Mathematics TEKS
SUPPORTING INFORMATION

GRADE 8

TEA
Texas Education Agency

TEKS	Supporting Information
(a) Introduction. (1) The desire to achieve educational excellence is the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on computational thinking, mathematical fluency, and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.	The definition of a well-balanced mathematics curriculum has expanded to include the Texas College and Career Readiness Standards (CCRS). A focus on mathematical fluency and solid understanding allows for rich exploration of the primary focal points.
(a) Introduction. (2) The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, algorithms, paper and pencil, and technology and techniques such as mental math, estimation, number sense, and generalization and abstraction to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, computer programs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.	This paragraph occurs second in the TEKS to highlight the continued emphasis on process skills that are now included from Kindergarten through high school mathematics. This introductory paragraph includes generalization and abstraction with the text from (1)(C). This introductory paragraph includes computer programs with the text from (1)(D). This introductory paragraph states, “Students will use mathematical relationships to generate solutions and make connections and predictions” instead of the text from (1)(E).

(a) Introduction. (3) The primary focal areas in Grade 8 are proportionality; expressions, equations, relationships, and foundations of functions; and measurement and data. Students use concepts, algorithms, and properties of real numbers to explore mathematical relationships and to describe increasingly complex situations. Students use concepts of proportionality to explore, develop, and communicate mathematical relationships. Students use algebraic thinking to describe how a change in one quantity in a relationship results in a change in the other. Students connect verbal, numeric, graphic, and symbolic representations of relationships, including equations and inequalities. Students begin to develop an understanding of functional relationships. Students use geometric properties and relationships, as well as spatial reasoning, to model and analyze situations and solve problems. Students communicate information about geometric figures or situations by quantifying attributes, generalize procedures from measurement experiences, and use the procedures to solve problems. Students use appropriate statistics, representations of data, and reasoning to draw conclusions, evaluate arguments, and make recommendations. While the use of all types of technology is important, the emphasis on algebra readiness skills necessitates the implementation of graphing technology.	This paragraph highlights specifics about grade 8 mathematics content and follows the paragraph about the mathematical process standards. This supports the notion that the TEKS should be learned in a way that integrates the mathematical process standards in an effort to develop fluency and proficiency.
(a) Introduction. (4) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	The State Board of Education approved the retention of some "such as" statements within the TEKS where needed for clarification of content. The phrases "including" and "such as" should not be considered as limiting factors for the student expectations (SEs) in which they reside.

Additional Resources are available online including

- Interactive Mathematics Glossary
- Vertical Alignment Charts
- Texas Response to the Curriculum Focal Points, Revised 2013
- Texas Mathematics Resource Page

TEKS: Mathematical Process Standards.	Supporting Information
8(1)(A) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to apply mathematics to problems arising in everyday life, society, and the workplace.**	This SE emphasizes application. The opportunities for application have been consolidated into three areas: everyday life, society, and the workplace. This SE, when paired with a content SE, allows for increased rigor through connections outside the discipline.
8(1)(B) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.**	This SE describes the traditional problem-solving process used in mathematics and science. Students are expected to use this process in a grade-appropriate manner when solving problems that can be considered difficult relative to mathematical maturity.
8(1)(C) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.**	The phrase "as appropriate" is included in the TEKS. This implies that students are assessing which tool(s) to apply rather than trying only one or all accessible tools. "Paper and pencil" is included in the list of tools that still includes real objects, manipulatives, and technology.
8(1)(D) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.**	Communication includes reasoning and the implications of mathematical ideas and reasoning. The list of representations is summarized with "multiple representations" with specificity added for symbols, graphs, and diagrams.
8(1)(E) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to create and use representations to organize, record, and communicate mathematical ideas.**	The use of representations includes organizing and recording mathematical ideas in addition to communicating ideas. As students use and create representations, it is implied that they will evaluate the effectiveness of their representations to ensure that they are communicating mathematical ideas clearly. Students are expected to use appropriate mathematical vocabulary and phrasing when communicating mathematical ideas.
8(1)(F) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to analyze mathematical relationships to connect and communicate mathematical ideas.**	The TEKS allow for additional means to analyze relationships and to form connections with mathematical ideas past forming conjectures about generalizations and sets of examples and non-examples. Students are expected to form conjectures based on patterns or sets of examples and non-examples.
8(1)(G) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. **The student is expected to display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.**	The TEKS create the expectation that students validate their conclusions with displays, explanations, and justifications. The conclusions should focus on mathematical ideas and arguments. Displays could include diagrams, visual aids, written work, etc. The intention is to make one's work visible to others so that explanations and justifications may be shared in written or oral form. Precise mathematical language is expected. For example, students would use "dilation" instead of "making a figure bigger or smaller" when referring to creation of a figure given a similar figure.

TEKS: Number and Operations.	Supporting Information
8(2)(A) **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 extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers.**	When creating sets and subsets of real numbers, students may be expected to distinguish between rational numbers and irrational numbers. For example, students are not expected to differentiate between transcendental real numbers and algebraic real numbers. Subsets of real numbers include counting or natural numbers, whole numbers, integers, rational numbers, and irrational numbers. A Venn diagram is an applicable visual representation. Students see Venn diagrams in 6(2)(A) as a they organize sets of numbers or as a graphic organizer in grade 5 [5(5)].
8(2)(B) **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 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.**	Approximations are limited to values that are less than $\sqrt{225}$. Though locating the rational number approximations of square roots on a number line is included, it is not a new skill for students to place a rational number on a number line. The mathematical process standards expect students to use graphical and numeric models. A number line is such a model. This SE complements the ordering of real numbers in 8(2)(D).
8(2)(C) **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 convert between standard decimal notation and scientific notation.**	When paired with (8)(1)(A), students may be expected to solve problem situations. Students are expected to “convert between” the two forms. Negative exponents are part of scientific notation.
8(2)(D) **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 order a set of real numbers arising from mathematical and real-world contexts.**	Real numbers include integers, percents and positive and negative fractions and decimals. A set of real numbers may also be ordered and may include irrational numbers. The skill of comparing is a needed skill for ordering; therefore, it is included within this standard.

TEKS: Proportionality.	Supporting Information
8(3)(A) **Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations. **The student is expected to generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation.**	This SE introduces the term "dilation" with similar figures. In grade 7(5)(A), students identify the critical attributes of similarity. These attributes include the generalization that the ratio of corresponding sides of similar figures are proportional. In 7(5)(C), students are expected solve problems with similar shapes and scale drawings.
8(3)(B) **Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations. **The student is expected to compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane.**	The content of this SE connects the work with critical attributes of similarity and similar figures in grade 7 to dilations on a coordinate plane. Students will be able to compare side length ratios (between the original shape and its dilation(s)) and to compare angle measures. Dilations on a coordinate plane are included in two strands: Proportionality, in order to emphasize the role of the scale factor, and two-dimensional shapes, in order to provide a contrast to those transformations that always preserve congruence.
8(3)(C) **Proportionality.** The student applies mathematical process standards to use proportional relationships to describe dilations. **The student is expected to 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.**	Students may be given a rule to apply to the vertices of a geometric figure such as $(x, y) \rightarrow (2.5x, 2.5y)$ in order to graph the dilated figure. This SE limits the dilations to those with positive rational scale factors with the origin as the center of dilation.

TEKS: Proportionality.	Supporting Information
8(4)(A) **Proportionality.** The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. **The student is expected to 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.**	This SE specifies the concept of slope through the lens of proportionality. Teaching the formula for slope is not the intent of 8(4)(A). The intent of 8(4)(A) is to note that the rate comparing the change in *y*- and *x*-values is the same for any two points on the same line including the reversal of the order of the points in the formula.
8(4)(B) **Proportionality.** The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. **The student is expected to graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship.**	This SE specifies the concept of slope through the lens of proportionality. The intent of 8(4)(B) is to connect the unit rate of a proportional relationship to the slope of the line that models the proportional relationship. The focus of this SE is interpreting and graphing a unit rate, whereas 8(5)(A) focuses on representing proportional linear relationships.
8(4)(C) **Proportionality.** The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. **The student is expected to use data from a table or graph to determine the rate of change or slope and *y*-intercept in mathematical and real-world problems.**	This SE specifies the concept of slope through the lens of proportionality. The intent of 8(4)(C) is to begin a discussion about parameter changes, in particular, the inclusion of the *y*-intercept to shift a function up or down with linear functions through proportional and non-proportional relationships. Students will not be asked about parameter changes as they would be in Algebra I.

TEKS: Proportionality	Supporting Information
8(5)(A) **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 represent linear proportional situations with tables, graphs, and equations in the form of $y = kx$.**	The SE separates proportional ($y = kx$) from non-proportional ($y = mx + b$, $b \neq 0$) situations to support learning related to foundations of linear functions and distinguishing between m or k and b. The contexts may include data from real-world applications or mathematical solutions with paired values. Equations should include rational number coefficients. Algebra I extends this concept with linear equations in two variables with A(2)(C): "Write linear equations in two variables given a table of values, a graph, and a verbal description." The emphasis is on proportional relationships as a foundation for functions with the summarization of "multiplication by a given constant factor (including unit rate)" with k. Conversions between measurement systems may be included as a context for linear proportional situations, applying content from 7(4)(E).
8(5)(B) **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 represent linear non-proportional situations with tables, graphs, and equations in the form of $y = mx + b$, where $b \neq 0$.**	The SE separates proportional ($y = kx$) from non-proportional ($y = mx + b$, $b \neq 0$) situations to support learning related to foundations of linear functions and distinguishing between m or k and b. The contexts may include data from real-world applications or mathematical solutions with paired values. Equations should include rational number coefficients and constants. Algebra I extends this concept with linear equations in two variables with A(2)(C): "Write linear equations in two variables given a table of values, a graph, and a verbal description."
8(5)(C) **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 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.**	This SE is included to ensure that students do not incorrectly generalize that all non-proportional situations are forms of $y = mx + b$. Students will not be expected to perform regressions. This contrast will result from reviewing graphical representations of bivariate sets of data.
8(5)(D) **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 use a trend line that approximates the linear relationship between bivariate sets of data to make predictions.**	The trend line is identified as a tool for making predictions by approximating the linear relationship between bivariate sets of data.
8(5)(E) **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 solve problems involving direct variation.**	Direct variation includes prediction and comparison problem situations. When this SE is paired with 8(1)(D), students may be expected to use multiple representation to find solutions. When this SE is paired with 8(1)(G), students may be expected to justify their solutions.
8(5)(F) **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 distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$.**	This SE specifies representational forms and focuses on distinguishing between proportional and non-proportional situations using multiple representations.

TEKS: Proportionality	Supporting Information
8(5)(G) **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 identify functions using sets of ordered pairs, tables, mappings, and graphs.**	The focus of identifying functions remains proportional and non-proportional linear relationships. Students will not be expected to explore other functional relationships. However, there are no limits for non-functions other than the definition of function. This SE offers the opportunity to deepen the understanding started in earlier grades of input-output tables and multiple representations. When paired with 8(1)(G), students may be asked to explain the definition of a function (A function is a relation where each input value has no more than one output value) using the stated representations. Students may be asked to distinguish between relations and functions. Students are not expected to use function notation.
8(5)(H) **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 identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems.**	This SE focuses on identifying examples of proportional and non-proportional situations. This may include comparing tables, graphs, and equations for proportional and non-proportional functions. Students are not expected to interpret or use functional notation.
8(5)(I) **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 write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations.**	The SE separates proportional ($y = kx$) from non-proportional ($y = mx + b$, $b \neq 0$) situations to support learning related to foundations of linear functions and distinguishing between m or k and b. The contexts may include data from real-world applications or mathematical solutions with paired values. Equations should include rational number coefficients and constants. Algebra I extends these concept with linear equations in two variables with A(2)(C): "Write linear equations in two variables given a table of values, a graph, and a verbal description."

TEKS: Expressions, Equations, and Relationships.	Supporting Information
8(6)(A) **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 describe the volume formula *V* = *Bh* of a cylinder in terms of its base area and its height.**	The use of the formula *V* = *Bh* begins in grade 5 with the volume of rectangular prisms [5(4)(G)] and is applied with 6(8)(D) where students are expected to solve problems involving the volume of rectangular prisms. The use of the formula *V=Bh* for triangular prisms begins in grade 7 with 7(8)(B) and is applied with 7(9)(A). Students may use the π key on a calculator, 3.14, or 22/7 when solving problems involving the volume of cylinders, cones, and spheres.
8(6)(B) **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 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.**	This SE extends the relationship between prisms and their corresponding pyramids in 7(8)(A), rectangular pyramids and prisms, and 7(8)(B), triangular pyramids and prisms. Students may use the π key on a calculator, 3.14, or 22/7 when solving problems involving the volume of cylinders, cones, and spheres.
8(6)(C) **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 use models and diagrams to explain the Pythagorean theorem.**	Diagrams provide a visual for a, b, and c and a justification of $a^2 + b^2 = c^2$. Students are to explain the Pythagorean Theorem rather than just demonstrate it. Students might use tangrams to rearrange the areas to show the Pythagorean Theorem without explaining the relationship between the side lengths and the area of the corresponding squares and the relationships between the areas of the squares formed by the side lengths of a right triangle. With this SE, students may demonstrate a model of the Pythagorean Theorem to support their explanations.

TEKS: Expressions, Equations, and Relationships.	Supporting Information
8(7)(A) **Expressions, equations, and relationships.** The student applies mathematical process standards to use geometry to solve problems. **The student is expected to solve problems involving the volume of cylinders, cones, and spheres.**	Estimation is still included as any work with pi will require an estimation of pi. Students may use the π key on a calculator, 3.14, or 22/7 when solving problems involving the volume of cylinders, cones, and spheres.
8(7)(B) **Expressions, equations, and relationships.** The student applies mathematical process standards to use geometry to solve problems. **The student is expected to 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.**	The previous knowledge that is referenced is determining surface area from nets [7(9)(D)]. Previous knowledge also includes how to determine composite area [7(9)(C)]. The focus for grade 8 shifts to algebraic representations related to measurement. Specificity is provided for prisms. Pyramids and cones are not included.
8(7)(C) **Expressions, equations, and relationships.** The student applies mathematical process standards to use geometry to solve problems. **The student is expected to use the Pythagorean Theorem and its converse to solve problems.**	When paired with 8(1)(A), students may be expected to solve problems such as a real-life problem related to whether or not a right triangle exists as when checking for a right angle when constructing intersecting walls based on lengths.
8(7)(D) **Expressions, equations, and relationships.** The student applies mathematical process standards to use geometry to solve problems. **The student is expected to determine the distance between two points on a coordinate plane using the Pythagorean Theorem.**	This is a mathematical application of the Pythagorean Theorem. Students will not be expected to use the distance formula. The derivation of the distance formula using the Pythagorean Theorem remains in Geometry.

TEKS: Expressions, Equations, and Relationships.	Supporting Information
8(8)(A) **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 write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants.**	Constraints, or conditions within the problems may be indicated by words such as "minimum" or "maximum."
8(8)(B) **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 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.**	This is the converse of 8(8)(A) or 8(8)(C) if the problem for this SE has a real-world context.
8(8)(C) **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 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.**	In grades 6 and 7, students are solving one-step or two-step equations and inequalities and representing the solutions on number lines. This SE builds to A(5)(A), where "students are expected to solve linear equations including those for which the application of the distributive property is necessary and for which variables are included on both sides." Including the distributive property in this SE would be a district decision.
8(8)(D) **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 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.**	An informal argument in mathematics refers to the use of everyday language within a conversation about the mathematics. It is not a formal proof with formal language and notation. Integrate informal arguments for the angle-angle criterion for similarity of triangles into work with similarity and dilations to reinforce the work in grade 7 with critical attributes of similarity. An example of an informal argument might be the following: *We know that two triangles that have 3 congruent angles are similar. We proved that in 7th grade. If we know the measures of 2 angles of a triangle, the third angle is the difference between 180° and the sum of these 2 angles. If 2 triangles have 2 angles that are congruent, the third angles are congruent because we'll get the same result when we subtract the sum of the angles from 180°. This means that all 3 angles of both triangles are congruent so the triangles are similar. This means one only really needs to know that 2 angles of 2 triangles are congruent to tell triangle similarity.* Integrate informal arguments for the angle sum and exterior angles of triangles into work with expressions and equations. Students may be expected to write an equation based on the relationship between an exterior angle of a triangle and the sum of the measures of the two non-adjacent interior angles. Angle relationships formed by parallel lines cut by a transversal include vertical angles, alternate interior angles, alternate exterior angles, same side exterior angles, same side interior angles, and corresponding angles.

TEKS: Expressions, Equations, and Relationships.	Supporting Information
8(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.**	This serves as an introductory element for systems of equations. It also reinforces for students that two linear functions may be considered simultaneously. The focus is on the identification of the intersection point and verification that it satisfies both linear equations. Because of prior work with multiple representations, students should know that a point on a line satisfies the equation for that line. With this SE, students should identify the point of intersection and perform the appropriate calculations to verify that the *x*- and *y*-values for the point of intersection satisfy both graphed equations. Students will not be expected to solve systems of equations. Students will not be expected to work with systems of equations with infinite solutions or with no solutions. When paired with (8)(1)(A) and 8(1)(D), the expectation is that students explain the meaning of the intersection point's values in terms of the given situation. This SE serves as a conceptual base for A(3)(H), where students are expected to graph the solution set of systems of two linear inequalities in two variables on the coordinate plane, and A(5)(C), where students are expected to solve systems of two linear equations with two variables for mathematical and real-world problems.

TEKS: Two-dimensional shapes.	Supporting Information
8(10)(A) **Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. **The student is expected to generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane.**	When paired with 8(1)(G), students may be expected to explain that a dilation with a scale factor of 1 preserves congruence, a scale factor between 0 and 1 creates a reduction, and a scale factor that is greater than 1 creates an enlargement. Dilations on a coordinate plane are included in two strands: • Proportionality, in order to emphasize the role of the scale factor • Two-dimensional shapes, in order to provide a contrast to those transformations that always preserve congruence Orientation of the vertices is the order in which the vertices are labeled (clockwise or counterclockwise). Using this definition, orientation is preserved using translations, dilations, and rotations. It is not preserved for a reflection. Orientation of the figure is the direction in which the figure is placed in the plane. It is preserved by dilation and translation, but not by reflection or rotation.
8(10)(B) **Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. **The student is expected to differentiate between transformations that preserve congruence and those that do not.**	Dilations are limited to positive, rational scale factors. Students may differentiate between the transformations using multiple representations, including algebraic representations. Dilations that result in a reduction or enlargement do not preserve congruence. A scale factor is applied to the coordinate values of the original figure and noted symbolically as $(x, y) \rightarrow (2x, 2y)$. This contrasts with those transformations that preserve congruence such as a reflection in $(x, y) \rightarrow (-x, y)$ or a translation in $(x, y) \rightarrow (x+2, y+1)$.
8(10)(C) **Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. **The student is expected to 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.**	Students may be given a rule to apply to the vertices of a geometric figure with the current SE such as $(x, y) \rightarrow (x + 2, y + 3)$ in order to graph a translation or $(x, y) \rightarrow (-x, y)$ in order to graph a reflection. In Geometry, students are expected to explain the effects of composites of transformations [G(3)(A), (B), and (C)]. This SE includes rotations about the origin on a coordinate plane. This SE also specifies the rotations students should know. Students may be expected to know that $(x, y) \rightarrow (y, -x)$ represents a 90° clockwise rotation or that $(x, y) \rightarrow (-y, x)$ represents a 90° counterclockwise rotation. One way to represent these rotations of the point (x, y) may be found in the table below. Rotation / Clockwise / Counter-clockwise: 90° / $(y, -x)$ / $(-y, x)$ 180° / $(-x, -y)$ / $(-x, -y)$ 270° / $(-y, x)$ / $(y, -x)$ 360° / (x, y) / (x, y) When paired with 8 (1)(G), students may be expected to explain that a 180° rotation may or may not have the same result as the composition of a vertical reflection and a horizontal reflection in either order.
8(10)(D) **Two-dimensional shapes.** The student applies mathematical process standards to develop transformational geometry concepts. **The student is expected to model the effect on linear and area measurements of dilated two-dimensional shapes.**	Modeling the effect may be accomplished numerically or algebraically. Examples include the following: • When a polygon is dilated by a factor of 2, its perimeter increases by a factor of 2, and its area increases by a factor of 4. • When a polygon is dilated by a factor of x, its perimeter increases by a factor of x, and its area increases by a factor of x^2. This SE builds to Geometry G(10)(B), where students are expected to "describe how changes in the linear dimensions of a shape affect" the various two and three dimensional measures.

TEKS: Measurement and Data.	Supporting Information
8(11)(A) **Measurement and Data.** The student applies mathematical process standards to use statistical procedures to describe data. **The student is expected to construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data.**	When paired with 8(1)(F) and (G), students may draw conclusions that focus on association and the use of language such as "positive trend," "negative trend," and "no trend" may be used to describe the association.
8(11)(B) **Measurement and data.** The student applies mathematical process standards to use statistical procedures to describe data. **The student is expected to 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.**	In grade 6, students represent data with box plots which use quartiles to show the spread of data relative to the median [6(12)(A), (C), 6(13)(A)]. This representation does not take into account every data point explicitly as the data are clustered into quartiles. The variation in grade 6 focuses on the median as opposed to the mean. To look at the spread of data where each value is taken into consideration, one may use the mean absolute deviation and comparison to the mean. The variation or total variability focuses on the mean. Students should be able to calculate the mean absolute deviation and compare each data point to this value in order to describe data. Combined with process standards 8(1)(D), 8(1)(F), and 8(1)(G), the expectation is that students look at the spread and shape of data through the lens of variation from the mean.
8(11)(C) **Measurement and data.** The student applies mathematical process standards to use statistical procedures to describe data. **The student is expected to 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.**	When paired with 8(1)(G), students may be expected to justify the argument that a random sample is needed to provide representation of a population. One may build on data collection with probabilistic events in grade 7 to draw comparisons to sampling from a population with known characteristics [7(6)(C) and (H)].

TEKS: Personal Financial Literacy.	Supporting Information
8(12)(A) **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 solve real-world problems comparing how interest rate and loan length affect the cost of credit.**	This SE builds on the grade 7 skill [7(13)(E)], where students are expected to calculate and compare simple interest and compound interest earnings. Interest rates and loan lengths can be compared separately or in combination. This SE differs from 8(12)(C) as investments are viewed as individual transactions and separate from other options. This SE differs from 8(12)(D), which may compare simple and compound interest using the same parameters.
8(12)(B) **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 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.**	This SE builds on the grade 7 skill [7(13)(E)], where students are expected to calculate and compare simple interest and compound interest earnings. This SE builds on the grade 5 skill [5(10)(C)], where students are expected to identify the advantages and disadvantages of different methods of payment, including check, credit card, debit card, and electronic payments, with the computation skills listed in other grade 8 TEKS.
8(12)(C) **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 explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time.**	This SE builds on the grade 7 skill [7(13)(E)], where students are expected to calculate and compare simple interest and compound interest earnings. This SE focuses on repeatedly investing over time, as opposed to 8(12)(A), which focuses on the length of the loan.
8(12)(D) **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 calculate and compare simple interest and compound interest earnings.**	This SE builds on the grade 7 skill [7(13)(E)], which may use simpler calculations. The inclusion of compounding other than annual compound interest is a district decision. This SE differs from 8(12)(A), as this uses two techniques to calculate interest, whereas 8(12)(A) may use the same technique, simple or compound, and compare different interest rates or loan lengths using that technique. This SE differs from 8(12)(C), as 8(12)(C) may involve several individual transactions, whereas this SE only requires one or two (for comparison) transactions. Compound interest in this standard can serve as an introduction to exponential functions for most students. In the formula $A = P(1 + r)^t$, A is the amount, P is the principle, r is the rate, t is the time. In Algebra I, $1 + r$ is referred to as the factor and is given the variable b.
8(12)(E) **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 identify and explain the advantages and disadvantages of different payment methods.**	Different payment methods may include stored-value cards, debit cards, and online payment systems. This SE builds on the grade 5 skill [5(10)(C)], where students are expected to identify the advantages and disadvantages of different methods of payment, including check, credit card, debit card, and electronic payments,.
8(12)(F) **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 analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial irresponsibility.**	This SE builds on the grade 6 skills [6(14)(D), (E) and (F)], which deals with credit reports and histories.
8(12)(G) **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 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.**	This SE builds on grade 6 and grade 7 skills 6(14)(G), where students are expected to explain various methods to pay for college, including through savings, grants, scholarships, student loans, and work-study; and 7(13)(E), where students are expected to calculate and compare simple interest and compound interest earnings. This SE may involve the creation of a budget.