Algebra 2

8-06A Permutations and Combinations

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Permutation

- How many ways to _____ objects

A, B, C

- Number of Permutations of n objects taken r at a time

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

- Factorial (!) – that number _____ all whole numbers _____ than it
- $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = $ _____

Permutations on a Calculator

TI
1. Enter value of n
2. Press MATH → PRB ↓ nPr
3. Enter value of r

NumWorks
1. Press Toolbox button
2. Down to Probability
3. Down to Combinatorics
4. Permute(n,k)
5. Enter n then r

Evaluate $_5P_2$ Evaluate $_9P_1$

Consider the letters in the word PENCILS.
In how many ways can you arrange all of the letters?

In how many ways can you arrange 3 of the letters?

Eight people serve on a committee. In how many different ways can a chairperson, a recorder, and a treasurer be chosen from the committee members?

You and your friend are auditioning for a part in the school play. There are 15 people auditioning, and the order of their auditions is chosen at random. Find the probability that your audition is last and your friend's audition is second to last.

You and your friend are 2 of 8 servers working a shift in a restaurant. At the beginning of the shift, the manager randomly assigns one section to each server. Find the probability that you are assigned Section 1 and your friend is assigned Section 2.

Combination

- Arranging of objects _____ order

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

- _____ have order
- _____ do not have order

Combinations on a Calculator

TI
1. Enter value of n
2. Press MATH → PRB ↓ nCr
3. Enter value of r

NumWorks
1. Press Toolbox button
2. Down to Probability
3. Down to Combinatorics
4. $\binom{n}{k}$
5. Enter n then r

Evaluate $_5C_1$ Evaluate $_9C_9$

Count the possible combinations of 4 letters chosen from the list P, Q, R, S, T, U.

You are listening to music. You have time to listen to 3 songs from your playlist of 16 songs. How many combinations of 3 songs are possible?

A team of 25 rowers attends a rowing tournament. Five rowers compete at a time. How many combinations of 5 rowers are possible?

Tell whether to use a permutation or combination, then answer the question.
To complete an exam, you must answer 8 questions from a list of 10 questions. In how many ways can you complete the exam?

Fifty-two athletes are competing in a bicycle race. In how many orders can the bicyclists finish first, second, and third?

An art teacher has selected 13 projects, including one of yours and one of your friend's, to put into a display case in the hallway. The projects are placed at random. There is room for 2 projects in the middle row of the case. What is the probability that your project and your friend's project are the 2 placed in the middle row?

You and your friend are in the studio audience on a game show. From an audience of 300 people, 2 people are randomly selected as contestants. What is the probability that you and your friend are chosen?

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445 #1, 3, 5, 7, 9, 13, 14, 15, 16, 17, 19, 21, 23, 27, 28, 33, 34, 35, 37, 38 = 20