Name:______________________________ Hour: ___________ Date: ___________

NOTES: Section 10.2 – Use Combinations and the Binomial Theorem

Goals: #1 - I can use combinations to count.

#2 - I can use "AND" and "OR" to evaluate a combination.

#3 - I can apply the binomial theorem.

Homework: Lesson 10.2 Worksheet

Warm Up:

1. Find the number of distinguishable permutations of the letters in the word BASKETBALL.

2. How many different 3-digit IDs can be made if the first digit must be a 7 and no digits may be repeated?

3. How many different ways can a chairperson and an assistant be selected for a research project if there are 7 qualified scientists for the position?

Example #1:

There are 6 people that need to be seated. In how many ways can these 6 people be seated in 3 chairs?

What if… we only cared about choosing 3 people to sit down, but we didn't care about what order they are sitting. In how many ways can I choose 3 out of the 6 people where I don't care which chair they sit on?

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Notes:

In Section 10.1, we learned that ____________ is important for some counting problems.

A ______________________ is a selection of r objects from a group of n objects where

____!:

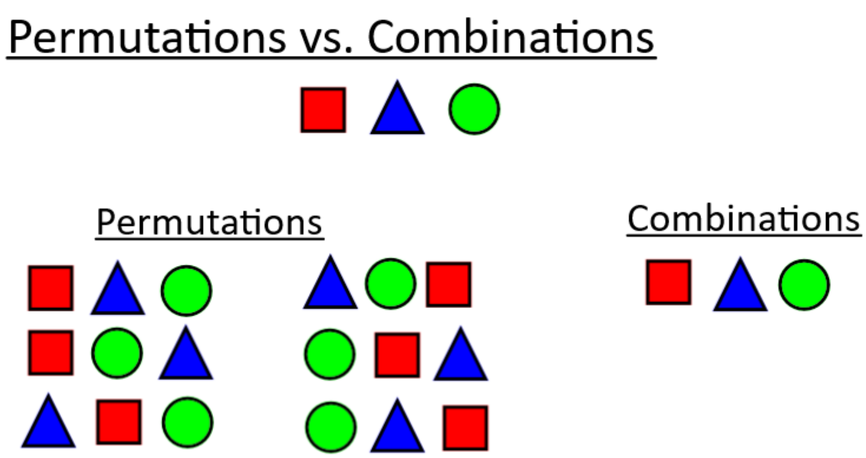
Example:

For other counting problems, ____________ is _________ important.

A ______________________ is a selection of r objects from a group of n objects where

____!:

Example:



Example #2:

You are picking 7 books from a stack of 32. How many different 7 book groups are possible?

You practice:

A relay race has a team of 4 runners who run different parts of the race. There are 20 students on your track squad. In how many ways can the coach select students to compete on the relay team? (The coach does not care in which order the 4 runners run).

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Example #3:

A standard deck of 52 playing cards has 4 suits with 13 different cards in each suit.

a. If the order in which the cards are dealt is not important, how many different 5-card hands are possible?

b. In how many 5-card hands are all 5 cards face cards (kings, queens, or jacks)?

Standard 52-Card Deck

K ♠	K ♥	K ♦	K ♣
Q ♠	Q ♥	Q ♦	Q ♣
J ♠	J ♥	J ♦	J ♣
10 ♠	10 ♥	10 ♦	10 ♣
9 ♠	9 ♥	9 ♦	9 ♣
8 ♠	8 ♥	8 ♦	8 ♣
7 ♠	7 ♥	7 ♦	7 ♣
6 ♠	6 ♥	6 ♦	6 ♣
5 ♠	5 ♥	5 ♦	5 ♣
4 ♠	4 ♥	4 ♦	4 ♣
3 ♠	3 ♥	3 ♦	3 ♣
2 ♠	2 ♥	2 ♦	2 ♣
A ♠	A ♥	A ♦	A ♣

Notes:

When finding the number of ways __________ an event *A* ________ event *B* can occur, you need to ________________________ the number of ways.

Example: Find the number of possible 5-card hands that contain 4 kings **<u>and</u>** 1 card that is not a king.

When finding the number of ways that event *A* ________ event *B* can occur, you need to ________________________ the number of ways.

Example: Find the number of possible 5-card hands that contain 5 hearts **<u>or</u>** 5 diamonds.

Couting problems often involve phrases that contain _________________________ or _________________________. In some cases, ____________________________ may be easier.

Example: Find the number of possible 5-card hands that contain at least 1 queen.

- ____:
- ____:

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You practice:

During the school year, the girls' basketball team is scheduled to play 12 home games. You want to attend at least 3 of the games. How many different combinations of the games can you attend?

Notes:

If you arrange the values of __________________________ in a triangular pattern, you get what is called ________________________________.

	Pascal's triangle as combinations	Pascal's triangle as numbers
$n = 0$ (0th row)	${}_0C_0$	
$n = 1$ (1st row)	${}_1C_0 \quad {}_1C_1$	
$n = 2$ (2nd row)	${}_2C_0 \quad {}_2C_1 \quad {}_2C_2$	
$n = 3$ (3rd row)	${}_3C_0 \quad {}_3C_1 \quad {}_3C_2 \quad {}_3C_3$	
$n = 4$ (4th row)	${}_4C_0 \quad {}_4C_1 \quad {}_4C_2 \quad {}_4C_3 \quad {}_4C_4$	
$n = 5$ (5th row)	${}_5C_0 \quad {}_5C_1 \quad {}_5C_2 \quad {}_5C_3 \quad {}_5C_4 \quad {}_5C_5$	

The numbers in Pascal's triangle can be used to find ____________ in binomial expansion.

Example #4: Use the binomial theorem to write the binomial expansion.

1. $(x^2 + y)^3$
2. $(2p - q)^2$