Padasalai's Telegram Groups!

(தலைப்பிற்கு கீழே உள்ள லிங்கை கிளிக் செய்து குழுவில் இணையவும்!)

- Padasalai's NEWS - Group
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- Lesson Plan - Group
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CHAPTER -1

SETS & PROPERTIES OF SET OPERATIONS

1. Write the set $\{-1, 1\}$ in set builder form
2. In a survey of 5000 persons in a town, 45% of the persons know Language A, 25% know Language B, 10% know Language C, 5% know Languages A and B, 4% know Languages B and C, and 4% know Languages A and C. If 3% of the persons know all the three Languages, find the number of persons who knows only Language A.
3. Prove that $((AUB'UC)\cap(A\cap B'\cap C'))U((AUBUC')\cap(B'\cap C'))=B'\cap C$
4. If $X = \{1, 2, 3, \ldots 10\}$ and $A = \{1, 2, 3, 4, 5\}$, find the number of sets $B \in X$ such that $A - B = \{4\}$
5. Find the number of subsets of A if $A = \{x : x = 4n + 1, 2 \le n \le 5, n \in N\}$.
6. If $n(P(A)) = 1024$, $n(A \text{ È } B) = 15$ and $n(P(B)) = 32$, then find $n(A \cap B)$.
7. If$P(A)$ denotes power set of A, find $n(P(P(P(\emptyset))))$.
8. If A and B are two sets so that $n(B - A) = 2n(A - B) = 4n(A \cap B)$ and if $n(AUB) = 14$, then find $n(P(A))$.
9. Two sets have m and k elements. If total number of subsets of the first set is 112 more than that of the second set, find the values of m and k.
10. Two sets have m and k elements. If total number of subsets of the first set is 112 more than that of the second set, find the values of m and k.
11. If $n(A) = 10$ and $n(A\cap B) = 3$, find $n((A\cap B)'\cap A)$.
12. If $n(A \cap B) = 3$ and $n(A \text{ È } B) = 10$, find $n(P(A\Delta B))$.

CARTESIAN PRODUCT

13. For a set A, $A \times A$ contains 16 elements,two of its elements are (1, 3) and (0, 2). Find elements of A.
14. If $A \times A$ has 16 elements, $S = \{(a, b) \in A \times A : a < b\}$ $(-1, 2)$ and $(0, 1)$ are two elements of S, then find the remaining elements of S.
15. If $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$, find $n((AUB)\times (A \cap B) \times(A\Delta B))$.

RELATION

16. Discuss for reflexivity, symmetricity and transitivity
    - P denote set of all straight lines in a plane R be relation defined on P as lRm if l is parallel to m
    - A be set consisting of all female members of a family. Relation R defined by "aRb if a is not a sister of b".
    - Prove that relation *friendship* is not equivalence relation on set of people in Chennai.
    - On the set of natural numbers R be the relation defined by xRy if $x + 2y = 21$.
17. Let $X = \{a, b, c, d\}$ and $R = \{(a, a), (b, b), (a, c)\}$. Write down the minimum number of ordered pairs to be included to R to make it i)reflexive ii) symmetric iii) transitive iv) equivalence
18. In the set Z of integers, define mRn if $m - n$ is a multiple of 12. Prove that R is an equivalence relation.

FUNCTION

19. Find the largest possible domain for the real valued function f defined by $f(x) = \sqrt{x^2 - 5x + 6}$.
20. Find the domain of (i) $f(x) = \frac{1}{1-2COS\,X}$ (ii) $f(x) = \frac{1}{1-2SinX}$
21. Find the range of F(x)$= \frac{1}{1-3COS\,X}$
22. a)Show that the relation $xy = -2$ is a function for a suitable domain.
    b) Find domain and the range of the function.
23. Find the largest possible domain for the real valued function given by $F(x) = \frac{\sqrt{9-x^2}}{\sqrt{x^2-1}}$

24. Check following functions one-to-one and onto.
    a. $f : N \to N$ defined by $f(n) = n + 2$.
    b. $f : N \in \{-1, 0\} \to N$ defined by $f(n) = n + 2$.
25. If $f : [-2, 2] \to B$ is given by $f(x) = 2x^3$, find B so that f is onto.
26. Let $f = \{(1, 4), (2, 5), (3, 5)\}$ and $g = \{(4, 1), (5, 2), (6,4)\}$. Find $g \circ f$. Can you find $f \circ g$?
27. Let f and g be two functions from R to R defined by $f(x) = 3x - 4$, $g(x) = x^2 + 3$.
    Find $g \circ f$ and $f \circ g$.
28. Let $f, g : R \to R$ be defined as $f(x) = 2x - |x|$ and $g(x) = 2x + |x|$. Find $f \circ g$.
29. If $f, g : R \to R$ are defined by $f(x) = |x| + x$ and $g(x) = |x| - x$, find $g \circ f$ and $f \circ g$.
30. If $f : R \to R$ is defined by $f(x) = 2x - 3$ prove that f is a bijection and find its inverse.
31. Draw the graphs of i)$y = \sin x$ ii) $y = \sin 2x$ iii) $y = \sin(-x)$ iv) $y = -\sin(-x)$
32. From the curve $y = x$, draw
    (i)$y = -x$ ii) $y = 2x$ iii) $y = x + 1$ iv) $y = 1/2\, x + 1$ v) $2x + y + 3 = 0$.
33. Plot the graphs of i) $f(x) = x^2$ ii) $f(x) = x^2 + 1$ iii) $f(x) = (x + 1)^2$. iv) $y = 3(x - 1)^2 + 5$
34. Write the values of f at -3,5,3,2,-1,0 if

$$f(x)= \begin{cases} x^2 + x - 5 & \text{if } x \in (-\infty,0) \\ x^2 + 3x - 2 & \text{if } x \in (3, \infty) \\ x^2 & \text{if } x \in (0,2) \\ x^2 - 3 & \text{otherwise} \end{cases}$$

CHAPTER -12

TOTAL PROBABILITY

1. A factory has two machines I and II. Machine-I produces 40% of items of the output and Machine-II produces 60% of the items. Further 4% of items produced by Machine-I are defective and 5% produced by Machine-II are defective. If an item is drawn at random, find the probability that it is a defective item.
2. Machine I produces 40% of items of the output and Machine II produces 60% of the items. Further 4% of items produced by Machine I are defective and 5% produced by Machine II are defective. An item is drawn at random. If the drawn item is defective, find the probability that it was produced by Machine II.
3. Machine-I produces 60% of items and Machine-II produces 40% of the items of the total output. Further 2% of the items produced by Machine-I are defective whereas 4% produced by Machine-II are defective. If an item is drawn at random what is the probability that it is defective?
4. Urn-I contains 8 red and 4 blue balls and urn-II contains 5 red and 10 blue balls. One urn is chosen at random and two balls are drawn from it. Find the probability that both balls are red.
5. A firm manufactures PVC pipes in three plants viz, *X, Y* and *Z*. The daily production volumes from the three firms *X, Y* and *Z* are respectively 2000 units, 3000 units and 5000 units. It is known from the past experience that 3% of the output from plant *X*, 4% from plant *Y* and 2% from plant *Z* are defective. A pipe is selected at random from a day's total production, find the probability that the selected pipe is a defective one. if the selected pipe is a defective, then what is the probability that it was produced by plant *Y* ?
6. The chances of *A, B* and *C* becoming manager of a certain company are 5 : 3 : 2. The probabilities that the office canteen will be improved if *A, B*, and *C* become managers are 0.4, 0.5 and 0.3 respectively. If the office canteen has been improved, what is the probability that *B* was appointed as the manager?
7. The chances of *X, Y* and *Z* becoming managers of a certain company are 4 : 2 : 3. The probabilities that bonus scheme will be introduced if *X, Y* and *Z* become managers are 0.3, 0.5 and 0.4 respectively. If the bonus scheme has been introduced, what is the probability that *Z* was appointed as the manager?

CHAPTER 4-COMBINATORICS AND MATHEMATICAL INDUCTION

FUNDAMENTAL PRINCIPLES OF COUNTING

1. **Suppose one girl or one boy has to be selected for a competition from a class comprising 17 boys and 29 girls. In how many different ways can this selection be made?**
2. **In the menu card of a restaurant, the person saw 10 Indian and 7 Chinese food items. In how many ways the person can select either an Indian or a Chinese food?**
3. **A School library has 75 books on Mathematics, 35 books on Physics. A student can choose only one book. In how many ways a student can choose a book on Mathematics or Physics?**
4. **Find the number of positive integers divisible by 2 or 7 (but not both), upto 1000**
5. **Find the number of strings of length 4, formed using the letters of the word BIRD, without repetition of the letters.**
6. **How many strings of length 5 can be formed out of the letters of the word PRIME taking all the letters at a time without repetition.**
7. **How many strings of length 6 can be formed using letters of the word FLOWER if**
   - **either starts with F or ends with R?**
   - **neither starts with F nor ends with R?**
   - **either starts with F or ends with R?**
8. **How many 4 - digit even numbers can be formed using the digits 0, 1, 2, 3 and 4, if repetition of digits are not permitted?**

FACTORIALS

1. **Let N denote the No. of days. If the value of $N!$ is equal to the total No. of hours in N days then find the value of N?**
2. **Find the value of n if $(n+1)! = 20(n-1)!$**
3. **What is unit digit of the sum $2!+3!+4!+\ldots+22!$**
4. **Find the value of A if $\frac{1}{7!}+\frac{1}{8!}=\frac{A}{9!}$**
5. **. Prove that $\frac{(2n)!}{n!} = 2n(1.3.5\cdots(2n-1))$.**

PERMUTATIONS

1. **From 7 letters A,B,C,D,E,F,G a 4 letter string is made. Express number of permutations of 4 letters chosen from 7 letters in generalised form**
2. **Evaluate i) ${}^{4}P_4$ ii) ${}^{5}P_3$ iii) ${}^{8}P_4$ iv) ${}^{6}P_5$.**
3. **If ${}^{(n+2)}P_4 = 42\times{}^{n}P_2$, find n**
4. **5. If ${}^{(n-1)}P_3 : {}^{n}P_4 = 1:10$, find n**
5. **If ${}^{10}P_r = {}^{7}P_{r+2}$ find r.**
6. **If ${}^{10}P_{r-1} = 2\times{}^{6}P_r$, find r.**
7. **Determine the No. of permutations of the letters of the word SIMPLE if all are taken at a time?**
8. **In how many ways can the letters of the word SUCCESS be arranged so that all Ss are together?**
9. **How many different strings can be formed together using the letters of the word "EQUATION" so that i) vowels always come together? ii) the vowels never come together?**
10. **If the letters of the word TABLE are permuted in all possible ways and the words thus formed are arranged in dictionary order find the ranks of the words (i) TABLE, (ii) BLEAT**

11. **Find the No. of strings that can be made using all letters of the word THING. If these words are written as in a dictionary, what will be the 85*th* string?**
12. **If the letters of the word FUNNY are permuted in all possible ways and the strings thus formed are arranged in the dictionary order, find the rank of the word FUNNY.**
13. **If the letters of the word IITJEE are permuted in all possible ways and the strings thus formed are arranged in the lexicographic order, find the rank of the word IITJEE**
14. **Find the sum of all 4-digit numbers that can be formed using the digits 1, 2, 4, 6, 8.**
15. **Find the sum of all 4-digit numbers that can be formed using digits 1, 2, 3, 4, and 5 repetitions not allowed?**
16. **Find the sum of all 4-digit numbers that can be formed using digits 0, 2, 5, 7, 8 without repetition?**
17. **Find the distinct permutations of the letters of the word MISSISSIPPI?**
18. **How many ways can the product $a^2b^3c^4$ be expressed without exponents?**

COMBINATIONS

1. **Evaluate the following:**
   (i) $^{10}C_3$ (ii) $^{15}C_{13}$ (iii) $^{100}C_{99}$
2. **If $nC12 = nC9$ find $_{21}C_n$.**
3. **If $_{15}C2r-1 = _{15}C2r+4$, find r.**
4. **If $nP_r = 11880$ and $nC_r = 495$, Find n and r.**
5. **If $nP_r = 720$, and $nC_r = 120$, find n, r.**
6. **If $^{(n+2)}C_7 : ^{(n-1)}P_4 = 13 : 24$ find n.**
7. **If $(n+1)C8 : (n-3)P4 = 57 : 16$, find the value of n.**
8. **Prove that $^{35}C_5 + \sum_{r=0}^{4}(39-r)C_4 = ^{40}C_5$**
9. **Find No. of strings of 5 letters that can be formed with the letters of the word PROPOSITION.**
10. **A committee of 7 peoples has to be formed from 8 men and 4 women. In how many ways can this be done when the committee consists of (i) exactly 3 women? (ii) at least 3 women? (iii) at most 3 women?**

MATHEMATICAL INDUCTION

1. **$1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$**
2. **Sum of first n positive odd numbers is n^2**
3. **$1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$**
4. **$a^n - b^n$ is divisible by $a - b$, where $a > b$**
5. **$3^{2n+2} - 8n - 9$ is divisible by 8 for all $n \geq 1$.**
6. **$\frac{1}{1.2}+\frac{1}{2.3}+\ldots..+\frac{1}{n(n+1)} = \frac{n}{n+1}$**
7. **Use induction to prove that $n^3 - 7n + 3$, is divisible by 3, for all natural numbers n**

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PGT IN MATHEMATICS