - 7x + 3 = 0$

(ii) $2x^2 + x - 4 = 0$(iii) $4x^2 + 4\sqrt{3}x + 3 = 0$

(iv) $2x^2 + x + 4 = 0$

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3. Find the roots of the quadratic equations given in Question no. 1 above by applying the quadratic formula.

4. Solve the following quations by using qardratic formula:

$$p^2x^2 + \left(p^2 - q^2\right)x - q^2 = 0$$

5. Find the roots of the following equation:

$$\frac{1}{x+3} - \frac{1}{x-6} = \frac{9}{20}, \; x \neq -3, 6$$

6. Find the nature of roots of the following quadratic equations. If the real roots exist,

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

(iii) $2x^2 - 6x + 3 = 0$

7. Find the values of k for each of the following quadratic equations, so that they have two equal roots.(i) $2x^2 + kx + 3 = 0$ (ii) $kx(x - 2) + 6 = 0$

8. Write the roots of the equation $(a - b)x^2 + (b - c)x + (c - a) = 0$.

9. If the equation

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

equal roots, prove that $c^2 = a^2\left(1 + m^2\right)$.

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10. If $\sin\theta$ and $\cos\theta$ are roots of the equation

$$ax^2 + bx + c = 0, \quad \text{prove} \quad \text{that}$$

$$a^2 - b^2 + 2ac = 0.$$

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11. The quadratic equation $ax^2 + bx + c = 0$

has real roots if:

12. $2\left(\dfrac{2x - 1}{x + 3}\right) - 3\left(\dfrac{x + 3}{2x - 1}\right) = 5$

13. Solve the equation $\dfrac{4}{x} - 3 = \dfrac{5}{2x + 3}$

14. $\dfrac{16}{x} - 1 = \dfrac{15}{x+1}; \; x \neq 0, \; -1$

15. Solve $x^2 + 5x - \left(a^2 + a - 6\right) = 0.$

16. Solve for $x.$

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

$x \neq 3, \; -\dfrac{3}{2}$

17. Solve for x:

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

xin1,2,3`

Long Answer Questions

1. Using quadratic formula, solve the following equation for x: $abx^2 + (b^2 - ac)x - bc = 0$

2. Find the values of p for whch the equadratic equation

$$(2p + 1)x^2 - (7p + 2)x + (7p - 3) = 0$$

3. $\dfrac{x-4}{x-5} + \dfrac{x-6}{x-7} = \dfrac{10}{3}$

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4. The sum of the reciprocals of Rehmans ages, (in years) 3 years ago and 5 years from now is $\dfrac{1}{3}$.Find his present age.

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5. The difference of two numbers is 5 and the difference of their reciprocals is $\dfrac{1}{10}$ Find the numbers.

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6. The sum of the squares of two consecutive odd numbers is 394. Find the numbers.

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7. The sum of two numbers is 15. If the sum of their reciprocals is $\dfrac{3}{10}$, find the numbers.

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

9. 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.

10. Sum of the areas of two squares is $468 \ m^2$. If the difference of their perimeters is 24 m, find the sides of the two squares.

11. Seven years ago Varuns age was five times the square of Swatis age. Three years hence Swatis age will be two fifth of Varuns age. Find their present ages.

12. A passenger train takes 2 hours less for a journey of 300 km if its speed is increased by 5

km/hr from its usual speed. Find the usual speed of the train.

13. A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

14. If twice the area of a smaller square is subtracted from the area of a larger square, the result is $14cm^2$. However, if twice the area of the larger square is added to three times the area of the smaller square, the result is $203 \ cm^2$. Determine the sides of the square.

15. If Zeba were younger by 5 years than what she really is, then the square of her age (in

years) would have been 1 more than five times her actual age. What is her age now?

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

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

18. The sum of the squares of two consecutive multiples of 7 is 637. Find the multiples.

19. Solve for x : $\dfrac{1}{x+1} + \dfrac{2}{x+2} = \dfrac{4}{x+4}$

20. The positive value of k for which the equation $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will both have real roots, is 4 (b) 8 (c) 12 (d) 16

Hots Higher Order Thinking Skills

1. One fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.

2. Solve for x:

$$9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$$

3. Two pipes running together can fill a cistern in $3\dfrac{1}{13}$ 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.

4. IN the centre of a rectangular lawn of dimensions $50m \times 40m$, a rectangular pond has to be cnstructed, so that the area of the grass surrounding the pond would be

$1184m^2$. Find the length and breadth of the pond.

Proficiency Exercise Very Short Answer Questions

1. What is the value of k, If one root of the quadratic equation $kx^2 - 7x + 12 = 0$ is 3

2. If the equation $16x^2 + 6kx + 4 = 0$ has equal roots, then what is the value of k?

3. Solve $x^2 - 9x + 20 = 0$ by factorisation method.

4. What is the value (s) of k for which the equation $kx^2 - kx + 1 = 0$ has equal roots?

5. If the roots of the equation

$$\left(a^2 + b^2\right)x^2 - 2b(a + c)x + \left(b^2 + c^2\right) = 0$$

are equal , then which one of the following is correct ?

6. Find the discriminant of the quadratic equation $3\sqrt{3}x^2 + 10x + \sqrt{3} = 0$.

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7. Write a quadratic equation which has the product of two roots is 5.

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Proficiency Exercise Short Answer Questions

1. For what value of k, -2 is a root of the equation $3x^2 + 4x + 2k = 0$?

2. What is the nature of roots of the quadratic equation $4x^2 - 12x - 9 = 0$?

3. Write the discriminant of the quadratic equation $\frac{1}{2}x^2 - 3x + 5 = 0$.

4. Find the value of p for which the quadratic equation $px(x-3) + 9 = 0$ has equal roots.

5. Find the discriminant of the quadratic equation: $4x^2 - \dfrac{2}{3}x - \dfrac{1}{16} = 0$

6. State whether the following quadratic equations have two distinct real roots. Justicy your answer:

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

7. State whether the following quadratic equations have two distinct real roots. Justicy your answer:

$$(x + 4)^2 - 8x = 0$$

8. State whether the following quadratic equations have two distinct real roots. Justicy your answer:

$$\left(x - \sqrt{2}\right)^2 - \sqrt{2}(x + 1) = 0$$

9. State whether the following quadratic equations have two distinct real roots. Justicy

your answer:

$$\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + \frac{1}{\sqrt{2}} = 0$$

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10. A quadratic equation with integral coefficients has integral roots. Justify your answer.

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11. Is 0.2 a root of the equation $x^2 - 0.4 = 0$?

Justify your answer.

12. If the coefficient of x^2 and the constant term have the same sign and if the coefficient of x term is zero, then the quadratic equation has no real roots. State true or false and justify your answer.

13. Find the value of k for which the quadratic equation $(k+4)x^2 + (k+1)x + 1 = 0$

14. Find the value of k for which the quadratic equation $k^2x^2 - 2(2k-1)x + 4 = 0$ has real and equal roots.

15. If equation $ax^2 + bx + c = 0$ has equal roots, then find 'c' in terms of 'a' and 'b'.

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

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2. Solve:

$$\frac{14}{x+3} - 1 = \frac{5}{x+1}, \; x \neq -3, \; -1.$$

3. Solve each of the following quadratic equations:

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

4. Find the roots of the following quadratic equations by the factorisation method.

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

5. Find the roots of the following quadratic equations by the factorisation method.

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

6. Find the roots of the following quadratic equations by the factorisation method.

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

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7. The sum of two numbers is 20 and the sum of their reciprocals is $\frac{5}{24}$. Find the numbers.

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8. The difference of squares of two numbers is 88. If the larger number is 5 less than twice the smaller number, then find the two numbers.

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

10. If one root of the quadratic equation $2x^2 + kx - 6 = 0$ is 2, find the value of k .

Also, find the other root.

11. If the roots of the equation

$$\left(a^2 + b^2\right)x^2 - 2(ac + bd)x + \left(c^2 + d^2\right) = 0$$

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

12. The difference of two natural numbers is 3 and the difference of their reciprocals is $\dfrac{3}{28}$. Find the numbers.

13. Seven years ago Varuns age was five times the square of Swatis age. Three years hence Swatis age will be two fifth of Varuns age. Find their present ages.

14. The area of a right angled triangle is $165m^2$. Determine its base and altitude if the latter exceeds the former by 7m.

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15. Is it possible to design or rectangular park of perimeter 40 m and area $400m^2$? If so, find its length and breadth.

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16. Determine the condition for the roots of the equation $ax^2 + bx + c = 0$ to differ by 2.

17. Show that the equation

$$2(a^2 + b^2)x^2 + 2(a + b)x + 1 = 0 \quad \text{has not}$$

real roots, when $a \neq b$.

18. Find the value of k for which the equation

$$x^2 - 2(1 + 3k)x + 7(3 + 2k) = 0 \quad \text{has} \quad \text{two}$$

equal roots, which are real.

19. Find the roots of the equation:

$$x^2 + 200x + 9975 = 0$$

20. If 1 is a root of the quadratic equation $x^2 + px - 2 = 0$ and the quadratic equation $2x^2 - 4px + k = 0$ has equal roots, find the value of k.

21. Find the non-zero value of k for which the quadratic equations $kx^2 + 1 - 2(k-1)x + x^2 = 0$ has equal roots. Hence, find the roots of the equation

22. Find whether the following equations have real roots. If real roots exist, find them

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

23. Find whether the following equations have real roots. If real roots exist, find them

$$6x^2 + 8x + 30 = 0$$

24. Find whether the following equation have real roots. If real roots exist, find them

$$3x^2 - 4x + 5 = 0$$

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25. Find whether the following equations have real roots. If real roots exist, find them

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

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26. Find whether the following equations have real roots. If real roots exist, find them

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

27. Find whether the following equations have real roots. If real roots exist, find them

$$4x^2 - \frac{1}{5}x + \frac{1}{32} = 0$$

28. Solve for x:

$$\frac{x-3}{x-4} + \frac{x-5}{x-6} = \frac{10}{6}, \ x \neq 4, 6$$

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29. Solve: $\dfrac{x-2}{x-3} + \dfrac{x-4}{x-5} = 3\dfrac{1}{3}, \ x \neq 3, 5.$

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30.

$$3\left(\frac{3x-1}{2x+3}\right) - 2\left(\frac{2x+3}{3x-1}\right) = 5, \ x \neq \frac{1}{3}, \ -\frac{3}{2}$$

31. The sum of the squares of two consecutive even numbers is 244. Find the numbers.

32. Solve for :

$$\frac{2}{x+1} + \frac{3}{2(x-2)} = \frac{23}{5x}; \ x \neq 0, \ -1, 2$$

33. The difference of two natural numbers is 5 and the difference of their reciprocals is $\dfrac{5}{14}$. Find the numbers.

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

35. A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

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36. Sum of the areas of two squares is $640m^2$. If the difference of their perimeters is 64m, find the sides of the two squares.

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37. 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 would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

38. There is a square field whose side is 44m. A square flower bed is prepared in its centre leaving a gravel path all round the flower bed.

The total cost of laying the flower bed and gravelling the path at Rs. 2.75 and Rs. 1.50 per square metre, respectively, is Rs. 4904. Find the width of the gravel path.

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39. At t minutes past 2 pm, the time needed by the minutes hand of a clock to show 3pm was found to be 3 minutes less than $(t^2)/4$ minutes. Find t.

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40. A train covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hr more, it would have taken 30 minutes less for the journey. Find the original speed of the train.

41. 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 his marks, would have been 180. Find his marks in the two subjects.

42. If the list price of a toy is reduced by Rs. 2, a person can buy 2 toys more for Rs. 360. Find the original price of the toy.

43. Solve $\dfrac{1}{a+b+x} = \dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{x}$,

$a + b \neq 0$

44.

$\dfrac{3}{x+1} + \dfrac{4}{x-1} = \dfrac{29}{4x-1}; \, x \neq 1, \, -1, \, \dfrac{1}{4}$

45. A motorboat whose speed is 24 km/hr in still water takes 1 hr more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream.

46. Solve by factorization:

$$\frac{a}{x-a} + \frac{b}{x-b} = \frac{2c}{x-c}$$

1. Check whether the following is a quadratic equation:

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

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2. The area of a rectangular plot is $528m^2$. The length of the plot (in metres) is one metre more then twice its breadth. Find the length and the breadth of the plot.

3. Find the nature of the roots of the quadratic equation $3x^2 - \sqrt{7}x + 1 = 0$

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

5. Does there exist a quadratic equation whose coefficients are all distinct irrationals but both the roots are rationals? Why?

6. The length of a rectangular field exceeds is its breadth by 8 m the area of the field is $240m^2$ .Find the dimensions of the field .

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

8. If 1 is a root of the quadratic equation $3x^2 + ax - 2 = 0$ and the quadratic equation $a\left(x^2 + 6x\right) - b = 0$ has equal roots, find the value of b.

9. The sum of two numbers is 10. If the sum of their reciprocals is $\dfrac{5}{8}$, the numbers.

10. Find whether the following equations have real roots. If real roots exist, find them

$$\frac{1}{2x-3} + \frac{1}{x-5} = 1, x \neq \frac{3}{2}, 5$$

11. 300 apples are distributed equally among a certain number of students. Had three been 10 more students, each would have received one apple less. Find the number of students.