8.2 Permutations of Different Objects

permutation – an arrangement of certain objects in a definite order

eg. numbers 1, 2 → 2 permutations 1 2 or 2 1

ex.1 How many ways can you arrange 6 people in a line?

$6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$ ways

factorial notation – a brief representation of the product of consecutive numbers.

$$n! = n(n-1)(n-2)\cdots(3)(2)(1)$$

(only for natural #'s) → $(-2)!$ or $(\tfrac{1}{4})!$ has no meaning

calc → $10! = 3,628,800$

$$\frac{12!}{9!3!} = \frac{\overset{2}{\cancel{12}}\cdot 11\cdot 10\cdot \cancel{9!}}{\cancel{9!}\,\cancel{3\cdot 2\cdot 1}} = 2\times 11\times 10 = 220$$

The notation used to represent the number of permutations of "n" distinct objects taken "r" at a time is:

$$_nP_r = \frac{n!}{(n-r)!}$$

$0 \le r \le n$

$0! = 1$

ex.2 You download 10 songs and create a playlist of 6 in any order. How many diff. playlists?

$$_{10}P_6 = \frac{10!}{(10-6)!} = \frac{10!}{4!} = 151{,}200$$

50 songs choose 40

$$\frac{50!}{10!} = 8.4 \times 10^{57}$$

p 702 # 4, 5, 6 ab, 7a, 8, 9, 10ac