

SADLIER

Standards-Based Progress Mathematics

Aligned to the Chapter 111.

Texas Essential Knowledge and Skills (TEKS) for Mathematics

Subchapter B. Middle School, §111.28, Grade 8,
Adopted 2012.

Grade 8

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(b) Knowledge and skills

GRADE 8 TEXAS ESSENTIAL KNOWLEDGE AND SKILLS FOR MATHEMATICS

(2) Number and operations. The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to:

(A) extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers;

(B) approximate the value of an irrational number, including π and square roots of numbers less than 225, and locate that rational number approximation on a number line;

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Related content—

Lesson 1 Understand Rational and Irrational Numbers— pp. 10–17

- Understand: Decimal forms of rational numbers
- Understand: Decimal forms of irrational numbers
- Understand: How to write a terminating decimal in fraction form
- Understand: How to write a repeating decimal in fraction form

Lesson 2 Use Rational Approximations of Irrational Numbers— pp. 18–25

- Understand: How to approximate the side length of a square with an area of 2 ft²
- Understand: How to use rational approximations to compare irrational numbers
- Understand: How to use decimal approximations to locate irrational numbers on a number line

Lesson 6 Evaluate Square Roots and Cube Roots— pp. 56–63

- Understand: How a square root is related to the side length of a square
- Understand: Square roots of a positive number
- Understand: Irrational square roots
- Understand: Square roots of decimals in simple cases
- Understand: Square roots of fractions in simple cases
- Understand: How a cube root is related to the edge length of a cube
- Understand: Cube roots of positive and negative numbers

Lesson 7 Solve Simple Equations Involving Squares and Cubes— pp. 64–71

- Understand: Solving equations of the form $x^2 = p$
- Understand: Solving equations of the form $x^3 = p$
- Understand: Representing solutions of $x^2 = p$, when p is not a perfect square
- Understand: Real-world problems involving square roots

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- (C) convert between standard decimal notation and scientific notation; and

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Lesson 9 Calculate with Numbers in Scientific Notation—pp. 80–87

- Understand: Scientific notation
- Understand: A shortcut for writing numbers in scientific notation
- Understand: Multiplying numbers in scientific notation
- Understand: Dividing numbers in scientific notation
- Understand: Adding numbers in scientific notation

See also the following readiness—

Lesson 3 Understand Zero and Negative Exponent—pp. 32–39

- Understand: Using patterns to find the value of 2^0
- Understand: Using patterns to understand zero exponents
- Understand: Using patterns to understand negative exponents
- Understand: How to find the values of powers with negative exponents

Lesson 4 Learn Properties of Exponents—pp. 40–47

- Understand: The Product of Powers Property
- Understand: The Power of a Product Property
- Understand: The Power of a Power Property
- Understand: The Quotient of Powers Property
- Understand: The Power of a Quotient Property

Lesson 5 Use Properties of Exponents to Generate Equivalent Expressions—pp. 48–55

- Understand: How to rewrite an expression so all the exponents are positive
- Understand: How to apply properties to compare expressions
- Understand: How to apply properties of exponents to show that expressions are equivalent
- Understand: How to use properties of exponents to write expressions that are equivalent to a given expression

Lesson 8 Estimate and Compare Large or Small Quantities—pp. 72–79

- Understand: Positive powers of 10
- Understand: Negative Powers of 10
- Understand: How to approximate and compare large numbers
- Understand: How to approximate and compare small numbers

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- (D) order a set of real numbers arising from mathematical and real-world contexts.

(3) Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

- (A) generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation;

- (B) compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane; and

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Lesson 2 Use Rational Approximations of Irrational Numbers—pp. 18–25

- Understand: How to approximate the side length of a square with an area of 2 ft^2
- Understand: How to use rational approximations to compare irrational numbers
- Understand: How to use decimal approximations to locate irrational numbers on a number line

Unit 1 Review—p. 28

Lesson 5 Use Properties of Exponents Generate Equivalent Expressions (see Independent Practice: #15, p. 54)—pp. 48–55

- Understand: How to rewrite an expression so all the exponents are positive
- Understand: How to apply properties to compare expressions
- Understand: How to apply properties of exponents to show that expressions are equivalent
- Understand: How to use properties of exponents to write expressions that are equivalent to a given expression

Lesson 28 Dilate Figures on the Coordinate Plane—pp. 244–251

- Understand: Dilations centered at the origin
- Understand: Dilations with scale factors between 0 and 1

Lesson 29 Identify Similar Figures—pp. 252–259

- Understand: Similar figures
- Understand: Demonstrating that two figures are similar
- Understand: Relating corresponding side lengths and angle measures in similar figures

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GRADE 8 TEXAS ESSENTIAL KNOWLEDGE AND SKILLS FOR MATHEMATICS

- (C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation.

(4) Proportionality. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to:

- (A) use similar right triangles to develop an understanding that slope, m , given as the rate comparing the change in y -values to the change in x -values, $(y_2 - y_1) / (x_2 - x_1)$, is the same for any two points (x_1, y_1) and (x_2, y_2) on the same line;

- (B) graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship; and

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Lesson 28 Dilate Figures on the Coordinate Plane—pp. 244–251

- Understand: Dilations centered at the origin
- Understand: Dilations with scale factors between 0 and 1

Lesson 10 Understand Proportional Relationships and Slope—pp. 88–95

- Understand: How the unit rate is represented in a graph
- Understand: The relationship between slope and steepness
- Understand: How to compare relationships given in different forms

Lesson 11 Understand Slope (similar triangles)—pp. 96–103

- Understand: Calculating slope using different pairs of points
- Understand: Negative and zero slope
- Understand: Finding the slope of a line without counting units

Related content—

Lesson 29 Identify Similar Figures—pp. 252–259

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- Understand: Calculating slope using different pairs of points
- Understand: Negative and zero slope
- Understand: Finding the slope of a line without counting units

Lesson 12 Write Equations for Lines—pp. 104–111

- Understand: The general equation for a line through the origin
- Understand: Writing an equation for a given line through the origin
- Understand: The general equation for a line through the point $(0, b)$

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SADLIER STANDARDS-BASED PROGRESS MATHEMATICS GRADE 8

- (C) use data from a table or graph to determine the rate of change or slope and y -intercept in mathematical and real-world problems.

- Understand: Writing an equation for a given line
- Understand: Graphing a line from its equation

Lesson 10 Understand Proportional Relationships and Slope—pp. 88–95

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- Understand: The general equation for a line through the origin
- Understand: Writing an equation for a given line through the origin
- Understand: The general equation for a line through the point $(0, b)$
- Understand: Writing an equation for a given line
- Understand: Graphing a line from its equation

Lesson 13 Solve Linear Equations—pp. 112–119

- Understand: Combining like terms before solving (using the Distributive Property)
- Understand: Solving equations with the variable on both sides

- (5) Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

- (A) represent linear proportional situations with tables, graphs, and equations in the form of $y = kx$;

Lesson 16 Understand Functions—pp. 142–149

- Understand: The definition of function
- Understand: Identifying a function from ordered pairs
- Understand: Identifying a function from a table
- Understand: Identifying a function from a graph
- Understand: Identifying a function from an equation

Lesson 17 Represent Functions—pp. 150–157

- Understand: Representing the same function in different ways
- Understand: Real-world functions
- Understand: Equations that define functions

(B) represent linear non-proportional situations with tables, graphs, and equations in the form of $y = mx + b$, where $b \neq 0$;

(C) contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation;

Foundational Skills Handbook—p. 373

- I. Understand: Represent a proportional relationship with an equation

Lesson 17 Represent Functions—pp. 150–157

- Understand: Representing the same function in different ways
- Understand: Real-world functions
- Understand: Equations that define functions

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- Understand: Representing the same function in different ways
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- Understand: Equations that define functions

Lesson 18 Compare Functions—pp. 158–165

- Understand: Comparing rates of change
- Understand: Comparing a function represented by an equation to a function represented as a table

Lesson 19 Investigate Linear and Non-Linear Functions—pp. 166–173

- Understand: The equation for a linear function
- Understand: Determining whether an equation represents a linear function

Lesson 20 Use Functions to Model Relationships—pp. 174–181

- Understand: Model a linear relationship given in a table
- Understand: Model a linear relationship given in a graph
- Understand: Model a linear relationship given two (x, y) pairs

Lesson 21 Problem Solving: Use Linear Models—pp. 182–189

- Understand: Using a linear function to model a real-world relationship given a table of values
- Understand: Using a linear function to model a real-world relationship given two pairs of values

(D) use a trend line that approximates the linear relationship between bivariate sets of data to make predictions;

(E) solve problems involving direct variation;

Lesson 37 Construct and Interpret Scatter Plots—pp. 322–329

- Understand: Use a scatter plot for a two-variable data set
- Understand: Describe the relationship between variables using scatter plots

Lesson 39 Problem Solving: Use Linear Models—pp. 338–345

- Understand: Using the trend line to answer questions about a situation
- Understand: Interpreting the slope and y-intercept of a trend line

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- Understand: How the unit rate is represented in a graph
- Understand: The relationship between slope and steepness
- Understand: How to compare relationships given in different forms

Lesson 11 Understand Slope—pp. 96–103

- Understand: Calculating slope using different pairs of points
- Understand: Negative and zero slope
- Understand: Finding the slope of a line without counting units

Lesson 12 Write Equations for Lines—pp. 104–111

- Understand: The general equation for a line through the origin
 - Understand: Writing an equation for a given line through the origin
 - Understand: The general equation for a line through the point $(0, b)$
 - Understand: Writing an equation for a given line
 - Understand: Graphing a line from its equation
-

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- (F) distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$;

- (G) identify functions using sets of ordered pairs, tables, mappings, and graphs;

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Lesson 14 Solve Systems of Equations—pp. 120–127

- Understand: The solution to a system of equations
- Understand: How to solve a system of equations algebraically
- Understand: Systems of equations with no solution

Lesson 16 Understand Functions—pp. 142–149

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- Understand: The definition of function
- Understand: Identifying a function from ordered pairs
- Understand: Identifying a function from a table
- Understand: Identifying a function from a graph
- Understand: Identifying a function from an equation

(H) identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems; and

(I) write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations.

(6) Expressions, equations, and relationships. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to:

(A) describe the volume formula $V = Bh$ of a cylinder in terms of its base area and its height;

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- Understand: Using a linear function to model a real-world relationship given two pairs of values

Lesson 36 Learn and Apply Volume Formulas—pp. 308–315

- Understand: How to calculate the volume of a cylinder
- Understand: How to calculate the volume of a cone
- Understand: How to calculate the volume of a sphere

<p>(B) model the relationship between the volume of a cylinder and a cone having both congruent bases and heights and connect that relationship to the formulas; and</p>	<p>Formulas—p. 380</p> <hr/> <p>Lesson 25 Understand and Identify Congruent Figures—pp. 220–227</p> <ul style="list-style-type: none"> • Understand: Congruent figures • Understand: Demonstrating that two figures are congruent
<p>(C) use models and diagrams to explain the Pythagorean theorem.</p>	<p>Lesson 36 Learn and Apply Volume Formulas—pp. 308–315</p> <ul style="list-style-type: none"> • Understand: How to calculate the volume of a cylinder • Understand: How to calculate the volume of a cone • Understand: How to calculate the volume of a sphere <hr/> <p>Formulas—p. 380</p>
<p>(7) Expressions, equations, and relationships. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:</p>	<p>Lesson 32 Understand the Pythagorean Theorem—pp. 276–283</p> <ul style="list-style-type: none"> • Understand: What the Pythagorean Theorem says • Understand: How to prove the Pythagorean Theorem • Understand: How to find an unknown leg length
<p>(A) solve problems involving the volume of cylinders, cones, and spheres;</p>	<p>Lesson 33 Understand the Converse of the Pythagorean Theorem—pp. 284–291</p> <ul style="list-style-type: none"> • Understand: The Converse of the Pythagorean Theorem • Understand: How to prove the Converse of the Pythagorean Theorem • Understand: Pythagorean triples
	<p>Lesson 34 Problem Solving: The Pythagorean Theorem—pp. 292–299</p> <ul style="list-style-type: none"> • Understand: Applying the Pythagorean Theorem • Understand: Finding the length of a diagonal of a box
	<p>Lesson 36 Learn and Apply Volume Formulas—pp. 308–315</p> <ul style="list-style-type: none"> • Understand: How to calculate the volume of a cylinder • Understand: How to calculate the volume of a cone • Understand: How to calculate the volume of a sphere
	<p>Foundational Skills Handbook—p. 374</p> <ul style="list-style-type: none"> • K. Understand: How to solve problems involving surface area and volume

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- (B) use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders;

- (C) use the Pythagorean Theorem and its converse to solve problems; and

- (D) determine the distance between two points on a coordinate plane using the Pythagorean Theorem.

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- Lesson 6 Evaluate Square Roots and Cube Roots** (surface area)—pp. 56–63
- Understand: How a square root is related to the side length of a square
 - Understand: Square roots of a positive number
 - Understand: Irrational square roots
 - Understand: Square roots of decimals in simple cases
 - Understand: Square roots of fractions in simple cases
 - Understand: How a cube root is related to the edge length of a cube
 - Understand: Cube roots of positive and negative numbers

Foundational Skills Handbook—p. 374

- K. Understand: How to solve problems involving surface area and volume

- Lesson 32 Understand the Pythagorean Theorem**—pp. 276–283

- Understand: What the Pythagorean Theorem says
- Understand: How to prove the Pythagorean Theorem
- Understand: How to find an unknown leg length

- Lesson 33 Understand the Converse of the Pythagorean Theorem**—pp. 284–291

- Understand: The Converse of the Pythagorean Theorem
- Understand: How to prove the Converse of the Pythagorean Theorem
- Understand: Pythagorean triples

- Lesson 34 Problem Solving: The Pythagorean Theorem**—pp. 292–299

- Understand: Applying the Pythagorean Theorem
- Understand: Finding the length of a diagonal of a box

- Lesson 32 Understand the Pythagorean Theorem**—pp. 276–283

- Understand: What the Pythagorean Theorem says
- Understand: How to prove the Pythagorean Theorem
- Understand: How to find an unknown leg length

- Lesson 34 Problem Solving: The Pythagorean Theorem**—pp. 292–299

- Understand: Applying the Pythagorean Theorem
- Understand: Finding the length of a diagonal of a box

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(8) Expressions, equations, and relationships. The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

- (A) write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants;
- (B) write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants;
- (C) model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants; and
- (D) use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

Lesson 35 Calculate Distances in the Coordinate Plane—pp. 300–307

- Understand: Calculating the distance between points
- Understand: Calculating distance without counting units
- Understand: Calculating distance without plotting

Lesson 13 Solve Linear Equations—pp. 112–119

- Understand: Combining like terms before solving (using the Distributive Property)
- Understand: Solving equations with the variable on both sides

Lesson 13 Solve Linear Equations—pp. 112–119

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Lesson 13 Solve Linear Equations—pp. 112–119

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- Understand: Solving equations with the variable on both sides

Lesson 30 Establish Facts about Parallel Lines and Angles—pp. 260–265

- Understand: Corresponding angles
- Understand: Alternate interior angles
- Understand: Alternate exterior angles
- Understand: Finding unknown angle measures in diagrams with parallel lines

Lesson 31 Establish Facts about Triangles and Angles—pp. 266–275

- Understand: The sum of angle measures of a triangle
- Understand: Why the sum of the angle measures of any triangle is 180°
- Understand: The relationship between the interior and exterior angles of a triangle
- Understand: Similarity of triangles with two pairs of congruent angles

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- (9) Expressions, equations, and relationships. The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations. The student is expected to identify and verify the values of x and y that simultaneously satisfy two linear equations in the form $y = mx + b$ from the intersections of the graphed equations.

- (10) Two-dimensional shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

- (A) generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane;

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- Lesson 14 Solve Systems of Equations**—pp. 120–127
- Understand: The solution to a system of equations
 - Understand: How to solve a system of equations algebraically
 - Understand: Systems of equations with no solution

- Lesson 15 Problem-Solving: Systems of Equations**—pp. 128–135
- Understand: Solving a real-world problem using a system of equations
 - Understand: Finding a break-even point

- Lesson 23 Verify Properties of Reflections and Translations**—pp. 204–211
- Understand: Reflection across a line
 - Understand: Properties of reflections
 - Understand: Translations
 - Understand: Properties of translations

- Lesson 24 Verify Properties of Rotations**—pp. 212–219
- Understand: Rotation around a point
 - Understand: Properties of rotations

- Lesson 25 Understand and Identify Congruent Figures**—pp. 220–227
- Understand: Congruent figures
 - Understand: Demonstrating that two figures are congruent

- Lesson 26 Reflect and Translate Figures on the Coordinate Plane**—pp. 228–235
- Understand: How reflecting a figure across the y -axis affects the coordinates
 - Understand: How reflecting a figure across the x -axis affects the coordinates
 - Understand: Reflecting a figure across the line $y = x$
 - Understand: How translating a figure affects the coordinates

- Lesson 27 Rotate Figures on the Coordinate Plane**—pp. 236–243
- Understand: How rotating a figure 90° around the origin affects the coordinates
 - Understand: How rotating a figure 180° around the origin affects the coordinates
 - Understand: How rotating a figure 270° around the origin affects the coordinates

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(B) differentiate between transformations that preserve congruence and those that do not;

(C) explain the effect of translations, reflections over the x - or y -axis, and rotations limited to 90° , 180° , 270° , and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation; and

(D) model the effect on linear and area measurements of dilated two-dimensional shapes.

(11) Measurement and data. The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:

(A) construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data;

Lesson 28 Dilate Figures on the Coordinate Plane—pp. 244–251

- Understand: Dilations centered at the origin
- Understand: Dilations with scale factors between 0 and 1

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- Understand: Similar figures
- Understand: Demonstrating that two figures are similar
- Understand: Relating corresponding side lengths and angle measures in similar figures

Lesson 37 Construct and Interpret Scatter Plots—pp. 322–329

- Understand: Use a scatter plot for a two-variable data set
- Understand: Describe the relationship between variables using scatter plots

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SADLIER STANDARDS-BASED PROGRESS MATHEMATICS GRADE 8

<p>(B) determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points; and</p>	<p>Lesson 38 Fit Linear Models to Data—pp. 330–337</p> <ul style="list-style-type: none"> Understand: Fitting a trend line to data on a scatter plot Understand: Describing the association between variables on a scatter plot
<p>(C) simulate generating random samples of the same size from a population with known characteristics to develop the notion of a random sample being representative of the population from which it was selected.</p>	<p><i>Related content</i>—</p> <p>Lesson 38 Fit Linear Models to Data—pp. 330–337</p> <ul style="list-style-type: none"> Understand: Fitting a trend line to data on a scatter plot Understand: Describing the association between variables on a scatter plot
<p>(12) Personal financial literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to:</p>	<p>Foundational Skills Handbook—p. 374</p> <ul style="list-style-type: none"> L. How to analyze data sets
<p>(A) solve real-world problems comparing how interest rate and loan length affect the cost of credit;</p>	<p>n/a</p>
<p>(B) calculate the total cost of repaying a loan, including credit cards and easy access loans, under various rates of interest and over different periods using an online calculator;</p>	<p>n/a</p>
<p>(C) explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time;</p>	<p>n/a</p>
<p>(D) calculate and compare simple interest and compound interest earnings;</p>	<p><i>Related content</i>—</p> <p>Lesson 18 Compare Functions (earning interest)—p.165</p> <ul style="list-style-type: none"> Understand: Comparing rates of change Understand: Comparing a function represented by an equation to a function represented as a table
<p>(E) identify and explain the advantages and disadvantages of different payment methods;</p>	<p>n/a</p>
<p>(F) analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial irresponsibility; and</p>	<p>n/a</p>

GRADE 8 TEXAS ESSENTIAL KNOWLEDGE AND SKILLS FOR MATHEMATICS

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- (G) estimate the cost of a two-year and four-year college education, including family contribution, and devise a periodic savings plan for accumulating the money needed to contribute to the total cost of attendance for at least the first year of college.

n/a