MATH-3012-QHS
M2.2-Quiz

Taiyun

Professor Dr. Kalila Lehmann

Solutions

Here is an example sentence.

1. Find the number of permutations of all the letters in "GEOLOGICAL". Use a calculator to simplify your answer to an integer.

   The number of permutations is 453,600.

   - The word has 10 letters in total.
   - The repeated letters are G (2 times), O (2 times), and L (2 times).
   - The formula for permutations with repetitions is:

   $$\frac{n!}{n_1!n_2!\ldots n_k!}$$

   - Calculation:

   $$\frac{10!}{2! \cdot 2! \cdot 2!} = \frac{3,628,800}{8} = 453,600$$

2. How many length 5 permutations of the letters in BOTTLE are there?

   The number of length 5 permutations is 360.

   - The word has 6 letters, with 'T' repeated twice.
   - Case 1: Permutations containing both 'T's. We choose 3 unique letters from the remaining 4 (B, O, L, E) and arrange them with the two 'T's.

   $$\binom{4}{3} \cdot \frac{5!}{2!} = 4 \cdot 60 = 240$$

   - Case 2: Permutations containing only one 'T'. We choose 4 unique letters from the remaining 4 and arrange them with the single 'T'.

   $$\binom{4}{4} \cdot 5! = 1 \cdot 120 = 120$$

   - Total permutations:

   $$240 + 120 = 360$$

3. How many length 4 permutations of the letters in COMPUTER are there?

   The number of length 4 permutations is 1,680.

   - The word has 8 unique letters.

- We use the k-permutation formula:

$$P(n, k) = \frac{n!}{(n-k)!}$$

- Calculation:

$$P(8, 4) = \frac{8!}{(8-4)!} = \frac{8!}{4!} = 8 \cdot 7 \cdot 6 \cdot 5 = 1,680$$

4. How many permutations of the symbols in "Elephantine" are there? Case matters! Use a calculator to simplify your answer to an integer.

The number of permutations is 9,979,200.

- The word has 11 symbols.
- The repeated symbols are 'e' (2 times) and 'n' (2 times).
- Calculation:

$$\frac{11!}{2! \cdot 2!} = \frac{39,916,800}{4} = 9,979,200$$