

# MATHS

## BOOKS - MBD

### QUADRATIC EQUATIONS

#### Exercise

1. Check whether the following is quadratic equation :-  $x = \frac{17}{4} - \frac{1}{x}$ .



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2. Check whether the following are quadratic

equations :-  $\frac{1}{15 - x} = \frac{3}{10} - \frac{1}{x}$ .



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3. Check whether the following are quadratic

equations :-

$$x^2 + (x + 1)^2 = 2702 - (x + 2)^2 .$$



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4. Check whether the following are quadratic equations :-  $x^3 - 2060 = (20 - x)^3$  .



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5. Check whether the following are quadratic equations :-  $(30-2x)(20-2x) = 375$  .



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6. Check whether the following are quadratic equations :-  $x(x+1)+8=(x+2)(x-2)$  .



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7. Check whether the following are quadratic equations :-

$$(x^2 - 4x + 9)^2 = 8(x^2 - 4x + 9) + 15 .$$



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8. Check whether the following are quadratic equations :-  $x(x^2 - 6) = 2(4x + 6)$  .



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9. Check whether the following are quadratic equations :-  $x(x + 6) = x(4x - 5x^2) + 14$  .



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**10.** Check whether the following are quadratic

equations :-  $\frac{360}{x+4} = \frac{360}{x} - 3.$



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**11.** Check whether the following are quadratic

equations :-  $x(2x + 3) = x^2 + 1.$



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**12.** Represent the following problem situations in the form of Quadratic Equations :- The product of two consecutive multiples of five is 300. We need to find the integers.



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**13.** Represent the following problem situations in the form of Quadratic Equations :- If I had walked 1 km per hour faster, I would have

taken 10 minutes less to walk 2 km. We need to find the rate of my walking.



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**14.** Represent the following problem situations in the form of Quadratic Equations :- The sides (in cm) of a right triangle containing the right angle are  $5x$  and  $\{3x - 1\}$ . If the area of the triangle is  $60 \text{ cm}^2$ , find the sides of the triangle.



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**15.** Represent the following problem situations in the form of Quadratic Equations :- The two numbers whose sum is 20 and the sum of whose cubes is 2060. We need to find the two numbers.



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**16.** Represent the following problem situations in the form of Quadratic Equations :- The sum

of, two number is 15. If the sum of their reciprocals is  $\frac{3}{10}$  find the two numbers.



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**17.** Find two numbers whose sum is 27 and product is 182.



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**18.** Find two consecutive positive integers, sum of whose squares is 365.



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**19.** The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.



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**20.** A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of

production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was ₹ 90, find the number of articles produced and the cost of each article.



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**21.** Find the roots of the following Quadratic Equations by factorisation :-

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



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22. Find the roots of the following Quadratic Equations by factorisation :-  $(3x+a)(3x+b)=ab$  .



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23. Find the roots of the following Quadratic Equations by factorisation :-

$$7y^2 - 11y - 6 = 0 .$$



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24. Find the roots of the following Quadratic Equations by factorisation :-  $y^2 - 3y - 18 = 0$

.



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25. Find the roots of the following Quadratic Equations by factorisation :-

$$4x^2 - 15x - 4 = 0 .$$



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**26.** Find the roots of the following Quadratic Equations by factorisation :-

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



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**27.** Find the roots of the following Quadratic Equations by factorisation :-

$$3y^2 - 16y + 20 = 0.$$



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**28.** Find the roots of the following Quadratic Equations by factorisation :-

$$3z^2 - 10z + 3 = 0.$$



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**29.** Find the roots of the following Quadratic Equations by factorisation :-

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



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**30.** Find the roots of the following Quadratic Equations by factorisation :-

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



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**31.** Find the roots of the following Quadratic Equations by factorisation :-

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



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**32.** Find the roots of the following Quadratic Equations by factorisation :-  $\sqrt{2}y^2 - 3y - 2\sqrt{2} = 0$ .



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**33.** Find the roots of the following Quadratic Equations by factorisation :-  
 $z^2 - (\sqrt{2} + 1)z + \sqrt{2} = 0$ .



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**34.** Find the roots of the following Quadratic Equations by factorisation :-

$$x^2 + 2ab = (2a + b)x .$$



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**35.** The sum of the squares of two positive integers is 208. If the square of the larger number is 18 times the smaller number, find the number.



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**36.** 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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**37.** Two trains leave a railway station at the same time. The first train travels due west and the second due north. The first train travels 5 km/hr faster than the second train. If after two

hours, they are 50 km apart, find the average speed of each train.



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**38.** The sum of ages of Meenakshi and her daughter is 45 years. Five years ago, the product of their ages (in years) was 124. Determine Meenakshi and her daughter's present ages.



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**39.** The hypotenuse of a right triangle is  $3\sqrt{5}$  cm. If the smaller side is tripled and the larger side is doubled, the new hypotenuse will be 15 cm. Find the length of each side.



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**40.** The area of a right angled triangle is  $600 \text{ cm}^2$ . If the base of the triangle exceeds the altitude by 10 cm, find the dimensions of the triangle.



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**41.** The 2 side of a square exceeds the side of the another square by 4,cm and the sum of the areas of the two squares is 400 sq cm. Find the dimensions of the squares.



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**42.** 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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**43.** Some students planned a picnic. The budget for food was \$ 24. But 4 of them failed to go and thus the cost of food for each member increased by \$ 1. How many students attended the picnic ?



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**44.** A person on tour has \$ 360 for his daily expenses. If he exceeds his tour programme by



4 days he must cut down his daily expenses by \$ 3 per day. Find the number of days of his tour programme.



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**45.** A party of tourists booked a room in a hotel for \$ 120. Three of the members failed to pay, as a result, other had to pay \$ 2 more. How many gentlemen were there in the party ?



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**46.** A tourist with 300, calculating that he could spend \$  $x$  everyday on his holidays. He spent \$  $(x + 10)$  per day and had nothing left 5 days before the end of his holidays. Calculate 'x'.



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**47.** One-fourth of a herd of camel was seen in the forest. Twice the square root of the herd had gone to the mountain slopes and three

times five camels were on the bank of the river.

What was the total number of those camels ?



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**48.** Find two consecutive odd positive integers, sum of whose squares is 290.



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**49.** Find the roots of the following quadratic equations if they exist, by the method of

completing the square :  $2x^2 - 7x + 3 = 0$  .



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**50.** Find the roots of the following quadratic equations if they exist, by the method of completing the square :  $2x^2 + x - 4 = 0$  .



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**51.** Find the roots of the following quadratic equations if they exist, by the method of

completing the square :  $4x^2 + 4\sqrt{3}x + 3 = 0$

.



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**52.** Find the roots of the following quadratic equations if they exist, by the method of completing the square :  $2x^2 + x + 4 = 0$  .



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**53.** Find the roots of the quadratic equations by applying the quadratic formula. Which of the above two methods do you prefer, and why? :-  $2x^2 - 7x + 3 = 0$ .



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**54.** Find the roots of the quadratic equations by applying the quadratic formula. Which of the above two methods do you prefer, and why? :-  $2x^2 + x - 4 = 0$ .





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**55.** Find the roots of the quadratic equations by applying the quadratic formula. Which of the above two methods do you prefer, and why? :-  $4x^2 + 4\sqrt{3}x + 3 = 0$ .



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**56.** Find the roots of the quadratic equations by applying the quadratic formula. Which of

the above two methods do you prefer, and why? :-  $2x^2 + x + 4 = 0$ .



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**57.** Find the roots of the following equations :-

$$x - \frac{1}{x} = 3, x \neq 0.$$



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**58.** Find the roots of the following equations :-

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





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**59.** The sum of the reciprocals of Rehman's age (in years) 3 years ago and 5 years from now is  $\frac{1}{3}$ . Find his present age.



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**60.** 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.



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**61.** 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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**62.** The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.



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**63.** 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.



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**64.** 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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**65.** An express train takes 1 hour less than a passenger train to travel 132 km between

Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11 km/hr more than that of the passenger train, find the average speed of the two trains.



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**66.** Sum of the areas of two squares is  $468 \text{ m}^2$ .

If the difference of their perimeters is 24 m, find the sides of the two squares.



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**67.** Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $9x^2 - 15x + 6 = 0$ .



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**68.** Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $5x^2 - 6x - 2 = 0$ .



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**69.** Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $4x^2 + 3x + 5 = 0$ .



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**70.** Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $x^2 - 4x - 8 = 0$ .



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71. Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-

$$2x^2 + 5\sqrt{3}x + 6 = 0.$$



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72. Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $5x^2 + 3x + 1=0$ .





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**73.** Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $x^2 + \frac{1}{2}x - 1 = 0$ .



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**74.** Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $2x^2 - 3x - 1 = 0$ .



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**75.** Find the roots of the following quadratic equations:-  $p^2x^2 + (p^2 - q^2)x - q^2 = 0$ .



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**76.** Find the roots of the following quadratic equations:  $abx^2 + (b^2 - ac)x - bc = 0$ .



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77. Find the roots of the following quadratic equations, (if they exist, by the method of completing the square) :-  $x(x+4)=12$  .



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78. Find the roots of the following quadratic equations :-  $x^2 - 2ax + (a^2 - b^2) = 0$  .



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**79.** Find the roots of the following quadratic equations :-  $9x^2 - 6a^2x + (a^4 - b^4) = 0$ .



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**80.** Find the roots of the following quadratic equations :-  $\frac{x - 1}{x + 2} + \frac{x - 3}{x - 4} = \frac{10}{3}$ .



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**81.** Find the roots of the following quadratic equations :-  $a^2 - b^2 = 4ax - 4x^2$  .



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**82.** Find the roots of the following quadratic equations :-  $3x^2 + 2\sqrt{5}x - 5 = 0$  .



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**83.** Find the roots of the following quadratic

equations :-  $\frac{2}{x^2} - \frac{5}{x} + 2 = 0, x \neq 0.$



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**84.** Find the roots of the following quadratic

equations :-  $\frac{x + 3}{x + 2} = \frac{3x - 7}{2x - 3}.$



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**85.** Find the roots of the following quadratic equations :-  $(x+4)(x+5)=2x+3+(x+1)(x+2)$  .



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**86.** Find the roots of the following quadratic equations :-

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



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**87.** Find the roots of the following quadratic equations :-  $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{2} = 0$ .



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**88.** The product of two numbers is 56. When their sum is added to the sum of their squares, we get 128. Find the numbers.



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**89.** Separate 18 into two parts such that twice the sum of their squares is 5 times their product.



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**90.** Two pipes together can fill a reservoir in 12 hours. If one pipe can fill the reservoir 10 hours faster than the other, how many hours will the second pipe take to fill the reservoir ?



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**91.** A plane left 30 minutes later than the schedule time. In order to reach its destination 1500 km away in time, it has to increase the speed by 250 km/hour. Find its usual speed.



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**92.** If twice the area of a smaller square be subtracted, from the area of the larger square, the result is 14 sq cm. But if twice the area of

the larger square be added to thrice the area of the smaller square, the , result is 203 sq. cm. Find the sides of the two squares.



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**93.** Two pipes running together can fill cistern in 6 minutes. One pipe takes 5 minutes more than the other to fill the cistern, find the time in which each pipe would fill the cistern.



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**94.** Deepak takes 6 days less than the time taken by Suresh to finish a piece of work. If both Deepak and Suresh together can finish it in 4 days, find the time taken by Suresh to finish the work.



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**95.** Two pipes running together can fill a cistern in  $2\frac{8}{11}$  minutes. If one pipe takes 1 minute more than the other to fill the cistern,

find the time in which each pipe would fill the cistern.



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**96.** A takes 12 days less than the time taken by B to finish a piece of work. If A and B together can finish it in 8 days, find the time taken by B to finish the work.



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**97.** A train covers a distance of 90 km at a uniform speed. Had the speed be 15 km/ hour more, it would have taken half an hour less for the journey. Find the original speed of the train.



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**98.** A motor boat whose speed is 15 km/hour in still water goes 30 km downstream and comes

back in a total time of 4 hours 30 minutes.

Find the speed of the stream.



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**99.** In a flight of 6000 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 400 km/hr and time increased by 30 minutes. Find the original duration of flight.



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**100.** The side of a square exceeds the side of another square by 4 cm and sum of the areas of the two squares is 400 sq. cm. Find the dimensions of the squares.



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**101.** A swimming pool is filled with three pipes with uniform flow. The first two pipes operating simultaneously, fill the pool in 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 separately.



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



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**103.** The length of a rectangle is twice as long as the side of a square. The side of the square is 4 cm more than the width of the rectangle. If their areas are equal, find their dimensions.



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**104.** The perimeter of a rectangular field is 82 m and its area is  $400 \text{ m}^2$ . Find the dimensions of the rectangle.



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**105.** A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find its length and breadth.



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**106.** A motor boat whose speed is 18 km/hr 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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**107.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $2x^2 - 3x + 5 = 0$ .



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**108.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $3x^2 - 4\sqrt{3}x + 4 = 0$ .



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**109.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $2x^2 - 6x + 3 = 0$ .



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**110.** Find the values of  $k$  for each of the following quadratic equations, so that they have two equal roots. :-  $2x^2 + kx + 3 = 0$ .



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**111.** Find the values of  $k$  for each of the following quadratic equations, so that they have two equal roots. :-  $kx(x-2)+6=0$ .



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**112.** Is it possible to design a rectangular mango grove whose length is twice its breadth, and the area is  $800 \text{ m}^2$  ? If so, find its length and breadth.



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**113.** Is the following situation possible ? If so, determine their present ages. The sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48.



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**114.** Is it possible to design a rectangular park of perimeter 80 m and area  $400 \text{ m}^2$  ? If so, find its length and breadth.



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**115.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $\sqrt{7}x^2 - 6x - 13\sqrt{7} = 0$  .



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**116.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $6x^2 = x + 1$ .



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**117.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $x^2 - 2x + \frac{3}{4} = 0$ .



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**118.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $25x(x+1)=-4$  .



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**119.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $\sqrt{3}x^2 + 11x + 6\sqrt{3} = 0$  .



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**120.** Find the nature of the roots of the quadratic equations. If the real roots exist, find them :-  $(m + n)^2 x^2 + (m + n)x - 2 = 0$ .



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**121.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $3x^2 - 6x + 5 = 0$ .



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**122.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $8x^2 + 5x + 1 = 0$ .



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**123.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $2x^2 - 2\sqrt{6}x + 3 = 0$ .



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**124.** Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :-  $3x^2 - 2x + 2 = 0$ .



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**125.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots— :-  $px^2 + 4x + 1 = 0$ .



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**126.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore 5px^2 - 8x + 2 = 0$ .



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**127.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore 2x^2 + 3x + p = 0$ .



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**128.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore 4x^2 + 8x - p = 0$ .



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**129.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore x^2 + px + 1 = 0$ .



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**130.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore 4x^2 - 3px + 9 = 0$ .



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**131.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore kx^2 - 2\sqrt{5}x + 4 = 0$ .



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**132.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore 3x^2 - 5x + 2k = 0$ .



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**133.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots—  $\therefore k^2x^2 - 2(2k - 1)x + 4 = 0$ .



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**134.** Find the value of  $p/k$  for each of the following quadratic equations, so that they have two equal roots— :-

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



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**135.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots— :-  $px^2 + 6x + 1 = 0.$



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**136.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots—  $\therefore 4x^2 + 8x - p = 0$ .



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**137.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots—  $\therefore 2x^2 + px + 18 = 0$ .



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**138.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots— :-  $2x^2 + 3x + k = 0$  .



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**139.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots— :-  $2x^2 + kx + 3 = 0$  .



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**140.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots—  $\therefore 4x^2 - 3kx + 1 = 0$ .



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**141.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots—  $\therefore 9x^2 + 3kx + 4 = 0$ .



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**142.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots— :-  $5x^2 - kx + 1 = 0$ .



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**143.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots— :-  $x^2 - 4x + k = 0$ .



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**144.** Find the values of  $p/k$  for each of the following quadratic equations, so that they have real roots—  $\therefore 4x^2 - 3kx + 9 = 0$ .



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**145.** Find a number such that its square is 21 more than four times the original number.



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**146.** Is the following situation possible ? If so, determine the sides of the triangle. The hypotenuse of a right triangle is 13 . m long, if the base of the triangle is 7 m more than the other side.



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**147.** Is it possible to design a rectangular park whose length exceeds its breadth by 5 metres.



The area of the park is 594 sq. metres ? If so, find its length and breadth.



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**148.** Is the following situation possible ? If so, determine their present ages. One year ago Ashish was 8 times as old as his son. Now his age is equal to the square of his son's age.



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**149.** Is it possible to divide 41 into two positive parts such that the difference of their squares is 369.



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**150.** Is it possible to find those two consecutive integers whose difference of the squares is 25.



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**151.** Is the following situation possible ? If so determine their ages. The difference of ages of Sarvesh and his father is 30 years. If the difference of the squares of their ages is 1560.



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**152.** 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 differences 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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