Discrete Mathematics Body of Knowledge

Standard 7: Set Theory

- MA.912.D.7.1
  Perform set operations such as union and intersection, complement, and cross product.

Sets

Unit 1 discussed **sets**. A *set* is a collection of distinct objects or numbers. Each item in the set is called an **element** or **member** of the set. Sets are indicated by grouping symbols called **braces** { }.

A set can have a few *elements*, lots of elements, or *no* elements—called a **null set (ø)** or **empty set**. Sets like the **counting numbers**, also called the **natural numbers**—{1, 2, 3, 4, 5, …}—are **infinite sets** because they continue in the **pattern** and *never* end. *Patterns* are predictable. They have a prescribed sequence of numbers or objects.

Other sets with a *specified* number of elements are called **finite sets**. Some *finite sets* are *very* large; however, even very large sets with bounds and limits are finite sets.

Sets can usually be written in two different ways. One way is by **roster**. A *roster* is a list. You have probably heard of a football roster—a list of players on the team—or a class roster—a list of students in the class. Look at this set expressed in roster format.

{red, orange, yellow, blue, green, indigo, violet}

We could also name this set using the **rule** format. That means describing the set.

{the colors in the rainbow}

This is another way to indicate the set of colors listed above. So you see, there are two ways to express the same set.

Let's look at some more examples.

{the set of vowels in the alphabet} means {a, e, i, o, u}

{2, 4, 6, 8, …} is the same as {the set of positive **even integers**}

Remember: Integers are the numbers in the set {… , -4, -3, -2, -1, 0, 1, 2, 3, 4, …} and **positive integers** are integers greater than zero.