

EVERGREEN COMMUNITY CHARTER SCHOOL CURRICULUM

MATH

Course: Pre-Algebra

Grade: 7, 8

Make sense of problems and persevere in solving them.
 Construct viable arguments and critique the reasoning of others.
 Use appropriate tools strategically.
 Look for and express regularity in repeated reasoning.

Reason abstractly and quantitatively.
 Model with mathematics.
 Attend to precision.
 Look for and make use of structure.

PA Common Core Standards	Materials	Methods/Assessment
<p>CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.</p> <p>CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.</p> <p>CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions.</p> <p>CC.2.2.8.B.2 Understand the connections between proportional relationships, lines, and linear equations.</p> <p>CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations.</p> <p>CC.2.2.8.C.1 Define, evaluate, and compare functions.</p> <p>CC.2.2.8.C.2 Use concepts of functions to model relationships between quantities.</p> <p>CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real world and mathematical problems.</p> <p>CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.</p> <p>CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems.</p> <p>CC.2.4.8.B.1 Analyze and/or interpret bivariate data displayed in multiple representations.</p> <p>CC.2.4.8.B.2 Understand that patterns of association can be seen in bivariate data utilizing frequencies.</p>	<p>Materials:</p> <p>Illustrative Mathematics: McGraw-Hill and supplementary workbooks</p> <p>Resources:</p> <ul style="list-style-type: none"> ● PDE SAS portal: http://www.pdesas.org ● Teacher-generated/differentiated instruction resources and activities ● PSSA released state sample questions ● http://www.khanacademy.org/ ● Calculators ● Math Counts activities ● Learnzillion.com ● PBS learningmedia.org ● Nces.ed.gov ● Smart TV ● DESMOS <p>Differentiation:</p> <p>Enrichment</p> <ul style="list-style-type: none"> ● Leveled tests and quizzes ● Self-paced <p>Remediation</p> <ul style="list-style-type: none"> ● One on one ● Quiz & test corrections ● Accommodations ● Adapted assignments ● Extra time ● Math Support 	<p>Methods:</p> <ul style="list-style-type: none"> ● Lecture ● Demonstration ● Note-taking ● Discussion ● Practice ● Problem-based Instruction ● Hands-on exploration ● Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> ● Observation ● Participation ● Notes/Portfolios ● Homework ● Question & Answer ● Quizzes ● Tests ● Think-Pair-Share ● Whiteboards ● At the bell activities ● Constructed Response Tasks ● CDTs ● PSSAs

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PSSA Eligible Content	Materials/Unit	Methods/Assessment
<ul style="list-style-type: none"> • M08.C-G.1.1.1 Identify and apply properties of rotations, reflections, and translations. • M08.C-G.1.1.2 Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them. • M08.C-G.1.1.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. • M08.C-G.1.1.4 Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them. • 8.G.A.1. Verify experimentally the properties of rotations, reflections, and translations: <ul style="list-style-type: none"> • 8.G.A.1a. Lines are taken to lines, and line segments to line segments of the same length. • 8.G.A.1b. Angles are taken to angles of the same measure. • 8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. • 8.G.A.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. 	<p>Materials: Illustrative Mathematics: McGraw-Hill and supplementary workbooks Pdesas.org</p> <p>Unit 1 – Rigid Transformations and Congruence</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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<ul style="list-style-type: none"> • M08.B-E.2.1.3 Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. • M08.C-G.1.1.1 Identify and apply properties of rotations, reflections, and translations. • M08.C-G.1.1.2 Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them. • M08.C-G.1.1.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. • M08.C-G.1.1.4 Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them. • 8.G.A.1. Verify experimentally the properties of rotations, reflections, and translations: <ul style="list-style-type: none"> • 8.G.A.1a. Lines are taken to lines, and line segments to line segments of the same length. • 8.G.A.1b. Angles are taken to angles of the same measure. • 8.G.A.1c. Parallel lines are taken to parallel lines. • 8.G.A.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. • 8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. • 8.G.A.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, 	<p>Materials:</p> <p>Illustrative Mathematics: McGraw-Hill and supplementary workbooks Pdesas.org</p> <p>Unit 2 – Dilations, Similarity, and Introducing Slope</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

- 8.G.A.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
- 8.G.B.6. Explain a proof of the Pythagorean Theorem and its converse.
- 8.G.B.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- 8.G.B.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

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<ul style="list-style-type: none"> • M08.B-E.2.1.1 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. • M08.B-E.2.1.2 Use similar right triangles to show and explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane. • M08.B-E.2.1.3 Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. • M08.B-E.3.1.1 Write and identify linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). • 8.EE.B.5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. • 8.EE.B.6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. 	<p>Materials:</p> <p>Illustrative Mathematics: McGraw-Hill and supplementary workbooks Pdesas.org</p> <p>Unit 3 – Linear Relationships</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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<ul style="list-style-type: none"> • M08.B-E.3.1.1 Write and identify linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). • M08.B-E.3.1.2 Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. • M08.B-E.3.1.3 Interpret solutions to a system of two linear equations in two variables as points of intersection of their graphs because points of intersection satisfy both equations simultaneously. • M08.B-E.3.1.4 Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection. • M08.B-E.3.1.5 Solve real-world and mathematical problems leading to two linear equations in two variables. • 8.EE.C.7. Solve linear equations in one variable. • 8.EE.C.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). • 8.EE.C.7b. Solve linear equations with rational number coefficients, including equations whose solutions require 	<p>Materials:</p> <p>Illustrative Mathematics: McGraw-Hill and supplementary workbooks Pdesas.org</p> <p>Unit 4 – Linear Equations and Linear Systems</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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expanding expressions using the distributive property and collecting like terms.

- 8.EE.C.8. Analyze and solve pairs of simultaneous linear equations.
- 8.EE.C.8a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
- 8.EE.C.8b. Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.
- 8.EE.C.8c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

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<ul style="list-style-type: none"> • M08.B-F.1.1.1 Determine whether a relation is a function. • M08.B-F.1.1.2 Compare properties of two functions, each represented in a different way (i.e., algebraically, graphically, numerically in tables, or by verbal descriptions). • M08.B-F.1.1.3 Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear. • M08.B-F.2.1.1 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values. • M08.B-F.2.1.2 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch or determine a graph that exhibits the qualitative features of a function that has been described verbally. • 8.EE.C.7. Solve linear equations in one variable. • 8.EE.C.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). • 8.EE.C.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. • 8.EE.C.8. Analyze and solve pairs of 	<p>Materials: Illustrative Mathematics: McGraw-Hill and supplementary workbooks Pdesas.org</p> <p>Unit 5 – Functions and Volume</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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<p>simultaneous linear equations.</p> <ul style="list-style-type: none"> • 8.EE.C.8a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. • 8.EE.C.8b. Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6. • 8.EE.C.8c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. • 8.F.A.1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. • 8.F.A.2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. • 8.F.A.3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. • 8.F.B.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its 		
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graph or a table of values.

- 8.F.B.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
- 8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- 8.G.C.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

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PSSA Eligible Content	Materials/Unit	Methods/Assessment
<ul style="list-style-type: none"> • M08.D-S.1.1.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association. • M08.D-S.1.1.2 For scatter plots that suggest a linear association, identify a line of best fit by judging the closeness of the data points to the line. • M08.D-S.1.1.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. • M08.D-S.1.2.1 Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible associations between the two variables. • 8.SP.A.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. • 8.SP.A.2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. • 8.SP.A.3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. • 8.SP.A.4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies 	<p>Materials:</p> <p>Illustrative Mathematics: McGraw-Hill and supplementary workbooks</p> <p>Unit 6 – Associations in Data</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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and relative frequencies in a two-way table.
Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects.
Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

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<ul style="list-style-type: none"> • M08.B-E.1.1.1 Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided. • M08.B-E.1.1.2 Use square root and cube root symbols to represent solutions to equations of the form $ax^2 + c = 0$ and $ax^3 + c = 0$, where p is a positive rational number. • Evaluate square roots of perfect squares (up to and including 100) and cube roots of perfect cubes (up to and including 1000) without a calculator. • M08.B-E.1.1.3 Estimate very large or very small quantities by using numbers expressed in the form of a single digit times an integer power of 10 and express how many times larger or smaller one number is than another. • M08.B-E.1.1.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Express answers in scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology (e.g., interpret 4.7×10^9 displayed on a calculator as 4.7 billion). • 8.EE.A.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. • 8.EE.A.3. Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. • 8.EE.A.4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use 	<p>Materials:</p> <p>Illustrative Mathematics: McGraw-Hill and supplementary workbooks</p> <p>Unit 7 – Exponents and Scientific Notation</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

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<ul style="list-style-type: none"> • M08.A-N.1.1.1 Determine whether a number is rational or irrational. For rational numbers, show that the decimal expansion terminates or repeats (limit repeating decimals to thousandths). • M08.A-N.1.1.2 Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandths). • M08.A-N.1.1.3 Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144). • M08.A-N.1.1.4 Use rational approximations of irrational numbers to compare and order irrational numbers. • M08.A-N.1.1.5 Locate/identify rational and irrational numbers at their approximate locations on a number line. • M08.B-E.1.1.1 Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided. • M08.B-E.1.1.2 Use square root and cube root symbols to represent solutions to equations of the form $ax^2 = k$ and $x^3 = k$, where p is a positive rational number. • Evaluate square roots of perfect squares (up to and including 100) and cube roots of perfect cubes (up to and including 1000) without a calculator. • M08.B-E.1.1.3 Estimate very large or very small quantities by using numbers expressed in the form of a single digit times an integer power of 10 and express how many times larger or smaller one number is than another. • M08.B-E.1.1.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Express 	<p>Materials:</p> <p>Illustrative Mathematics: McGraw-Hill and supplementary workbooks</p> <p>Unit 8 - Pythagorean Theorem and Irrational Numbers</p>	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice • Problem-based Instruction • Hands-on exploration • Small Group activities <p>Assessment:</p> <ul style="list-style-type: none"> • Observation • Participation • Notes/Portfolios • Homework • Question & Answer • Quizzes • Tests • Think-Pair-Share • Whiteboards • At the bell activities • Constructed Response Tasks • CDTs • PSSAs

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answers in scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology (e.g., interpret 4.7EE9 displayed on a calculator as).

- 8.NS.A.1. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.
- 8.NS.A.2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions.
- 8.EE.A.2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that is irrational.
- 8.F.A.2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.