NCERT Solutions for Class XI Maths

Chapter-7 Exercise-7.1

NCERT Math Class 11

1. How many 3-digit numbers can be formed from the digits 1, 2, 3,4 and 5 assuming that
(i) repetition of the digits is allowed?
(ii) repetition of the digits is not allowed?

1. (i) There will be as many ways as there are ways of filling 3 vacant places in succession by the given five digits. In this case, repetition of digits is allowed.
Therefore, the units place can be filled in by any of the given five digits.
Similarly, tens and hundreds digits can be filled in by any of the given five digits.
Thus, by the multiplication principle, the number of ways in which three-digit numbers can be formed from the given digits is $5 \times 5 \times 5 = 125$

(ii) In this case, repetition of digits is not allowed. Here, if units place is filled in first, then it can be filled by any of the given five digits.
Therefore, the number of ways of filling the units place of the three-digit number is 5.
Then, the tens place can be filled with any of the remaining four digits and the hundreds place can be filled with any of the remaining three digits.
Thus, by the multiplication principle, the number of ways in which three-digit numbers can be formed without repeating the given digits is $5 \times 4 \times 3 = 60$

2. How many 3-digit even numbers can be formed from the digits 1, 2, 3, 4, 5, 6 if the digits can be repeated?

2. Let the 3 digit number be ABC, where C is at the units place, B at the tens place and A at the hundreds place.
As the number has to even, the digits possible at C are 2 or 4 or 6. That is number of possible digits at C is 3.Now, as the repetition is allowed, the digits possible at B is 6 (any of the 6 is okay). Similarly at A, also, the number of digits possible is 6.
Therefore, The total number possible 3-digit numbers =6 × 6 × 3 = 108.

3. How many 4-letter code can be formed using the first 10 letters of the English alphabet, if no letter can be repeated?

3. There are as many codes as there are ways of filling 4 vacant places in succession by the first 10 letters of the English alphabet, keeping in mind that the repetition of letters is not allowed.

The first place can be filled in 10 different ways by any of the first 10 letters of the English alphabet following which, the second place can be filled in by any of the remaining letters in 9 different ways. The third place can be filled in by any of the remaining 8 letters in 8 different ways and the fourth place can be filled in by any of the remaining 7 letters in 7 different ways.
Therefore, by multiplication principle, the required numbers of ways in which 4 vacant places can be filled is $10 \times 9 \times 8 \times 7 = 5040$
Hence, 5040 four-letter codes can be formed using the first 10 letters of the English alphabet, if no letter is repeated.

4. How many 5-digit telephone numbers can be constructed using the digits 0 to 9 if each number starts with 67 and no digit appears more than once?

4. Let the five digit number be ABCDE. Given that first 2 digits of each number is 67. Therefore the number is 67CDE.
As the repetition is not allowed and 6 and 7 are already taken, the digits available for place C are 0,1,2,3,4,5,8,9. The number of possible digits at place C is 8. Suppose one of them is taken at C, now the digits possible at place D is 7. And similarly, at E the possible digits are 6.
∴The total five digit numbers with given conditions=8 × 7 × 6=336.

5. A coin is tossed 3 times and the outcomes are recorded. How many possible outcomes are there?

5. When a coin is tossed once, the number of outcomes is 2 (Head and tail) i.e., in each throw, the number of ways of showing a different face is 2.
Thus, by multiplication principle, the required number of possible outcomes is $2 \times 2 \times 2 = 8$

6. Given 5 flags of different colours, how many different signals can be generated if each signal requires the use of 2 flags, one below the other?

6. The signal requires 2 flags.
The number of flags possible for upper flag is 5.
Now as one of the flag is taken, the number of flags remaining for lower flag in the signal is 4.
The number of ways in which signal can be given= 5 × 4 =20.