Counting Combinations

Boise Math Circle

Big Idea

> If order doesn't matter, how many ways are there to choose a fixed number of items from a set of objects?

Example

Joe has 5 friends (Abe, Billy, Charlie, Danny, Evan) and needs to pick 3 friends to be his "besties". How may combinations are possible? (list them below)

Note: When we count these, mathematicians say "5 choose 3" and write $\binom{5}{3}$***.***

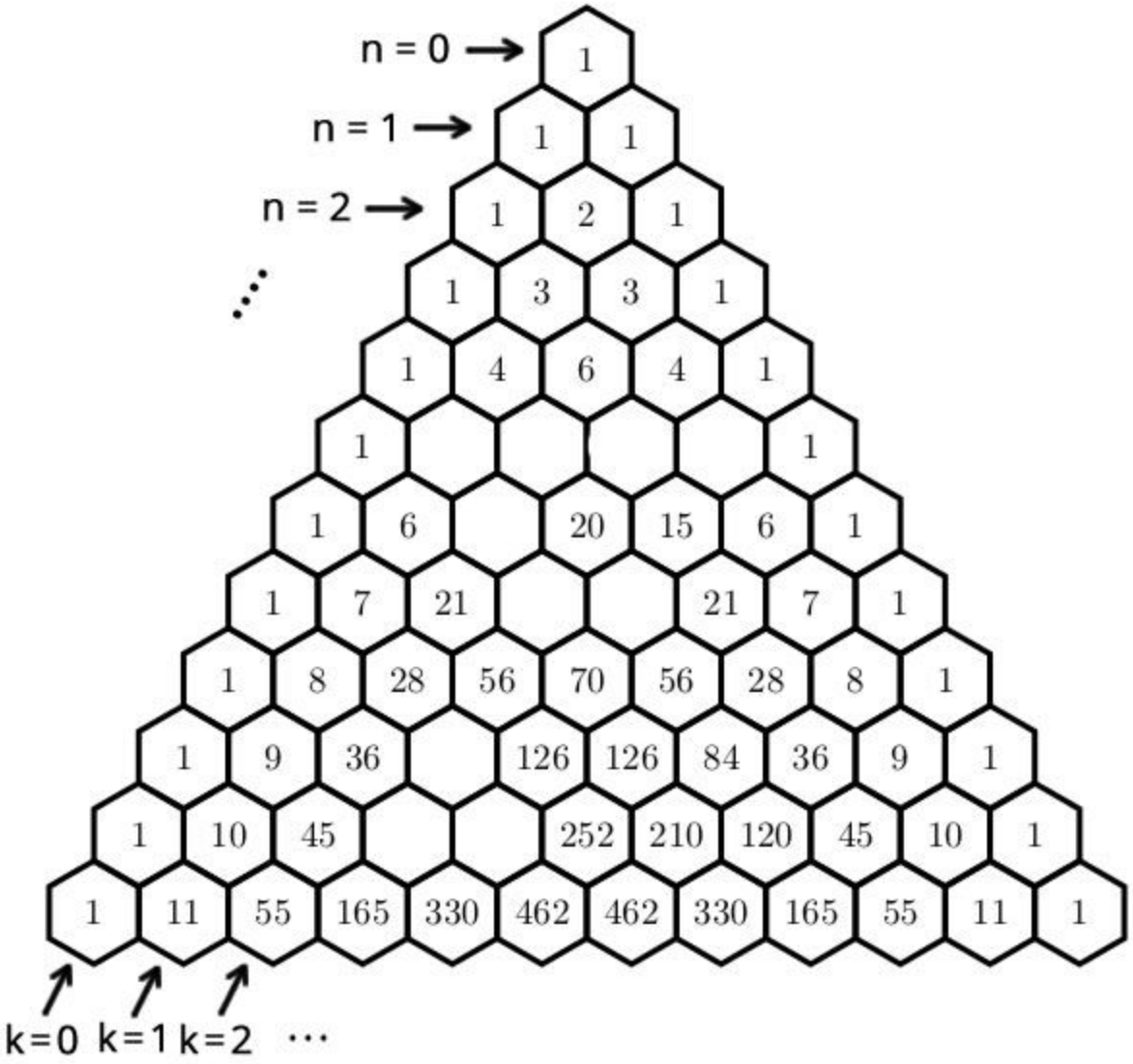
Compute the following:

$\binom{7}{3} =$ $\binom{10}{3} =$ $\binom{26}{3} =$

Write a formula for each of the following:

$\binom{n}{3} =$ $\binom{n}{5} =$ $\binom{n}{k} =$

Pascal's Triangle for Combinations



Good Questions about Combinations

- Why should "10 choose 2" be the same as "10 choose 8"?
- Can you express the combination formula using just factorials?
- Explain the following pattern: The number of ways to pick 3 people from 10 people is the same as the total number of ways to pick 2 or 3 people from 9 people.
- Explain the following pattern: The sum of each row is a power of 2.