1) Find the value of k for which the given equation have real and equal roots
i) $(k-12)x^2 + 2(k-12)x + 2 = 0$.

2) Find k, if the roots of the quadratic equation $x^2 + kx + 40 = 0$ are in the ratio 2 : 5.

3) If the roots of the equation $x^2 + px + q = 0$ differ by 1, prove that $p^2 = 1 + 4q$.

4) Find k, if the sum of the roots of the quadratic equation $4x^2 + 8kx + k + 9 = 0$ is equal to their product.

5) If the sum of the roots of the quadratic equation is 3 and the sum of their cubes is 63, find the quadratic equation.

6) If the difference of the roots of the quadratic equation is 5 and the difference of their cubes is 215, find the quadratic equation.

7) Solve the following equations :

i) $x^4 - 3x^2 + 2 = 0$ ii) $(x^2 + 2x)(x^2 + 2x - 11) + 24 = 0$.

8) The sum of the squares of two consecutive even natural numbers is 100. Find the numbers.

9) A natural number is greater than twice its square root by 3. Find the number.

10) If the cost of banana is increased by Rs.1 per dozen, one can get 2 dozen less for Rs. 840. Find the original cost of one dozen banana.

11) If α and β are the roots of the equation $4x^2 - 5x + 2 = 0$, find the equation whose roots are :

i) $\alpha + 3\beta$ and $3\alpha + \beta$ ii) $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$ iii) $\alpha + \frac{1}{\alpha}$ and $\beta + \frac{1}{\beta}$

12) If one root of the quadratic equation $ax^2 + bx + c = 0$ is the square of the other, then show that $b^3 + a^2c + ac^2 = 3abc$.

13) 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 works alone.

14) The sum of the areas of two squares is 400 m^2. If the difference between their perimeter is 16 m, find the sides of two squares.

15) The product of four consecutive positive integers is 840. Find the numbers.

16) The side of one regular hexagon is larger than that of the other regular hexagon by 1cm. If the product of the numbers denoting their areas is 243, then find the sides of both the regular hexagons.

17) A car covers a distance of 240 km with some speed. If the speed is increased by 20km/hr, it will cover the same distance in 2 hours less. Find the usual speed of the car.

18) One tank can be filled up by two taps in 6 hours. The smaller tap alone takes 5 hours more than the bigger tap alone. Find the time required by each tap to fill the tank separately.

19) 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.

20) 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.

21) 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?