Math 30-2: U2L5 Teacher Notes

Exploring Combinations

Key Math Learnings:

4.1 Represent and solve counting problems, using a graphic organizer.

5.2 Determine, with or without technology, the value of a factorial.

5.5 Determine the number of permutations of n elements taken r at a time.

5.8 Generalize strategies for determining the number of permutations of n elements taken r at a time.

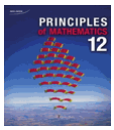
6.1 Explain, using examples, why order is or is not important when solving problems that involve permutations or combinations.

6.2 Determine the number of combinations of n elements taken r at a time.

6.3 Generalize strategies for determining the number of combinations of n elements taken r at a time.

Exploring Combinations

There is a difference between counting the number of permutations or arrangements and the number of combinations.



Turn to Page 109 and do the EXPLORE the Math.

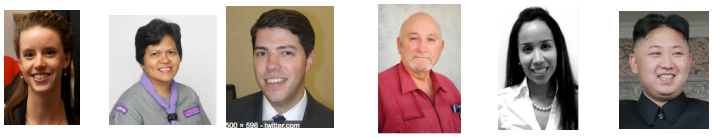
Click the icon to watch a Youtube video on the difference between Permutations and Combinations

What is a Combination?

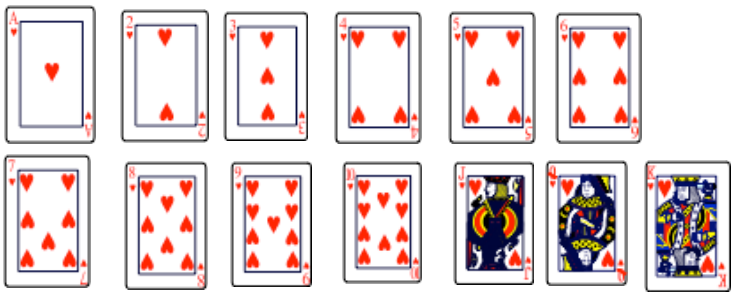
A combination is a grouping of objects where the order **does not matter**.

Some Examples of Combinations:

1. Selecting a group of 3 people from a group of 6.



2. Picking 5 cards from just the hearts in a standard deck of playing cards.



Determine whether the following situations would require calculating a permutation or a combination:

1. Selecting three students to attend a conference in New York City.

2. Assigning students to their seats on the first day of school.

3. Selecting a lead and an understudy for a school musical.

Since order is not important in a combination and order is important is permutations, there will always be fewer combinations then the number of permutations.

For Example

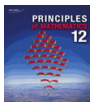
Calculate ${}_6P_4$ and ${}_6C_4$

On the TI-83 this can be done easily by doing the following:

Press 6 first, then press **MATH** and

Cursor across to **PRB** (which stands for probability)

Choose 3**: nCr** and press **ENTER**, then press 4 and then **ENTER**



Practice Problem:

Complete “Practising” question 1 on page 110 of your textbook.

Solution:

1. a) Let W represent the number of ways:

$W = 3!$

$W = 3 \cdot 2 \cdot 1$

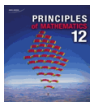
$W = 6$

There are 6 different ways that Brian, Rachelle, and Linh can be chosen for these jobs.

b)

Canned Goods	Dry Goods	Fruits and Vegetables
Brian	Rachelle	Linh
Brian	Linh	Rachelle
Rachelle	Brian	Linh
Rachelle	Linh	Brian
Linh	Rachelle	Brian
Linh	Brian	Rachelle

c) Since all 3 volunteers are being used to help unload the vehicles, there is only one way they can be chosen for this job.
d) Part a) and b) involve permutations and part c) involved combinations. I know because in part a) and b), the order in which the volunteers were selected for the jobs mattered. In part c) the order did not since all the volunteers were being selected to do the same job.

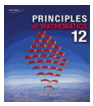


Practice Problem:

Complete “Practising” question 2 on page 110 of your textbook.

Solution:

The main difference is that for the permutations, the order of the 4 objects matters, and for the combinations, it does not. For the permutations, you could have multiple arrangements with the same objects since there is more than one way to order a group of four different objects. This is not possible for combinations since you just need one arrangement for each group of 4, regardless of the order.



Practice Problem:

Complete “Practising” question 3 on page 110 of your textbook.

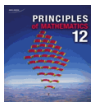
Solution:

3. Let C represent the number of dance committees possible:

$C = {}_{10}C_4$

$C = 210$

There are 210 ways that 4 of the members can be chosen to serve on the dance committee.



Practice Problem:

Complete “Practising” question 4 on page 110 of your textbook.

Solution:

4. Let C represent the number of combinations:

$C = {}_{12}C_3$

$C = 220$

There are 220 ways 3 of the 12 dogs can be selected to appear.

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