# Streamwood High School
# AIM 1 Scope and Sequence
2022-2023

| Unit/Reporting Task | Instructional Focus | Standards | Pacing |
|---|---|---|---|
| Unit 1: Relationships Between Quantities | Solving Equations & Inequalities | A.SSE.1, A.REI.3 | 5 weeks |
| | Creating Equations & Inequalities | A.CED.1, A.CED.2, A.CED.3, N.Q.1, N.Q.2, N.Q.3 | |
| | Literal Equations | A.CED.4, A.REI.3 | |
| Unit 2: Linear and Exponential Relationships | Identifying, Evaluating, & Applications of Functions | F.IF.1, F.IF.2, F.IF.3, F.BF.2, F.LE.1, F.LE.5 | 5 weeks |
| | Linear & Exponential Functions | F.BF.1,F.LE.2, F.LE.3, F.IF.6, F.IF.9 | |
| Unit 3: Key Features & Sketching Graphs | Key Features of Graphs | F.IF.4, F.IF.5, F.IF.6, F.IF.9, F.BF.3 | 4 weeks |
| | Sketching Graphs | A.REI.10, A.REI.12, F.IF.7 | |
| Unit 4: Reasoning with Equations | Solving Systems of Equations & Inequalities | A.REI.1, A.REI.5, A.REI.6, A.REI.11 | 4 weeks |
| | Applications of Systems of Equations & Inequalities | A.CED.2, A.REI.5, A.REI.6 | |
| Unit 5: Descriptive Statistics | Representing and Analyzing Data | S.ID.1, S.ID.2, S.ID.3, S.ID.5, | 4 weeks |
| | Interpret Linear Models | S.ID.6, S.ID.7, S.ID.8, S.ID.9 | |
| Unit 6: Transformations | Transformations | G.CO.1, G.CO.2, G.CO.3, G.CO.4, G.CO.5, SRT.1 | 5 weeks |
| Unit 7: Congruence | Congruence | G.CO.6, G.CO.7, G.CO.8 | 4 weeks |
| Unit 8: Connecting Algebra and Geometry | Parallel and Perpendicular Lines | G.GPE.4, G.GPE.5 G.CO.12, G.CO.13 | 5 weeks |
| | Perimeter and Area | G.GPE.7 | |

## Unit 1 Relationships Between Quantities

A. Solving Equations & Inequalities

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Interpret expressions and equations (A.SSE.1*)** | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Interpret individual and groups of parts of an expression (such as variables, coefficients, factors, etc.) in terms of a given context. | Identify groups in an expression and Interpret individual parts of an expression (such as variables, coefficients, factors, etc.) in terms of a given context. | Identify individual parts of an expression (such as variables, coefficients, factors, etc.) | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Solve equations and inequalities (A.REI.3)** | | Solve linear equations and inequalities with rational numbers and variables on both sides, that requires distributing and combining like terms. | Solve linear equations and inequalities with rational numbers and variables on both sides, that requires distributing or combining like terms. | Solve linear equations and inequalities with rational numbers and variables on both sides. | |

A.SSE.1* Interpret expressions that represent a quantity in terms of its context.
a. Interpret parts of an expression, such as terms, factors, and coefficients.
b. Interpret complicated expressions by viewing one or more of their parts as a single entity.

A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

## Unit 1: Relationships Between Quantities

B. Creating Equations & Inequalities

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Create equations and inequalities** (A.CED.1*) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Create linear equations **and** inequalities with one variable and use them in a contextual situation and solve problems. | **Create** linear equations or inequalities with one variable and use them in a contextual situation and solve problems. | **Identify** linear equations **or** inequalities with one variable to represent a contextual situation and use them to solve problems. | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Create systems of equations** (A.CED.2*) | | Create a system of equations to model a situation | **Create** a system of equations to model a situation | **Identify** a system of equations to model a situation | |
| **Represent constraints and interpret solutions** (A.CED.3*) | | Write the constraints for a contextual situation<br><br>**Interpret solutions as viable or nonviable options** in context of the situation. | **Write** the constraints for a contextual situation<br><br>Identify solutions **in context of the situation.** | Identify the constraints for a contextual situation<br><br>Identify solutions | |

A.CED.1* Create equations and inequalities in one variable and use them to solve problems

A.CED.2* Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.CED.3* Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

## Unit 1: Relationships Between Quantities

C. Literal Equations

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Solve and rewrite literal equations** (A.REI.3, A.CED.4*) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Solve multi-step literal equations involving more than 2 variables **in contextual situations** | Solve multi-step literal equations involving **more than 2 variables** | Solve multi-step literal equations involving **2 variables** | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |

A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A.CED.4* Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

## Unit 2: Linear and Exponential Equations

A. Identifying, Evaluating, & Applications of Functions

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Understand functions** (F.IF.1) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Determine and explain if a relation, graph **and** table are functions<br><br>Use the different terminology that describes the x values (domain, input) and the y values (output, f(x)) to find the domain and range from a table, relation, **and** graph. | Determine **and explain** if a relation, graph or table are functions **(2 of the 3)**<br><br>**Use** the different terminology that describes the x values (domain, input) and the y values (output, f(x)) to find the domain and range **from a table, relation, or graph.** | Determine if a relation, graph **or** table are functions **(2 of the 3)**<br><br>Identify the different terminology that describes the x values (domain, input) and the y values (output, f(x)) | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Use function notation** (F.IF.2) | | Use function notation and the values in the domain to calculate the values in the range from a table, graph, and equation **and interpret statements using function notation in context of a given situation** | Use function notation and the values in the domain to calculate the values in the range from a table, graph, **and** equation | Use function notation and the values in the domain to calculate the values in the range from a table, graph, **or** equation | |
| **Construct linear and exponential functions** (F.BF.2*, F.IF.3, F.LE.1) | | Distinguish between linear and exponential functions from arithmetic and geometric sequences, tables, graphs, and **real world situations**<br><br>Write the recursive function and the function rule for linear and exponential functions **to model real world situations.** | Distinguish between linear and exponential functions from arithmetic and geometric sequences, tables, and graphs.<br><br>**Write the recursive function and the function rule** for linear and exponential functions from arithmetic and geometric sequences and tables. | **Distinguish** between linear and exponential functions from arithmetic and geometric sequences, tables, and graphs.<br><br>**Identify the common difference/common ratio** for linear and exponential functions from arithmetic and geometric sequences and from tables. | |
| **Identify and compare key features** (F.LE.5) | | Identify and compare key features of two functions represented in **all** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | Identify and compare key features of two functions represented in **three** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | Identify and compare key features of two functions represented in **two** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | |

F.IF.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of *f* is the graph of the equation y = f(x).

F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F.BF.2* Write arithmetic and geometric sequences both recursively ~~and with an explicit formula~~, use them to model situations, and translate between the two forms. *(Modeling Standard)

F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.

F.LE.1* Distinguish between situations that can be modeled with linear functions and with exponential functions. *(Modeling Standard)

a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another

F.LE.5* Interpret the parameters in a linear or exponential function in terms of a context. *(Modeling Standard)

## Unit 2: Linear and Exponential Equations

B. Linear & Exponential Functions

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Construct linear and exponential functions** (F.BF.1, F.LE.2) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Distinguish between linear and exponential functions from arithmetic and geometric sequences, tables, graphs, and **real world situations**<br><br>Write the recursive function and the function rule for linear and exponential functions **to model real world situations.** | Distinguish between linear and exponential functions from arithmetic and geometric sequences, tables, and graphs.<br><br>**Write the recursive function and the function rule** for linear and exponential functions from arithmetic and geometric sequences and tables. | **Distinguish** between linear and exponential functions from arithmetic and geometric sequences, tables, and graphs.<br><br>**Identify the common difference/common ratio** for linear and exponential functions from arithmetic and geometric sequences and from tables. | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Calculate and interpret rate of change** (F.LE.3) | | Calculate the average rate of change over a given interval and explain the meaning in context for linear and exponential functions presented symbolically, in a table, **and** in a graph<br><br>**Describe that an increasing exponential function will eventually exceed a linear function** | Calculate the average rate of change over a given interval **and explain the meaning in context** for linear and exponential functions presented symbolically, in a table, or in a graph | Calculate the average rate of change over a given interval for linear and exponential functions presented symbolically, in a table, or in a graph | |
| **Create and graph equations** (F.IF.7) | | Create equations in two or more variables to represent relationships in contextual situations<br><br>Graph exponential functions expressed in symbolic form and show key features of the graph **(including labels and scales on the graph)** | **Create** equations in two or more variables to represent relationships in contextual situations<br><br>Graph exponential functions expressed in symbolic form **and show key features of the graph** | **Identify** equations in two or more variables to represent relationships in contextual situations<br><br>Graph exponential functions expressed in symbolic form | |
| **Identify and compare key features** (F.IF.9) | | Identify and compare key features of two functions represented in **all** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | Identify and compare key features of two functions represented in **three** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | Identify and compare key features of two functions represented in **two** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | |
| **Identify transformations** (F.BF.3) | | Identify the effect on a graph by replacing f(x) with a single transformation:<br>• f(x) + k<br>• k f(x),<br>• f(kx)<br>• f(x + k) | Identify the effect on a graph by replacing f(x) with a single transformation **(3 of the 4)**:<br>• f(x) + k<br>• k f(x),<br>• f(kx)<br>• f(x + k) | Identify the effect on a graph by replacing f(x) with a single transformation **(2 of the 4)**:<br>• f(x) + k<br>• k f(x),<br>• f(kx)<br>• f(x + k) | |

| | | | | | |
|---|---|---|---|---|---|
| | | for specific positive and negative values of k<br><br>Given the graph of a function and a single transformation **(for all listed above)**, find the value of the constant or coefficient | for specific positive and negative values of k<br><br>Given the graph of a function and a single transformation **(3 of the 4 listed above)**, find the value of the constant or coefficient | for specific positive and negative values of k<br><br>Given the graph of a function and a single transformation **(2 of the 4 listed above)**, find the value of the constant or coefficient | |

F.BF.1 Write a function that describes a relationship between two quantities.
~~a. Determine an explicit expression~~, a recursive process or steps for calculation from a context.

F.LE.2* Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). *(Modeling Standard)

F.LE.3* Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, ~~quadratically, or (more generally) as a polynomial function.~~ *(Modeling Standard)

F.IF.9* Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

F.BF.3 Identify the effect on the graph of replacing f(x) by f(x + k), k f(x), f(kx) and f(x) + k, for specific values of k (both negative and positive); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

F.IF.7 Graph exponential ~~and logarithmic~~ functions, showing intercepts and end behavior, ~~and trigonometric functions, showing period, midline, and amplitude~~

**Unit 2b: Key Features & Sketching Graphs**

A. Key Features of Graphs

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Identify and compare key features** (F.IF.4, F.IF.5) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Identify and compare key features of two functions represented in **all** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | Identify and compare key features of two functions represented in **three** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | Identify and compare key features of two functions represented in **two** of the following ways<br>• algebraically<br>• graphically<br>• tables<br>• in context | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Identify transformations** (F.BF.3) | | Identify the effect on a graph by replacing f(x) with a single transformation:<br>• f(x) + k<br>• k f(x),<br>• f(kx)<br>• f(x + k)<br>for specific positive and negative values of k<br><br>Given the graph of a function and a single transformation **(for all listed above)**, find the value of the constant or coefficient | Identify the effect on a graph by replacing f(x) with a single transformation **(3 of the 4)**:<br>• f(x) + k<br>• k f(x),<br>• f(kx)<br>• f(x + k)<br>for specific positive and negative values of k<br><br>Given the graph of a function and a single transformation **(3 of the 4 listed above)**, find the value of the constant or coefficient | Identify the effect on a graph by replacing f(x) with a single transformation **(2 of the 4)**:<br>• f(x) + k<br>• k f(x),<br>• f(kx)<br>• f(x + k)<br>for specific positive and negative values of k<br><br>Given the graph of a function and a single transformation **(2 of the 4 listed above)**, find the value of the constant or coefficient | |
| **Calculate and interpret rate of change** (F.IF.6*) | | Calculate the average rate of change over a given interval and explain the meaning in context for linear and exponential functions presented in symbolic, table and graph form | Calculate the average rate of change over a given interval and explain the meaning in context for linear and exponential functions presented in symbolic, table or graph form | Calculate the average rate of change over a given interval for linear and exponential functions presented in symbolic, table or graph form | |

F.BF.3 Identify the effect on the graph of replacing f(x) by f(x + k), k f(x), f(kx) and f(x) + k, for specific values of k (both negative and positive); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

F.IF.4 For a linear, exponential, or quadratic function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior. *

F.IF.5 Relate the domain of a linear, exponential, ~~or quadratic function~~ to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. *

F.IF.6* Calculate and interpret the average rate of change of a linear, exponential, ~~or quadratic~~ function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph of a function over a specified interval. *

**Unit 2b: Key Features & Sketching Graphs**

B. Sketching Graphs

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Understand solutions** (A.REI.10) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | **Explain** that all solutions to an equation in two variables are contained on the graph of that equation | Verifies that **multiple solutions** to an equation in two variables are contained on the graph of that equation. | **Verifies** that **one solution** to an equation in two variables is contained on the graph of that equation. | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Explaining solutions** (A.REI.11*) | | Explain a solution to a system of equations (algebraically, graphically, or with tables) **in context of a given situation** | **Explain a solution** to a system of equations (algebraically, graphically, or with tables) | **Verify** solutions to a system of equations (algebraically, graphically, or with tables) | |
| **Graph inequalities and systems of Inequalities** (A.REI.12) | | Graph a system of linear inequalities in two variables from contextual situations **(standard form)** and identify the solution set. | Graph **a system of linear** inequalities in two variables from contextual situations (slope intercept form) and identify the solution set. | Graph **a linear inequality** in two variables from contextual situations (slope intercept form) and identify the solution set. | |

A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

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 solutions to f(x) = g(x) approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, quadratic, or exponential functions. *(Modeling Standard).

A.REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the

## Unit 3: Reasoning with Equations

A. Solving Systems of Equations & Inequalities

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Explain steps to solving** (A.REI.1) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Explain each step in solving an equation using properties of equality **and justify the solution method** | **Explain** each step in solving an equation using properties of equality. | **Identify**/match properties of equality used for each step in solving an equation. | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Solve systems of equations** (A.REI.6) | | Solve a system of linear equations approximately (graphing **with labels and scales**) and exactly (algebraically) when multiplication or rearranging is necessary | Solve a system of linear equations approximately (graphing) and exactly (algebraically) **when multiplication or rearranging is necessary** | Solve a system of linear equations approximately (graphing) and exactly (algebraically) | |
| **Explaining solutions** (A.REI.5, A.REI.11*) | | Explain a solution to a system of equations (algebraically, graphically, or with tables) **in context of a given situation** | **Explain a solution** to a system of equations (algebraically, graphically, or with tables) | **Verify** solutions to a system of equations (algebraically, graphically, or with tables) | |

A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. .

A.REI.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions

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 solutions to f(x) = g(x) approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, quadratic, or exponential functions. *(Modeling Standard)

**Unit 3: Reasoning with Equations**

B. Applications of Systems of Equations & Inequalities

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Create systems of equations** (A.CED.2*) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Create a system of equations to model a situation | **Create** a system of equations to model a situation | **Identify** a system of equations to model a situation | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Solve systems of equations** (A.REI.6) | | Solve a system of linear equations approximately (graphing **with labels and scales**) and exactly (algebraically) when multiplication or rearranging is necessary | Solve a system of linear equations approximately (graphing) and exactly (algebraically) **when multiplication or rearranging is necessary** | Solve a system of linear equations approximately (graphing) and exactly (algebraically | |
| **Explaining solutions** (A.REI.5) | | Explain a solution to a system of equations (algebraically, graphically, or with tables) **in context of a given situation** | **Explain a solution** to a system of equations (algebraically, graphically, or with tables) | **Verify** solutions to a system of equations (algebraically, graphically, or with tables) | |

A.CED.2* Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.REI.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions

A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

**Unit 4: Descriptive Statistics**

A. Representing and Analyzing Data

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Represent data** (S.ID.1*) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Represent data with plots on the real number line using **all of** the following models:<br>• Dot plot<br>• Histograms<br>• Box plots | Represent data with plots on the real number line using **two** of the following models:<br>• Dot plot<br>• Histograms<br>• Box plots | Represent data with plots on the real number line using **one** of the following models:<br>• Dot plot<br>• Histograms<br>• Box plots | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Compare center and spread** (S.ID.2*) | | Use statistics appropriate to the data to **compare** center (median, mean) and spread (interquartile range, standard deviation) of two or more data sets. | Calculates the center (median, mean) **and** spread (interquartile range, standard deviation) of two or more data sets. | Calculates center (median, mode) **or** spread (interquartile range, standard deviation) of two or more data sets. | |
| **Interpret data** (S.ID.3*) | | Interpret differences in shape, center and spread **in the context** of the data sets accounting for possible effects of extreme data points (outliers) | Interpret differences in shape, center and spread **accounting for possible effects of extreme data points (outliers)** | Interpret differences in shape, center and spread. | |
| **Create and analyze scatter plots** (S.ID.6) | | Represent data on two quantitative variables on a scatter plot, fit a function to the data **and use the function to solve problems in context of the data** | Represent data on a scatter plot **and fit a function to the data** (function may be linear, quadratic or exponential) | Represent data on a scatter plot by hand **and** by technology | |
| **Interpreting and analyzing frequency** (S.ID.5*) | | Can do **all of** the following:<br><br>Summarize categorical data for two categories in two-way frequency tables<br><br>Interpret relative frequencies in the context (joint, marginal, and conditional relative frequencies)<br><br>Recognize possible associations and trends | Can do **two** of the following:<br><br>Summarize categorical data for two categories in two-way frequency tables<br><br>Interpret relative frequencies in the context (joint, marginal, and conditional relative frequencies)<br><br>Recognize possible associations and trends | Can do **one** of the following:<br><br>Summarize categorical data for two categories in two-way frequency tables<br><br>Interpret relative frequencies in the context (joint, marginal, and conditional relative frequencies)<br><br>Recognize possible associations and trends | |

S.ID.1 Represent data with plots on the real number line (dot plots, histograms and box plots).

S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
a. 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.
b. Informally assess the fit of a function by plotting and analyzing residuals.
c. Fit a linear function for a scatter plot that suggests a linear association.

S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

**Unit 4: Descriptive Statistics**

B. Interpret Linear Models

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Create and analyze scatter plots** (S.ID.7, S.ID.8, S.ID.9) | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | **Interpret** the slope and intercept of a linear model **in context of the data**<br><br>Compute **and interpret** the correlation coefficient of a linear fit **in context of the data**<br><br>**Determine whether correlation implies causation in data** | **Identify the slope and intercept** of a linear model<br><br>**Compute the correlation coefficient** of a linear fit.<br><br>**Determine if there is correlation in data** | Represent data on a scatter plot by hand **and** by technology | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |

S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

S.ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.

S.ID.9 Distinguish between correlation and causation.

**Unit 5: Transformations**

A. Transformations

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Definitions of lines and angles (G.CO.1)** | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>•Connecting<br>•Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Describe the following terms using points, lines, distance and circular arcs for **all** of the following:<br>• Angles<br>• Circles<br>• Perpendicular Lines<br>• Parallel Lines<br>• Line Segments | Describe the following terms using points, lines, distance and circular arcs for **4** of the following:<br>• Angles<br>• Circles<br>• Perpendicular Lines<br>• Parallel Lines<br>• Line Segments | Describe the following terms using points, lines, distance and circular arcs for **2** of the following:<br>• Angles<br>• Circles<br>• Perpendicular Lines<br>• Parallel Lines<br>• Line Segments | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Represent, describe and compare transformations (G.CO.2, G.CO.5)** | | Draw **and** describe transformations of reflections, rotations, translations, and combinations of these, including mapping a figure onto another.<br><br>Describe reflections, translations, **and rotations** as functions that take points on the plane as inputs and give other points as outputs<br><br>**Compare** transformations that preserve distance and angles to those that do not | Draw **or** describe transformations of reflections, **rotations,** translations, **and a combination of these,** including mapping a figure onto another.<br><br>**Describe** reflections and translations as functions that take points on the plane as inputs and give other points as outputs<br><br>**Describe** transformations that preserve distance and angles to those that do not | Draw **and** describe a singular transformation of reflections and translations, including mapping a figure onto another.<br><br>Given a function rule for reflections and translations, **identify the outputs**<br><br>**Identify** transformations that preserve distance and angles to those that do not | |
| **Describe symmetry (G.CO.3)** | | Describe **and** illustrate rotations and reflections of a rectangle, parallelogram, trapezoid, or regular polygon that carry each figure onto itself. | Describe **or** illustrate rotations **and** reflections of a rectangle, parallelogram, trapezoid, or regular polygon that carry each figure onto itself. | Describe **or** illustrate rotations **or** reflections of a rectangle, parallelogram, trapezoid, or regular polygon that carry each figure onto itself. | |
| **Develop definitions of transformations (G.CO.4)** | | Develop the definition **of all the terms** rotations, reflections and translations in terms of:<br>• Angles<br>• Circles<br>• Perpendicular lines<br>• Parallel lines<br>• Line segments. | Develop the definition **for 4 of the terms** rotations, reflections and translations in terms of:<br>• Angles<br>• Circles<br>• Perpendicular lines<br>• Parallel lines<br>• Line segments. | Develop the definition **for 2 of the terms** rotations, reflections and translations in terms of:<br>• Angles<br>• Circles<br>• Perpendicular lines<br>• Parallel lines<br>• Line segments. | |
| **Properties of Dilations (G.SRT.1)** | | **Verify** that when a side passes through the center of dilation, **the side and its image lie on the same line.** | Given an image and the pre-image, **determine the center of dilation** | **Perform dilation** with a given center and scale factor on a figure in the coordinate plane. | |

G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor:

a. dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.
b. the dilation of a line segment is longer or shorter in the ratio given by the scale factor.

**Unit 6: Congruence**

B. Congruence

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Predict and decide congruency (G.CO.6)**<br><br>**Corresponding sides and angles (G.CO.7)** | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br><br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Use descriptions of rigid motions to **predict** the effect of a rigid motions on a figure<br><br>Use the definition of congruence in terms of rigid motions to:<br>• decide if two given figures are congruent<br>• **prove** that corresponding sides are congruent and corresponding angles are congruent in a pair of congruent triangles | Use descriptions of rigid motions to **show** the effect of a rigid motions on a figure<br><br>Use the definition of congruence in terms of rigid motions to:<br>• decide if two given figures are congruent<br>• **show** that corresponding sides are congruent and corresponding angles are congruent in a pair of congruent triangles | Use descriptions of rigid motions to **identify** the effect of a rigid motions on a figure<br><br>Use the definition of congruence in terms of rigid motions to:<br>• decide if two given figures are congruent<br>• **identify** that corresponding sides are congruent and corresponding angles are congruent in a pair of congruent triangles | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Explain triangle congruence (G.CO.8)** | | **Prove** SSS, SAS, and ASA triangle congruence using rigid motion. | Identify all SSS, SAS, ASA, AAS, and HL triangle congruence **using rigid motion**<br><br>**Identify missing parts based on a congruence postulate.** | **Identify** if triangles are congruent and by which method (SSS, SAS, ASA, AAS or HL) | |

G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

## Unit 7: Constructions

C. Constructions

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Construction of lines and angles (G.CO.12, G.CO.13)** | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Use a variety of tools to **perform all** of the following:<br>• Bisect a segment<br>• Bisect an angle<br>• Construct the perpendicular bisector of a segment<br>• Construct an equilateral triangle | Use a variety of tools to **perform 3** of the following:<br>• Bisect a segment<br>• Bisect an angle<br>• Construct the perpendicular bisector of a segment<br>• Construct an equilateral triangle | Use a variety of tools to **perform 2** of the following:<br>• Bisect a segment<br>• Bisect an angle<br>• Construct the perpendicular bisector of a segment<br>• Construct an equilateral triangle | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |

G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

## Unit 8: Connecting Algebra and Geometry

A. Parallel and Perpendicular Lines

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Prove using formulas (G.GPE.4)** | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>•Connecting<br>•Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Using coordinate geometry and the slope, distance and midpoint formulas to prove **all** of the following<br>• Segments on a coordinate plane are congruent<br>• Segments on a coordinate plane are perpendicular<br>• Segments on a coordinate plane are parallel | Using coordinate geometry and the slope, distance and midpoint formulas to prove **two** of the following<br>• Segments on a coordinate plane are congruent<br>• Segments on a coordinate plane are perpendicular<br>• Segments on a coordinate plane are parallel | Using coordinate geometry and the slope, distance and midpoint formulas to prove **one** of the following<br>• Identify if segments on a coordinate plane are congruent<br>• Identify If segments on a coordinate plane are perpendicular<br>• Segments on a coordinate plane are parallel | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |
| **Prove and use parallel and perpendicular lines (G.GPE.5)** | | Prove **a pair of lines** are parallel or perpendicular using slope<br><br>Write the equation of a line that is parallel **and** perpendicular to a given line that passes through a given point | **Given the slope of 1 line**, prove if a pair of lines are parallel or perpendicular<br><br>**Write** the equation of a line that is parallel **or** perpendicular to a given line that passes through a given point | **Given the slope of a pair of lines**, identify the lines are parallel or perpendicular<br><br>**Identify** the equation of a line that is parallel or perpendicular to a given line that passes through a given point | |

G.GPE.4 Use coordinates to prove simple geometric theorems algebraically.

G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

**Unit 8: Connecting Algebra and Geometry**

B. Perimeter and Area

| CCSS | 4 – Mastery | 3 – Proficient | 2 - Basic | 1 – Below Basic | 0 – No Evidence |
|---|---|---|---|---|---|
| **Perimeter and area (G.GPE.7)** | Can extend thinking beyond the standard, including tasks that may involve one of the following:<br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Using coordinate geometry and the Pythagorean, slope, distance and midpoint formulas to do both of the following<br>• find the perimeter of polygons.<br>• find the area **of polygons using** triangles and rectangles | Using coordinate geometry and the Pythagorean, slope, distance and midpoint formulas to do **both** of the following<br>• find the perimeter of polygons.<br>• find the area of triangles and rectangles | Using coordinate geometry and the Pythagorean, slope, distance and midpoint formulas to do **one** of the following<br>• find the perimeter of polygons.<br>• find the area of triangles and rectangles | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |

G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★