Assign 2 Permutations

November 25, 2017 9:28 AM

Math 9 Enriched

Permutations

Name _____ Date _____

1. Using each of the digits 2, 5, 7, and 8 once in each number, how many different four-digit numbers can be formed?

$4 \times 3 \times 2 \times 1$

$= 24$

2. If the B and the E must remain in their original positions, in how many different ways can the letters in the word BALTIMORE be arranged?

B _____ E

$7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$= 5040$

3. In how many different ways can the letters in the word TEST be scrambled?

TEST $n = 4$

$a = 2$

$\#\text{ of ways} = \frac{4!}{2!}$

$= 4 \times 3$

$= 12$

4. A four-letter sequence is formed by rearranging the letters in the word "math". How many such different sequences are possible?

MATH $\Rightarrow 4 \times 3 \times 2 \times 1$

$= 24$

5. The 5 letters of the word ROTOR are place on separate pieces of paper. By choosing 3 of these pieces of paper, how many distinct 3-letter arrangements can be made?

RRO ROR ORR RRT RTR TRR
OOR ORO ORR OOT OTO TOO
OTR ORT TOR TRO RTO ROT
18

6. How many distinct arrangements of the letters in the word CHAIR are possible?

$5 \times 4 \times 3 \times 2 \times 1$
$= 120$

7. The letters in the word COUNTS are to be written down in some order from left to right. In how many different ways can this be done?

$6 \times 5 \times 4 \times 3 \times 2 \times 1$
$= 720$

8. How many different arrangements of the letters of the word SCIENCE have N as their first letter and S as their last?

N _ _ _ _ _ S

~~S~~CIE~~N~~CE $\Rightarrow \frac{5!}{2!} =$
$= 5 \times 4 \times 3$
$= 60$

9. How many different ways can the five letters of the word STATE be scrambled if the two T's cannot be consecutive?

① 2 ways: "USE COMPLEMENT"

$\frac{5!}{2!} - 4!$

$= 5 \times 4 \times 3 - 24$

$= 60 - 24$

$= 36$

② $3 \times 2 \times 1 = 6$

T _ T _ _ _ T _ T

T _ _ T _ _ , 6 ways

T _ _ _ T

_ T _ T _

_ T _ _ T

Each way: $6 \times 6 = 36$

10. How many different ways can the letters of the word FOUR be scrambled so that the first letter is a vowel and the last letter is a consonant?

F/R _ _ _ O/U

$= 2 \times 2 \times 1 \times 2 = 8$

11. How many ways could 8 different students be selected for president, vice-president and treasurer of a club if each student holds exactly one office?

$8 \times 7 \times 6$

$= 336$

56 × 6 = 300 + 36

12. In how many ways can 4 students from a group of 9 be seated in a row of 4 chairs?

$9P_4 = 9 \times 8 \times 7 \times 6$

$= 3024$

72

	40	2
70	2800	140
2	80	4

2800 + 220 = 3024

13. How many 2-letter permutations are there using the letters in the word NUMBER?

$6P_2 = 6 \times 5$

$= 30$

14. A softball all-star team is introduced with the catcher first and the pitcher last. If there are 9 players altogether, how many ways can the remaining team members be introduced between the catcher and the pitcher?

$7! = 5040$

15. Write the following expression without using the factorial symbol.

$\frac{(n-4)!}{(n-1)!}$

$\frac{(n-4)!}{(n-1)(n-2)(n-3)(n-4)!}$

$= \frac{1}{(n-1)(n-2)(n-3)}$

16. Write the following expression without using the factorial symbol.

$\frac{(n-6)!}{(n-5)!}$

$\frac{(n-6)!}{(n-5)(n-6)!} = \frac{1}{n-5}$

17. Solve for n.

$${}_nP_2 = 20$$

1st METHOD:

- 2 spaces

$n \times (n-1) = 20$

$5 \times 4 = 20$

$\therefore \boxed{n=5}$

2nd METHOD:

$${}_nP_2 = \frac{n!}{(n-r)!} = 20$$

$$\frac{n!}{(n-2)!} = 20$$

$$n(n-1) = 20$$

$$n^2 - n = 20$$

$$n^2 - n - 20 = 0$$

$$(n-5)(n+4) = 0$$

$\boxed{n=5}$ $n \neq -4$

18. Solve for r.

$${}_7P_r = 840$$

1st

$7 \times 6 \times 5 \times 4 = 840$

4 spaces.

So $\boxed{r=4}$

$$\frac{7!}{(7-r)!} = 840$$

$$\frac{7!}{840} = (7-r)!$$

$$6 = (7-r)!$$

$$3! = (7-r)!$$

$$3 = 7 - r$$

$\boxed{r=4}$

19. Solve for n.

$${}_nP_4 = 360$$

$n \times (n-1) \times (n-2) \times (n-3) = 360$

or $\frac{n!}{(n-4)!} = 360$

- Trial & error.

$n=8$

$8 \times 7 \times 6 \times 5 \neq 360$ (Too big)

$5 \times 4 \times 3 \times 2 = 360$ ✓ $\boxed{n=5}$

Math 9 Enriched Permutations Mr. Young 03/06/2010

Answer List

1. 24 (numbers)
2. 5040 (ways)
3. 12 (ways)
4. 24 (sequences)
5. 18 (arrangements)
6. 120 (arrangements)
7. 720 (ways)
8. 30 (arrangements)
9. 36 (ways)
10. 8 (ways)
11. 8 (ways)
12. 3024
13. 30
14. 5040
15. $\frac{1}{(n-3)(n-2)(n-1)}$
16. $\frac{1}{(n-5)}$
17. 5
18. 4
19. 6

Catalog List

1. MCC EC 1
2. MCC EC 21
3. MCC EC 12
4. MCC EC 35
5. MCC EC 33
6. MCC EC 99
7. MCC EC 109
8. MCC EC 150
9. MCC EC 142
10. MCC EC 135
11.
12. AW3 FB 21
13. AW3 FB 6
14. AW3 FB 16
15. AW3 FB 38
16. AW3 FB 40
17. AW3 FB 30
18. AW3 FB 34
19. AW3 FB 31