

Assignment Class XI
Mathematics

1. In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice.
2. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports ?
3. Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation on A defined by $\{(a, b) : a, b \in A, b \text{ is exactly divisible by } a\}$. (i) Write R in roster form (ii) Find the domain of R (iii) Find the range of R .
4. Let R be the relation on Z defined by $R = \{(a, b) : a, b \in Z, a - b \text{ is an integer}\}$. Find the domain and range of R .
5. Find the domain and range of the following real functions: (i) $f(x) = -|x|$ (ii) $f(x) = \sqrt{9 - x^2}$.
6. Find the value of $\sin 31\pi/3$.
7. Show that $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$.
8. $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$
9. $\sin x + \sin 3x + \sin 5x = 0$.
10. Find $\sin x/2$, $\cos x/2$ and $\tan x/2$ in the following :
 $\tan x = -4/3$, x in quadrant II.
11. Prove that $2 \cdot 7^n + 3 \cdot 5^n - 5$ is divisible by 24, for all $n \in \mathbb{N}$.
12. Prove the following by using the principle of mathematical induction for all $n \in \mathbb{N}$:
$$\left(1 + \frac{3}{1}\right) \left(1 + \frac{5}{4}\right) \left(1 + \frac{7}{9}\right) \dots \left(1 + \frac{(2n+1)}{n^2}\right) = (n+1)^2$$
13. If $x+iy = \frac{a+ib}{a-ib}$, prove that $x^2 + y^2 = 1$.
14. If $\left(\frac{1+i}{1-i}\right)^m$, then find the least positive integral value of m .
15. Solve the equation: $27x^2 - 10x + 1 = 0$.
16. To receive Grade 'A' in a course, one must obtain an average of 90 marks or more in five examinations (each of 100 marks). If Sunita's marks in first four examinations are 87, 92, 94 and 95, find minimum marks that Sunita must obtain in fifth examination to get grade 'A' in the course.

17. Solve the system of inequalities graphically: $4x + 3y \leq 60$, $y \geq 2x$, $x \geq 3$, $x, y \geq 0$.
18. A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%?
19. How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5, if the repetition of the digits is not allowed?
20. In how many ways can the letters of the word PERMUTATIONS be arranged if the
 (i) Words start with P and end with S, (ii) vowels are all together,
 (iii) There are always 4 letters between P and S?
21. In how many ways can the letters of the word ASSASSINATION be arranged? so that all the S's are together ?
22. using binomial theorem, prove that $6^n - 5n$ always leaves remainder 1 when divided by
23. The coefficients of three consecutive terms in the expansion of $(1 + a)^n$ are in the ratio 1 : 7 : 42. Find n .
24. Find n , if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of

$$\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$$
 is $\sqrt{6} : 1$
25. Insert five numbers between 8 and 26 such that the resulting sequence is an A.P.
26. Find the sum of the sequence 7, 77, 777, 7777, to n terms.
27. The sum of first three terms of a G.P. is 16 and the sum of the next three terms is
 128. Determine the first term, the common ratio and the sum to n terms of the G.P.
28. The slope of a line is double of the slope of another line. If tangent of the angle between them is $1/3$. find the slopes of the lines
29. Find the coordinates of the foot of perpendicular from the point $(-1, 3)$ to the Line $3x - 4y - 16 = 0$.
30. Find the equation of the parabola which is symmetric about the y -axis, and Passes through the point $(2, -3)$.

31 Find the coordinates of the foci, the vertices, the lengths of major and minor axes and the eccentricity of the ellipse $9x^2 + 4y^2 = 36$.

32. Find the ratio in which the YZ-plane divides the line segment formed by joining the points $(-2, 4, 7)$ and $(3, -5, 8)$.

33. If the origin is the centroid of the triangle PQR with vertices P $(2a, 2, 6)$, Q $(-4, 3b, -10)$ and R $(8, 14, 2c)$, then find the values of a, b and c .

34. A point R with x -coordinate 4 lies on the line segment joining the points P $(2, -3, 4)$ and Q $(8, 0, 10)$. Find the coordinates of the point R.

35. Find the derivative of $\cos x$ from first principle.

36. Find the derivative of the following functions

(i) $(ax^2 + \sin x)(p + q \cos x)$ (ii) $\frac{px^2 + qx + r}{ax + b}$

(iii) $\frac{x^2 - \cos x}{\sin x}$