# Algebra 2 6.7 Permutations and Combinations Name:

**Permutation-** an arrangement of items in a particular order

*n* factorial $n! = n(n-1)(n-2) … 3 \*2\*1$ $0! = 1$

* *n*! can be used when you use all the items available

Ex: In how many orders can 6 people line up from left to right for a photo?

**Number of Permutations**

* When all the items are not used we can find Number of Permutations
* You will be given an amount of items “*n*” and will need to arrange only “*r*” items

$\_{n}P\_{r}$= $\frac{n!}{\left(n-r\right)!}$

Ex: $\_{8}P\_{3}$

Ex: How many 4 letter codes can be made if no letter can be used twice?

Ex: Use your calculator to find the number of possible locker permutatins can be made using the numbers 0 through 40 if no number can be used twice.

**Combination –** a selection in which the order does not matter

 Number of Combinations

 $\_{n}C\_{r}$= $\frac{n!}{r!\left(n-r\right)!}$

Ex: Find the number of possible combinations of ways to pull two bills out of your wallet if you only have a $1, $5, $10, and $20 bill.

Ex: $\_{5}C\_{3}$

Ex: $\_{10}C\_{4}$

Ex: A DJ wants to select 5 songs from a new CD that contains 12 songs. How many combinations are possible?

Ex: A pizza menu allows you to select 4 toppings at no extra charge from a list of 9 possible toppings. In how many ways can you select 4 or fewer toppings?

# Algebra 2 6.8 The Binomial Theorem Name:

Ex. Expand the following

 $(a+b)^{2}=$

 $(a+b)^{3}=$

**Pascal’s Triangle**



Find the next row

Ex: $(a+b)^{5}=$

Ex: $(x-3)^{4}=$

**Binomial Theorem**

 $(a+b)^{n}= a^{n}+ a^{n-1}b^{1}+ a^{n-2}b^{2}+…+ a^{1}b^{n-1}+ b^{n}$

$k^{th}$ term = $a^{n-\left(k-1\right)}b^{k-1}$

Ex: Find the 4th term of $(a+b)^{8}$

Ex: Find the 5th term of $(2a-b)^{9}$

Ex: Find the 2nd term of $(2x^{2}+1)^{5}$

**Application**

A family has 5 children. Assume the probability of a boy is 50%. Write the term in the expansion of $(b+g)^{5}$ and find the probability of exactly 3 boys.