

# Combinations and Permutations

## Key Concepts:

- If the order doesn't matter, it is a **combination**.
- A **permutation** is an *ordered combination*.

Fill in the correct word for the blanks in the sentence...

I'm sure I have the right \_\_\_\_\_ of the 4 digits I used for the pass code on my phone. I swear I've tried every \_\_\_\_\_, but I still can't open it!

A pass code requires the exact \_\_\_\_\_ of a *set* of digits, just getting the right \_\_\_\_\_ is not enough.

The correct \_\_\_\_\_ of digits is a necessary, but not sufficient condition for a passcode.

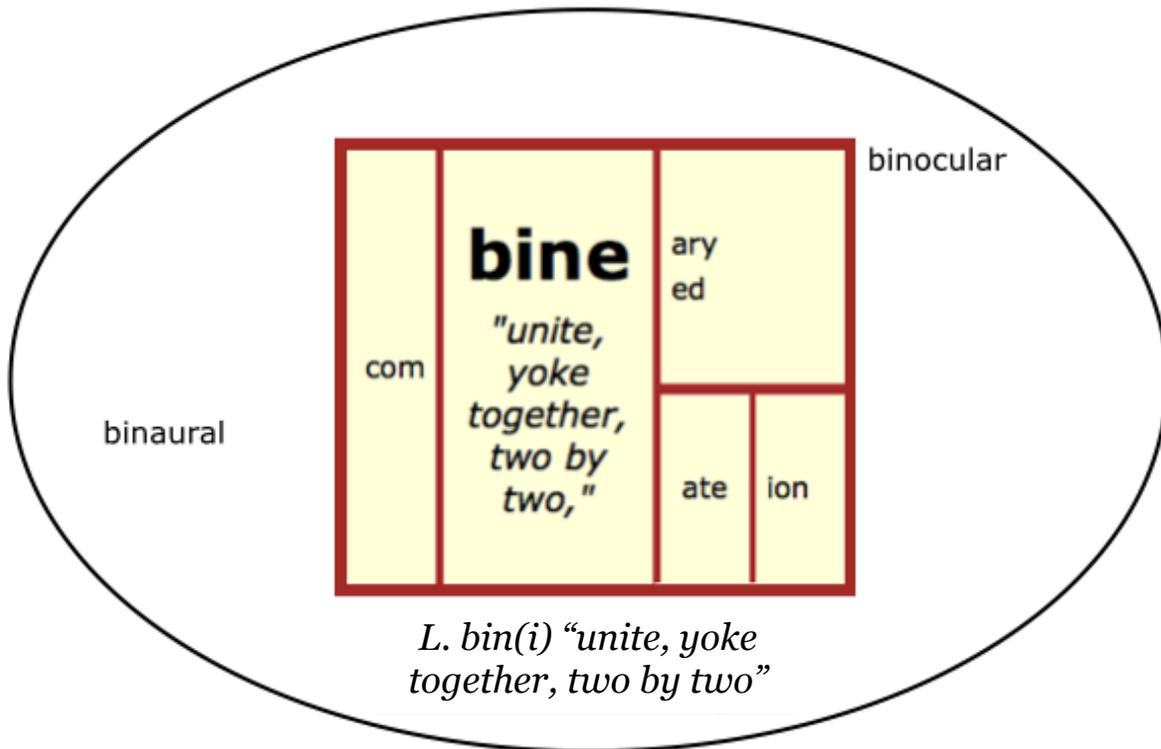
To have the correct \_\_\_\_\_ of a pass code, you *must* have the right \_\_\_\_\_ of digits, but having the right \_\_\_\_\_ of digits does not necessarily mean you have the right \_\_\_\_\_ of digits!

What is similar about these two terms, and what is different?

Why is the term "combination lock" inappropriate for the device pictured?



**Etymological relatives of <combination> (in the oval)**  
**Morphological relatives of <combination> (in the matrix)**



com + bine/ + ate/ + ion	→ combination
bine/ + ary	→ binary
com + bine/ + ed	→ combined

**Why are <binaural> and <binocular> in the oval, but not the matrix?**

The <aural> part of <binaural> is a *word* from Latin *auris* "ear".

The <ocular> part of <binocular> is a *word* from Latin *oculus* "an eye".

Vowel *suffixes* replace final, single, silent <e>s, but bases do not!

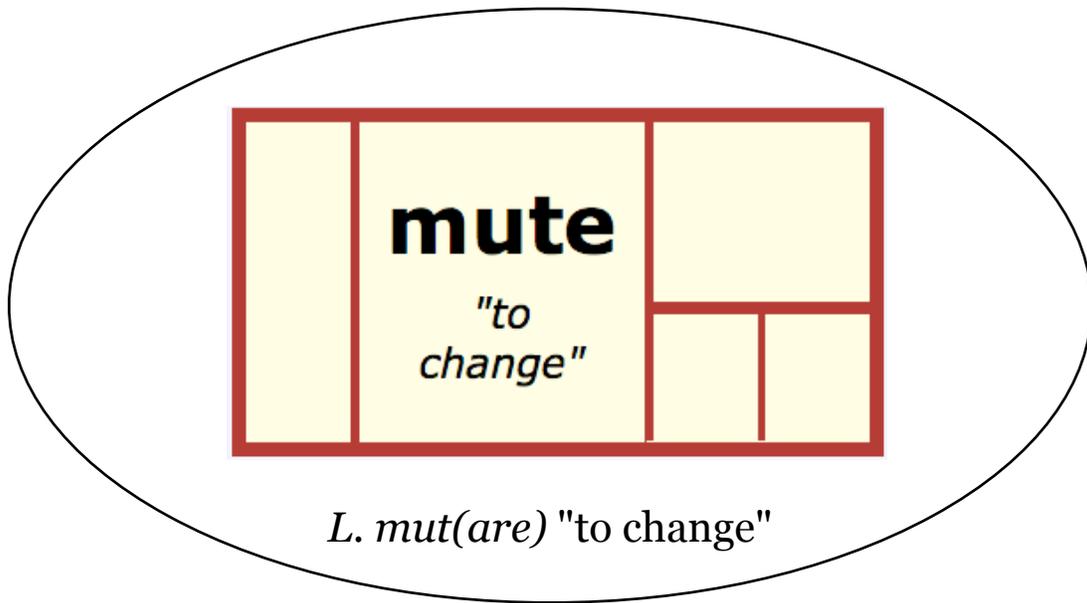
We cannot build the word sum for these words with a base spelled <bine>, so we show that we have evidence that these words are *etymologically* related (share a root) but we don't have evidence that they are *morphologically* related by a *base element*.

**Question:**

How are the underlying meanings "unite, yoke together, two by two" echoed in the mathematical meaning of <combination>

*Find links to the Word Searcher, Mini Matrix Maker, and Etymonline under "Key Links" at [www.wordworkskingston.com](http://www.wordworkskingston.com)*

**Etymological relatives of <permutation> (in the oval)**  
**Morphological relatives of <permutation> (in the matrix)**



Words to Analyze	Construct word sums for the base <mute> for “change” (All can be represented in the matrix.)
commute	
immutable	
mutation	
mutate	
permutation	

**Question:**

How is the underlying meanings “to change” echoed in the mathematical meaning of <permutation>?