CLASS X
QUADRATIC EQUATIONS

1. Determine the value of k for which the quadratic equation $4x^2 – 3kx + 1= 0$ has equal roots.
2. Determine the value of k for which the quadratic equation $kx^2 – 5x + k = 0$ has equal roots.
3. If one root of the quadratic equation is $2x^2 – 3x + p = 0$ is 3, find the other root of the quadratic equation. Also find the value of p.
4. Find the value of k so that the quadratic equation $x^2–2x(1 +3k)+7(3 + 2K)= 0$ has equal roots.
5. 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.
6. Find the value of k for which the given equation has real and equal roots: $x^2 + k(4x + k –1) + 2= 0$.
7. Find the value of k such that the quadratic equation $(k–12)x^2+2(k–12)x+2=0$, has equal roots.
8. Solve for x: (i) $4x^2 – 2(a^2 + b^2)x + a^2b^2 = 0$ (ii) $4x^2 – 4a^2x + (a^4 – b^4) = 0$
   (iii) $9x^2 – 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$
9. Using quadratic formula, solve the following quadratic equation for x:
   $p^2x^2 + (p^2 – q^2) x – q^2 = 0$
10. Solve for x: $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$; $a \neq 0, b \neq 0, x \neq 0$
11. Solve for x: (i) $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$, $(x \neq 2, 4)$

    (ii) $\frac{x}{x-1} + \frac{x-1}{x} = 4$ (iii) $\frac{x+1}{x-1} – \frac{x-1}{x+1} = \frac{5}{6}$
12. Find the roots of the following equations:
    (i) $x^2 – 2\sqrt{3}\,x + 2 = 0$; (ii) $\sqrt{3}\,x^2 – 2\sqrt{2}\,x – 2\sqrt{3} = 0$
    (iii) $\sqrt{2}\,x^2 – 4\sqrt{3} + 4\sqrt{2} = 0$ (iv) $0.3x^2 – 0.1x – 0.4 = 0$
    (v) $\sqrt{3}\,x^2 + 10x + 7\sqrt{3} = 0$ (vi) $4\sqrt{3}\,x^2 + 5x – 2\sqrt{3} = 0$
13. Find k such that the quadratic equation $(4–k)x^2+(2k+ 4)x+(8k + 1)=0$, is a perfect square.
14. If the roots of the equation $x^2 + 2cx + ab = 0$ are real and unequal, prove that the equation $x^2 – 2(a + b)x + a^2 + b^2 + 2c^2 = 0$ has no real roots.
15. Find the value of k if the roots of the equation $a^2x^2 – kx + 9 =0$ are real and unequal.
16. If $\sin\alpha$ and $\cos\alpha$ are the roots of the equation $ax^2 + bx + c =0$, then prove that $a^2 + 2ac = b^2$.
17. Find the value of h and k for which $x = – 2$ and $x = \frac{3}{4}$ are solution of the equation $hx^2 + kx – 6 = 0$.

WORD PROBLEMS ON QUADRATIC EQUATIONS

1. Find two numbers which differ by 3 and the sum of whose squares is 117.
2. Five times a certain whole number is equal to three less than twice the square of the number. Find the number.
3. For the same amount of work, A takes 6 hours less than B. If together they complete the work in 13 hours 20 minutes, find how much time will B alone take to complete the work?
4. Divide 15 into two parts such that the sum of their reciprocals is $\frac{3}{10}$.
5. Three consecutive natural numbers are such that the square of middle number exceeds the difference of the squares of the other two by 60. Find the numbers.
6. The ages of two sisters are 11 years and 14 years respectively. In how many years time will the product of their ages be 304?
7. One pipe can fill a cistern in 3 hours less than the other. The two pipes together can fill the cistern in 6 hours 40 minutes. Find the time that each pipe will take to fill the cistern.
8. The hypotenuse of a right triangle is 13 cm and the difference between the other two sides is 7 cm. Find its other two sides.
9. The length of a verandah is 3 m more than its breadth. The numerical value of its area is equal to the numerical value of its perimeter. Find the dimensions of the verandah.
10. A footpath of uniform width runs round the inside of a rectangular field 32 m long and 24 m wide. If the path occupies 208 sqm, find the width of the footpath.
11. An area is paved with square tiles of a certain size and the number required is 600. If the tiles had been 1 cm smaller each way, 864 would have been needed. Find the size of the larger tiles.
12. A man travels 200 km with a uniform speed. If the speed is increased by 5 km/hr, the same distance would be covered in 2 hrs. less. Find the uniform speed of the man.
13. By selling an article for Rs. 24, a trader loses as much percent as the cost price of the article. Calculate the cost price of the article.
14. If the speed of a car is increased by 10 km/hr, it takes 18 minutes less to cover a distance of 36 km. Find the speed of the car.
15. If the speed of an aero plane is decreased by 40 km/hr, it takes 20 minutes more to cover 1200 km. Find the speed of the aero plane.
16. Speed of an Express train is 5 km/hr more than the speed of a Passenger train. If Passenger train takes 3 hrs more than the time taken by Express train to cover a distance of 300 km, find the speed of both the trains.
17. If the speed of a car is 4 km/hr more, it would take 2 hours less time to

cover 390 km. Find the speed of the car and time taken to cover 390 km.

18. **Mr Mehta sends his servant to the market to buy oranges worth Rs 15. The servant having eaten three oranges on the way. Mr Mehta pays 25 paise per orange more than the market price. Find the number of oranges Mr Mehta receives.**
19. **Rs. 250 is divided equally among a certain number of children. If there were 25 children more, each would have received 50 paise less. Find the number of children.**
20. **A trader bought a number of articles for Rs 1200. Ten were damaged and he sold each of the remaining articles at Rs 2 more than what he paid for it, thus getting a profit of Rs 60 on the whole transaction. Find the number of articles.**
21. **By selling a chair for Rs 75, Mohan gained as much percent as its cost. Calculate the cost of the chair.**
22. **A goods train leaves a station at 6 p.m., followed by an express train which leaves at 8 p.m. and travels 39 km/hr faster than the goods train. The express train arrives at a station, 180 km away, 36 minutes before the goods train. Assuming that the speed of both the trains remain constant between the two stations, find the speed of both the trains**
23. **An employer finds that if he increases the weekly wages of each worker by Rs 3mand employs one worker less, he reduces his weekly wage bill from Rs 816 to Rs 781. Find the weekly wages of each worker.**
24. **The product of the digits of a two digit number is 24. If its unit's digit exceeds twice its ten's digit by 2, find the number.**
25. **The distance by road between two towns A and B is 216 km and by rail it is 208 km. Speed of a train is 16 km/hr faster than a car and it takes 2 hours less time than time taken by car to reach town B. Find the speed of car and train.**
26. **A hotel bill for a number of people for overnight stay is Rs 4800/- . If there were 4 people more, the bill each person had to pay would have reduced by Rs 200/- . Find the number of people staying overnight.**
27. **A piece of cloth costs Rs 200. If the piece was 5 m longer and each metre of cloth cost 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?**
28. **Rs 6500 were divided equally among a certain number of persons. Had there been 15 persons more, each would have got Rs 30 less. Find the original number of persons.**
29. **The speed of a boat in still water is 15 km/hr. It can go 30 km upstream and return downstream to the original point in 4 hours 30 minutes. Find the speed of the stream.**
30. **A plane left 30 minutes later than the scheduled time and in order to reach the destination 1500 km away in time it has to increase its speed by 250 km/hr from its original speed. Find the original speed of the plane.**

31. **Two trains leave a railway station at the same time. The first train travels due west and the second train 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.**
32. **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.**
33. **If the cost of banana is increased by Re 1 per dozen, one may get 2 dozen less for Rs 840. Find the original cost of one dozen banana.**
34. **Two taps running together can fill a tank in 6 hours. If one tap takes 5 hours more than the other to fill the tank alone, find the time taken for each tap to fill the tank separately.**
35. **An open box is to be made from a rectangular cardboard of sides 35 cm and 20 cm by cutting equal squares from each corner and then bending up the edges. If the base area of the box thus formed is 250 sqcm, find the length of the side of the square cut from each corner.**
36. **A man riding on a bicycle covers a distance of 60 km in the direction of wind and comes back to his original position in 8 hours. If the speed of the wind is 10 km/hr, find the speed of the bicycle.**
37. **For doing some work Ganesh takes 10 days more than John. If both work together they complete the work in 12 days. Find the number of days if Ganesh worked alone.**
38. **The sum of the areas of two squares is 400 sqm. If the difference between their perimeters is 16 m, find the side of two squares.**
39. **Two years ago, my age was $4\frac{1}{2}$ times the age of my son. Six years ago, my age was twice the square of the age of my son. What is the present age of my son?**
40. **An express train takes 30 minutes less for a journey of 440 km if its original speed increased by 8 km/hr. Find its original speed.**
41. **Around a square pool there is a footpath of width 2 m. If the area of the footpath is $\frac{5}{4}$ times that of the pool, find the area of the pool.**
42. **A businessman bought some items for Rs 600, keeping 10 items for himself he sold the remaining items at a profit of Rs 5 per item. From the amount received in this deal he could buy 15 more items. Find the original price of each item.**
43. **In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/ hr and the time increased by 30 minutes. Find the duration of the flight.**
44. **Speed of a boat in still water is 11 km/ hr. It can go 12 km upstream and return downstream to the original point in 2 hours 45 minutes. Find the speed of the stream.**