Permutations

Permutations.tns

Name _____

Class _____

Problem 1 – An introduction

A password must contain 5 unique lowercase letters. How many possible passwords are there?

A. 3,125 **B.** 100,000 **C.** 7,893,600 **D.** 11,881,376

- Explain why you chose the answer you did.

Problem 2 – Factorials and the Fundamental Counting Principle

- Evaluate the following. $5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 =$ _____

  $5! =$ _____

  $0! =$ _____

  $(5-2)! =$ _____

  $5! - 2! =$ _____

- A spinner with four equal sections colored red, green, blue, and yellow is spun, and a penny is flipped. List all possible outcomes.

- A penny is flipped three times. List all possible outcomes.

- State the Fundamental Counting Principle in your own words.

Problem 3 – *n* objects taken *n* at a time

- List all the ways in which the letters *a*, *b*, and *c* can be arranged.

- What multiplication expression can be used to find the answer? _____
- Complete this equation: ${}_nP_n =$ ☐
- Find how many different ways you can arrange the letters in the word **NUMBER**. _____

Problem 4 – *n* objects taken *r* at a time

- List all of the ways to arrange *two* of the following 4 letters: *a*, *b*, *c*, and *d*.

- What multiplication expression can be used to find the answer? _____
- Complete this equation: $_nP_r = \frac{\square}{\square}$
- A collector has 16 statues. In how many ways can the collector arrange 5 of the statues on a shelf? _____

Problem 5 – Practice

- A certain password must contain 5 unique lowercase letters. How many possible passwords are there? _____
- Use permutations to find the number of ways the letters in the word **FLOWER** can be arranged. _____
- Ten people are in a race. Use permutations to find the number of ways 1st, 2nd, and 3rd places can be awarded. _____
- **CHALLENGE:** A password must have 3 unique lowercase letters and 5 unique digits. Find the number of possible passwords if the letters must stay grouped together and the digits must stay grouped together. _____

Extension

Read page 6.1. Find the number of distinguishable permutations of the letters in each of these words.

- **PIZZA** _____
- **COOKBOOK** _____
- **SUCCESS** _____
- **MISSISSIPPI** _____