Imagine Math

Built for Idaho

Grades 3–Geometry

CREDIT RECOVERY PLAN

Imagine Math is now available to utilize for Algebra 1 and Geometry credit recovery for your students. The program is simple to implement and monitor. Students will go through a rigorous set of course work which will give them a solid foundation in Algebra 1 and will prepare them for success in Geometry and future Math courses.

Program Overview

Imagine Math's Algebra 1 credit recovery program initially enrolls students into a pathway of 57 grade level lessons covering the Idaho Core Algebra 1 standards. Imagine Math's Geometry credit recovery program initially enrolls students into a pathway of 49 lessons covering the Idaho Core Geometry Standards. This pathway has been constructed in conjunction with the Idaho SDE and all lessons are aligned to the Idaho Core Standards Algebra 1 and Geometry courses. Students take a brief placement test which determines if there are additional pre-cursor lessons that need to be added into each student's pathway. Additionally, Imagine Math monitors student progress and adds additional pre-cursors as needed to fill students' learning gaps.

Below are the Algebra 1 and Geometry Credit Recovery pathways and the associated standards to which they are aligned.

8.14.2017

Algebra I Credit Recovery Learning Pathway

Unit	*Lesson & Standards Addressed*
Quantities	**Using Units to Solve Problems** HSN-Q.A.1 Reason quantitatively and use units to solve problems. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HSN-Q.A.3 Reason quantitatively and use units to solve problems. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Linear, Quadratic, and Exponential Models	**Introduction to Nonlinear Models** HSF-LE.A.3 Construct and compare linear and exponential models and solve problems. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function
Seeing Structure in Expressions	**Interpreting the Structure of Linear and Exponential Expressions** HSA-SSE.A.1a Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients
Creating Equations	**Writing and Solving Linear Equations in One Variable** HSA-CED.A.1 Create equations that describe numbers or relationships. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. HSA-CED.A.3 Create equations that describe numbers or relationships. 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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. **Writing and Graphing Linear Equations in Two or More Variables** HSA-CED.A.2 Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Equations of Parallel and Perpendicular Lines** HSA-CED.A.2 Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **Writing Linear Inequalities in One Variable** HSA-CED.A.1 Create equations that describe numbers or relationships. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. HSA-CED.A.3 Create equations that describe numbers or relationships. 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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Reasoning with Equations and Inequalities	**Solving Linear Inequalities in One Variable** HSA-REI.B.3 Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters
Creating Equations	**Modeling Exponential Relationships with Equations, Inequalities, and Graphs** HSA-CED.A.1 Create equations that describe numbers or relationships. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. HSA-CED.A.2 Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

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Unit	*Lesson & Standards Addressed*
Reasoning with Equations and Inequalities	**Solving Linear Equations in One Variable as a Reasoning Process** HSA-REI.A.1 Understand solving equations as a process of reasoning and explain the reasoning. 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. HSA-REI.B.3 Solve equations and inequalities in one variable. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters
Creating Equations	**Solving Literal Equations** HSA-CED.A.4 Create equations that describe numbers or relationships. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.
Reasoning with Equations and Inequalities	**Solving Systems of Linear Equations** HSA-REI.C.5 Solve systems of equations. 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. HSA-REI.C.6 Solve systems of equations. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **Solving Linear Equations Graphically** HSA-REI.D.10 Represent and solve equations and inequalities graphically. 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). HSA-REI.D.11 Represent and solve equations and inequalities graphically. 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 the solutions 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, polynomial, rational, absolute value, exponential, and logarithmic functions. **Solving Exponential Equations Graphically** HSA-REI.D.10 Represent and solve equations and inequalities graphically. 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). HSA-REI.D.11 Represent and solve equations and inequalities graphically. 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 the solutions 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, polynomial, rational, absolute value, exponential, and logarithmic functions. **Graphing Linear Inequalities and Systems of Linear Inequalities in Real-World Situations** HSA-REI.D.12 Represent and solve equations and inequalities graphically. Graph the solutions to a linear inequality in two variables as a halfplane (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 corresponding half-planes.

Unit	*Lesson & Standards Addressed*
Interpreting Functions	**Function Notation I** HSF-IF.A.1 Understand the concept of a function and use function notation. 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). HSF-IF.A.2 Understand the concept of a function and use function notation. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **Function Notation II** HSF-IF.A.1 Understand the concept of a function and use function notation. 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). HSF-IF.A.2 Understand the concept of a function and use function notation. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **Interpreting Graphs of Linear and Exponential Functions in Context** HSF-IF.B.4 Interpret functions that arise in applications in terms of the context. For a 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; end behavior; and periodicity. **Sketching Graphs of Linear and Exponential Functions from a Context** HSF-IF.B.4 Interpret functions that arise in applications in terms of the context. For a 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; end behavior; and periodicity. **Understanding the Domain of a Function** HSF-IF.B.5 Interpret functions that arise in applications in terms of the context. Relate the domain of a 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. **Rate of Change for Linear and Exponential Functions** HSF-IF.B.6 Interpret functions that arise in applications in terms of the context. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. Sketching Graphs of Linear Functions from Symbolic Representations HSF-IF.C.7a Analyze functions using different representations. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph linear and quadratic functions and show intercepts, maxima, and minima.

Algebra I Credit Recovery Learning Pathway

Unit	*Lesson & Standards Addressed*
Interpreting Functions	**Sketching Graphs of Exponential Functions from Symbolic Representations** HSF-IF.C.7e Analyze functions using different representations. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
Building Functions	**Transformations of Graphs of Linear and Exponential Functions** HSF-BF.B.3 Build new functions from existing functions. 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 positive and negative); 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.
Interpreting Functions	**Comparing Functions Using Different Representations** HSF-IF.C.9 Analyze functions using different representations. 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.
Linear, Quadratic, and Exponential Models	**Distinguishing Between Linear and Exponential Relationships** HSF-LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions. HSF-LE.A.1a Construct and compare linear, quadratic, and exponential models and solve problems. Distinguish between situations that can be modeled with linear functions and with exponential functions. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. HSF-LE.A.1b Construct and compare linear, quadratic, and exponential models and solve problems. Distinguish between situations that can be modeled with linear functions and with exponential functions. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. HSF-LE.A.1c Construct and compare linear, quadratic, and exponential models and solve problems. Distinguish between situations that can be modeled with linear functions and with exponential functions. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
Building Functions	**Writing Linear and Exponential Functions from a Context** HSF-BF.A.1a Build a function that models a relationship between two quantities. 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.
Linear, Quadratic, and Exponential Models	**Writing Linear and Exponential Functions Based on Different Representations** HSF-LE.A.2 Construct and compare linear and exponential models and solve problems. 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).
Building Functions	**Composite Functions** HSF-BF.A.1b Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. **Writing Geometric Sequences Using an Explicit Formula** HSF-BF.A.2 Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

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Unit	*Lesson & Standards Addressed*
Building Functions	**Writing Geometric Sequences Recursively** HSF-BF.A.2 Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. **Writing Arithmetic Sequences Explicitly and Recursively** HSF-BF.A.2 Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
Interpreting Functions	**Sequences as Functions** HSF-IF.A.3 Understand the concept of a function and use function notation. 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 $n \geq 1$.
Interpreting Categorical and Quantitative Data	**Data Displays on the Real Number Line** HSS-ID.A.1 Summarize, represent, and interpret data on a single count or measurement variable. Represent data with plots on the real number line (dot plots, histograms, and box plots). **Comparing the Shape, Center, and Spread of Data Sets** HSS-ID.A.2 Summarize, represent, and interpret data on a single count or measurement variable. 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. HSS-ID.A.3 Summarize, represent, and interpret data on a single count or measurement variable. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). **Summarizing and Interpreting Categorical Data** HSS-ID.B.5 Summarize, represent, and interpret data on two categorical and quantitative variables. 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.) **Fitting Functions to Data** HSS-ID.B.6a Summarize, represent, and interpret data on two categorical and quantitative variables. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. 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 and exponential models. HSS-ID.B.6b Summarize, represent, and interpret data on two categorical and quantitative variables. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. Informally assess the fit of a function by plotting and analyzing residuals. HSS-ID.B.6c Summarize, represent, and interpret data on two categorical and quantitative variables. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. Fit a linear function for a scatter plot that suggests a linear association. **Correlation** HSS-ID.C.7 Interpret linear models. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. HSS-ID.C.9 Interpret linear models. Distinguish between correlation and causation.

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Unit	*Lesson & Standards Addressed*
Arithmetic with Polynomials and Rational Expressions	**Adding and Subtracting Polynomials** HSA-APR.A.1 Perform arithmetic operations with polynomials. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Multiplying Polynomials** HSA-APR.A.1 Perform arithmetic operations with polynomials. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
The Real Number System	**Products and Sums with Rational and Irrational Numbers** HSN-RN.B.3 Use properties of rational and irrational numbers. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. **Using Rational Exponents to Rewrite Expressions** HSN-RN.A.1 Extend the properties of exponents to rational exponents. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 5^1/3 to be the cube root of 5 because we want (5^1/3)³ = 5(^1/3)³ to hold, so (5^1/3)³ must equal 5. HSN-RN.A.2 Extend the properties of exponents to rational exponents. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
Interpreting Functions	**Rewriting and Interpreting Exponential Functions in Terms of Context** HSA-SSE.B.3c Write expressions in equivalent forms to solve problems. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as (1.15^1/12)^12t ≈ 1.012^12t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%. HSF-IF.C.8b Analyze functions using different representations. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay. HSF-LE.B.5 Interpret expressions for functions in terms of the situation they model. Interpret the parameters in a linear or exponential function in terms of a context.
Seeing Structure in Expressions	**Interpreting the Structure of Quadratic Expressions and Expressions with Rational Exponents** HSA-SSE.A.1a Interpret the structure of expressions. Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients.
Creating Equations	**Modeling Quadratic Relationships with Equations, Inequalities, and Graphs** HSA-CED.A.1 Create equations that describe numbers or relationships. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. HSA-CED.A.2 Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. HSA-CED.A.4 Create equations that describe numbers or relationships. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.

Unit	*Lesson & Standards Addressed*
Building Functions	**Writing Quadratic Functions from a Context** HSF-BF.A.1a Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Determine an explicit expression, a recursive process, or steps for calculation from a context. HSF-BF.A.1b Build a function that models a relationship between two quantities. Write a function that describes a relationship between two quantities. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
Seeing Structure in Expressions	**Factoring Quadratic Expressions** HSA-SSE.A.2 Interpret the structure of expressions. Use the structure of an expression to identify ways to rewrite it. For example, see x^4 - y^4 as (x^2)^2 - (y^2)^2, thus recognizing it as a difference of squares that can be factored as (x^2 - y^2)(x^2 + y^2). HSA-SSE.B.3a Write expressions in equivalent forms to solve problems. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines.
Interpreting Functions	**Sketching Graphs of Quadratic Functions in Context** HSF-IF.B.4 Interpret functions that arise in applications in terms of the context. For a 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; end behavior; and periodicity. HSF-IF.B.6 Interpret functions that arise in applications in terms of the context. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. HSF-IF.B.5 Interpret functions that arise in applications in terms of the context. Relate the domain of a 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. **Sketching and Transforming Graphs of Quadratic Functions from Symbolic Representations** HSF-IF.C.7a Analyze functions using different representations. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. HSF-BF.B.3 Build new functions from existing functions. 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 positive and negative); 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.
Reasoning with Equations and Inequalities	**Solving Quadratics - Completing the Square** HSA-REI.B.4a Solve equations and inequalities in one variable. Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.
Building Functions	**Writing Quadratic Functions from Their Graphs** HSA-CED.A.2 Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. HSF-BF.A.1 Write a function that describes a relationship between two quantities.

Unit	*Lesson & Standards Addressed*
Interpreting Functions	**Rewriting Quadratics to Reveal Their Structure** HSA-SSE.B.3b Write expressions in equivalent forms to solve problems. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. HSF-IF.C.8a Analyze functions using different representations. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
Reasoning with Equations and Inequalities	**Problem Solving with Quadratic Functions** HSA-REI.B.4b Solve equations and inequalities in one variable. Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a +/- bi for real numbers a and b. **Using the Quadratic Formula** HSA-REI.B.4b Solve equations and inequalities in one variable. Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. Solving a System of Linear and Quadratic Equations HSA-REI.C.7 Solve systems of equations. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = -3x and the circle $x^2 + y^2 = 3$.
Interpreting Functions	**Piecewise, Step, and Absolute Value Functions** HSF-IF.C.7b Analyze functions using different representations. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
Building Functions	**Writing Inverse Functions** HSF-BF.B.4a Build new functions from existing functions. Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^3$ for $x > 0$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.

Geometry Credit Recovery LearningPathway

Unit	*Lesson & Standards Addressed*
Congruence	**Defining Basic Geometric Elements** HSG-CO.A.1 Experiment with transformations in the plane. 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. **Defining Transformations** HSG-CO.A.4 Experiment with transformations in the plane. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **Rotational and Reflectional Symmetry** HSG-CO.A.3 Experiment with transformations in the plane. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **Representing Transformations with Algebra** HSG-CO.A.2 Experiment with transformations in the plane. 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). **Rigid Motion and Congruence** HSG-CO.A.5 Experiment with transformations in the plane. 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. HSG-CO.B.6 Understand congruence in terms of rigid motions. 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. **What Is Proof?** HSG-CO.B.7 Understand congruence in terms of rigid motions. 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. HSG-CO.C.9 Prove geometric theorems. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. **Proving Theorems About Lines and Angles** HSG-CO.C.9 Prove geometric theorems. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. **Proving Theorems About Congruent Triangles** HSG-CO.B.8 Understand congruence in terms of rigid motions. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. HSG-CO.C.10 Prove geometric theorems. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

Geometry Credit Recovery LearningPathway

Unit	*Lesson & Standards Addressed*
Similarity, Right Triangles, and Trigonometry	**Problem Solving with Congruent Triangles** HSG-CO.C.10 Prove geometric theorems. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. HSG-SRT.B.5 Prove theorems involving similarity. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures
Congruence	**Proving Theorems About Relationships in Triangles** HSG-CO.C.10 Prove geometric theorems. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. **Proving Theorems About Parallelograms** HSG-CO.C.11 Prove geometric theorems. Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. **Constructing Angles and Special Line Segments** HSG-CO.D.12 Make geometric constructions. 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. **Constructing Inscribed Figures** HSG-CO.D.13 Make geometric constructions. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
Modeling with Geometry	**Modeling Objects with Geometric Figures** HSG-MG.A.1 Apply geometric concepts in modeling situations. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). **Using Geometric Relationships to Solve Design Problems** HSG-MG.A.3 Apply geometric concepts in modeling situations. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
Similarity, Right Triangles, and Trigonometry	**Properties of Dilations I** HSG-SRT.A.1b Understand similarity in terms of similarity transformations. Verify experimentally the properties of dilations given by a center and a scale factor: b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. **Properties of Dilations II** HSG-SRT.A.1a Understand similarity in terms of similarity transformations. Verify experimentally the properties of dilations given by a center and a scale factor: a. 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.

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Unit	*Lesson & Standards Addressed*
Similarity, Right Triangles, and Trigonometry	**Transformations and Similarity** HSG-SRT.A.2 Understand similarity in terms of similarity transformations. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. HSG-SRT.A.3 Understand similarity in terms of similarity transformations. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar." **Problem Solving with Transformations and Similarity** HSG-SRT.B.5 Prove theorems involving similarity. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
Geometry	**Pythagorean Theorem - Hypotenuse** 8.G.B.7 Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. HSG-SRT.C.8 Define trigonometric ratios and solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **Pythagorean Theorem - Legs** 8.G.B.7 Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. HSG-SRT.C.8 Define trigonometric ratios and solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **Pythagorean Theorem - Mixed Problems** 8.G.B.7 Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. HSG-SRT.C.8 Define trigonometric ratios and solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
Similarity, Right Triangles and Trigonometry	**Proving Theorems About Similar Triangles** HSG-SRT.B.4 Prove theorems involving similarity. Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. **Similarity and Trigonometric Ratios** HSG-SRT.C.6 Define trigonometric ratios and solve problems involving right triangles. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. **Problem Solving with Similarity and Trigonometric Ratios** HSG-SRT.C.8 Define trigonometric ratios and solve problems involving right triangles. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **Sine and Cosine of Complementary Angles** HSG-SRT.C.7 Define trigonometric ratios and solve problems involving right triangles. Explain and use the relationship between the sine and cosine of complementary angles.

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Unit	*Lesson & Standards Addressed*
Geometry	**Volume of Cylinders** 8.G.C.9 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. HSG-GMD.A.3 Explain volume formulas and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. **Volume of Pyramids and Cones** 8.G.C.9 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. HSG-GMD.A.3 Explain volume formulas and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. **Volume of Spheres** 8.G.C.9 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. HSG-GMD.A.3 Explain volume formulas and use them to solve problems. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
Modeling with Geometry	**Rates with Area and Volume** HSG-MG.A.2 Apply geometric concepts in modeling situations. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
Geometric Measurement and Dimension	**Understanding Formulas for Curved Figures** HSG-GMD.A.1 Explain volume formulas and use them to solve problems. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. **Cross Sections of 3-Dimensional Figures** HSG-GMD.B.4 Visualize relationships between two-dimensional and three-dimensional objects. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
Expressing Geometric Properties with Equations	**Coordinates of Parallel and Perpendicular Lines** HSG-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2). HSG-GPE.B.5 Use coordinates to prove simple geometric theorems algebraically. 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). **Problem Solving with Coordinates of Parallel and Perpendicular Lines** HSG-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).

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Unit	*Lesson & Standards Addressed*
Expressing Geometric Properties with Equations	**Dividing a Segment Proportionally** HSG-GPE.B.6 Use coordinates to prove simple geometric theorems algebraically. Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **Using Coordinates to Find Perimeters and Areas** HSG-GPE.B.7 Use coordinates to prove simple geometric theorems algebraically. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
Circles	**Tangents, Chords, Radii, and Angles in Circles** HSG-C.A.2 Understand and apply theorems about circles. Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. HSG-C.A.4 Understand and apply theorems about circles. (+) Construct a tangent line from a point outside a given circle to the circle. **Radians and Area of Sectors** HSG-C.B.5 Find arc lengths and areas of sectors of circles. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
Expressing Geometric Properties with Equations	**Equation of a Circle** HSG-GPE.A.1 Translate between the geometric description and the equation for a conic section. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. HSG-C.A.1 Understand and apply theorems about circles. Prove that all circles are similar. **Problem Solving with the Equation of a Circle** HSG-GPE.A.1 Translate between the geometric description and the equation for a conic section. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. HSG-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2). **Deriving the Equation of a Parabola from Its Definition** HSG-GPE.A.2 Translate between the geometric description and the equation for a conic section. Derive the equation of a parabola given a focus and directrix.
Circles	**Quadrilaterals Inscribed in Circles** HSG-C.A.3 Understand and apply theorems about circles. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
Similarity, Right Triangles and Trigonometry	**Law of Sines and Law of Cosines** HDG-SRT.D.11 Apply trigonometry to general triangles. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Unit	*Lesson & Standards Addressed*
Conditional Probability and the Rules of Probability	**Organizing Possible Outcomes of Events** HSS-CP.A.1 Understand independence and conditional probability and use them to interpret data. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). **Using Area Models for Compound Probability** HSS-CP.A.5 Understand independence and conditional probability and use them to interpret data. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. HSS-CP.B.9 Use the rules of probability to compute probabilities of compound events in a uniform probability model. (+) Use permutations and combinations to compute probabilities of compound events and solve problems. **Understanding Independent and Dependent Events** HSS-CP.A.2 Understand independence and conditional probability and use them to interpret data. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. **Understanding Conditional Probability** HSS-CP.A.3 Understand independence and conditional probability and use them to interpret data. Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. HSS-CP.B.6 Use the rules of probability to compute probabilities of compound events in a uniform probability model. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. **Modeling Probability Situations Using Two-Way Frequency Tables** HSS-CP.A.4 Understand independence and conditional probability and use them to interpret data. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. HSS-CP.B.6 Use the rules of probability to compute probabilities of compound events in a uniform probability model. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. **Relating Probabilities of Unions and Intersections of Events** HSS-CP.B.7 Use the rules of probability to compute probabilities of compound events in a uniform probability model. Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.

Lesson Overview

Each lesson follows a Gradual Release model. This means that the program starts by modeling how to do the math and gradually releases responsibility to the student. The beginning activities have more support and gradually remove support until the Post Quiz, where the student must do the math completely on their own. The Problem-Solving activity serves as a part of the instructional component within Imagine Math. Two of the activities, Guided Learning and the Problem-Solving Process, provide access to a Live Teacher.
Below is a summary of the activities within each lesson. Not every lesson has these activities.

- **PRE-QUIZ:** If the student thinks (s)he knows the lesson material; the student may opt to take the Pre-Quiz. If the student scores 80% or better on the Pre-Quiz, he or she skips the lesson, and the lesson path adapts to match student need.
- **WARM UP:** In this activity, the student sees items that are precursors to the standard for this lesson. This activates students' prior knowledge to increase success. It reinforces the idea that each piece of math learning is connected to other math understandings.
- **GUIDED LEARNING:** Guided Learning is a series of items that span the key parts of the standard of the lesson. This is a very interactive type of learning activity where the student is posed a question and may choose to try to answer right away, or get more help before they answer. Once a student exhausts all the Math Coach help, he or she can get help from a Live Teacher.
- **PROBLEM SOLVING PROCESS:** The Problem-Solving Process activity focuses on a 5-step process for solving problems that students can apply to any problem that can be solved by writing an equation. This process bolsters students' confidence that they can get started solving any problem without anxiety. Access to Live Teachers is also available here.

  During this activity, students practice the problem-solving process:
  - Analyzing given information
  - Formulating a plan or strategy
  - Determining a solution
  - Justifying the solution
  - Evaluating the problem-solving process and the reasonableness of the solution

- **PRACTICE:** In the Independent Practice activity, students get plenty of practice with more problems on the target standard. They work more independently in this activity. The student has correction on incorrect answer, but the instructional support from the coach and live teacher is no longer available.
- **POST-QUIZ:** At the end of each lesson, students prove whether they know the mathematics totally independently (the final step in the gradual release process). If they get 60% or better on this activity, they pass the lesson.

Monitoring Student Progress

We have created a very easy to implement and monitor program for credit recovery.
As students work through their pathway, reports on student progress are available through the teacher portal. These are easy to use reports that indicate how much work students are doing as well as how much progress they are making toward completing the Target and pre-cursor lessons on their pathway. In order to ensure students demonstrate proficiency on the content, we highly recommend that you require students to maintain a math journal to document their work and serve as a portfolio of their progress. Teachers are free to implement this in any way that they see fit. However, Imagine Math has a Math Journal, along with suggestions for its use, which is available under the support tab of the teacher page.

Grading

The grading process for this program is very simple. Students should be given credit for Algebra 1 if they:

1. Pass at least 70% of their Grade Level lessons (the lessons listed on this document)
2. Submit a math journal that meets the expectations set by the monitoring teacher
    - At minimum, this journal should include student work for all applicable problems the student completed while working in Imagine Math.