Ch-4 Quadratic Equations

1. Had Ravita scored 10 more marks in her Mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test?
2. 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.
3. In a class test, the sum of marks obtained by P in Mathematics and Science is 28. Had he got 3 more marks in Mathematics and 4 marks less in Science, the product of marks obtained in the two subjects would have been 180? Find the marks obtained in two subjects separately.
4. Solve for x : $\sqrt{3}\,x^2 - 2\sqrt{2}\,x - 2\sqrt{3} = 0$.
5. At 't' minutes past 2 pm, the time needed by the minute hand of a clock to show 3 pm was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find 't'.
6. A train, travelling at a uniform speed for 360 km, would have taken 48 minutes less to travel the same distance if its speed were 5 km/hr more. Find the original speed of the train.
7. If the roots of the equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are equal, then prove that $2b = a + c$.
8. If the roots of the equations
   $ax^2 + 2bx + c = 0$, and $bx^2 - 2\sqrt{ac}\,x + b = 0$
   are simultaneously real then prove that $b^2 = 4ac$.
9. If the roots off the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are equal, then prove that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$.
10. By increasing the list price of a book by Rs. 10, a person can buy 10 books less for Rs. 1200. Find the original list price of the book.
11. A passenger train takes 2 hours less for a journey of 300 km, if its speed is increased by 5 km/hr from its usual speed. Find its usual speed.
12. The numerator of a fraction is one less than its denominator. If three is added to each of the numerator and denominator, the fraction is increased by $\frac{3}{28}$. Find the fraction.
13. The difference of squares of two natural numbers is 45. The square of the smaller number is four times the larger number. Find the numbers.
14. Solve for x : $\frac{x+1}{x-1} + \frac{x-2}{x+2} = 3$; $(x \neq 1, -2)$.
15. Using quadratic formula, solve the following for x : $9x^2 - 3(a^2 + b^2)x + a^2b^2 = 0$.
16. The sum of the squares of two consecutive odd numbers is 394. Find the numbers.
17. Solve for x : $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$; $(a \neq 0, b \neq 0, x \neq 0)$.
18. Find the roots of the following quadratic equation : $\frac{2}{5}x^2 - x - \frac{3}{5} = 0$.
19. Find the roots of the equation : $\frac{1}{2x-3} + \frac{1}{x-5} = 1$; $(x \neq \frac{3}{2}, 5)$.
20. A natural number when subtracted from 28, becomes equal to 160 times its reciprocal. Find the number.
21. Find two consecutive odd positive integers, sum of whose squares is 290.
22. Find the values of k for which the quadratic equation $(k + 4)x^2 + (k + 1)x + 1 = 0$ has equal roots. Also find these roots.

23. Solve for x : $\frac{16}{x} - 1 = \frac{15}{x+1}$; $(x \neq 0, -1)$.
24. Solve for x : $\frac{x-2}{x-3} + \frac{x-4}{x-5} = \frac{10}{3}$; $(x \neq 3, 5)$.
25. Find the value of 'k' for which the quadratic equation $kx^2 - 5x + k = 0$ have real roots.
26. If – 4 is a root of the quadratic equation $x^2 + px - 4 = 0$ and $x^2 + px + k = 0$ has equal roots, find the value of k.
27. For what value of k, does the given equation have real and equal roots? $(k + 1) x^2 - 2 (k - 1) x + 1 = 0$.
28. Using quadratic formula, solve the following quadratic equation for x : $x^2 - 2ax + (a2 - b2) = 0$.
29. For what value of k are the roots of the quadratic equation $3x^2 + 2kx + 27 = 0$ real and equal?
30. For what value of k are the roots of the quadratic equation $kx^2 + 4x + 1 = 0$ equal and real?
31. Solve the following quadratic equation : $2x^2 + 4x - 8 = 0$.
32. Solve for x : $36x^2 - 12ax + (a^2 - b^2) = 0$.
33. Solve : $16x^2 - 8a^2x + (a^4 - b^4) = 0$ for x.