



# MATHS

## BOOKS - SAI MATHS (TELUGU ENGLISH)

### PERMUTATIONS AND COMBINATIONS

#### Problems

1. 
$$\sum_{r=0}^{10} (40 - r)C_5 =$$

A.  ${}^{41}C_5 - {}^{30}C_5$

B.  ${}^{41}C_6 - {}^{30}C_6$

C.  ${}^{41}C_5 + {}^{30}C_5$

D.  ${}^{41}C_6$

**Answer: B**



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2. IF a polygon has 35 diagonals , then the number of sides of the polygon is

A. 12

B. 9

C. 10

D. 11

**Answer: C**



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**3.** The number of four-digit numbers formed by using the digits 0,2,4,5 and which are not divisible by 5, is

A. 10

B. 8

C. 6

D. 4

**Answer: B**



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4.  $T_m$  denotes the number of triangles that can be formed with the vertices of a regular

polygon of  $m$  sides . If  $T_{m+1} - T_m = 15$  then

$m =$

A. 3

B. 6

C. 9

D. 12

**Answer: B**



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5. Out of thirty points in a plane , eight of them are collinear . The number of straight lines that can be formed by joining these points is

A. 296

B. 540

C. 408

D. 348

**Answer: C**



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6. If  $n$  is an integer with  $0 \leq n \leq 11$ , then the minimum value of  $n!(11 - n)!$  is attained when a value of  $n$  equals to

A. 11

B. 5

C. 7

D. 9

**Answer: B**





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7.

$${}^n C_{r-1} = 330, {}^n C_r = 462, {}^n C_{r+1} = 462 \Rightarrow r =$$

A. 3

B. 4

C. 5

D. 6

**Answer: C**



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8. 10 men and 6 women are to be seated in a row so that all women sit together. The number of ways they can be seated, is



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9. IF  $T_n$  denotes the number of triangles formed with  $n$  points in plane no three of which are collinear and if  $T_{n+1} - T_n = 36$  then  $n =$

A. 7

B. 8

C. 9

D. 10

**Answer: C**



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**10.** A regular polygon of  $n$  sides has 170 diagonals. Then  $n =$

A. 12

B. 17

C. 20

D. 25

**Answer: C**



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**11.** A committee of 12 members is to be formed from 9 women and 8 men. The number of

committee in which the women are in majority  
is

A. 2720

B. 2702

C. 2270

D. 2278

**Answer: B**



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12. A student is asked to answer 10 out of 13 questions in an examination such that he must answer at least four questions from the first five questions. The number of choices available to him is

A. 63

B. 91

C. 161

D. 196

**Answer: C**



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13.  $\sum_{k=1}^{\infty} \sum_{r=0}^k \frac{1}{3^k} \binom{k}{r}$  is equal to

A.  $\frac{1}{3}$

B.  $\frac{2}{3}$

C. 1

D. 2

**Answer: D**



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**14.** A bag contains  $n$  white and  $n$  black balls . Pairs of balls are drawn at random without replacement successively , until the bag is empty . If the number of ways in which each pair consists of one white and one black ball is 14,400 then  $n =$

A. 6

B. 5

C. 4

D. 3

**Answer: B**



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**15.** the number of five digit numbers divisible by 5 that can be formed using the numbers 0,1,2,3,4,5 without repetition is

A. 240

B. 216

C. 120

D. 96



**Answer: B**



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16.  ${}^{15}P_8 = A + 8 \cdot {}^{14}P_7 \Rightarrow A =$

A.  ${}^{14}P_6$

B.  ${}^{14}P_8$

C.  ${}^{15}P_7$

D.  ${}^{16}P_9$

**Answer: B**



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17. If  ${}^{(n+1)}C_3 + {}^{(n-1)}C_4 > {}^nC_3$ , then the minimum value of  $n$  is

A. 5

B. 6

C. 7

D. 8

**Answer: D**



18. Let  $n = 1! + 4! + 7! + \dots + 400!$  then ten's digit of  $n$  is

A. 1

B. 6

C. 2

D. 7

**Answer: B**



19. Let  $a_n = \frac{10^n}{n!}$  for  $n = 1, 2, 3, \dots$  then the greatest value of  $n$  for which  $a_n$  is the greatest is

A. 11

B. 20

C. 10

D. 8

**Answer: C**



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20. A polygon has 14 diagonals. Then, the number of its sides is

- A. 7
- B. 9
- C. 10
- D. 12

**Answer: A**



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21. The number of subsets of  $(1, 2, 3, \dots, 9)$  containing at least one even number is



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22.  $P$  points are chosen on each of the three coplanar lines. The maximum number of triangles formed with vertices at these points is

A.  $p^3 + 3p^2$

B.  $\frac{1}{2}(p^3 + p)$

C.  $\frac{p^2}{2}(5p - 3)$

D.  $p^2(4p - 3)$

**Answer: D**



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**23.** A binary sequence is an array of '0' s and 1's  
. The number of n- digit binary sequences  
which contain even number of 0 s is :

A.  $2^{n-1}$

B.  $2^n - 1$

C.  $2^{n-1} - 1$

D.  $2^n$

**Answer: B**



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**24.** 9 balls are to be placed in 9 boxes : and 5 of the balls cannot fit into 3 small boxes the



number of ways of arranging one ball in each of the boxes is

A. 18720

B. 18270

C. 17280

D. 12780

**Answer: C**



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25. If  ${}^n P_r = 30240$  and  ${}^n C_r = 252$  then the ordered pair  $(n,r)=$

A. (12,6)

B. (10,5)

C. (9,4)

D. (16,7)

**Answer: B**



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26. Find the number of ways of arranging 8 men and 4 women around a circular table. In how many of them no two women come together

A.  $8!$

B.  $4!$

C.  $8!4!$

D.  $7! {}^8P_4$

**Answer: D**



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27. IF a polygon of  $n$  sides has 275 diagonals  
then  $n =$

A. 25

B. 35

C. 20

D. 15

**Answer: A**



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28. Eight different letters of an alphabet are given . Words of four letters from these are formed the number of such words with at least one letter repeated is

A.  $\binom{8}{4} - {}^8P_4$

B.  $8^4 + \binom{8}{4}$

C.  $8^4 - {}^8P_4$

D.  $8^4 - \binom{8}{4}$

**Answer: C**



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29. The number of natural numbers less than 1000, in which no two digits are repeated is

A. 738

B. 792

C. 837

D. 720

**Answer: A**



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30. A three digit number  $n$  is such that the last two digits of it are equal and different from the first , the number of such  $n$ 's is

A. 64

B. 72

C. 81

D. 900

**Answer: C**



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31.  $s_1, s_2, \dots, s_{10}$  are the speakers in a conference, if  $s_1$  addresses only after  $s_2$ , then the number of ways the speakers address is

A.  $10!$

B.  $9!$

C.  $10 \times 8!$

D.  $\frac{10!}{2}$

**Answer: D**



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32. A person who tosses an unbiased coin gains two points for turning up a head and loses one point for a tail. If three coins are tossed and the total score  $X$  is observed, then the range of  $X$  is

A.  $\{-3,0,3\}$

B.  $\{-3,0,3\}$

C.  $\{-3,0,3,6\}$

D.  $\{-3,3,6\}$

**Answer: C**



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**33.** The number of positive odd divisors of 216 is

A. 4

B. 6

C. 8

D. 12

**Answer: A**



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**34.** For any integer  $n \geq 1$ , the number of positive divisors of  $n$  is denoted by  $d(n)$ . Then for a prime  $P$ ,  $d(d(d(p^7)))$  is equal to

A. 1

B. 2

C. 3

D.  $P$

**Answer: C**



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**35.** Let  $l_1$  and  $l_2$  be two lines intersecting at P. If  $A_1, B_1, C_1$  are points on  $l_1$  and  $A_2, B_2, C_2, D_2, E_2$  are points on  $l_2$  and if none of these coincides with P, then the number of triangles formed by these eight points, is

A. 56

B. 55

C. 46

D. 45

**Answer: D**



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**36.** Consider the fourteen lines in the plane given by  $y = x + r, y = -x + r$ , where  $r \in \{0, 1, 2, 3, 4, 5, 6\}$ . The number of squares

formed by these lines, whose sides are of length  $\sqrt{2}$ , is

A. 9

B. 16

C. 25

D. 36

**Answer: C**



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37. The least value of  $n$  so that

$${}^n C_5 + {}^n C_6 > (n + 1)C_5 \text{ is}$$

A. 10

B. 11

C. 12

D. 13

**Answer: B**



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**38.** The number of ways that 8 beads of different colours be strung as a necklace is

A. 2520

B. 2880

C. 4320

D. 5040

**Answer: A**



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**39.** The number of 5-digit numbers which are not divisible by 5 and which consist of different odd digits is

A. 24

B. 32

C. 96

D. 120

**Answer: C**



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**40.** The number of ways in which 5 boys and 4 girls sit around a circular table, so that all girls sit together



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**41.** Using the digits 0,2,4,6,8 not more than once in any number , the number of 5 digit number that can be formed is

A. 16

B. 24

C. 96

D. 120

**Answer: C**



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