

# Important Questions For Class 11 Maths Chapter 6 - Permutations and Combinations

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## Question 1:

Find the 3-digit numbers that can be formed from the given digits: 1, 2, 3, 4 and 5 assuming that

- a) digits can be repeated.
- b) digits are not allowed to be repeated.

## Solution:

a) By the multiplication principle, the number of ways in which three-digit numbers can be formed from the given digits is  $5 \times 5 \times 5 = 125$

b) By the multiplication principle, the number of ways in which three-digit numbers can be formed without repeating the given digits is  $5 \times 4 \times 3 = 60$

## Question 2:

A coin is tossed 6 times, and the outcomes are noted. How many possible outcomes can be there?

## Solution:

When we toss a coin once, the number of outcomes we get is 2 (Either Head or tail)

So, in each throw, the no. of ways to get a different face will be 2.

Therefore, by the multiplication principle, the required no. of possible outcomes is

$$2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$$

## Question 3:

Evaluate the following

(i)  $6!$  (ii)  $5! - 2!$

## Solution:

(i)  $6! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 = 720$

(ii)  $5! = 1 \times 2 \times 3 \times 4 \times 5 = 120$

$$\text{As } 2! = 1 \times 2 = 2$$

$$\text{Therefore, } 5! - 2! = 120 - 2 = 118.$$

**Question 4:**

From a team of 6 students, in how many ways can we choose a captain and vice-captain assuming one person can not hold more than one position?

**Solution:**

From a team of 6 students, two students are to be chosen in such a way that one student will hold only one position.

Here, the no. of ways of choosing a captain and vice-captain is the permutation of 6 different things taken 2 at a time.

$$\text{So, } {}^6P_2 = 6! / (6 - 2)! = 6! / 4! = 30$$

**Question 5:**

How many words, with or without meaning, can be formed using all the letters of the word EQUATION, using each letter exactly once?

**Solution:**

Number of letters in word EQUATION = 8

$$n = 8$$

If all letters of the word used at a time

$$r = 8$$

Different numbers formed =  $nPr$

$$= {}^8P_8$$

$$= 8! / (8 - 8)!$$

$$= 8! / 0!$$

$$= 8! / 1$$

$$= 8!$$

$$= 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1$$

$$= 40320$$

**Question 6:**

How many words can be formed each of 2 vowels and 3 consonants from the letters of the given word – DAUGHTER?

**Solution:**

No. of Vowels in the word – DAUGHTER is 3.

No. of Consonants in the word Daughter is 5.

No of ways to select a vowel =  ${}^3C_2 = 3!/2!(3 - 2)! = 3$

No. of ways to select a consonant =  ${}^5C_3 = 5!/3!(5 - 3)! = 10$

Now you know that the number of combinations of 3 consonants and 2 vowels =  $10 \times 3 = 30$

Total number of words =  $30 \times 5! = 3600$  ways.

**Question 7:**

It is needed to seat 5 boys and 4 girls in a row so that the girl gets the even places. How many are such arrangements possible?

**Solution:**

5 boys and 4 girls are to be seated in a row so that the girl gets the even places.

The 5 boys can be seated in  $5!$  Ways.

For each of the arrangements, 4 girls can be seated only at the places which are cross marked to make girls occupy the even places).

B x B x B x B x B

So, the girls can be seated in  $4!$  Ways.

Hence, the possible number of arrangements =  $4! \times 5! = 24 \times 120 = 2880$

**Question 8:**

Find the number of 5-card combinations out of a deck of 52 cards if each selection of 5 cards has exactly one king.

**Solution:**

Take a deck of 52 cards,

To get exactly one king, 5-card combinations have to be made. It should be made in such a way that in each selection of 5 cards, or in a deck of 52 cards, there will be 4 kings.

To select 1 king out of 4 kings =  ${}^4C_1$

To select 4 cards out of the remaining 48 cards =  ${}^{48}C_4$

To get the needed number of 5 card combination =  ${}^4C_1 \times {}^{48}C_4$

$$= 4 \times 47 \times 46 \times 45$$

$$= 778320 \text{ ways.}$$

**Question 9:**

Find the number of 6 digit numbers that can be formed by using the digits 0, 1, 3, 5, 7, and 9. These digits shall be divisible by 10, and no digit shall be repeated?

**Solution:**

The number which has a 0 in its units place is divisible by 10.

If we put 0 in the unit place,  $\_ \_ \_ \_ 0$ , there will be as many ways to fill 5 vacant places.  
(1, 3, 5, 7, 9)

The five vacant places can be filled in  $5!$  ways = 120.

**Question 10:**

Evaluate:  $10! - 6!$

**Solution:**

$$10! = 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 3628800$$

$$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

$$10! - 6! = 3628800 - 720 = 3628080$$