

Progression of Linear Relationships in the Common Core State Standards: Grade 6 through High School Algebra

Grade 6	Grade 7	Grade 8	High School Algebra
<p>Represent and analyze quantitative relationships between dependent and independent variables.</p> <p>6.EE.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. <i>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.</i></p>	<p>Analyze proportional relationships and use them to solve real-world and mathematical problems.</p> <p>7.RP.2: Recognize and represent proportional relationships between quantities.</p> <ol style="list-style-type: none"> 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. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. Represent proportional relationships by equations. <i>For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.</i> Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate. 	<p>Understand the connections between proportional relationships, lines, and linear equations.</p> <p>8.EE.5: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. <i>For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i></p> <p>Use functions to model relationships between quantities.</p> <p>8.F.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.</p>	<p>Building and Interpreting Linear Models</p> <p>F-LE.1: Distinguish between situations that can be modeled with linear functions and with exponential functions.*</p> <ol style="list-style-type: none"> Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.* Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.* <p>F-LE.5: Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.*</p> <p>S-ID.6: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.</p> <ol style="list-style-type: none"> Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. <p>S-ID.7: Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.</p> <p>F-CED.2: Create equations in two or more variables to represent relationships between quantities ...</p> <p>F-BF.1: Write a function that describes a relationship between two quantities (Determine an explicit expression, a recursive process, or steps for calculation from a context.)</p>