Class Worksheet

 $\begin{array}{c} \mbox{March 12 and 24} \\ \mbox{Math 125} \ Kovitz \ 2025 \end{array}$

The Binomial Coefficients

The number of ways of arranging k of one thing and n - k of another thing in a row is given by the formula

$$\frac{n!}{k!(n-k)!}$$

The Binomial Formula

The chance that an event will occur exactly k times out of n is given by the binomial formula

$$\frac{n!}{k!(n-k)!}p^k(1-p)^{n-k}$$

In this formula, n is the number of trials, k is the number of times the event is to occur, and p is the probability that the event will occur on any particular trial. The assumptions:

- The value of *n* must be fixed in advance.
- *p* must be the same from trial to trial.
- The trials must be independent.

The first factor in the binomial formula is the binomial coefficient.

Problems to think about

Find the number of different ways of arranging three R's and five G's in a row. Write out all the patterns.

A statistics class has 23 students. Find the number of possible ways to choose a group of 3 students for a special project.

A box has five balls: four blue and one orange. Seven draws are made at random from the box with replacement. Find the chance of getting the orange ball at least once in the seven draws.

A coin is tossed 8 times. Find the chance of getting exactly 8 heads. Find the chance of getting exactly 6 heads. Find the chance of getting between 3 and 5 heads inclusive.

A die is rolled 9 times. Find the chance that a face with less than three spots comes up exactly five times among the nine rolls.

A die will be rolled 22 times. What's the chance of getting exactly 1 ace?

A random-number generator independently produces digits from 0 to 9 inclusive. Find the chance that among a series of six digits produced there will be exactly two 8's.