PROBABILITY

DIVYA SAI - FWC22094

16.4.10 **The number lock of a suitcase has 4 wheels each labelled with ten digits i.e. from 0 to 9.The lock opens with a sequence of four digits with no repeats.What is the probability of a person getting the right sequence to open the suitcase?**

Solution:

Let,the wheels be $X = \{1, 2, 3, 4\}$ and the digits be $Y = \{0, 1, 2...9\}$. There are 10 digits out of which 4 digits are to be chosen with no repetition

Example	Wheel	Outcome
1	8 6 4 2	Possible
2	8 4 2 6	Possible
3	1 2 3 4	Possible
4	8 8 8 8	Not Possible
5	1 1 2 2	Not Possible

Wheel 1	Wheel 2	Wheel 3	Wheel 4
10 ways	9 ways	8 ways	7 ways

Number of ways to fill first wheel, n(X=1) is 10.
Number of ways to fill second wheel, n(X=2)is 9.
Number of ways to fill third wheel, n(X=3) is 8.
Number of ways to fill fourth wheel, n(X=4) is 7.

Possible placement of digits are,
$$n(s) = n(X = 1) \times n(X = 2) \times n(X = 3) \times n(X = 4) = 10 \times 9 \times 8 \times 7 = 5040$$

Let A be the event the correct sequence is selected So,n(A)=1.
The lock opens with only one right sequence.

Probability of correct sequence is selected as P(A),

$$P(A) = \frac{n(A)}{n(s)} = \frac{1}{5040}$$

The probability of getting the right sequence to open the suitcase is $\boxed{\dfrac{1}{5040}}$