9.1 Day 2

Thursday, May 7, 2015 9:07 AM

Precalculus
Section 9.1 Notes – Day 2
More Combinatorics and Permutations

Name:
Period:

WARM IT UP!

PERMUTATION COUNTING FORMULA

Sometimes, we have more objects than we have "blanks" to fill. For instance, we may wish to consider how many ways 3 prize winners may be selected from a group of 11 entrants. In these instances, we are interested in using *n* objects to fill *r* blanks, where n > r.

Permutations of n objects taken r at a time: $_{11}P_3 = \frac{11!}{(11-3)!} = \frac{11!}{8!}$

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

11 10 9

11 10 9 8 . . X

Evaluate each of the following permutations.

1. Find the number of ways to arrange 5 objects chosen from a group of 8 objects.

$$_8P_5 = \frac{8!}{3!} = 6720$$

X 2. Sadly, only nine students entered Mr. V.'s annual Pi-Day Costume Contest. How many ways can he select three students to be the "Best Dressed", "First Runner-Up" and "Second Runner-Up"?

$$_9P_3 = \frac{9!}{6!} = 504$$

3. A Precalculus classroom has 27 desks and 21 students. How many different seating charts are possible?

$_{27}P_{21} = \frac{27!}{6!} \approx 1.5 \times 10^{25}$

$\frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{4 \cdot 3 \cdot 2 \cdot 1}$

4. Using seven Scrabble tiles, how many sequences can be made that use:

a. Three letters? $_7P_3 = \frac{7!}{4!} = 210$

b. Four letters? $_7P_4 = \frac{7!}{3!} = 840$

c. Explain why the answer to part b. is four times the answer to part a.

5. Using seven Scrabble tiles, how many sequences can be made that use:

a. Six letters? $_7P_6 = \frac{7!}{1!} = 5040$

$7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2$ (1)

b. Seven letters? $_7P_7 = \frac{7!}{0!} = 5040$ $7!$

c. Explain why the answer to parts a. and b. are the same.

6. A filing system at a museum assigns each artifact a unique code consisting of two letters followed by three digits. How many codes are possible if neither letters nor digits may be repeated?

$L_1 L_2 D_1 D_2 D_3$

AB 123

$26 \cdot 25 \cdot 10 \cdot 9 \cdot 8$ $\quad * {}_{26}P_2 \cdot {}_{10}P_3$

Bonus! How would your answer change if the letters and digits could appear in any order?

A1B23

A12B3

AB321

CAN YOU CREATE YOUR OWN?

Write your own question that can be answered using the Permutation Counting Formula.