

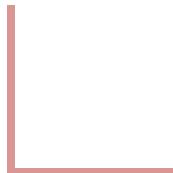
# Mathematical Foundations for Computer Applications

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## Permutations Problems

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# Mathematical Foundations for Computer Applications

## Permutations-Problems

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1. Determine the number of 4 digit decimal number that contain no repeated digit.

**Total Number=** $9*9*8*7 = 4536$

**OR**

Required number=Total 4 digit number – “4” digit number “0” in the beginning

$$={}^{10}P_4 - {}^9P_3$$

$$=5040 - 504$$

$$= \mathbf{4536}$$

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2. In how many ways can we select three students from a group of five students to stand in a line for a picture? In how many ways can we arrange all five of these students in a line for a picture?

- (a) By the product rule, there are  $5 \cdot 4 \cdot 3 = 60$  ways ( ${}^5P_3$ )
- (b) There are  $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$  ways to arrange all five students in a line for a picture.

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3. How many ways are there to select a first-prize winner, a second-prize winner, and a third-prize winner from 100 different people who have entered a contest?

- $P(100, 3) = 100 \cdot 99 \cdot 98 = 970,200.$

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4. Suppose that there are eight runners in a race. The winner receives a gold medal, the second place finisher receives a silver medal, and the third-place finisher receives a bronze medal. How many different ways are there to award these medals, if all possible outcomes of the race can occur and there are no ties?

- $P(8, 3) = 8 \cdot 7 \cdot 6 = 336$  possible ways to award the medals.

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5. How many 3-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?

$$= {}^{10}P_3 = 10! / (10-3)!$$

$$= 10 \times 9 \times 8$$

$$= 720$$

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6. Suppose that a saleswoman has to visit eight different cities. She must begin her trip in a specified city, but she can visit the other seven cities in any order she wishes. How many possible orders can the saleswoman use when visiting these cities?

$$7! = 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 5040 \text{ ways}$$

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## Permutations-Problems

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7. How many strings can be formed by considering 4 distinct letters followed by 3 distinct digits.

*Using product Rule* =  $26*25*24*23*10*9*8$

*Using Permutation:*  ${}^{26}P_4 * {}^{10}P_3$

$$= 258336000$$

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## Permutations-Problems

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8. How many permutations of the letters  $ABCDEFGH$  contain the string  $ABC$  ?

- The letters  $ABC$  must occur as a block, we can find the answer by finding the number of permutations of six objects,
- These six objects can occur in any order, there are  $6!$  = **720** permutations



# THANK YOU

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