Chapter-1
Permutation and Combination

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Exercise - 1.1

1. A football stadium has four entrance gates and nine exists. In how many different ways can a man enter and leave the stadium?

Solution:
There are total 4 entrance but total 9 exists. So by basic principle of counting:

Total no. of ways = 4×9
$= 36$

2. There are six doors in a hostel. In how many ways can can a student enter the hostel and leave by different door?

Solution:
There are total 6 ways to enter in a hostel but only 5 ways to ~~exist~~ exit. So, by basic principle of counting.

Total no. of ways = 6×5
$= 30$

∴ A student can enter and exit the hostel from a different door in 30 ways.

3. In how many ways can a man send three of his children to seven different colleges of a certain town?

Solution:
For a man to send three of his children to 7 different colleges, the total no. of ways = $5 \times 6 \times 7$
$= 210$

4. There are five main roads between the cities A and B. In how many ways can a man go from a city to another and return by a different road?

Solution:
There are total ~~4 roo~~ 5 roads to travel from city A to

B but only 4 roads to travel from B to A.
By basic principle of counting.
Total no. of ways = 5×4
= 20

5. There are five main roads between the cities A and B and four between B and C. In how many ways can a person drive from A to C and return without driving on the same road twice?
Solution:
Here, There are five main roads between A to B and 4 roads between B to C.
Now, Total ways to go from A to C is given by
= 5×4
= 20
Also,
Total possible ways to return from C to A without repeating the path = 4×3
= 12
Hence ..
Total ways to travel from A to C and return back without repeating path = 20×12
= 240

6. How many numbers of at least three digits can be formed from the integers 1, 2, 3, 4, 5, 6?
Solution:
Here, number consisting at least 3 digits means that it can have 3 or 4 or 5 or 6 digits.
For 3 digits number = 4×5×6 = 120
For 4 digits number = 3×4×5×6 = 360

For 5 digit numbers = $2 \times 3 \times 4 \times 5 \times 6 = 720$
For 6 digits number = $1 \times 2 \times 3 \times 4 \times 5 \times 6 = 720$
Hence,
The total no. of ways = $120 + 360 + 720 + 720$
$= 1920$

7. How many three digits number ~~can be~~ less than 500 can be formed from the integers 1, 2, 3, 4, 5, 6?
Solution:
For a 3 digit number to be less than 500. The hundreds place digit must be less than 5. So, the total choices for hundred, tens and one place are 4, 5 and 4 resp.
By basic law of counting.
Total no. of ways = $4 \times 5 \times 4$
$= 80$

8. Of the numbers formed by using all the figures 1, 2, 3, 4, 5 only once, how many are even?
Solution:
For a number to be even the unit place of the number must be even. So, the no. of choices for unit place is 2, for tens, hundreds, thousand and Ten-thousand place are 4, 3, 2 and 1 respectively.
By basic principle of counting:
Total no. of ways = $2 \times 4 \times 3 \times 2 \times 1$
$= 48$

9. How many different digit number between 4000 and 5000 can be formed with the digits 2, 3, 4, 5, 6, 7?
Solution:
For a number between 4000 and 5000, ~~the unit place~~

~~digit should be less than 5 and~~ the total no. of choices for unit place is 3. Again, for the digits in tense, hundred and thousand place, the no. of choices are 4, 5 and 1 respectively.

By basic principle of Counting:

Total no. of ways = $1 \times 5 \times 4 \times 3$

$= 60$

10. How many number of three digits number can be formed from the integers 2, 3, 4, 5, 6? How many of them are divisible by 5?

Solution:

For making 3 digits number from 2, 3, 4, 5, 6. The total possible ways = $3 \times 4 \times 5$

$= 60$

Also,

for a number divisible by 5, the no. in unit place must be divisible by 5. The total number of choices for ones, tense and hundred place are 1, 4 and 3 resp.

By basic principle of Counting:

Total no. of ways = $1 \times 4 \times 3$

$= ~~12~~ \ 12$