

Chapter 7

PERMUTATION, COMBINATION AND PROBABILITY

FACTORIAL NOTATION

Let n be a positive integer. Then the product $n (n - 1) (n - 2) \dots \dots \dots 3 \cdot 2 \cdot 1$ is denoted by $n!$ or n and read as n factorial.

i.e. $n! = n (n - 1) (n - 2) \dots \dots \dots 3 \cdot 2 \cdot 1$

and $n! = n (n - 1)!$ where $0! = 1$

EXERCISE 7.1

Q.1 Evaluate each of the following:

$$(i) 4! \quad (ii) 6! \quad (iii) \frac{8!}{7!} \quad (iv) \frac{10!}{7!} \quad (v) \frac{11!}{4! 7!} \quad (vi) \frac{6!}{3! 3!} \quad (vii) \frac{8!}{4! 2!}$$

$$(viii) \frac{11!}{2! 4! 5!} \quad (ix) \frac{9!}{2! (9 - 2)!} \quad (x) \frac{15!}{15! (15 - 15)!} \quad (xi) \frac{3!}{0!} \quad (xii) 4! 0! 1!$$

Solution:

$$(i) 4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$$

$$(ii) 6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$$

$$(iii) \frac{8!}{7!} = \frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 8$$

$$(iv) \frac{10!}{7!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 720$$

$$(v) \frac{11!}{4! 7!} = \frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{4 \cdot 3 \cdot 2 \cdot 1 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 330$$

$$(vi) \frac{6!}{3! 3!} = \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1 \cdot 3 \cdot 2 \cdot 1} = 20$$

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