Q.1 Solve : $\frac{x+1}{x-1} + \frac{x-2}{x+2} = 3$.

Q.2 Solve by completion of square method : $2x^2 + 4x - 8 = 0$.

Q.3 Solve using discriminant method : $9x^2 - 12x + 4 = 0$.

Q.4 In the following determine the set of values of 'p' for which the given equation has real roots :
(i) $px^2 + 4x + 1 = 0$
(ii) $2x^2 + px + 3 = 0$

Q.5 The hypotenuse of a right triangle is 25 cm. The difference between the lengths of the other two sides of the triangle is 5 cm. Find the lengths of these sides.

Q.6 Swati can row her boat at a speed of 5 km/h in still water. If it takes her 1 hour more to row the boat 5.25 km upstream then to return downstream, find the speed of the stream.

Q.7 In a fight for 3000 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 100 km/hr and consequently time of flight increased by one hour. Find the original duration of flight.

Q.8 Show that :
(i) $x = 3$ is a zero of quadratic polynomial $x^2 - 2x - 3$.
(ii) $x = -2$ is a zero of quadratic polynomial $3x^2 + 7x + 2$.
(iii) $x = 4$ is not a zero of quadratic polynomial $2x^2 - 7x - 5$.

Q.9 In each of the following, determine whether the given values are solutions (roots) of the equation or not :
(i) $3x^2 - 2x - 1 = 0$; $x = 1$
(ii) $x^2 + 6x + 5 = 0$; $x = -1$, $x = -5$
(iii) $x^2 + \sqrt{2}x - 4 = 0$; $x = \sqrt{2}$, $x = -2\sqrt{2}$

Q.10 Solve the following quadratic equations
(i) $x^2 + 5x = 0$ (ii) $x^2 = 3x$
(iii) $x^2 = 4$

Q.11 Solve the following quadratic equations
(i) $7x^2 = 8 - 10x$
(ii) $3(x^2 - 4) = 5x$
(iii) $x(x + 1) + (x + 2)(x + 3) = 42$

Q.12 Solve for x : $12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$

Q.13 If a and c are such that the quadratic equation $ax^2 - 5x + c = 0$ has 10 as the sum of the roots and also as the product of the roots, find a and c.

Q.14 If one of the roots of the quadratic equation $2x^2 + px + 4 = 0$ is 2, find the value of p. also find the value of the other roots.

Q.15 In the following, find the value (s) of p so that the given equation has equal roots.
(i) $3x^2 - 5x + p = 0$
(ii) $2px^2 - 8x + p = 0$

Q.16 Solve :(i) $9x^2 - 3(a + b)x + ab = 0$
(ii) $9x^2 - 3(a^2 + b^2)x + a^2b^2 = 0$

Q.17 Solve :(i) $10x^2 + 3(5a - 2)x - 9 = 0$, $a \neq 0$
(ii) $abx^2 = (a + b)^2 (x - 1)$, $ab \neq 0$

Q.18 Solve :(i) $x^2 - 2ax + (a^2 - b^2) = 0$
(ii) $x^2 - 4ax + 4a^2 - b^2 = 0$

Q.19 Solve :(i) $4x^2 - 2(a^2 + b^2)x + a^2b^2 = 0$
(ii) $9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$

Q.20 Solve :(i) $x + \frac{1}{x} = 3$, $x \neq 0$
(ii) $x - \frac{1}{x} = 3$, $x \neq 0$

Q.21 Solve :(i) $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}$, $x \neq -4, 7$
(ii) $\frac{1}{x} + \frac{1}{x-2} = 3$, $x \neq 0, 2$.

Q.22 Solve :(i) $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$, $x \neq 2, 4$
(ii) $\frac{x}{x+1} + \frac{x+1}{x} = 2\frac{1}{12}$, $x \neq 0, -1$

Q.23 Solve :(i) $2\left(\frac{2x-1}{x+3}\right) - 3\left(\frac{x+3}{2x-1}\right) = 5$, $x \neq -3, \frac{1}{2}$
(ii) $2\left(\frac{2x+3}{x-3}\right) - 25\left(\frac{x-3}{2x+3}\right) = 5$, $x \neq 3, -\frac{3}{2}$

Q.24 (i) Find the vale of k so that the quadratic equation $x^2-2(1+3k)x+7(3+2k)=0$ has equal roots.
(ii) Find the value of c such that the equation $4x^2-2(c+1)x+(c+4)=0$ has real and equal roots.

Q.25 (i) Determine the value(s) of p for which the quadratic equation $2x^2+3x+p=0$ has real roots.
(ii) Determine the value(s) of p for which the quadratic equation $4x^2-3px+9=0$ has real roots.

Q.26 If the equation :

$(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2(1 + m^2)$.

Q.27 If the roots of the equation

$(a-b)x^2 + (b-c)x + (c-a)=0$ are equal, prove that $2a = b + c$.

Q.28 (i) Find two numbers whose sum is 27 and product is 182.

(ii) The sum of the squares of two natural numbers is 116. If the square of the larger number is 25 times the smaller number, find the numbers.

(iii)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.

(iv) 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.

Q.29 (i) The difference of two natural numbers is 4 and the difference of their reciprocals is $\frac{1}{8}$,find the numbers.

(ii) The difference of two numbers is 5 and the difference of their reciprocals is $\frac{1}{10}$. Find the numbers.

Q.30 (i) The sum of the numerator and denominator of a certain fraction is 11. If 1 is added to both numerator and denominator, the fraction increases by $\frac{3}{56}$. Find the fraction.

(ii) The numerator of a fraction is one less than its denominator. If three is added to each of the numerator and denominator, the fraction increases by $\frac{3}{28}$. Find the fraction.

(iii)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.

Q.31 (i) A two digit number contains the bigger digit at ten's place. The product of the digits is 27and the difference between the two digits is 6. Find the number.

(ii) A two digit number is seven times the sum of its digits and is also equal to 12 less than three times the product of its digits. Find the number.

Q.32 (i) A rectangular garden 10 m by 16 m is to be surrounded by a concrete walk of uniform width. If the area of the walk is 120 m^2, find the width of the walk.

(ii) Harish made a rectangular garden, with its length 5 metres more than its breadth. Next year, he increased the length by 3 metres and decreased the width by 2 metres. If the area of the garden is 119 sq. m, was this garden larger or smaller ?

(iii) The sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.

(iv) The area of a right angled triangle is 600 sq. cm. If the base of the triangle exceeds the altitude by 10 cm, find the dimensions of the triangle.

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

(vi)A wire, 112 cm long, is bent to form a right angled triangle. If the hypotenuse is 50 cm long, find the area of the triangle.

(vii) 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.

(viii)The length (in cm) of the hypotenuse of a right angled triangle exceeds the length of one side by 2 cm and exceeds twice the length of the other side by 1 cm. Find the length of each side. Also find the perimeter and the area of the triangle.

Q.33 (i) A rectangular park is to be designed whose length is 3 m more than its breadth. Its area is 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 (shown in the adjoining figure). Find the dimensions of the rectangular park.

(ii) A farmer wishes to grow a 100 m^2 rectangular vegetable garden. Since he has with him only 30 m barbed wire, he fences three sides of the rectangular garden letting compound wall of his house act as the fourth side fence. Find the dimensions of his garden.

(iii) If twice the area of a smaller square is subtracted from the area of a larger square, the result is 14 cm^2. However, if twice the area of the larger square is added to three times the area of the smaller square, the result is 203 cm^2. Determine the sides of the two squares.

Q.34 (i) In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 more marks in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects.

(ii) In an auditorium, seats are arranged in rows and columns. The number of rows was equal to the number of seats in each row. When the number of rows was doubled and the number of seats in each row is reduced by 10, the total number of seats increased by 300. Find :

(a) the number of rows in the original arrangement.

(b) the number of seats in the auditorium after re-arrangement.

Q.35 (i) Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. What is Rohan's present age ?

(ii) Forty years hence Mr. Pratap's age will be the square of what it was 32 years ago. Find his present age.

(iii) The product of Ramu's age (in years) five years ago and his age nine years later is 15. Determine Ramu's present age.

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

Q.36 (i) 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 the age of his son. Find their present ages.

(ii) Two years ago, a man's age was three times the square of his son's age. In three years', his age will be four times his son's age. Find their present ages.

ANSWER KEY

1. $x = -5, 2$ **2.** $x = \sqrt{5} - 1$ or $-\sqrt{5} - 1$

3. $x = \frac{2}{3}$ **4.** **(i)** $p \le 4$ **(ii)** $p \le -2\sqrt{6}$

5. 15 cm, 20 cm **6.** 2 km/hr. **7.** 5 hours

9. **(i)** yes **(ii)** try yourself **(iii)** try yourself

10. **(i)** 0, –5 **(ii)** 0, 3 **(iii)** ± 2

11. **(i)** $x = -2, \frac{4}{7}$ **(ii)** $x = 3,, -\frac{4}{3}$ **(iii)** $x = -6, 3$

12. $x = \frac{3a}{4b}, \frac{2b}{3a}$ **13.** $a = \frac{1}{2}$ and $c = 5$

14. $p = -6$, other root is 1.

15. (i) $p = \frac{25}{12}$ (ii) $p = \pm 2\sqrt{2}$ **16.** (i) $\frac{a}{3}, \frac{b}{3}$ (ii) $\frac{a^2}{3}, \frac{b^2}{3}$

17. (i) $-\frac{3}{2}, \frac{3}{\sqrt{a}}$ (ii) $\frac{a+b}{a}, \frac{a+b}{b}$

18. (i) a + b, a – b (ii) 2a + b, 2a – b

19. (i) $\frac{a^2}{2}, \frac{b^2}{2}$ (ii) $\frac{2a+b}{3}, \frac{a+2b}{3}$

20. (i) $\frac{3 \pm \sqrt{5}}{2}$ (ii) $\frac{3 \pm \sqrt{13}}{2}$ **21.** (i) 1, 2 (ii) $\frac{4 \pm \sqrt{10}}{3}$

22. (i) 5, 5/2 (ii) 3, –4 **23.** (i) $-10, \frac{-1}{5}$ (ii) 6, 1

24. (i) $2, \frac{-10}{9}$ (ii) –3, 5 **25.** (i) $p \le \frac{9}{8}$

(ii) $p \ge 4$ or $p \le -4$

28. (i) 13, 14 (ii) 4, 10
(iii) 18, 12, or 18, –12 (iv) 9, 6

29. (i) 8, 4 (ii) 10, 5 or –5, –10

30. (i) $\frac{4}{7}$ (ii) $\frac{3}{4}$ (iii) $\frac{3}{7}$

31. (i) 93 (ii) 84

32. (i) 2m (ii) 7 sq. m
(iii) 18m, 12m
(iv) 30cm, 40cm, 50cm
(v)12cm,5cm (vi) 336cm^2
(vii) 120m, 90m
(viii) 15cm, 8cm, 17cm; 40cm, 60cm^2

33. (i) 7m, 4m
(ii) 20m×5m or 10m ×10m
(iii) 5cm, 8cm

34. (i) 12, 18 or 13, 17
(ii) (a) 30 (b) 1200

35. (i) 7 years (ii) 41 years (iii) 6 years
(iv) No

36. (i) 32 years 4 years (ii) 29 years, 5 years