EXERCISE 7.1 PAGE NO: 138

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?

Solution:
(i) 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.
Now when repetition is allowed,
The number of digits possible at C is 5. As repetition is allowed, the number of digits possible at B and A is also 5 at each.
Hence, the total number possible 3-digit numbers $=5 \times 5 \times 5 = 125$

(ii) 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.
Now when repetition is not allowed,
The number of digits possible at C is 5. Let's suppose one of 5 digits occupies place C, now as the repletion is not allowed, the possible digits for place B are 4 and similarly there are only 3 possible digits for place A.
Therefore, The total number of possible 3-digit numbers$=5 \times 4 \times 3=60$

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

Solution:
Let the 3-digit number be ABC, where C is at the unit's 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. Similarly, at A, also, the number of digits possible is 6.
Therefore, The total number possible 3 digit numbers = $6 \times 6 \times 3 = 108$.

3. How many 4-letter code can be formed using the first 10 letters of the English

alphabet, if no letter can be repeated?

Solution:
Let the 4 digit code be 1234.
At the first place, the number of letters possible is 10.
Let's suppose any 1 of the ten occupies place 1.
Now, as the repetition is not allowed, the number of letters possible at place 2 is 9. Now at 1 and 2, any 2 of the 10 alphabets have been taken. The number of alphabets left for place 3 is 8 and similarly the number of alphabets possible at 4 is 7.
Therefore the total number of 4 letter codes=10 × 9 × 8 × 7=5040.

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?

Solution:
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?

Solution:
Given A coin is tossed 3 times and the outcomes are recorded
The possible outcomes after a coin toss are head and tail.
The number of possible outcomes at each coin toss is 2.
∴The total number of possible outcomes after 3 times = 2 × 2 × 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?

Solution:
Given 5 flags of different colours

We know 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.