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.

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Permutations of n objects taken r at a time: $\begin{vmatrix}
1 & 3 \\
3 & -3
\end{vmatrix} = \begin{vmatrix}
1 & 3 \\
3 & -3
\end{vmatrix} = \begin{vmatrix}
1 & 3 \\
3 & -3
\end{vmatrix}$

$$\Lambda P_{\Gamma} = \frac{\Lambda!}{(h-r)!}$$

1 10 9

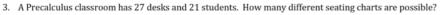
Evaluate each of the following permutations.

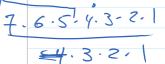
1. Find the number of ways to arrange 5 objects chosen from a group of 8 objects.

$$8^{\circ}_{5} = \frac{8!}{3!} = 6720$$

 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"?

$$9l_3 = \frac{9!}{6!} = 504$$



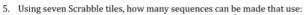


- 4. Using seven Scrabble tiles, how many sequences can be made that use:
 - a. Three letters?

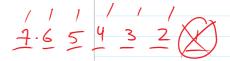


b. Four letters?

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



 $7P_6 = \frac{7!}{1!} = 5040$



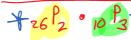
b. Seven letters?
$$7P_7 = \frac{7!}{0!} = 5040$$

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? $L_1 L_2 D_1 D_2 D_3$









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



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

A1 B2 3 A12 B3 AB321