

Counting Methods - Engaging Resources

P SO4,5,6 - Counting Methods Concept Summary Sheet

(Download: [Counting Methods Concept Map.pdf](#))

This chart may help students see the big picture and the connections within the topic.

Counting Methods

Principles

AND Problems

- use Fundamental Counting Principle. (Multiply)


$a \cdot b \cdot c$

(Tree diagrams and Grids)

OR Problems

- Mutually Exclusive (add)

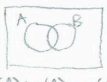
A
B



$n(A) + n(B)$

- Not Mutually Exclusive (add, but subtract overlap)

A
B



$n(A) + n(B) - n(A \cap B)$

Permutations

- ORDER MATTERS
- Arrange n objects $\rightarrow n!$
- Arrange r objects out of $n \rightarrow nPr$
or Partial Factorial
- Deal with restrictions first
- Identical objects $\rightarrow \frac{n!}{a!b!c!}$
- Grouping
 - treat group as a single object, then multiply by ways to arrange the group.

$(\quad) - \quad - \quad = 4! \cdot 2!$

Combinations

ORDER DOESN'T MATTER

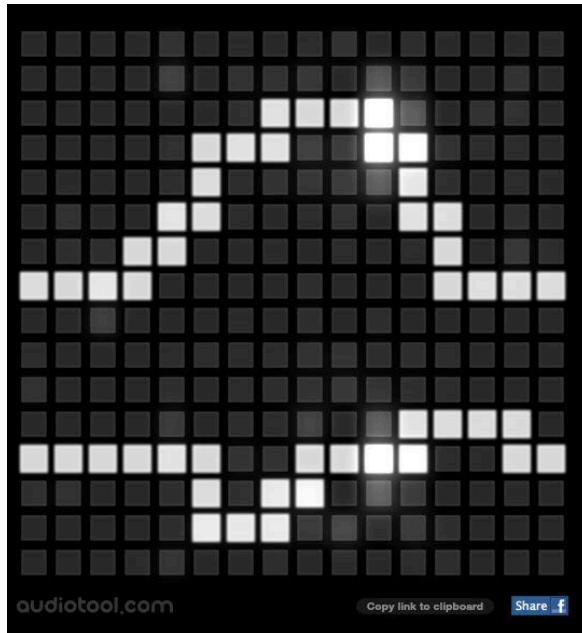
- use $nCr = \binom{n}{r}$
- AND is multiply
 $nCr \cdot nCr$
- OR is add
 $nCr + nCr$
- At Least or At Most
 - hidden OR type ?'s

At Most 3 = one or two or three
 $nC_1 + nC_2 + nC_3$

P SO4 - Interesting Fundamental Counting Principle Problems

(Link: [TonematrixAudiotool](#))

This website provides an interesting problem to introduce students to the fundamental counting principle.



Tone Matrix - AudioTool

- Click to turn on squares and listen to the different melodies.
- Space bar to restart.
- Ask students ... How many melodies are possible?
 - The question is simpler if you include the sound of silence as a melody.

P SO5,6 - Row Game: Permutations & Combinations

(Download: [RG-Permutations & Combinations.docx](#))

Person A: _____ Person B: _____

Permutations and Combinations Row Game

Person A solves the problems in column A, while Person B solves the problems in column B. As you finish each problem, check your answer with the other person. The answers should be the same! If they are not, work together to find your mistake.

| Person A | Person B |
|---|--|
| 1.) The number of ways to choose a group of 5 cards from a stack of 13 cards, if it doesn't matter what order you choose. | 1.) The number of ways to choose a group of 8 cards from a stack of 13 cards, if it doesn't matter what order you choose. |
| 2.) The number of ways 8 horses place 1 st , 2 nd , and 3 rd in a race. | 2.) The number of outfits you can create from 7 pants, 12 shirts, and 4 pairs of shoes. (Each outfit must consist of one pants, one shirt, and one pair shoes) |
| 3.) The number of unique arrangements of the letters in the word MONDAY | 3.) Number of 2-letter words that can be made from the letters in the word MYTZEPLIK, multiplied by 10. |