Lesson Notes 2-3 Permutations of Distinguishable Objects

The number of permutations of n different objects taken r at a time is: $_nP_r = \frac{n!}{(n-r)!}$

Example 1: Matt has downloaded 10 new songs from an online music store. How many different 6-song play lists can be created from 10 songs?

$_{10}P_6 = \frac{10!}{4!} = 151200$ Math → Prb 2: nPr

10 nPr 6

Example 2: How many 8-song play lists could Matt in example 1 create?

$_{10}P_8 = 1,814,400$

Example 3: State the values of n for which each expression is defined.

a) (n + 3)! $n+3>0$

$n>-3$

(b) $\frac{n!}{(n+2)!}$ $n>0$

$n+2>0$

$n>-2$

Example 4: An online magazine requires each subscriber to have a password with exactly 8 characters. The password can use any digits from 0 to 9 and/or any letters of the alphabet. The password is case sensitive, so she can use both lower- and upper-case letters. How many different passwords are possible? $26+26+10 = 62$

$_{62}P_8 = 1.36E14$

1.36×10^{14}

Example 5: How many different passwords are possible in example 4 if the password must be at least 4 characters but a maximum of 6 characters?

4 charac

$_{62}P_4 = 13388280$

5 charac

$_{62}P_5 = 776520240$

6 charac

$_{62}P_6 = 4.42 \times 10^{10}$

Total $= 4.51 \times 10^{10}$

Example 6: At a used car lot, seven different car models are to be parked close to the street for each viewing.

a) The three red cars must be parked so that there is a red car at each end and the third car is exactly in the middle. How many ways can the seven cars be parked?

3 4 3 2 2 1 1

R R

$3! \cdot 4! = 144$

b) The three red cars must be parked side by side. How many ways can the seven cars be parked?

[| 5] 4 3 2 1

$5! \cdot 3! = 720$