*“The separation between Algebra and Functions in the standards is intended to specify the difference as mathematical concepts between expressions and equations on the one hand and functions on the other.” (p. 3, Algebra Progressions)*

**Directions:** Create a Concept Map that shows characteristics of the concepts of expressions, equations, and functions, and relationships and distinctions among the concepts of expressions, equations, and functions.

Consider how your concept map:

* Distinguishes among and clarifies uses and meanings of the equals sign.
* Distinguishes among the meanings of ‘equivalence’.
* Distinguishes vocabulary that indicate what we will do with the object such as solve, transform, change the form of, graph, build a table,… (What vocabulary is used when discussing just one of the concepts? Two? All three?)
* Distinguishes among and clarifies number of and form of solutions.
* Addresses structure sense.
* Addresses algebraic thinking such as generalizing, use of multiple representations, doing and undoing, building rules to represent relationships.
* Includes the properties that we can use with the object.
* Addresses whether all functions can be defined by expressions.
* Addresses whether all equations in two variables are functions.
* Addresses under what circumstances it might be helpful to consider equations in two variables as functions.
* Addresses when it might be helpful to consider an equation in one variable as two expressions defined by functions.

From Algebra Progressions:

The Algebra category in high school is very closely allied with the Functions category:

• An expression in one variable can be viewed as defining a function: the act of evaluating the expression is an act of producing the function’s output given the input.

• An equation in two variables can sometimes be viewed as defining a function, if one of the variables is designated as the input variable and the other as the output variable, and if there is just one output for each input. This is the case if the equation is in the form y=(expression in x) or if it can be put into that form by solving for y. (Under what circumstances might it be helpful to think about an equation in two variables as a function, and when is it not?)

• The notion of equivalent expressions can be understood in terms of functions: if two expressions are equivalent they define the same function.

• The solutions to an equation in one variable can be understood as the input values which yield the same output in the two functions defined by the expressions on each side of the equation. This insight allows for the method of finding approximate solutions by graphing the functions defined by each side and finding the points where the graphs intersect. (A-REI.11: Explain why the x-coordinates of the points where the graphs of the equations y=f(x) and y=g(x) intersect are the solutions of the equation f(x)=g(x); find the solutions approximately, e.g., using technology to graph the functions. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolue value, exponential, and logarithmic functions.)