

First, we become familiar with nouns.

Definition: A list, with individual entries separated by commas, is called a SET when it is enclosed in brackets { }.

- (orderings and repetitions are considered irrelevant)
- (The brackets turn an ordinary list of things into a mathematical entity!)

Example:

- “king, silver, pink, red” is a list of salmon types
- {king, silver, pink, red} is a SET which contains the names of some salmon types.
- Alternative / equivalent ways to write this set include:
  - {king, silver, red, pink}
  - {king, pink, silver, red}
  - {king, pink, red, silver}
  - {king, red, silver, pink}
  - {king, red, pink, silver}
- Can you find another 18 equivalent (but “different”) ways to write this?

Second, we find verbs that work with the nouns we know.

- Operations: union, intersection, complement
  - These give us something to do with sets, a legitimate algebraic game without needing any numbers.
- Analyses:
  - names for sets
    - When there are a bunch around we give them names; this common human solution to avoid confusion is also a very, very popular mathematical method.
  - numeric measure / description of a sets
    - The number of elements in a set is the most natural measure though we are often concerned with a percentage of the whole.
  - pieces and parts of sets (called SUBSETS)
    - Often we are concerned only with selected individuals from a set.
  - order the elements of sets
    - This is popular among computers and word processors, which allows us to add “concatenate” as an operation.

## Example:

Let {king, silver, pink, red} be called the set Salmon.

- Use  $S$  as a nickname for the set called Salmon.  
Then we write  $S = \{\text{king, silver, pink, red}\}$
- The number of elements in  $S$  is easily counted to be 4, and is written mathematically as  $n(S) = 4$ .
- Let  $\{\text{pink, silver, red}\} = C$ . Then  $C$  is a subset of  $S$ ,  $n(C) = 3$ , and  $C$  is three fourths the size of  $S$

A phone survey of Ketchikan draws from the set of all names in the Ketchikan phone book.

- This set is then called the DOMAIN or REALM OF ACTION or UNIVERSAL SET for the operation called a survey.
- (This domain is often ordered by an alphabet.)

A function being graphed on the coordinate plane draws from the set of all real numbers.

- This set, commonly known as  $R$ , is called the DOMAIN or REALM OF ACTION or UNIVERSAL SET for the operation called a function.
- (This domain is often ordered by the notion  $>$ .)

A computer reading a HD floppy disc draws from the set of all information bytes stored on the disc.

- This set is then called the DOMAIN or REALM OF ACTION or UNIVERSAL SET for the operation called read the disc.
- (This domain is ordered by a matrix assignment.)

These three (important mathematical applications of) sets are very large and unwieldy for novices.

They are also encumbered by the “natural” orderings commonly associated with them.

- For introductory classroom purposes of hands-on pattern-development and demonstration,
- to construct the properties and concepts of set theory, which will enable future work with large, complex sets
- there is a common, mathematically and historically rich, manipulative available.