St. Mary's School, Dwarka
Holiday Homework
Class XI
Subject: Mathematics

Worksheet 1

PERMUTATIONS AND COMBINATIONS   **3x8=24**

Q1   If $^{n}C_{12} = {}^{n}C_{13}$ then find the value of $^{25}C_{n}$.

Q2   In how many ways 4 boys can be chosen from 7 boys to make a committee?

Q3   How many different words (with or without meaning) can be made using all the vowels at a time?

Q4   A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if a team has (i) no girl (ii) at least 3 girls (iii) at least one girl and one boy?

Q5   How many words can be formed from the letters of the word 'ORDINATE' so that vowels occupy odd places?

Q5   Three balls are drawn from a bag containing 5 red,4 white and 3 black balls. Find the number of ways in which this can be done, if at least 2 are red.

Q7   A sports team of 11 students is to be constituted, choosing at least 5 from class XI and at least 5 from class XII .If there are 20 students in each of these class, in how many ways can the team be constituted?

Q8   Find the number of triangles that are formed by choosing the vertices from a set of 12 points, seven of which lie on the same line.

Q1   If all letters of word 'MOTHER' are written in all possible orders and the word so formed are arranged in a dictionary order, then find the rank of word 'MOTHER'?

Q2   What is the number of ways of choosing 4 cards from a deck of 52 cards? In how many of these, a) 3 are red and 1 is black.   b) All 4 cards are from different suits.

   (c) At least 3 are face cards.   (d) All 4 cards are of the same colour.

Q3   Using the letters of the word 'EDUCATION' how many words using 6 letters can be made so that every word contains at least 4 vowels?

Q4   In an election, these are ten candidates and four are to be elected. A voter may vote for any number of candidates, not greater than the number to be elected. If a voter vote for at least one candidate, then find the number of ways in which he can vote.

 Q5   A polygon has 35 diagonal. Find the number of its sides

Q6   Using the letters of the word, 'ARRANGEMENT' how many different words (using all letters at a time) can be made such that both A, both E, both R and both N occur together.

Q7   From a class of 15 students, 10 are to be chosen for a picnic. There are two students who decide that either both will join or none of them will join. In how many ways can the picnic be organized?

Q8   Using the digits 0, 1, 2, 3, 4, 5, 6 how many 4 digit even numbers can be made, no digit being repeated?

Worksheet 2

BINOMIAL THEOREM   **4x8=32**

Q1 Find the 11th term from the end in the expansion of $\left(2x - \dfrac{1}{x^2}\right)^{25}$.

Q2 Find the sum of the coefficients in $(x + y)^8$.

Q3 Find the constant term in expansion of $\left(x - \dfrac{1}{x}\right)^{10}$.

Q4 If the fourth term in the expansion of $\left(ax + \dfrac{1}{x}\right)^n$ is $\dfrac{20}{27}$,then find the value of a and n .

Q5 Find the middle term in $\left(2x - \dfrac{x^2}{4}\right)^9$.

Q6 If the coefficients of three consecutive terms in the expansion of $(1 + x)^n$ are in the ratio 1:3:5, then show   that n = 7.

Q7 Find the coefficients of x^4 in using binomial $(1 + x)^2 (2 + x)^5$ theorem

Q8 Evaluate $\left(\sqrt{2} + 1\right)^5 - \left(\sqrt{2} - 1\right)^5$ using binomial theorem

HOTS   **4x6=24**

Q1 Find n in the binomial $\left(\sqrt[3]{2} + \dfrac{1}{\sqrt[3]{3}}\right)^n$, if the ratio of 7th term   from the beginning to the 7th term from the end is $\dfrac{1}{6}$.

Q2 If the 3rd, 4th and 5th terms in the expansion of $(x + a)^n$ are 84, 280 and 560 respectively then find the values of

a, x and n .

Q3 Show that $2^{4n+4} - 15n - 16$, where $n \in N$ is divisible by 225.

Q4 In the binomial expansion of $(1 + x)^n$, the coefficients of the fifth, sixth and seventh terms are in A.P. Find all values f n for which this can happen.

Q5   Find the value of x if the middle term of $\left(\dfrac{1}{x} + x\sin x\right)^{10}$ is $7\dfrac{7}{8}$.

Q6 If the coefficient of second, third and fourth terms in the expansion of $(1+x)^{2n}$ are in AP, then show that $2n^2 - 9n + 7 = 0.$

Worksheet 3

LINEAR INEQUALITIES   **4x8=32**

Q1 Find all pairs of consecutive even positive integers, both of which are larger than 5 such that their sum is less than 23.

Q2   A company manufactures cassettes and its cost and revenue functions are $C(x) = 26000 + 30x$ and $R(x) = 43x$ respectively, where x is number of cassettes produced and sold in a week. How many cassettes must be sold per week to realise some profit.

Q3   Solve $\dfrac{x-2}{x+5} > 2$

Q4   Solve $\dfrac{2x+3}{4} - 3 < \dfrac{x-4}{3} - 2,\ x \in R$

Q5   Solve $-5 \le \dfrac{2-3x}{4} \le 9,\ x \in R$

Q6 Solve the following system of in equations

$$|x-1| \le 1,\ |x| \ge 1$$

Q7 Solve the following system of inequalities

graphically :
$$5x + 4y \le 40$$
$$x \ge 2$$
$$y \ge 3$$

Q8   Solve the following system of inequalities

$$x + 2y \leq 8$$

Graphically : $2x + y \leq 8$

$$x \geq 0$$
$$y \geq 0$$

HOTS   **6x8=48**

Q1 A solution of 9% acid is to be diluted by adding 3% acid solution to it. The resulting   mixture is to be more than 5% but less than 7% acid. If there is 460 litres of the 9% solution, how many litres 3% solution willhave to be added ?

Q2 The water acidity in a pool is considered normal when theaverage PH reading of their daily measurements is between 7.2 and 7.8. If the first two PH reading are 7.48 and 7.85. Find the range of PH value for the 3rd reading that will result in acidity level being normal.

Q3   Solve $|2x - 3| \leq 11, |x - 2| \geq 3$

Q4   Solve $\dfrac{|x| - 1}{|x| - 2} \leq 0 \quad x \in R, x \neq \pm 2$

Q5   Solve for x   : $|x| + |x - 1| > 3$

Solve the following system of inequalities   graphically**:**

Q6 $2x + y \leq 24, x + y < 11, 2x + 5y \leq 40, \ x \geq 0, y \geq 0$

Q7 $3x + 2y \geq 24, 3x + y \leq 15, x \geq 4$

Q8 $x - 2y \leq 3, 3x + 4y > 12, x \geq 0, y \geq 1$