Personal guidance center for CAT, GMAT preparation

Permutations and Combinations

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1. nP5=12(np4), find n?
   a) 12 b) 16 c) 8 d) 14
2. An automobile dealer provides cars in 5 models in 6 different colors. Find the number of choices open to a customer.
   a) 30 b) 11 c) 15 d) 21
3. How many permutations can be made using all the letters of the word ‘ WOMEN’?
   a) 60 b) 20 c) 120 d) 24
4. How many 5 letters permutations can be made using all the letters of the word ‘ ORGANIC’?
   a) 2520 b) 1840 c) 1260 d) 3480
5. Find the number of ways of arranging the letter of the word ‘MAJOR’ such that it begins and ends with a vowel.
   a) 6 b) 12 c) 2 d) 8
6. The number of ways of arranging 7 dissimilar things if two particular themes are always to be together.
   a) 960 b) 480 c) 240 d) 1440
7. Find the number of ways of permuting letters of the word ‘SHOOT’.
   a) 60 b) 45 c) 15 d) 30
8. How many different numbers can be formed by using five out of nine digits 1, 2, 3, 4, 5, 6, 7, 8, 9
   a) 16120 b) 14120 c) 15120 d) 13120
9. In how many ways can 3 prizes be distributed among 4 boys when no boys get more than one prize?
   a) 48 b) 36 c) 24 d) 18
10. In how many ways can 3 prizes be distributed among 4 boys when a boy may get any number of prizes?
    a) 24 b) 16 c) 64 d) 46
11. If there are 15 railway station on a railway line, how many single different 1^{st} class ticket must be printed so as to enable a passenger to travel from 1 station to another?
    a) 350 b) 390 c) 360 d) 380
12. Find the number of different words that can be formed using 3 As, 2 Bs and 1 C.
    a) 45 b) 48 c) 60 d) 64
13. Find the number of 8 digited numbers that can be formed using 1, 1, 1, 1, 3, 3, 4 and 6.
    a) 840 b) 810 c) 830 d) 800
14. Find the numbers of ways of arranging the letter of the word ‘ARRANGE’ so that the 2 Rs come together.
    a) 360 b) 310 c) 330 d) 350
15. Find the numbers of ways of arranging the letter of the word ‘ARRANGE’ so that the 2 Rs are never together?
    a) 1260 b) 360 c) 900 d) 600
16. Find the numbers of ways of arranging the letter of the word ‘ARRANGE’ so that no 2 Rs come together?
    a) 800 b)900 c) 600 d) 700
17. Find the ways of arranging the letters of the word ‘SHIPPING’ so that the 2 Ps are together and 2 Is are together.
    a) 360 b) 120 c) 720 d) 460

18. In how many different ways can the letters of the word ‘RULER’ be arranged so that the vowels always come together?
    a) 12 b) 24 c) 18 d) 22
19. Find the number of 5 digit numbers formed using the digit {1, 2, 4, 6, 8, 9} when repetitions are not allowed?
    a) 720 b) 710 c) 715 d) 725
20. Find the number of 5 digit numbers formed using the digit {1, 2, 4, 6, 8, 9} when repetitions are allowed?
    a) 216 b) 1296 c) 7776 d) 36

Answers with solution

1. Solution: (b)

   Given ${}^{n}p_5=12\times{}^{n}p_4 \rightarrow \frac{n!}{(n-5)!} = 12 \times \frac{n!}{(n-4)!}$

   $$\rightarrow \frac{1}{(n-5)!} = \frac{12}{(n-4)!}$$
   $$\rightarrow 12(n-5)! = (n-4)!$$
   $$\rightarrow 12(n-5)! = (n-4)(n-5)!$$
   $$\rightarrow 12 = n-4 \rightarrow n = 12+4 \rightarrow 16$$

2. Solution: (a)

   Using the fundamental principle, number of choices available to the customer=$5\times 6 = 30$

3. Solution: (c)

   Since, all the letters are distinct that are 5 in number.
   The required number of permutations is ${}^{5}p_5=5! = 120$

4. Solution: (a)

   Since, all the 7 letters are distinct it is ${}^{7}p_5$.
   ${}^{7}p_5=\frac{7!}{(7-5)!} = \frac{7!}{2!} = \frac{7\times6\times5\times4\times3\times2!}{2!} = 2520$

5. Solution: (b)

   There are two vowels 'A' and 'O' in the word 'MAJOR'. The beginning and end with vowel give ${}^{2}p_2=2! =2$ arrangements. The middle 3 letters can themselves be permutated in ${}^{3}p_3=3! =6$ ways.
   Required number of arrangements= $2\times 6 = 12$

6. Solution: (d)

   Since, 2 particular things are always together take them as one unit. Now we have 6 things which can be permuted in ${}^{6}P_6=6!$ Ways.
   Now the 2 particular things can be arranged amongst themselves in ${}^{2}P_2=2!$ Ways. Hence, the required number of the arrangements =
   $6! \times 2! = (6\times5\times4\times3\times2) \times 2=1440$

7. Solution: (a)

   'SHOOT' contains 5 letters which can be grouped as S=1, H=1, O=2 and T=1

   ∴ Required permutations = $\frac{5!}{2!} = \frac{5\times4\times3\times2!}{2!} = 60$

8. Solution: (c)

   We have 9 different digits and we have to find the number of permutations of them 5 at a time.

   ∴ Required permutations ${}^{9}P_5 = \frac{9!}{(9-5)!} = \frac{9!}{4!} = \frac{9\times8\times7\times6\times5\times4!}{4!} = 15120$

9. Solution: (c)

Here, we have 4 different boys and 3 prizes.

∴ Required permutations ${}^4P_3 = \frac{9!}{(4-3)!} = 4 \times 3 \times 2 \times 1 = 24\ ways.$

10. Solution: (c)

Here, each prize can be given in 4 ways. i.e., to any of the 4 boys.
∴ Required permutations = 4^3=64

11. Solution: (d)

Required number of the permutations = Number of ways of arranging two station names out of 20 station names.
${}^{20}P_2 = \frac{20!}{(20-2)!} = \frac{20\times19\times18!}{18!} = 380$

12. Solution: (c)

Total 6 letters care given in which 3 As are alike, 2 Bs are alike and the rest all different.
∴ Required number of arrangements = $\frac{6!}{3!\times2!} = \frac{6\times5\times4\times3!}{3!\times2\times1} = 60$

13. Solution: (a)

In the given 8 digits there are four 1's, two 3's and the rest all different.
∴ Required number of arrangements = $\frac{8!}{4!\times2!} = \frac{8\times7\times6\times5\times4!}{4!\times2} = 840$

14. Solution: (a)

There are 7 letters in ARRANGE in which 2 As are alike, RS 2 are alike and the rest are different.
They can be arranged in $\frac{6!}{2!} = \frac{6\times5\times4\times3\times2!}{2!} = 360\ ways.$
The RS 2 among themselves can be arranged in one way.
The required number of arrangements= 360×1=360.

15. Solution: (c)

The given word consists of 7 letters having 2 As, RS 2 and the rest all different.
The total number of words = $\frac{7!}{2!2!} = \frac{7\times6\times5\times4\times3\times2!}{2\times1\times2!} = 1260$

16. Solution: (b)

The given word contains 2 As, 2Rs, 1 N, 1 G, and 1 E. Since no 2 Rs come together, 1st arrange 2 As, 1 N, 1G and 1 E in $\frac{5!}{2!}$ ways.
The remaining 6 positions can be arranged in 2 As in $\frac{6P2}{2!}$ Ways.
∴ Required number of arrangements =$\frac{5!}{2!} \times \frac{6P2}{2!}$ =900 ways.

17. Solution: (c)

There are 8 letters in the given word SHIPPING in which 2 Ps are alike and 2Is are alike. By taking 2Ps as 1 unit and 2Is as another unit and the rest all different, we have total 6 different units. Yhis can be arranged in 6! Ways.
The 2 Is can be arranged among themselves in 1 way and 2Ps can be arranged in one way.
∴ Required number of arrangements = 6! ×1×1 =720

18. Solution: (b)

The given word consists of 2 vowels. Treating them as 1 unit we have 2 Rs, 1 E and 1 unit of vowels.

This can be arranged in $\frac{4!}{2!}$ ways = 12 ways.

The 2 vowels can be arranged among themselves in 2! Ways = 2 ways.

∴ Required number of arrangements = 12×2 ways = 24 ways.

19. Solution: (a)

Arranging 6 digits taken 5 at a time, the number of 5 digited numbers is ${}^{6}P_{5}$.

${}^{6}P_{5} = \frac{6!}{(6-5)!} = 6! = 720$

20. Solution: (c)

The number of 5 digit number formed using the digits 1, 2, 4, 6, 8 and 9 when repetitions are allowed is $n^{r}=6^{5}=7776$