Imagine Math

BUILT for TEXAS

2017–2018

TSI Support Pathway

Imagine Learning®

TSI Support Pathway

Imagine Math's TSI Support Pathway is built to synthesize the major understandings from Algebra I, Algebra II, and some Geometry in order to prepare students to college readiness and success on the TSI assessment.

This pathway highlights the major function types in these courses as well as different ways of examining these functions. The pathway also weaves the different function types throughout so that students not only learn about each relationship individually, but also have an opportunity to compare them against one another and continually revisit each relationship in more complex ways.

Overall, this pathway is built to equip students with the skills and conceptual understandings of high school level mathematics necessary for success in college readiness.

These are the pathway settings:

- Benchmark Remediation = OFF
- Pathway Remediation = ON
- Skip PSP = OFF
- Require Pre-Quiz = ON
- Allow Test Out = ON

TSI
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Unit	Lesson & Description
Expressions and Equations	**Solving Equations with the Distributive Property** Apply the distributive property when solving equations. **Solving Equations with the Distributive Property in Context** Analyze and solve real-world problems by constructing or solving equations that use the distributive property. **Analyzing Solution Sets to Linear Equations with the Variable on Both Sides** Construct examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. **Solving Equations with the Variable on Both Sides** Construct and solve equations with the variable on both sides, given a situation by applying the distributive property and/or combining like terms. **Interpreting Slope** Interpret the unit rate as the slope of the graph and compare proportional relationships presented in different ways. For example, compare a proportional relationship presented in a table with a proportional relationship presented in a graph. **Slope** Reason about slope and calculate the slope of a line. Given slope and one point, find other points on the line.
Functions	**Slope-Intercept Form** Use similar triangles to show that the equation for a line is y = mx + b, and interpret the slope and intercept of a line in context. Write equations in slope-intercept form. **Point-Slope Form** Identify the graph for an equation that is in point-slope form. Identify the equation in point-slope form that you would use to solve a word problem.
Building Functions	**Direct Variation** Distinguish direct variations from other linear functions and use their proportionality to solve problems.
Linear, Quadratic, and Exponential Models	**Introduction to Nonlinear Models** Understand the fundamental differences between linear, exponential, and quadratic models. Compare the shapes of graphs and equations, and the type of growth of these three models. Understand the meaning of each model type and how the output changes with changes in input.
Seeing Structure in Expressions	**Interpreting the Structure of Linear and Exponential Expressions** Given a linear or an exponential expression and the context it is meant to represent, explain what each part of that expression represents in terms of the context.

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Unit	Lesson & Description
Creating Equations	**Writing and Solving Linear Equations in One Variable** Create linear equations in one variable and use them to solve problems. Represent constraints with equations. **Writing and Graphing Linear Equations in Two or More Variables** Create linear equations in two variables to represent relationships between two quantities. Graph these equations with appropriate labels and scales. **Equations of Parallel and Perpendicular Lines** Understand the relationship of slopes of parallel lines and of perpendicular lines. Understand how to write the equation of a line that is parallel to or perpendicular to a given line. **Writing Linear Inequalities in One Variable** Create inequalities in one variable and use them to solve problems by interpreting solutions as viable or nonviable. Represent constraints with inequalities. This lesson does not require students to understand the mechanics of solving inequalities.
Reasoning with Equations and Inequalities	**Solving Linear Inequalities in One Variable** Solve linear inequalities in one variable, including those that involve operations with negative numbers.
Creating Equations	**Modeling Exponential Relationships with Equations, Inequalities, and Graphs** Create exponential equations and inequalities in one or two variables to model relationships between two quantities. Graph exponential equations in two variables.
Reasoning with Equations and Inequalities	**Solving Linear Equations in One Variable as a Reasoning Process** Solve linear equations in one variable and explain the reasoning process used in the solution method. This includes solving equations that are linear in the variable being solved for and includes equations with letters for coefficients.
Creating Equations	**Solving Literal Equations** Rearrange formulas to highlight the quantity of interest. Equations will be linear in this quantity, though the quantity itself may not be linear.
Expressions and Equations	**Solving a System of Linear Equations Graphically** Analyze graphs of pairs of linear equations to approximately solve the system, and analyze the number of solutions of the system.
Reasoning with Equations and Inequalities	**Solving Systems of Linear Equations** Solve systems of linear equations with a focus on justifying the solution method used. **Graphing Linear Inequalities and Systems of Linear Inequalities in Real-World Situations** Graph solutions to a linear inequality in two variables as a half plane. Graph the solution set to a system of linear inequalities in two variables as an intersection of half planes. Include inequalities arising from context.

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Unit	Lesson & Description
Interpreting Functions	**Function Notation I** Introduce function notation and the mechanics of the notation. Use function notation to evaluate functions for different inputs, and interpret statements written in function notation. This lesson does not define domain of a function or address the distinction between functions and relations. **Function Notation II** Understand that a function maps every element of a domain to exactly one element of the range. Extend understandings from Function Notation I to ideas of domain and range, exponential functions, and interpreting statements that use function notation in terms of context. **Interpreting Graphs of Linear and Exponential Functions in Context** Given a graph, identify and interpret key features in terms of context. For example, given a graph of an exponential function and the context it represents, explain what the y-intercept means in terms of the context. The focus is on linear and exponential functions that model situations. Key features include x- and y-intercepts, slope, and intervals where a function is increasing or decreasing, or is positive or negative. **Sketching Graphs of Linear and Exponential Functions from a Context** Given a description of a relationship, sketch a graph including key features. Distinguish graphs of different situations, using key features of those graphs. Focus on linear and exponential functions that model situations. **Understanding the Domain of a Function** Given the graph of a function or a function and the context it is meant to represent, identify the domain or a domain that makes sense. **Rate of Change for Linear and Exponential Functions** Calculate and interpret the average rate of change for linear and exponential functions, including interpretation from graphs, tables, or symbolic notation. **Sketching Graphs of Linear Functions from Symbolic Representations** Graph linear functions, showing intercepts and correct slope, from symbolic representation, and compare the growth of two linear functions. **Sketching Graphs of Exponential Functions from Symbolic Representations** Create inequalities in one variable and use them to solve problems by interpreting solutions as viable or nonviable. Represent constraints with inequalities. This lesson does not require students to understand the mechanics of solving inequalities.
Building Functions	**Transformations of Graphs of Linear and Exponential Functions** Identify how to change the form of a linear or an exponential function to result in a transformation of the graph. This lesson focuses on, but is not limited to, translations. **Writing Linear and Exponential Functions from a Context** Decide whether a context can be modeled by a linear or an exponential function and then write functions that correctly model contexts.

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Unit	Lesson & Description
Linear, Quadratic, and Exponential Models	**Writing Linear and Exponential Functions Based on Different Representations** Combine standard function types using arithmetic operations and interpret these combinations in context. Relate the new functions to the model and reason about combining functions graphically.
Building Functions	**Writing Geometric Sequences Using an Explicit Formula** Write formulas for geometric sequences and use them to find a given term. **Writing Geometric Sequences Recursively** Describe a geometric sequence using a recursive formula and identify the initial term and common ratio. **Writing Arithmetic Sequences Explicitly and Recursively** Write explicit and recursive formulas to describe arithmetic sequences. Use these formulas to extend and find specific terms in a sequence.
Interpreting Functions	**Sequences as Functions** Understand that sequences are functions with restricted domains. Classify sequences as geometric, arithmetic, or neither. Recognize that geometric sequences are exponential functions and that arithmetic sequences are linear functions.
Interpreting Categorical and Quantitative Data	**Fitting Functions to Data** Reason about data represented on a scatter plot and use a line fit to data to solve problems. Understand what a residuals plot tells you about the line fit to the data. **Correlation** Interpret linear models in the context of the data, including slope and y-intercept. Distinguish between correlation and causation.
Arithmetic with Polynomials and Rational Expressions	**Adding and Subtracting Polynomials** Add and subtract polynomials by combining like terms and following the rules for exponents. **Multiplying and Dividing Monomials** Multiply and divide monomials in mathematical and real-world situations. **Multiplying Polynomials** Multiply polynomials using various methods in mathematical and real-world situations. **Simplifying Monomials** Identify and simplify monomials.
Seeing Structure in Expressions	**Factoring Expressions** Factor and expand polynomials using the properties of multiplication and division.
The Real Number System	**Using Rational Exponents to Rewrite Expressions** Explain the rules that relate radical notation and rational exponents.

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Unit	Lesson & Description
Interpreting Functions	**Rewriting and Interpreting Exponential Functions in Terms of Context** Use properties of exponents to rewrite exponential functions to reveal information about the situation being modeled.
Building Functions	**Writing Quadratic Functions from a Context** Build functions to create quadratic functions that model quantities in mathematical and real-world situations.
Seeing Structure in Expressions	**Factoring Quadratic Expressions** Use knowledge of multiplying binomial expressions to factor quadratics to identify the zeros of the quadratic function defined by the expression.
Interpreting Functions	**Sketching Graphs of Quadratic Functions in Context** Interpret key features of graphs of quadratic functions that model real-world situations, including intercepts, maximum and minimum values, and intervals of increase and decrease. Calculate and interpret rate of change from a graph. **Sketching and Transforming Graphs of Quadratic Functions from Symbolic Representations** Given the symbolic representation of a quadratic function, sketch the graph showing intercepts, maxima, and minima. Explain the effect of transformations on these graphs.
Reasoning with Equations and Inequalities	**Solving Quadratics - Completing the Square** Solve quadratic equations by completing the square and recognize equations where this is a useful solution strategy.
Interpreting Functions	**Rewriting Quadratics to Reveal Their Structure** Use factoring and completing the square to rewrite quadratic expressions to highlight different things about the structure of the quadratic function and its graph.
Reasoning with Equations and Inequalities	**Problem Solving with Quadratic Functions** Solve real-world problems with quadratic functions using the context of the problem to determine which solutions are applicable. **Using the Quadratic Formula** For quadratic equations in one variable, recognize when to use the quadratic formula as a solution method. Understand how to apply the formula and address common errors in the application process. Solve quadratic equations using the quadratic formula. **Solving a System of Linear and Quadratic Equations** Use algebraic and graphical methods to solve systems consisting of a linear equation and quadratic equation.
Operations and Algebraic Thinking	**Solving Quadratic Equations Graphically** Recognize that an equation f(x) = g(x) can be solved by finding the point of intersection of the graphs y = f(x) and y = g(x). Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane. This lesson is limited to quadratic equations.
Expressing Geometric Properties with Equations	**Deriving the Equation of a Parabola from Its Definition** Define a parabola as the set of all points that are equidistant from a point, called the focus, and a line, called the directrix. Use this definition of a parabola to derive the equation of a parabola given its focus and directrix.

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Interpreting Functions	**Piecewise, Step, and Absolute Value Functions** Graph absolute value, and step and piecewise defined functions, and compare and contrast these functions with linear, quadratic, and exponential functions.
Building Functions	**Writing Inverse Functions** Understand the relationship between a function and its inverse and interpret the meaning of the inverse in context. Use these understandings to write inverse functions given a function.
Interpreting Functions	**Graphing Polynomial Functions** Graph polynomials by finding the zeros of the function and then use a table to find the behavior of the graph between the zeros. **Introduction to Logarithms** Build the connection between exponents and logarithms. **Logarithmic Functions** Use logarithms as functions and identify logs as continuous.
Expressions and Equations	**Solving Rational and Radical Equations I** Simplify radical expressions and solve radical equations that have extraneous roots.
Interpreting Functions	**Radical Functions and Their Graphs** Identify, describe, and graph functions in the form $y = \sqrt{x}$ and $y = 3\sqrt{x}$.
Arithmetic with Polynomials and Rational Expressions	**Adding and Subtracting Rational Expressions** Add rational numbers by finding equivalent fractions with a common denominator. **Simplifying, Multiplying, and Dividing Rational Expressions** Simplify, multiply, and divide rational expressions following the same process as used with fractions.
Interpreting Functions	**Rational Functions and Their Graphs** Identify, describe, and graph functions that can be written as the ratio of two polynomials.
Expressions and Equations	**Solving Rational and Radical Equations II** Solve rational equations by multiplying the equation by the least common multiple (LCM) of the denominators and use the properties of equality to solve the resulting equation.
Reasoning with Equations and Inequalities	**Complex Numbers and Complex Solutions** Develop the concept of the imaginary unit and how it is used to simplify square roots of negative numbers. Relate the idea of imaginary numbers to the graphs of quadratic equations.
The Complex Number System	**Complex Number Arithmetic** Understand that i is used to represent the value of -1. Simplify and perform arithmetic operations on complex numbers with imaginary parts.

Unit	*Lesson & Description*
Reasoning with Equations and Inequalities	**Solving Quadratic Equations with Real and Complex Roots - Completing the Square** Solve quadratic equations by completing the square and recognize equations in which this is a useful solution strategy. This includes quadratics with complex roots. **Solving Quadratic Equations with Real and Complex Roots - Using the Quadratic Formula** For quadratic equations in one variable, recognize when to use the quadratic formula as a solution method. Understand how to apply the formula and address common errors in the application process. Solve quadratic equations using the quadratic formula, including equations with complex roots.