CLASS X
MATHEMATICS

1. Which rational expression should be added to $\frac{x^3-1}{x^2+2}$ to get $\frac{2x^3-x^2+3}{x^2+2}$?

2. Find k, if the given value of x is the k[th] term of the given AP: $5\frac{1}{2}, 11, 16\frac{1}{2}, 22, \ldots$; x = 550.

3. Find the solution such that $u \neq 0$, $v \neq 0$ of the following :

$2u+v=\frac{7}{3}uv$, $u+3v=\frac{11}{3}uv$.

4. Find the L.C.M of the polynomials $(x + 3)(-x^2 + 10x - 25)$ and $(x - 5)(x + 3)^3$. Deduce that the H.C.F. of these polynomials is (x + 3) (x -5).

5. Solve for x : $abx^2 + (b^2 - ac)x - bc = 0$.

(OR)

$$\frac{1}{x-3}-\frac{1}{x+5}=\frac{1}{6} \quad (x \neq 3, -5)$$

6. Find the sum of the first 24 terms of the sequence whose n[th] term is given by $a_n = 3+\frac{2}{3}n$.

7. An article is available for Rs 7000 cash to for Rs 1900 cash down payment and six equal monthly instalments. If the rate of interest is $2\frac{1}{2}$ per month, determine each instatement.

8. A sum of Rs 10815 is to be paid back in 3 equal half-yearly instalments. If the interest is compounded half yearly at the rate of $13\frac{1}{2}$ p.a., find each instalments.

9. Prove that area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.

10. Prove that a cyclic parallelogram is a rectangle.

11. Draw the graphs of the equations 2x –y = -8 and 8x + 3y = 24. Determine the vertices of the triangle formed by the lines representing these equations and the x-axis. Shade the triangular region so formed.

12. O Girl! Out of a group of swans, $\frac{7}{2}$ times the square root of the number is playing on the shore of a tank. The two remaining ones are playing, with amorous fight, in the water. What is the total number of swans?

13. A right triangle, whose sides are 15 cm and 20 cm, is made to revolve about its hypotenuse. Find the volume and the surface area of the double cone so formed. (Use $\pi = 3.14$).

14. If $\sec\theta + \tan\theta = \rho$, show that $\frac{\rho^2-1}{\rho^2+1}=\sin\theta$.

15. Construct a triangle ABC in which BC = 5 cm, angle A = 60[o] and altitude AD = 4 cm.

16. Find the lengths of the medians of the triangle whose vertices are (1, -1), (0, 4) and (-5,3).

(OR)

Find the co-ordinates of the points which divide the line segment joining the points (- 4, 0) and (0, 6) in four equal parts.

17. Find the ratio in which the point (11, 15) divide the line segment joining the points (15, 5) and (9, 20).

18. The following table shows marks secured by 140 students in on exam:,

Marks	:	0-10	10-20	20-30	30-40	40-50
No. of students:		20	24	40	36	20

Calculate mean marks by using step-deviation method.

19. The number of students admitted in different faculties of a college are given below:

Faculty	:	Science	Arts	Commerce	Law	Educations	Total
No. of students :		1000	1200	650	450	300	3600

Draw a pie-chart to represent the above information.

20. The king, queen and jack of clubs are removed from a deck of 52 playing cards and then will shuffled. One card is selected from the remaining cards. Find the probability of gating.

(i) a heart (ii) a king (iii) a club (iv) the '10' of hearts.

21. Prove, if two chards of a circle intersects inside the circle, then inside the circle, then the rectangle formed by the two parts of one chord is equal in area to the rectangle formed by the two parts of the other.

If PAB is a secant to a circle intersecting it at A and B, and PT is a tangent, then prove PA x PB = PT^2, by using the concept of similarity of triangles.

22. A man on a cliff observes a boat at an angle of depression of 30^o which is approaching the shore to the point immediately beneath the observer with a uniform speed. Six minutes later, the angle of depression of the boat is found to be 60^o. find the time taken by the boat to reach the shore.

23. A hollow cone is cut by a plane parallel to the base and the upper portion is removed. If the curved surface of the remainder is $\frac{3}{9}$ of their curved surface of the whole cone, find the ratio of the line-segment into which the cone's altitude is divided by the plane.

24. (a) Prove, the perpendicular drawn from the centre of a circle to a chord bisects the chord.

(b) Prove that if the bisector of any angle of a triangle and the perpendicular bisector of its opposite side intersect, they will intersect on the circumcircle of the triangle.

25. Sudesh gets monthly salary of Rs 40000. she contributes Rs 3000 per month to G.P.F. and Rs 34000 towards PPF. She also invests Rs 30000 in Infrastructure bands getting tax relief upto a saving of Rs 10000. She contributes Rs 11000 to P.M's National Relief Fund and donates Rs 5000 to the college where she studied, getting a relief of 100% and 50% on the donations respectively. If Rs 4500 is the deducted each month from her salary for 11 months, find the taxes deducted form her salary in the last month of the year. Use the following for calculating income tax:

I.**(a) for men (Below 65 years)**

Taxable income	Rate
(i) Upto Rs 100000	NIL
(ii) Rs 100001 to 150000	10% of the exceeding Rs 100000
(iii) Rs 150001 to Rs 250000	Rs 5000 + 20% of the amount exceeding Rs 150000
(iv) Exceeding Rs 250000	Rs 25000 + 30% of the amount exceeding Rs 250000

(b) For women (Below 65 years)

Taxable income	Rate
(i) Upto Rs 135000	NIL
(ii) Rs 135001 to Rs 150000	10% of the amount exceeding Rs 135000
(iii) Rs 150001 to Rs 250000	Rs 5000 + 20% of the amount exceeding Rs 150000
(iv) Exceeding Rs 250000	Rs 25000 + 30% of the exceeding Rs 250000.

II.. Surcharge: 10% of the amount of tax payable if the taxable income exceeds Rs 1000000.

III.. Educational case : 2% of the amount of tax payable.

IV. Concession for saving : Notified saving (PF, LIC, PF, PPF etc). Upto a maximum of Rs 100000 are exempted from payments of income tax.