

MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

QUADRATIC EQUATIONS

Others

1. If the roots of the equation $ax^2 + 2bx + c = 0$ and $-2\sqrt{acx} + b = 0$ are simultaneously real, then prove that $b^2 = ac$

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2. If p, q are real $p \neq q$, then show that the roots of the equation $(p - q)x^2 + 5(p + q)x - 2(p - q) = 0$ are real and unequal.

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3. 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 .

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4. For what value of k , $(4 - k)x^2 + (2k + 4)x + (8k + 1) = 0$ is a perfect

square.



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5. Prove that the equation

$x^2(a^2 + b^2) + 2x(ac + bd) + (c^2 + d^2) = 0$ has no real root, if $ad \neq bc$.



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6. Find the value of k for which the quadratic equation

$(k + 4)x^2 + (k + 1)x + 1 = 0$ has equal roots



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

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8. If the roots of the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, prove that $\frac{a}{b} = \frac{c}{d}$.

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9. Find the least positive value of k for which the equation $x^2 + kx + 4 = 0$ has real roots.

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10. Find the values of k for which the given quadratic equation has real and distinct roots: (i)

$$kx^2 + 2x + 1 = 0 \quad \text{(ii)} \quad kx^2 + 6x + 1 = 0 \quad \text{(iii)}$$

$$x^2 - kx + 9 = 0$$

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11. If 2 is a root of the quadratic equation

$$3x^2 + px - 8 = 0 \quad \text{and} \quad \text{the quadratic equation}$$

$$4x^2 - 2px + k = 0 \text{ has equal roots, find the value of } k.$$

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12. Show that the equation $2(a^2 + b^2)x^2 + 2(a + b)x + 1 = 0$ has no real roots, when $a \neq b$.

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13. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are equal, prove that either $a = 0$ or $a^3 + b^3 + c^3 = 3ab$.

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14. If a, b, c , are real number such that $ac \neq 0$, then show that at least one of the equations

$ax^2 + bx + c = 0$ and $-ax^2 + bx + c = 0$ has real roots.

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15. Show that the roots of the equation: $(x-a)(x-b) + (x-b)(x-c) + (x-c)(x-a) = 0$ are always real and these cannot be equal unless $a=b=c$

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16. find the values of k so, that the equation $3x^2 + kx + 2 = 0$ has equal roots. also find the roots in each case.

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17. If the equation $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2(1 + m^2)$.

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18. 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 .

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19. Find the values of p for which the quadratic equation $(2p + 1)x^2 - (7p + 2)x + (7p - 3) = 0$ has equal roots

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20. If $ax^2 + bx + c = 0$ has equal roots, then $c = -\frac{b^2}{4a}$

(b) $\frac{b}{2a}$ (c) $\frac{-b^2}{4a}$ (d) $\frac{b^2}{4a}$

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21. 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

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22. The value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}$ is

(a) 4

(b) 3

(c) -2

(d) 3.5



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23. If the equation

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

roots, then (a) $ab = cd$ (b) $ad = bc$ (c) $ad = \sqrt{bc}$

$ab = \sqrt{cd}$



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24. A pole has to be erected at a point on the boundary of a circular park of diameter 13 metres in such a way that the difference of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Is it possible to do so? If yes, at what distances from the two gates should the pole be erected?

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25. If $1 + \sqrt{2}$ is a root of a quadratic equation with rational coefficients, write its other root.

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26. Write the sum of real roots of the equation

$$x^2 + |x| - 6 = 0$$

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27. If the equation $x^2 - ax + 1 = 0$ has two distinct roots, then $|a| = 2$ (b) $|a| < 2$ (c) $|a| > 2$ None of these

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28. If one root of the equation $2x^2 + bx + c = 0$ is three times the other, then $b^2 : ac =$ (a) 3:1 (b) 3:16 (c) 16:3 (d)

16:1

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29. If one root of the equation $4x^2 - 2x + (\lambda - 4) = 0$ be the reciprocal of the other, then $\lambda =$ 8 (b) -8 (c) 4 (d) -4



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30. 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.



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31. The difference of the squares of two numbers is 45. The square of the smaller number is 4 times the larger number. Determine the numbers.

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32. If the sum of first n even natural numbers is 420, find the value of n .

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33. If 1 is the root of equation $3x^2 + ax - 2 = 0$ and the quadratic equation $a(x^2 + 6x) - b = 0$ has equal roots. Find the value of b .



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34. The sum of the squares of three consecutive natural numbers is 149. Find the numbers.



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35. The sum of two numbers is 9. The sum of their reciprocals is $\frac{1}{2}$. Find the numbers.



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36. 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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37. The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its reciprocal is $2\frac{16}{21}$, find the fraction.



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38. A two digit number is four times the sum and three times the product of its digits.



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39. To fill swimming pool two pipes are to be used. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half the pool can be filled. Find, how long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter to fill the pool



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40. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.



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41. A shop keeper buys a number of books for Rs.80. If he had bought 4 more books for the same amount, each book would have cost his Rs.1 less .How many books did he buy?



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42. An electric cable costs Rs. 200. If the cable was 2m longer and each meter of cloth cost Rs 2 less, the cost of the cable would remain unchanged. Represent the above situation in the form of quadratic equation.



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43. A factory kept increasing its output by the same percentage every year. Find the percentage if it is known that the output is doubled in the last two years.



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44. If the price of a book is reduced by Rs. 5, a person can buy 5 more books for Rs. 300. Find the original list price of the book.



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45. 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.

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46. The angry Arjun carried some arrows for fighting with Bheeshm. With half the arrows, he cut down the arrows thrown by Bheeshm on him and with six other arrows he killed the rath driver of Bheeshm. With one arrow each he knocked down respectively the rath, flag and the bow of Bheeshm. Finally, with one more than four times the square root of arrows he laid Bheeshm unconscious on an arrow bed. Find the total number of arrows Arjun had.

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47. Rs. 9000 were divided equally among a certain number of persons. Had there been 20 more persons, each would have got Rs. 160 less. Find the original number of persons.

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48. A peacock is sitting on the top of a pillar, which is 9m high. From a point 27m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal, at what distance from the hole is the snake caught?

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49. The difference of two numbers is 4. If the difference of their reciprocals is $\frac{4}{21}$, find the numbers

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50. The sum of a number and its positive square root is $\frac{6}{25}$. Find the number.

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51. If an integer is added to its square, the sum is 90. Find the integer with the help of quadratic equation.

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52. Two squares have sides $x\text{ cm}$ and $(x + 4)$. The sum of their areas is 656 cm^2 . Find the sides of the squares.



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53. Two number differ by 4 and their product is 192. Find the number.



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54. Two numbers differ by 3 and their product is 504. Find the number.



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55. The sum of two numbers is 16. The sum of their reciprocals is $\frac{1}{3}$. Find the numbers.

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56. The sum of the squares of three consecutive natural numbers is 149. Find the numbers.

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57. The sum of two numbers is 18. The sum of their reciprocals is $\frac{1}{4}$. Find the numbers.

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58. The difference of the squares of two positive integers is 180. The square of the smaller number is 8 times the larger, find the numbers.

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

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60. 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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61. The area of a right angled triangle is 600cm^2 . If the base of the triangle exceeds the altitude by 10cm, find the dimensions of the triangle.



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62. The perimeter of a rectangular field is 82 cm and its area is 400m^2 . Find the breadth of the rectangle.



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63. 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.



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64. A farmer wishes to grow a 100m^2 rectangular vegetable garden. Since he has with the only 30 m barbed wire, the fences three sides of the rectangular garden letting compound wall of his house act as the fourth side-fence. Find the dimensions of his garden.



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65. Solve the following quadratic equations by factorization: $x^2 + 6x + 5 = 0$

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66. Solve the following quadratic equations by factorization method. $x^2 + 2\sqrt{2}x - 6 = 0$

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67. Sum of the areas of two squares is $468m^2$. If the difference of their perimeters is $24m$, formulate the quadratic equation to find the sides of the two squares.

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68. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore. If the average speed of the express train is 11 km/hr more than that of the passenger train, form the quadratic equation to find the average speed of express train.



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



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70. If $x = 2$ and $x = 3$ are roots of the equation $3x^2 - 2kx + 2m = 0$, find the value of k and m .

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71. A fast train takes one hour less than a slow train for a journey of 200 km. If the speed of the slow train is 10 km/hr less than that of the fast train, find the speed of the two trains.

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72. Swati can row her boat at a speed of 5km/hr in still water. if it takes her 1 hour more to row the boat 5.25 km

upstream than to return downstream, Find the speed of the stream.



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73. A motor boat 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.



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



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75. The numerator of a fraction is 3 less than the denominator. If 2 is added to both the numerator and the denominator, then the sum of the new fraction and the original fraction is $\frac{29}{20}$. Find the original fraction.

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76. Three consecutive positive integers are such that the sum of the square of the first and the product of other two is 46, find the integers.

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77. 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.



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78. The sum of two numbers is 9. The sum of their reciprocals is $\frac{1}{2}$. Find the numbers.



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79. The sum of two numbers is 9. The sum of their reciprocals is $\frac{1}{2}$. Find the numbers.



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80. Solve the following quadratic equations by factorization:

$$\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} + \frac{1}{(x-3)(x-4)} = \frac{1}{6}$$

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81. Solve the following quadratic equations by

factorization: $\frac{x-a}{x-b} + \frac{x-b}{x-a} = \frac{a}{b} + \frac{b}{a}$

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82. Solve for x : $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}, x \neq 2, 4$

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83. Solve for : $a^2b^2x^2 + b^2x - a^2x - 1 = 0$

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84. Solve the following quadratic equations by factorization method: $4x^2 - 2(a^2 + b^2)x + a^2b^2 = 0$

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85. Solve: $x + \frac{1}{x} = 25$

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86. Solve for: $\frac{1}{2a + b + 2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

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87. Solve for : $\frac{1}{x - 3} + \frac{2}{x - 2} = \frac{8}{x}; x \neq 0, 2, 3$

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88. The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the sides of the field.

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89. the hypotenuse of a right angle triangle is 1m less than twice the shortest side. If the third side is 1m more than the shortest side, find the sides of the triangle.



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90. The product of Ramu's age (in years) five years ago with his age (in years) 9 years later is 15. Find Ramu's present age.



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91. One year ago, a man was 8 times as old as his son. Now his age is equal to the square of his son's age. Find their present ages.



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92. A girl is twice as old as her sister. Four years hence, the product of their ages (in years) will be 160. Find their present ages.



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93. 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.



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94. While boarding an aeroplane, a passenger got hurt. The pilot showing promptness and concern, made arrangements to hospitalise the injured and so the plane started late 30 minutes to reach the destination, 1500 km away in time, the pilot increased the speed by 100 km/hr. Find the original speed/hour of the plane.



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95. While boarding an aeroplane, a passenger got hurt. The pilot showing promptness and concern, made arrangements to hospitalise the injured and so the plane started late 30 minutes to reach the destination, 1500 km

away in time, the pilot increased the speed by 100 km/hr.

Find the original speed/hour of the plane.

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96. A motor boat whose speed is 18 km/h in 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.

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97. While boarding an aeroplane, a passenger got hurt. The pilot showing promptness and concern, made arrangements to hospitalise the injured and so the plane

started late 30 minutes to reach the destination, 1500 km away in time, the pilot increased the speed by 100 km/hr. Find the original speed/hour of the plane.

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98. Solve for: $\frac{4}{x} - 3 = \frac{5}{2x + 3}, x \neq 0, -\frac{3}{2}$

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99. Solve for: $\frac{x - 4}{x - 5} + \frac{x - 6}{-x - 7} = \frac{10}{3}; x \neq 5, 7$

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100. Solve for : $\frac{5+x}{5-x} - \frac{5-x}{5+x} = 3\frac{3}{4}$; $x \neq 5, -5$

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101. Solve for : $\frac{3}{x+1} - \frac{1}{2} = \frac{2}{3x-1}$, $x \neq \frac{3}{5}, -\frac{1}{7}$

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

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103. Find the roots of the following equation $4x^2 + 4bx - (a^2 - b^2) = 0$ by the method of completing the square.

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104. Find the roots of the equation $a^2x^2 - 3abx + 2b^2 = 0$ by the method of completing the square.

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105. Solve the equation $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$ by the method of completing the square.



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106. Find the roots of the quadratic equations (if they exist) by the method of completing the square.

$$4x^2 + 4\sqrt{3}x + 3 = 0$$



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107. Find the roots of the quadratic equations (if they exist) by the method of completing the square.

$$\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$$



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108. If the roots of the equation $x^2 + 2cx + ab = 0$ are real unequal, prove that the equation $x^2 - 2(a + b)x + a^2 + b^2 + 2c^2 = 0$ has no real roots.

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109. If p, q, r and s are real numbers such that $pr = 2(q + s)$, then show that at least one of the equations $x^2 + px + q = 0$ and $x^2 + rx + s = 0$ has real roots.

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110. Find the values of k for which the equation $x^2 + 5kx + 16 = 0$ has no real roots.

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111. If p, q are real and $p \neq q$, then show that the roots of the equation $(p - q)x^2 + 5(p + q)x - 2(p - q) = 0$ are real and unequal.

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



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113. Find the values of k for which the following equation has equal roots: $(k - 12)x^2 + 2(k - 12)x + 2 = 0$



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114. Find the value of k for which the given equation has real and equal roots: $2x^2 - 10x + k = 0$

$$9x^2 + 3kx + 4 = 0$$

$$12x^2 + 4kx + 3 = 0$$

$$2x^2 + 3x + k = 0 \quad 2x^2 - kx + 1 = 0 \quad kx^2 - 5x + k = 0$$

$$x^2 + k(4x + k - 1) + 2 = 0$$

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

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

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115. Using quadratic formula, solve the following equation

$$\text{for } x: abx^2 + (b^2 - ac)x - bc = 0$$

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116. Using quadratic formula solve the following quadratic

equations:
$$p^2x^2 + (p^2 - q^2)x - q^2 = 0, p \neq 0$$

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

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117. A dealer sells a toy for Rs 24 and gains as much per cent as the cost price of the toy. Find the cost price of the toy.



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