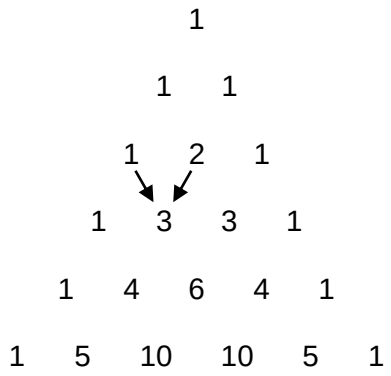
# Vocabulary: Binomial Probabilities

## Vocabulary

- Binomial coefficient – the number of unordered ways to choose *r* objects from a set of *n* objects.
  - The binomial coefficient also describes the number of ways to order *r* successes in *n* trials of a binomial experiment.
  - Notations for the binomial coefficient include ${}_nC_r$, $C(n, r)$, $C_r^n$, and $\binom{n}{r}$.
    - This is expressed as "*n* choose *r*."
  - The formula for the binomial coefficient is ${}_nC_r = \frac{n!}{r!(n-r)!}$.
    - For example, ${}_3C_2 = \frac{3 \bullet 2 \bullet 1}{(2 \bullet 1)(1)} = \frac{6}{2} = 3$, because there are three ways to order two successes in three trials: *SSF*, *SFS*, and *FSS*.
- Binomial experiment – an experiment that consists of independent trials in which each trial has two possible outcomes.
  - Flipping a coin (heads or tails) and shooting a free throw (make or miss) are examples of binomial experiments.
- Factorial – the product of an integer and all positive integers below it.
  - The symbol for factorial is the exclamation point (!).
    - For example, 5! = 5 • 4 • 3 • 2 • 1 = 120.
  - By convention, 0! = 1.
- Pascal's Triangle – a triangular array of binomial coefficients.
  - Each term in Pascal's Triangle is obtained by adding the two terms diagonally above it.
    - For example, the "3" in the fourth row is the sum of the "1" and "2" terms above it.




- Tree diagram – a diagram that uses branches to show the different possible outcomes of an experiment or set of experiments.
  - For example, the tree diagram to the right shows the possible outcomes of two binomial trials in which each trial can end in success (*S*) or failure (*F*). The possible outcomes are: *SS*, *SF*, *FS*, and *FF*.