



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: ${}_n P_n = \square$
- 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: ${}_n P_r = \frac{\boxed{}}{\boxed{}}$

- 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 p.705.

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

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