**Session Seven: Graphs, Tables, and Equations**

**Common Core Standards Addressed**

#### Students will be introduced to graphs, tables, and/or equations separately before Grade 5, The combination of the ideas and how to go from one form to another will often not be introduced until Grade 5. Students below this grade level should focus on the skills they have with each individual form.

#### Grade 5

#### Graph points on the coordinate plane to solve real-world and mathematical problems.

[CCSS.Math.Content.5.G.A.1](http://www.corestandards.org/Math/Content/5/G/A/1/)
Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

[CCSS.Math.Content.5.G.A.2](http://www.corestandards.org/Math/Content/5/G/A/2/)
Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

#### Grade 6

#### Represent and analyze quantitative relationships between dependent and independent variables.

[CCSS.Math.Content.6.EE.C.9](http://www.corestandards.org/Math/Content/6/EE/C/9/)
Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.

#### Understand ratio concepts and use ratio reasoning to solve problems.

[CCSS.Math.Content.6.RP.A.1](http://www.corestandards.org/Math/Content/6/RP/A/1/)
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

[CCSS.Math.Content.6.RP.A.2](http://www.corestandards.org/Math/Content/6/RP/A/2/)
Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*1

[CCSS.Math.Content.6.RP.A.3](http://www.corestandards.org/Math/Content/6/RP/A/3/)
Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

[CCSS.Math.Content.6.RP.A.3.a](http://www.corestandards.org/Math/Content/6/RP/A/3/a/)
Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

#### Grade 7

#### Analyze proportional relationships and use them to solve real-world and mathematical problems.

[CCSS.Math.Content.7.RP.A.2.a](http://www.corestandards.org/Math/Content/7/RP/A/2/a/)
Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

[CCSS.Math.Content.7.RP.A.2.b](http://www.corestandards.org/Math/Content/7/RP/A/2/b/)
Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

#### Grade 8

#### Define, evaluate, and compare functions.

[CCSS.Math.Content.8.F.A.1](http://www.corestandards.org/Math/Content/8/F/A/1/)
Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.1

[CCSS.Math.Content.8.F.A.2](http://www.corestandards.org/Math/Content/8/F/A/2/)
Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change*.

[CCSS.Math.Content.8.F.A.3](http://www.corestandards.org/Math/Content/8/F/A/3/)
Interpret the equation *y = mx + b* as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*.

#### Use functions to model relationships between quantities.

[CCSS.Math.Content.8.F.B.4](http://www.corestandards.org/Math/Content/8/F/B/4/)
Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x, y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

[CCSS.Math.Content.8.F.B.5](http://www.corestandards.org/Math/Content/8/F/B/5/)
Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.