4.QUADRATIC EQUATIONS

TWO MARKS QUESTIONS

1. If the equation $kx^2 - 2kx + 6 = 0$ has equal roots, then find the value of k.
2. Find the roots of the following quadratic equation: $x^2 - \frac{x}{5} + \frac{1}{100} = 0$
3. Find the values of p for which the following equation has two equal roots:
   $(p-12)x^2 + 2(p-12)x + 2 = 0$
4. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$, find the value of p.
5. Solve for x: $ax^2 + (4a^2 - 3b)x - 12ab = 0$
6. Find the roots of the quadratic equation:
   $\frac{1}{3}x^2 - \sqrt{11}x + 1 = 0$
7. Find the roots of the quadratic equation:
   $4x^2 - 4px + (p^2 - q^2) = 0$
8. Find the value of 'p' for which the quadratic equation has real and equal roots
   $2x^2 + px + \frac{9}{2} = 0$
9. Find the roots of the quadratic equation:
   $\frac{2}{5}x^2 - x - \frac{3}{5} = 0$
10. Solve for x: $10x - \frac{1}{x} = 3, x \neq 0$
11. Find the values of 'k' for which the following euqation has equal roots.
    $(k-12)x^2 + 2(k-12)x + 2 = 0$
12. The product of two consecutive positive integers is 306. Find the integers.
13. For what value of 'k' the equation $4x^2 - 2(k+1)x + (k+1) = 0$ has real and equal roots?
14. Determine the roots of the following quadratic equation: $4\sqrt{5}x^2 - 17x + 3\sqrt{5} = 0$
15. Find, for what values of 'k' does the quadratic equation $x^2 + 2x + k^2 - 3 = 0$, has real and equal roots.
16. If 2 and 1 are the two roots of the quadratic equation $ax^2 + bx + 2 = 0$, Find a and b.
17. Find the roots of the quadratic equation
    $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$
18. One root of the quadratic equation $2x^2 - px + 6 = 0$ is 2. Find the other root and the value of p.
19. Solve for x : $a^2b^2x^2 + b^2x - a^2x - 1 = 0$
20. One root of $x^2 - 7x + 10 = 0$ and $x^2 - 10x + 16 = 0$ is common. Find this root.
21. Solve the following equation for x::
    $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$
22. If the equation $x^2 + 4x + k = 0$, has real and distinct roots, find the value of k.
23. Find the nature of the roots of quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$.
24. Find the roots of the quadratic equation $6x^2 - x - 2 = 0$ by factorisation.
25. Solve : $\frac{x^2}{15} - \frac{x}{3} - 10 = 0$
26. Find two consecutive natural numbers, the sum of whose squares is 85.
27. If the roots of $x^2+mx+12=0$ are in the ratio 1:3 then find 'm'.
28. If p, q are the roots of equation $x^2-7x+10=0$, then find the equation whose roots are p+2, q+2.
29. If the sides of a right angled triangle are x, x+2, x+4 (x>0), then find x.

THREE MARKS QUESTIONS

1. Find the roots of the equation:
   $ax^2 + a = a^2x + x$
2. Find the roots of the equation
   $x^2 - 2(a^2 + b^2)x + (a^2 - b^2)^2 = 0$
3. Find the roots of the quadratic equation:
   $a^2b^2x^2 + b^2x - a^2x - 1 = 0$
4. Solve for x :
   $9x^2 - 6a^2x + (a^4 - b^4) = 0$
5. Solve for 'x' by method of completing the square $2x^2 + x - 4 = 0$
6. Solve for x:
   $9x^2 - 9(a+b)x + [2a^2 + 5ab + 2b^2] = 0$
7. Solve the quadratic equation $9x^2 - 15x + 6 = 0$ by the method of completing the square
8. For what value(s) of k will the quadratic equation $(2k+1)x^2 + 2(k+3)x + (k+5) = 0$ have real and equal roots?
9. Solve, for value of x:
   $4x^2 - 2(a^2 + b^2)x + a^2b^2 = 0$

10. If -2 is a root of the quadratic equation $x^2 - px - 5 = 0$ and the quadratic equation $x^2 + px + k = 0$ has equal roots, find the value of k.
11. Determine the positive values of 'k' for which the equation $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will both have real and equal roots.
12. Solve for x: $6x^2 + 7x - 10 = 0$
13. If roots of a quadratic equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are real and equal, then prove that $2b = a + c$
14. Find the roots of the following quadratic equation using quadratic formula: $abx^2 + (b^2 - ac)x - bc = 0$
15. Using quadratic formula, solve the following equation for x: $36x^2 - 12ax + (a^2 - b^2) = 0$
16. Find the value of k so that the following quadratic equation has equal roots $x^2 - kx + (k-1) = 0$
17. Find the nature of the roots of the following quadratic equation. If the real roots exist, find them. $3x^2 - 4\sqrt{3}x + 4 = 0$
18. If the roots of the Quadratic equation $(b-c)x^2 + x(c-a) + a - b = 0$ are equal, then prove that $2b = a + c$
19. In $px^2 + 4\sqrt{3}x + 3 = 0$, find the value of p, so that
    (i) the roots are real
    (ii) the roots are not real
    (iii) the roots are equal
20. Solve for x: $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$
21. Solve $x^2 - (\sqrt{3}+1)x + \sqrt{3} = 0$ by the method of completing the square.
22. For what value of k does the quadratic equation $(k-5)x^2 + 2(k-5)x + 2 = 0$ have equal roots?
23. If the equation $(1+m^2)n^2x^2 + 2mncx + (c^2 - a^2) = 0$ has equal roots of x, prove that $c^2 = a^2(1+m^2)$
24. 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.
25. Find the roots of the quadratic equation $a^2b^2x^2 + b^2x - a^2x - 1 = 0$
26. If $x = 2$ and $x = 3$ are the roots of the equation $3x^2 - 2kx + 2m = 0$, find the values of k and m.
27. Solve for x: $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$; $a \neq 0, b \neq 0, c \neq 0$ and $a + b + x \neq 0$
28. Solve for x: $\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$
29. Solve the following equation for x $\frac{4}{x} - \frac{5}{2x+3} = 3$
30. Find the roots of the given equation: $\frac{x-1}{2x+1} + \frac{2x+1}{x-1} = \frac{5}{2} : \forall x \neq 1, -\frac{1}{2}$
31. Solve for x: $2\left(\frac{x-1}{x+3}\right) - 7\left(\frac{x+3}{x-1}\right) = 5, x \neq -3, 1$
32. Solve the following equation for x: $2\left(\frac{2x+3}{x-3}\right) - 25\left(\frac{x-3}{2x+3}\right) = 5, \quad x \neq -3, \frac{-3}{2}$
33. Solve for x: $\left(\frac{x}{x+1}\right)^2 - 5\left(\frac{x}{x+1}\right) + 6 = 0$
34. Solve for x: $\frac{4}{x} - 3 = \frac{2}{2x+3}$, where $x \neq 0, -\frac{3}{2}$
35. The sum of two natural numbers is 8. Find the numbers if the sum of their reciprocals is $\frac{8}{15}$.
36. The difference of the ages Sohrab and his father is 30 years. If the difference of the squares of their ages is 1560, Find their ages.
37. The sum of the ages of a father and his son is 50 years. Five years ago the product of their ages was 175. Find their present ages.
38. Find two consecutive odd positive integers, sum of whose squares is 290.
39. In a class test, the sum of the marks obtained by a student in Mathematics and Science is 28. Had he got 3 marks more in Mathematics and 4 marks less in Science, the product of the marks would have been 180. Find his marks in two subjects.

40. 7 years hence the age of a child will be three times of his age 3 years ago. Find the present age of the child.

41. The sum of a number and its reciprocal is $2\frac{1}{42}$ Find the number.

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

43. The sum S of first n even natural numbers is given by the relation $S = n(n+1)$. Find n, if the sum is 420.

44. The sum of ages (in years) of a son and his father is 35 years and product of their ages is 150 years. Find their ages.

45. The sum of the squares of two consecutive natural numbers is 421. Find the numbers.

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

47. Out of a group of swans, $\frac{7}{2}$ times the square root of the total number are playing on the shore of a tank. The two remaining ones are playing in the water. Find the total number of swans.

48. Find the nature of the roots of the Quadratic equation $2x^2-6x+3=0$. If the real roots exist, find them.

49. If the following situation is possible? If so, determine their presnt ages.
The sum of the ages of two friends is 20 years. 4 years ago the product of their ages in years was 48.

FOUR MARKS QUESTIONS

1. A train takes 2 hours less for a journey of 300 km if its speed is increased by 5km/hr from its usual speed. Find the usual speed of the train.

2. A shopkeeper buys a number of books for Rs.1200. If he had bought 10 more books for the same amount each book would have cost is Rs. 20 less. How many books did he buy?

3. A motorboat whose speed is 18km / 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.

4. In a flight of 600km, an aircraft was slowed down due to bad weather. The average speed for the trip was decreased by 200km/hr. and the time of flight increased by 30 minutes. Find the duration of flight.

5. A plane left 30 minutes later than the schedule time. In order to reach its destination 1500km away in time. It has to increase the speed by 250km/hr. Find its usual speed.

6. Some students planned a picnic. The budget for food was Rs.480. But 8 of these failed to go and thus cost of food for each member increased by Rs. 10. How many students attended the picnic?

7. An aeroplane left 40 minutes late due to heavy rains and in order to reach its destination, 1600km away in time, it had to increase its speed by 400km / hr from its original speed. Find the original speed of the plane.

8. A two-digit number is such that the product of the digits is 35. When 18 is added to this number, the digits interchange their places. Determine the number.

9. The difference of square of two numbers is 180. The square of the smalier number is 8 times the large number. Find the two numbers.

10. A journey of 192km from a town A to town B takes 2 hours more by an ordinary passenger train than a super fast train. If the speed of the faster train is 16km/h more, find the speeds of the faster and the passenger train.

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

12. In a class test, the sum of the marks obtained by 'X' in mathematics and science is 28. Had he got 3 more marks in mathematics and 4 marks less in science, the product of the marks obtained in two subjects would have been 180. Find the marks obtained by him in two subjects separately.

13. A passenger train takes 2 hour less for a journey of 300km. if its speed is increased by 5km/h from its usual speed. Find its usual speed.

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

15. 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

16. 300 apples are distributed equally among a certain number of students. Had there been 10 more students, each would have received one apple less. Find the number of students.

17. A fast train takes 3 hour less than a slow train for a journey of 600km. If the speed of the slow train is 10km/hr less than that of the fast train, find the speeds of the two trains.

18. From a station, two trains start at the same time. One train moves in west direction and other in North direction. First train moves 5km/hour faster than the second train. If after two hours, distance between the two trains is 50km, Find the average speed of each train.

19. Two water taps together can fill a tank in $2\frac{11}{12}$ hrs. The tap of smaller diameter takes 2 hours more than the larger one to fill the tank separately. Find the time in which each tap can separately fill the tank.

20. A student scored a total of 32 marks in class tests in mathematics and science. Had he scored 2 marks less in Science and 4 more in Mathematics, the product of his marks would have been 253. Find his marks in two subjects.

21. A person on tour has Rs.360 for his daily expenses. If he exceeds his four programme by 4 days, he must cut down his daily expenses by Rs.3 per day. Find the number of days of his tour programme.

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

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

24. 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 finishg the work.

25. The speed of a motor boat in still water is 15km/h. It can go 30km upstream and return downstream in $4\frac{1}{2}$ hours. Find the speed of the stream.

26. Sum of the areas of two squares is $340m^2$. If the difference of their perimeter is 8m. Find the sides of the two squares.

27. 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.

28. Two pipes running together fill a cistern in $3\frac{1}{13}$ minutes if one pipe takes 3 minutes more than the other to fill the cistern. Find the time in which each pipe would fill the cistern.

29. Determine the value of 'p' so that the equations $x^2 + px + 64 = 0$ and $x^2 - 8x + p = 0$ will both have real roots.

30. 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.

31. Two water pipes together can fill a tank in 2 hours. The tap of larger diameter takes 3 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

32. A fast train takes 2 hours less than a slow train for a journey of 480km. If the speed of the slow train is 20km/h less than that of fast train, find the speeds of the two trains.

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

34. A plane left 30 minutes later than the schedule time and in order to reach its destination. 1500km away in time it has to increase its speed by 250km/hr from its usual speed. Find its usual speed.

35. A piece of cloth costs Rs.200. If the piece was 5m longer and each meter of cloth costs Rs.2 less the cost of the piece would have remained unchanged. How long is the piece and what is the original rate per metre?

36. A person on tour has Rs.3600 for his expenses. If he extends his tour for 4 days, he has to cut his daily expenses by Rs.30. Find the original duration of the tour.

37. John and Jivanthi together have 45 marbles. Both of them lost 5 marbles each and the product of the number of marbles they now have is 124. We would like to find out how many marbles they had to start with.

38. Naimish's mother is 46 years older than him. The product of their ages (in years) 3 years from now will be 1071. We would like to find Naimish's present age. Represent the given situation in the form of a Quadratic equation. How one should care their parents in old age ?