Monday, August 29, 2011
9:54 AM

Permutations with Repetitions

Basic Counting Principle : $p \cdot q \cdot r \ldots$
- tells how many arrangements are possible for independent events
- fill slots (license plates, phone numbers, etc.)

Permutations

$n!$ find the number of arrangements (order matters) possible if all objects (n) in the set are chosen

$\frac{n!}{(n-r)!}$ find the number arrangements (order matters) if r objects are chosen from a set of n objects
* don't choose everything in the set *

Permutations with Repetition : $\frac{n!}{p!q!\ldots}$

find how many arrangements are possible where n is total number of objects and p, q are objects that are alike

Example 1: How many 5 letter patterns are formed from the word

T W E E T

n = number of total objects = 5
p = objects that are alike = T → 2
q = objects that are alike = E → 2

$\frac{n!}{p!q!} = \frac{5!}{2!2!}$ 30

$= \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1 \cdot 2 \cdot 1} = \frac{60}{2} = 30$

TENNESSEE

n = 9
E p = 4
N q = 2
S r = 2

$\frac{9!}{4!2!2!} \quad \frac{362880}{96} = 3780$

Example 2: There are 5 blue chips, 4 red chips, 1 green chip in a bucket. How many different looking stacks can I make if

a) only use blue and red ?

n = 9
Blue p = 5
Red q = 4

$\frac{9!}{5!4!} = 126$

b) all chips are used ?

n = 10
p, q stay the same

$\frac{10!}{5!4!} = 1260$