**Session Five: An Introduction to Graphing**

**Common Core Standards Addressed**

#### For graphs to be have meaning to a child ,the child must have a firm understanding of numbers, the counting sequence, and how numbers can be applied to the real world. Since these standards are the focus of Grade 1, we cannot introduce graphing until after.

#### Grade 2

#### Represent and interpret data.

[CCSS.Math.Content.2.MD.D.9](http://www.corestandards.org/Math/Content/2/MD/D/9/)  
Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

[CCSS.Math.Content.2.MD.D.10](http://www.corestandards.org/Math/Content/2/MD/D/10/)  
Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems1 using information presented in a bar graph.

#### Grade 3

#### Represent and interpret data.

[CCSS.Math.Content.3.MD.B.3](http://www.corestandards.org/Math/Content/3/MD/B/3/)  
Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets*.

[CCSS.Math.Content.3.MD.B.4](http://www.corestandards.org/Math/Content/3/MD/B/4/)  
Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

***Grade 4***

#### Represent and interpret data.

[CCSS.Math.Content.4.MD.B.4](http://www.corestandards.org/Math/Content/4/MD/B/4/)  
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection*.

#### 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.

#### Summarize and describe distributions.

[CCSS.Math.Content.6.SP.B.4](http://www.corestandards.org/Math/Content/6/SP/B/4/)  
Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

[CCSS.Math.Content.6.SP.B.5.c](http://www.corestandards.org/Math/Content/6/SP/B/5/c/)  
Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

[CCSS.Math.Content.6.SP.B.5.d](http://www.corestandards.org/Math/Content/6/SP/B/5/d/)  
Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

#### Grade 7

***Investigate chance processes and develop, use, and evaluate probability models.***

[CCSS.Math.Content.7.SP.C.8](http://www.corestandards.org/Math/Content/7/SP/C/8/)  
Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

[CCSS.Math.Content.7.SP.C.8.a](http://www.corestandards.org/Math/Content/7/SP/C/8/a/)  
Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

[CCSS.Math.Content.7.SP.C.8.b](http://www.corestandards.org/Math/Content/7/SP/C/8/b/)  
Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.

[CCSS.Math.Content.7.SP.C.8.c](http://www.corestandards.org/Math/Content/7/SP/C/8/c/)  
Design and use a simulation to generate frequencies for compound events.

#### Grade 8

***Analyze and solve linear equations and pairs of simultaneous linear equations.***

Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*.

#### Investigate patterns of association in bivariate data.

[CCSS.Math.Content.8.SP.A.1](http://www.corestandards.org/Math/Content/8/SP/A/1/)  
Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

[CCSS.Math.Content.8.SP.A.2](http://www.corestandards.org/Math/Content/8/SP/A/2/)  
Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

[CCSS.Math.Content.8.SP.A.3](http://www.corestandards.org/Math/Content/8/SP/A/3/)  
Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height*.

[CCSS.Math.Content.8.SP.A.4](http://www.corestandards.org/Math/Content/8/SP/A/4/)  
Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*