Algebra 1 Unit 1 (MS): Pre-Algebra Topics

Unit Focus

This unit focuses on linear relationships and the connection between situations, tables, equations, and graphs.

The unit begins with an introduction to a slope triangle and establishes that the quotient of the vertical side length and the horizontal side length does not depend on the triangle; this number is called the slope of a line.

Next, students revisit the different representations of proportional relationships (graphs, tables, and equations) and the role of the constant of proportionality in each representation and how it may be interpreted in context. Next, students are introduced to "rate of change" as a way to describe the rate per 1 in a linear relationship and note that its numerical value is the same as that of the slope that represents the relationship. Students next consider negative slopes and the slopes of vertical and horizontal lines. Students practice graphing linear functions using the slope and the vertical intercept. Students practice writing equations of lines from a graph, a table, a situation, and from two specific points. The unit concludes with students transforming equations into slope-intercept form.

Stage 1: Desired Results - Key Understandings

Standard(s)

Common Core Mathematics: 8 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. (CCSS.MATH.CONTENT.8.EE.B.5) Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. (CCSS.MATH.CONTENT.8.EE.B.6) 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.2) 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. (CCSS.MATH.CONTENT.8.F.A.3) 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

Transfer

Students will be able to independently use their learning to...
T1 Apply models to solve problems.

Meaning

Understanding(s)	Essential Question(s)
Students will understand that... **U1** Mathematicians create or use models to generalize, represent, and solve problems.	*Students will keep considering...* **Q1** What model best represents this problem?

Acquisition of Knowledge and Skill

Knowledge	Skill(s)
Students will know... **K1** Vocabulary: slope, similar, rate of change, proportional, linear, increasing/decreasing, linear/nonlinear, vertical intercept **K2** A vertical line has an undefined slope and is in the form x = #.	*Students will be skilled at...* **S1** Identifying slope from a graph, table, equation, and/or situation. **S2** Comparing functions given in a graph, table, equation, and/or situation. **S3** Identifying a function as either proportional or linear.

Stage 1: Desired Results - Key Understandings		
of its graph or a table of values. (CCSS.MATH.CONTENT.8.F.B.4) 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. (CCSS.MATH.CONTENT.8.F.B.5) Model with mathematics. (CCSS.MATH.MP.4) **Madison Public Schools Profile of a Graduate** Product Creation: Effectively use a medium to communicate important information. (POG.3.2)	**K3** A horizontal line has a slope of zero and is in the form x = #. **K4** Parallel lines have the same slope and a different y-intercept.	**S4** Writing an equation in y = mx + b for when given two pieces of information. **S5** Graphing equations in y = mx + b form. **S6** Converting equations to y = mx + b form