

1. Which of the following statements is true about $n!$?

- a. $n \times (n + 1) \times (n + 2) \times \dots \times 1$
- b. $n - 1$
- c. $n \times n - 1 \times n - 2 \times \dots \times 2 \times 1$
- d. $n(n - 1) \times n(n - 2) \times \dots \times 1$

2. Which of the following statement is equal to 1?

- a. $P_{n,1}$
- b. $P_{n,n}$
- c. $C_{n,n}$
- d. $C_{n,1}$

3. What is the value of n if $P_{n,7} = P_{n,8}$?

- a. 6
- b. 7
- c. 9
- d. 8

4. What is the value in factorial form : $\frac{(n+k-2)!}{(n+k+1)!}$?

- a. $(n + k - 2)(n + k - 1)(n + k)$
- b. $\frac{1}{(n+k-2)(n+k-1)(n+k)}$
- c. $\frac{1}{(n+k+1)(n+k)(n+k-1)}$
- d. $(n + k + 1)(n + k)(n + k - 1)$

5. Suppose $\frac{(n+3)!}{n!} = 504$, what is the value of n ?

- a. 7
- b. 4
- c. 3
- d. 6

6. Selecting 20 students from a group of 50 to attend a Math competition is an example of ____.

- a. permutation
- b. combination
- c. fundamental counting principle
- d. both permutation and combination

7. What is the value of the number in factorial form: $\frac{n!}{(n-1)!}$?

- a. n
- b. $(n - 2)(n - 3)$
- c. $n(n - 1)(n - 2)$
- d. $n(n - 1)$

8. What is the value of the number in factorial form: $(n + 1)(n)(n + 5)(n + 4)(n + 3)$?

- a. $\frac{n!(n+5)!}{(n-1)!((n-2)!}$
- b. $\frac{(n-1)!(n+5)!}{n!(n+2)!}$
- c. $\frac{(n+1)!(n+5)!}{(n-1)!(n+2)!}$
- d. $\frac{n!(n+3)!}{(n-1)!(n+2)!}$

9. Given $C_{n,3} = 10$, what is the value of $P_{n,3}$?

- a. 20
- b. 40
- c. 50
- d. 60

10. Given $C_{n,13} = C_{n,15}$, what is the value of $C_{n,1}$?

- a. 15 b. 18 c. 28 d. 27

11. $\frac{10!}{7!3!}$ is an example of getting a _____ of 3 things out of 10 things.

- a. $P_{7,3}$ b. $C_{7,3}$ c. permutation d. combination

12. Which of the following statements is/are true?

- i. $0!$ is equal to 0. ii. ${}_0P_5$ is equal to 0.
iii. ${}_6C_6$ is equal to 1. iv. ${}_{10}C_1$ is equal to 1.
a. i,ii, iii and iv b. i and ii c. statement iii only d. ii and iii

13. There are 6 different types of cakes in the bake shop. In how many ways can a customer select 4 different options?

- a. 24 b. 48 c. 15 d. 360

For items 14 – 15. How many 3-digit numbers can be formed with the digits 1, 4, 7, 8, 9 and 0 under the following conditions:

14. If the digits are not repeated

- a. 100 b. 120 c. 125 d. 18

15. If digits can be repeated

- a. 100 b. 210 c. 186 d. 216

For items 16 -18. Using the numbers 1, 2, 5, 7, 8 and 9 to create a 3-digit number, without repetition. How many numbers can be created under the following conditions:

16. If the number has a value less than 500, how many numbers are there?

- a. 20 b. 40 c. 60 d. 108

17. If the number created is an even number no more than 200, how many numbers are there?

- a. 48 b. 8 c. 32 d. 16

18. How many 3 digits can be created (w/o repetition) ?

- a. $P_{6,3}$ b. $C_{6,3}$
c. $6!$ d. $\frac{6!}{3!3!}$

19. Choosing a president, vice president, secretary and treasurer for school officers is an example of...

- a. permutation b. combination
c. fundamental counting principle d. both permutation and combination

For items 20 -22. There are 8 people, including Karen and Niko. How many ways can these people stand in a row in front of the whiteboard, under the following conditions?

20. If Karen and Niko must stand next to each other, how many ways are there?

- a. 1440 b. 10080
- c. 5040 d. 30240

21. If each person can stand in any position, how many ways are there?

- a. 720 b. 40320
- c. 12! d. 3628800

22. If Karen and Niko must stand in the first and the last row of the line, how many ways are there?

- a. 720 b. 38880
- c. 40320 d. 1440

23. How many different arrangements of the word "MATHEMATICS" are possible with or without meaning?

- a. 4,989,600 b. 39,916,800
- c. 6,930 d. 623,700

24. What is the equivalent value of $C(10,10)$?

- a. 10! b. 0 c. 1 d. 10

For items 25 – 26.

Use the letters from the word "JOINTS" to form any distinct 6-letter words, how many of these arrangements will be made under the following restrictions?

25. If the 6-letter words starts with a consonant

- a. 320 b. 186 c. 480 d. 20

26. If the first and the last letter must be vowels

- a. 32 b. 16 c. 48 d. 12

For items 27 – 30.

A company has four female and six male workers. According to the training schedule, a group of four workers will be selected to take a training course. Find the number of different groups which will be selected containing

27. no female workers

- a. 360 b. 15 c. 18 d. 25

28. only one female worker

- a. 25 b. 80 c. 90 d. 75

29. exactly two female workers

- a. 27 b. 25 c. 87 d. 90

30. more than two female workers

- a. 18 b. 15 c. 40 d. 25