



MATHS

BOOKS - KALYANI MATHS (ASSAMESE ENGLISH)

Quadratic Equation

Example

1. Which of the following is quadratic equation:

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



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2. Which of the following is quadratic equation:

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



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3. Which of the following is quadratic equation:

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



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4. Which of the following is quadratic equation:

$$x - \frac{1}{x} = 0$$



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5. Test which of the following as solution of

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

$$x = 1$$



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6. Test which of the following as solution of

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

$$x = -1$$



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7. Test which of the following as solution of

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

$$x = \frac{1}{2}$$



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8. Test which of the following as solution of

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

$$x = -3$$



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9. If $x = 1$ and $x = -3$ as the roots of

$$3x^2 + 2mx + 3n = 0, \text{ then find } m \text{ and } n.$$



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10. Find the roots of the following quadratic equation

$$15x^2 - 11x + 2 = 0$$



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11. Find the roots of the following quadratic equation

$$x^2 - 5\sqrt{3}x + 18 = 0$$





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12. Find the roots of the following quadratic equation

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



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13. A rectangular field is 20m long and 14m wide. There is a path of equal width all around it having an area of 111sq.m. Find the width of the path.



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14. Solve the equation by completing the square:

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



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15. Solve the equation by completing the square:

$$x^2 - 10x + 22 = 0$$



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16. Solve the equation by completing the square:

$$6x^2 - 7x + 2 = 0$$



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



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18. Two water taps can fill together a tank in 6h 40m. The larger tap takes 3h less than the smaller to fill the tank separately. Find the time in which each tap can separately fill the tank.



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19. A motor boat whose speed in still water 15km/hr takes half an hour more to go 18km up stream than to returns down stream to the same spot. Find Speed of the stream.





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20. Using formula solve the following question

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, x \neq -4, 7$$



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21. Using formula solve the following question

$$\frac{x+3}{x+2} = \frac{3x-7}{2x-2}, x \neq -2, x \neq \frac{3}{2}$$



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22. A car and a bus start from a place P at the same time and move non-stop towards a place where the distance between P and Q is 210 km. The car takes half an hour less than the bus to arrive Q. If the average speed of the car is $10k\frac{m}{h}$ more than that of the bus, find the average speed of the car and the bus.



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23. Solve the equation $\frac{x - 1}{x + 2} + \frac{x - 3}{x - 2} = \frac{11}{8}$



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24. Solve the equation $4^x - 3 * 2^{x+2} + 2^5 = 0$



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25. For what of k the equation $2x^2 - 2kx + k = 0$ will have Two unequal roots. Further if k is a rational number, for what value or values, of k , the roots will be rational.



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26. For what of k the equation $2x^2 - 2kx + k = 0$ will have no solution. Further if k is a rational number, for what value or values, of k , the roots will be rational.



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27. Find the value of k such that the equation $(k - 12)x^2 - 2(k - 12)x + 2 = 0$ may have equal roots.



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28. If -4 is a root of $x^2 + px - 4 = 0$ and the equation $x^2 + px + q = 0$ has equal roots find p and q .



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29. Mr. X has a rectangular plot of land of length $16m$. He wants to sell a portion of it which will be of the shape of a square of side length equal to the breadth of the rectangular plot in such a manner that the remaining

portion is of the area of 100sq. m. Is it possible?



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30. Find the quadratic equation whose roots are given below.

$$-3, \frac{4}{3}$$



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31. Find the quadratic equation whose roots are given below.

$$\sqrt{3} + \sqrt{2}, \sqrt{3} - \sqrt{2}$$



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32. If the roots of the equation $ax^2 + bx + c = 0$ are in the ratio 2:3, then prove that $6b^2 = 25ac$



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33. For what of k the equation $2x^2 - 2kx + k = 0$ will have Two unequal roots. Further if k is a rational number, for what value or values, of k , the roots will be rational.



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34. For what value of k the equation $2x^2 - 2kx + k = 0$ will have real and equal roots.



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35. Find the value of k such that the equation $(k - 12)x^2 - 2(k - 12)x + 2 = 0$ may have equal roots.



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36. If -4 is a root of $x^2 + px - 4 = 0$ and the equation $x^2 + px + q = 0$ has equal roots find p and q .



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37. Mr. X has a rectangular plot of land of length $16m$. He wants to sell a portion of it which will be of the shape of a square of side length equal to the breadth of the rectangular plot in such a manner that the remaining portion is of the area of $100sq. m$. Is it possible?



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38. Find the quadratic equation whose roots are given below.

$$-3, \frac{4}{3}$$



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39. Find the quadratic equation whose roots are given below.

$$\sqrt{3} + \sqrt{2}, \sqrt{3} - \sqrt{2}$$



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40. If the roots of the equation $ax^2 + bx + c = 0$ are in the ratio 2:3, then prove that $6b^2 = 25ac$



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Exercise

1. Which of the following is quadratic equation:

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



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2. Which of the following is quadratic equation:

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



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3. Which of the following is quadratic equation:

$$(x - 1)^2 = x - 1$$



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4. Which of the following is quadratic equation:

$$x^2 = x$$



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5. Which of the following is quadratic equation:

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



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6. Which of the following is quadratic equation:

$$x(x+1)+7=(x+2)(x+3)$$



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7. Which of the following is quadratic equation:

$$x^3 - x^2 = (x - 1)^3$$



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8. Test which of the following is solutions of

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

i)2,ii)– 3,iii)– 2,iv)3



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9. Test which of the following is solutions of

$$x^2 - 3x - 10 = 0$$

i)2,ii)– 5,iii)– 2,iv)5



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10. Test which of the following is solutions of

$$x^2 + 3x - 180 = 0$$

i)12,ii)10,iii)– 15,iv)– 18



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11. Test which of the following is solutions of

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

i)– $\frac{\sqrt{2}}{3}$,ii)– $\sqrt{2}$,iii) $\frac{1}{\sqrt{2}}$,iv) $\sqrt{2/3}$



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12. Test which of the following is solutions of

$$x^2 + x - 306 = 0$$

i)17,ii)3,iii) -18,iv)12



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13. If 3 is a root of the quadratic equation

$$x^2 - ax + 8 = 0, \text{ find the value of } a.$$



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14. If 1 is a root of the quadratic equation

$$px^2 + x + \frac{1}{4} = 0, \text{ find the value of } p.$$



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15. If 2 is a root of the quadratic equation

$$x^2 - ax + 8 = 0, \text{ find the value of } a.$$



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16. If -3 is a root of the quadratic equation

$$x^2 + ax + 6 = 0, \text{ find the value of } a.$$



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17. If $-\frac{1}{2}$ is a root of the quadratic equation

$$2x^2 + ax - 3 = 0, \text{ find the value of } a.$$



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18. Find the value of a and b for which $x=2,3$ are the roots of the equation $3x^2 + 2ax + 2b = 0$



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19. If $x = \frac{1}{3}, -1$ are the roots of the equation $ax^2 + bx - 1 = 0$, find a and b.



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20. If $x=11,7$ are the roots of the equation

$ax^2 + bx + 77 = 0$, find the value of a, b .



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21. If $x=-5, -7$ are the roots of the equation

$ax^2 + bx + 35 = 0$, find the value of a, b .



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22. If $x = -\frac{4}{3}, \frac{7}{5}$ are the roots of the equation

$mx^2 + nx - 28 = 0$, find the value of $m.n$



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23. Solve the following equation by using the method of factorisation:

$$2x^2 - 9x + 10 = 0$$



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24. Solve the following equation by using the method of factorisation:

$$14x^2 + 3x = 11$$



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25. Solve the following equation by using the method of factorisation:

$$35 - x - 6x^2 = 0$$



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26. Solve the following equation by using the method of factorisation:

$$a^2x^2 + 2ax = 15$$



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27. Solve the following equation by using the method of factorisation:

$$(x - 2)(x + 4) - 16 = 0$$



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28. Solve the following equation by using the method of factorisation:

$$x^2 + 2ab = b^2 + 2ax$$



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29. Solve the following equation by using the method of factorisation:

$$x + \frac{1}{x} = 5\frac{1}{5}$$



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30. Solve the following equation by using the method of factorisation:

$$\sqrt{7}x^2 - 6x - 13\sqrt{7} = 0$$



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31. Solve the following equation by using the method of factorisation:

$$4\sqrt{5}x^2 + 7x - 3\sqrt{5} = 0$$



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32. Solve the following equation by using the method of factorisation:

$$x^2 - 2x - 899 = 0$$



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33. Solve the following equation by using the method of factorization:

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



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34. Solve the following equation by using the method of factorization:

$$x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a} \right) x + 1 = 0$$



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35. Solve the following equation by using the method of factorization:

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



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36. Solve the following equation by using the method of factorization:

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



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37. Solve the following equation by using the method of factorization:

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



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38. Solve the following equation by using the method of factorization:

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



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39. Solve the following equation by using the method of factorization:

$$\frac{1}{a + b + x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$$



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40. Solve the following equation by using the method of factorization:

$$\frac{1}{x+4} - \frac{1}{x+7} = \frac{11}{30} \quad x \neq -4, 7$$



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41. Solve the following equation by using the method of factorization:

$$\frac{1}{x+3} + \frac{1}{2x-1} = \frac{11}{7x+9} \quad x \neq -3, -\frac{9}{7}, \frac{1}{2}$$



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42. Solve the following equation by using the method of factorization:

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



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43. Solve the following equation by the method of completing square :

$$x^2 + 6x + 7 = 0$$



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44. Solve the following equation by the method of completing square :

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



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45. Solve the following equation by the method of completing square :

$$49x^2 - 42x + 9 = 0$$



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46. Solve the following equation by the method of completing square :

$$8x^2 + 22x - 21 = 0$$



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47. Solve the following equation by the method of completing square :

$$x^2 + 4x = 1517$$



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48. Solve the following equation by the method of completing square :

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



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49. The sum of a positive integer and its square is 240, find the number.



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50. The sum of the square of two consecutive natural number is 313, find the numbers.



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51. The sum of the square of two consecutive even natural number is 340, find the numbers.



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52. The difference between a positive proper fraction and its reciprocal is $\frac{11}{30}$. Find the fraction.



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53. The difference between a positive proper fraction and its reciprocal is 0.45. Find the fraction.



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54. Find two consecutive natural numbers whose product is 2352.



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55. There are some balls and marbles in a box. The square of the number of marbles exceeds the number of balls by 38. If four more marbles had been in the box, the numbers of ball would have been same as that of marbles. Find the number of balls and marbles.



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

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57. The sum of two natural number is 15. If the sum of their reciprocal is $\frac{3}{10}$, find the number.

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



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59. The numerator of a fraction is one less than its denominator. If three is added each of the numerator and denominator, the fraction is increased by $\frac{3}{28}$, find the fraction.



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60. Some students arranged a picnic. The budget of food was ₹2400. Four students of the group failed to go. The cost of food for each student got increased by ₹50. How many students went for the picnic?



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61. 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 his present age.



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62. The age of a man after 9 years will be equal to the square of his age 33 years ago. Determine the present age of the man.



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63. Sum of the ages of the father and the son is 60 years. One-ninth of the product of their ages is 30 years more than the age of the father. What is the age of the father?



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64. The age of Argha's mother is square of the age of Argha, 5 years hence if her age is three times of Argha, find their respective ages.



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65. The age of a man is twice the square of the age of his son. Eight years hence, the age of the man will be 4 years more than three times of the age of his son. Find their present ages.



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66. The hypotenuse of a right angle triangle is 6 cm more than twice the shortest side. If the third side is 2 cm less than the hypotenuse, find the sides of the triangle.





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67. If twice the area of a smaller square be subtracted from the area of a larger square, the difference will be 14cm^2 . However if twice the area of the larger square is added to three times the area of smaller square. The sum would be 203cm^2 , How long is the side of each square.



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68. The length and breadth of a rectangular field are 38m and 32m respectively. The path of uniform width exists within the field along its boundary. If the area of the both is $600m^2$, find the width of the path.



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69. The sum of the area of two squares is $640m^2$. If the difference in their perimeters be 64m, find the sides of the two squares.





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70. Sum of the areas of two squares is $468m^2$. If the difference of their perimeters is 24 m, find the side length of the two squares.



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71. The hypotenuse of a right angle triangle is $3\sqrt{10}$ cm, if the smaller side is tripled and the longer side doubled, new hypotenuse will be $9\sqrt{5}$ cm. How long are the sides of the triangle.



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72. A train travels a distance 300km at a uniform speed.If the speed of the train is increased by 5km an hour,The journey would have taken to two hours less.Find the original speed of the train.



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73. A train travels 360 km at a uniform speed. If she had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.



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74. An aeroplane left 30mins later than its scheduled time and in order to reach its destination 1500km away on time, it had to

increased its speed 250km/hr from its usual speed. Determine its usual speed.



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75. A motor boat whose speed in still water 9km/hr takes three hours to go 12km down stream and come back. Find Speed of the stream.



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76. A motor boat whose speed in still water 18km/hr takes 1 hour more to go 24km up stream than to returns down stream to the same spot. Find Speed of the stream.



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77. Two water taps together can fill a tank in $9\left(\frac{3}{8}\right)$ 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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78. Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. If one takes 3 minutes more than the other to fill the cistern, find the time in which each pipe would fill the cistern.



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79. A swimming pool is filled with three pipes with uniform flow. The first two pipes operating simultaneously, fill the pool at the same time, during which the pool is filled by the third pipe alone. The second pipe fills the pool five hours faster than the first pipe and four hours slower than the third pipe. Find the time required by each pipe to fill the pool individually.



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80. A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B to finish the work.



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81. A and B can complete a piece of work in $\frac{9}{5}$ hours, when they work together. If they work individually then A needs $1\frac{1}{2}$ hours more than that required by B to complete the same. Find

the time required by A and B for the completion of the work working individually.



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82. Applying formula of quadratic equation, solve the following equations.

$$ax^2 - bx - c = 0.$$



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83. Applying formula of quadratic equation, solve the following equations.

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



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84. Applying formula of quadratic equation, solve the following equations.

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



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85. Applying formula of quadratic equation, solve the following equations.

$$a^2x^2 + 2ax = 8.$$



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86. Applying formula of quadratic equation, solve the following equations.

$$2x + 3 = \frac{12}{x - 1}x \neq 1.$$



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87. Applying formula of quadratic equation,
solve the following equations.

$$\frac{5x - 6}{4x - 1} = \frac{2x + 3}{3x + 2}, x \neq \frac{1}{4}, -\frac{2}{3}.$$



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88. Applying formula of quadratic equation,
solve the following equations.

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



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89. Applying formula of quadratic equation, solve the following equations.

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



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90. Applying formula of quadratic equation, solve the following equations.

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



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91. Applying formula of quadratic equation, solve the following equations.

$$\frac{x}{2a} = \frac{4ax}{x + 2a}, x \neq -2a.$$



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92. Applying formula of quadratic equation, solve the following equations.

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



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93. Applying formula of quadratic equation, solve the following equations.

$$\frac{2x - 1}{x + 2} + \frac{x + 2}{2x - 1} = \frac{10}{3}, x \neq \frac{1}{2}, -2.$$



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94. Applying formula of quadratic equation, solve the following equations.

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



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95. Applying formula of quadratic equation, solve the following equations.

$$a^2b^2x^2 - (4b^4 - 3a^4)x - 12a^2b^2 = 0.$$



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96. Applying formula of quadratic equation, solve the following equations.

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



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97. Solve the following equations.

$$\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = \frac{13}{6}.$$



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98. Solve the following equations.

$$8\sqrt{\frac{x}{x+3}} - \sqrt{\frac{x+3}{x}} = 2.$$



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99. Solve the following equations.

$$\left(\frac{x}{x+1}\right)^2 - 5\left(\frac{x}{x+1}\right) \div 6 = 0, x \neq -1.$$



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100. Solve the following equations.

$$\frac{x}{\sqrt{x}} = \frac{6}{25}.$$



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101. Solve the following equations.

$$(x^2 - 5x)^2 - 7(x^2 - 5x) \div 6 = 0.$$



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102. Solve the following equations.

$$3^{2x} - 10 \cdot 3^x + 9 = 0.$$



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103. Solve the following equations.

$$2^{x+1} + 4^x = 8.$$



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104. Solve the following equations.

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



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105. Solve the following equations.

$$(x + 2)(x - 5)(x - 6)(x + 1) = 144.$$



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106. Solve the following equations.

$$(x + 1)(x + 2)(x + 3)(x + 4) = 0.$$



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107. Determine the nature of the roots of the following equation without solving them.

$$2x^2 - 13x + 15 = 0$$



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108. Determine the nature of the roots of the following equation without solving them.

$$3x^2 + 2x - 1 = 0$$



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109. Determine the nature of the roots of the following equation without solving them.

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



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110. Determine the nature of the roots of the following equation without solving them.

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



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111. Determine the nature of the roots of the following equation without solving them.

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



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112. Determine the nature of the roots of the following equation without solving them.

$$4x^2 + 12x + 9 = 0$$



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113. Determine the nature of the roots of the following equation without solving them.

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



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114. Determine the nature of the roots of the following equation without solving them.

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



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115. Determine the nature of the roots of the following equation without solving them.

$$\sqrt{5}x^2 - 6x - \sqrt{5} = 0$$



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116. Determine the nature of the roots of the following equation without solving them.

$$x^2 + 3\sqrt{5}x - 1 = 0$$



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117. For what value of k the following equations will have (a)two unequal roots, (b)no solution.

$$x^2 + 3x + k = 0.$$



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118. For what value of k the following equations will have (a)two unequal roots, (b)no solution, (c)equal roots.

$$x^2 + 3kx + 4k = 0.$$



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119. For what value of k the following equations will have (a)two unequal roots, (b)no solution, (c)equal roots.

$$kx^2 - 6kx + 2 = 0.$$



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120. For what value of k the following equations will have (a)two unequal roots, (b)no solution, (c)equal roots.

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



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121. For what value of k the following equations will have real and equal roots

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



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122. The following equations have equal roots find k in each equation.

$$x^2 - 2(5 + 2k)x + 3(7 + 10k) = 0.$$



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123. The following equations have equal roots
find k in each equation.

$$kx^2 - (3k + 2)x + 5k - 2 = 0.$$



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124. The following equations have equal roots
find k in each equation.

$$x^2 - 2(3k + 1)x - (5k + 1) = 0.$$



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125. The following equations have equal roots
find k in each equation.

$$(kx + 2)^2 = 4(x - 1).$$



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126. The following equations have equal roots
find k in each equation.

$$x^2 - (5k + 1)x + (10k - 1) = 0.$$



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127. The following equations have equal roots
find k in each equation.

$$9x^2 + 8kx + 16 = 0.$$



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128. The following equations have equal roots
find k in each equation.

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



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129. The following equations have equal roots
find k in each equation.

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



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130. Is it possible that the sum of the ages of a mother and her daughter is 25 years. Four years ago, the product of their age was 40 years.



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131. Is it possible to design a rectangular park of perimeter 80 m and area $400m^2$? If so, find its length and breadth.



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132. Mr. Sharma has a rectangular plot of land of length $14m$. He wants to sell a portion of it which will be of the shape of a square of side length equal to the breadth of the rectangular

plot in such a manner that the remaining portion of it of the area of 50sq. m. Is it possible?



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133. If -3 is a root of the equation $x^2 + px + 6 = 0$ and the equation $x^2 + px + q = 0$ has equal roots, find p, q .



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134. If 2 is a root of the equation $x^2 + px - 8 = 0$ and the equation $x^2 + px + q = 0$ has equal roots, find p, q .



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135. If a, b, c , are real, then prove that roots of the equation $\frac{1}{x-a} + \frac{1}{x-b} + \frac{1}{x-c} = 0$ are real.



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136. If a, b, c , are rational and $a + b + c = 0$.

Show that the roots of the following equation are rational.

$$ax^2 + bx + c = 0.$$



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137. If a, b, c , are rational and $a + b + c = 0$.

Show that the roots of the following equation are rational.

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



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138. If a, b, c , are rational and $a + b + c = 0$.

Show that the roots of the following equation are rational.

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



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139. Find the quadratic equation whose roots are given as

$$-4 \text{ and } \frac{1}{2}.$$



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140. Find the quadratic equation whose roots are given as

$$\sqrt{2} + 1 \text{ and } \sqrt{2} - 1.$$



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141. If α and β are roots of $x^2 - 6x + a = 0$ and $3\alpha + 2\beta = 20$, find the value of a .



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142. If the roots of the equation

$$3x^2 + 2(p + q + r)x + (pq + qr + pr) = 0$$

are equal show that $p = q = r$.



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143. If the equation

$$a(b - c)x^2 + b(c - a)x + c(a - b) = 0 \quad \text{has}$$

equal roots, prove that $\frac{1}{a} + \frac{1}{c} = \frac{2}{b}$



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144. If p be the ratio of roots of the equation

$$ax^2 + bx + c = 0, \text{ show that } \frac{(p + 1)^2}{p} = \frac{b^2}{ac}$$

.



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