Mathematics TEKS
SUPPORTING INFORMATION

GRADE 5

Texas Education Agency

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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 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, preceding the content descriptions. This highlights the emphasis of student use of the mathematical process standards to acquire and demonstrate mathematical understanding. This introductory paragraph includes generalization and abstraction in the text from (1)(B). This introductory paragraph includes computer programs in the text from (1)(C). 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) For students to become fluent in mathematics, students must develop a robust sense of number. The National Research Council's report, "Adding It Up," defines procedural fluency as "skill in carrying out procedures flexibly, accurately, efficiently, and appropriately." As students develop procedural fluency, they must also realize that true problem solving may take time, effort, and perseverance. Students in Grade 5 are expected to perform their work without the use of calculators.	The TEKS include the use of the words “automaticity,” “fluency”/”fluently,” and “proficiency” with references to standard algorithms. Attention is being given to these descriptors to indicate benchmark levels of skill to inform intervention efforts at each grade level. These benchmark levels are aligned to national recommendations for the development of algebra readiness for enrollment in Algebra I in the ninth grade. Automaticity refers to the rapid recall of facts and vocabulary. For example, we would expect a third-grade student to recall rapidly the sum of 5 and 3 or to identify rapidly a closed figure with 3 sides and 3 angles. To be mathematically proficient, students must develop conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition (National Research Council, 2001, p. 116). “Procedural fluency refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently” (National Research Council, 2001, p. 121). “Students need to see that procedures can be developed that will solve entire classes of problems, not just individual problems” (National Research Council, 2001, p. 121). Procedural fluency and conceptual understanding weave together to develop mathematical proficiency.

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(a) Introduction. (4) The primary focal areas in Grade 5 are solving problems involving all four operations with positive rational numbers, determining and generating formulas and solutions to expressions, and extending measurement to area and volume. These focal areas are supported throughout the mathematical strands of number and operations, algebraic reasoning, geometry and measurement, and data analysis. In Grades 3-5, the number set is limited to positive rational numbers. In number and operations, students will apply place value and identify part-to-whole relationships and equivalence. In algebraic reasoning, students will represent and solve problems with expressions and equations, build foundations of functions through patterning, identify prime and composite numbers, and use the order of operations. In geometry and measurement, students will classify two-dimensional figures, connect geometric attributes to the measures of three-dimensional figures, use units of measure, and represent location using a coordinate plane. In data analysis, students will represent and interpret data.	The paragraph that highlights more specifics about grade 5 mathematics content follows paragraphs about the mathematical process standards and mathematical fluency. This supports the notion that the TEKS are expected to be learned in a way that integrates the mathematical process standards to develop fluency. The paragraph highlights focal areas or topics that receive emphasis in this grade level. These are different from focal points which are part of the *Texas Response to Curriculum Focal Points Revised 2013 (TXRCFP 2013)*. "[A] curriculum focal point is not a single TEKS statement; a curriculum focal point is a mathematical idea or theme that is developed through appropriate arrangements of TEKS statements at that grade level that lead into a connected grouping of TEKS at the next grade level" (TEA, 2013, p. 6). The focal areas are found within the focal points. The focal points may represent a subset of a focal area, or a focal area may represent a subset of a focal point. The focal points within the *TXRCFP 2013* list related grade-level TEKS.focal points.
(a) Introduction. (5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative	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

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TEKS: Mathematical Process Standards.	Supporting Information
5(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.
5(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, especially those that can be considered difficult relative to mathematical maturity.
5(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.
5(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.
5(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.
5(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.
5(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 set the expectation for students to 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 "vertex" instead of "corner" when referring to the point at which two edges intersect on a polygon.

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TEKS: Number and Operations.	Supporting Information
5(2)(A) **Number and operations.** The student applies mathematical process standards to represent, compare, and order positive rational numbers and understand relationships as related to place value. **The student is expected to represent the value of the digit in decimals through the thousandths using expanded notation and numerals.**	Represent includes using place value to read and write using numerals and expanded notation. The expanded notation for 3.94 can be represented as 3.94 = (3 × 1) + (9 × 0.1) + (4 × 0.01) or 3.94 = (3 × 1) + (9 × 1/10) + (4 × 1/100). The conversion between expanded notation, verbal representation, and numerals builds on the fourth grade skill. Expanded notation is written following the order of place value.
5(2)(B) **Number and operations.** The student applies mathematical process standards to represent, compare, and order positive rational numbers and understand relationships as related to place value. **The student is expected to compare and order two decimals to thousandths and represent comparisons using the symbols >, <, or =.**	Specificity regarding notation has been included with the inclusion of the symbols >, <, or =. A set of decimals can be compared in pairs in the process of ordering decimals. Comparing, ordering, and representing comparisons of decimals in this grade level bridges the SEs in grades 4 and 6. In grade 4 [4(2)(C)], students compare and order whole numbers, and in grade 6: where students locate, compare, and order integers and rational numbers [6(2)(C)] and students order rational numbers in mathematical and real-word situations [6(2)(D)].
5(2)(C) **Number and operations.** The student applies mathematical process standards to represent, compare, and order positive rational numbers and understand relationships as related to place value. **The student is expected to round decimals to tenths or hundredths.**	Because the work with decimals in the TEKS extends to the thousandths place, students are expected to round decimals to the tenths or hundredths. This SE builds on the skills of estimating and rounding in prior grades [3(2)(C), 3(4)(B), 4(2)(D), and 4(4)(G)].

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TEKS: Number and Operations.	Supporting Information
5(3)(A) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division.**	The word "problems" has been clarified with "mathematical and real-world problems." Strategies and methods may include front-end estimation (one keeps the first digit of the number and changes all remaining digits to zero), compatible numbers (with values that lend themselves to mental calculations), rounding up or down, and/or compensation (one adjusts estimates to draw closer to an exact calculation). This SE includes estimation with whole numbers, fractions, and decimals. This SE builds on the fourth-grade skills and builds to the grade 6 skill.
5(3)(B) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to multiply with fluency a three-digit number by a two-digit number using the standard algorithm.**	The introductory paragraph (a)(3) communicates the following: "Students in grade 5 are expected to perform their work without the use of calculators." When paired with 5(1)(A), the expectation is that students solve real-world problems. Specificity has been provided with the inclusion of the phrase "using the standard algorithm." Work with the standard algorithm builds on the work from grade 4 with mental math, partial products, and the commutative, associative, and distributive properties for 4(4)(D). The phrase "with fluency" is included. "Procedural fluency refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently" (National Research Council, 2001, p. 121). This SE builds to the grade 6 skill and eventually to Algebra I [A(10)(B)] as polynomial multiplication can be accomplished using the same algorithm.
5(3)(C) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to solve with proficiency for quotients of up to a four-digit dividend by a two-digit divisor using strategies and the standard algorithm.**	The introductory paragraph (a)(3) communicates the following: "Students in grade 5 are expected to perform their work without the use of calculators." When paired with 5(1)(A), the expectations is that students solve real-world problems. Specificity has been provided with the inclusion of the phrase "using strategies and the standard algorithm." The application of strategies and the standard algorithm includes four-digit dividends. Students are expected to solve with proficiency. Procedural fluency and conceptual understanding weave together to develop mathematical proficiency along with strategic competence, adaptive reasoning, and productive disposition (National Research Council, 2001). "Procedural fluency refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently" (National Research Council, 2001, p. 121). This SE builds to the grade 6 skill and eventually to A(10)(C) as polynomial division can be accomplished using the same algorithm.
5(3)(D) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to represent multiplication of decimals with products to the hundredths using objects and pictorial models, including area models.**	The limitation of products to the hundredths constrains the values with which students are asked to work in grade 5. When paired with 5(1)(A), the expectation is that students solve real-world problems. The intent of this SE is not a sole focus on the computation. This SE builds to the sixth-grade skill of multiplying and dividing rational numbers fluently.

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TEKS: Number and Operations.	Supporting Information
5(3)(E) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to solve for products of decimals to the hundredths, including situations involving money, using strategies based on place-value understandings, properties of operations, and the relationship to the multiplication of whole numbers.**	Place-value understandings would include estimating factors and products to determine reasonable placement of the decimal in a product. Properties of operations would include thinking with the distributive property. For example, if students are asked to determine the total price of 12 books where each book is $4.50, students might think of this as $4.50 × (10 + 2) and determine $4.50 × 10 is $45 and $4.50 × 2is $9. $45 and $9 is $54, therefore $4.50 × 12 is $54. The intention is for students to develop flexible thinking with numbers using properties of operations. When paired with 5(1)(A), the expectation is that students solve real-world problems. The intent of this SE is not a sole focus on the computation. Within the TEKS, fluency with decimal multiplication occurs in grade 6.
5(3)(F) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to represent quotients of decimals to the hundredths, up to four-digit dividends and two-digit whole number divisors, using objects and pictorial models, including area models.**	The limitation of quotients to the hundredths constrains the values with which students are asked to work in grade 5. When paired with 5(1)(A), the expectation is that students solve real-world problems. The intent of this SE is not a sole focus on the computation. Within the TEKS, fluency with decimal division occurs in grade 6 [6(3)(E)].
5(3)(G) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to solve for quotients of decimals to the hundredths, up to four-digit dividends and two-digit whole number divisors, using strategies and algorithms, including the standard algorithm.**	Strategies may include mental math, place value, partial products, and properties of operations. The intention is for students to develop flexible thinking with numbers. When paired with 5(1)(A), the expectation is that students solve real-world problems. The intent of this SE is not a sole focus on the computation. Within the TEKS, fluency with decimal division occurs in grade 6. These division skills support the development of computational skills needed for students' work with division and rates in grade 6 science.
5(3)(H) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to represent and solve addition and subtraction of fractions with unequal denominators referring to the same whole using objects and pictorial models and properties of operations**.	When paired with 5(1)(A), the expectation is that students solve real-world problems. The intent of this SE is not a sole focus on the computation. Specificity addresses the accuracy of the mathematics. The equivalent values should be used to describe the same whole. Pictorial models may include strip diagrams. Associative property can be used for addition of fractions, as in this example: $\frac{5}{6}+\frac{7}{12}=\frac{10}{12}+\frac{7}{12}=\frac{10}{12}+(\frac{2}{12}+\frac{5}{12})=(\frac{10}{12}+\frac{2}{12})+\frac{5}{12}=\frac{12}{12}+\frac{5}{12}=1\frac{5}{12}$ This SE builds to the grade 7 skills on operations with rational numbers.

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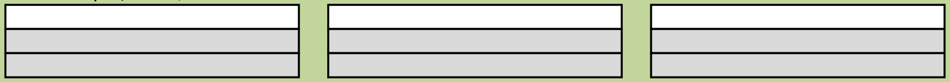
TEKS: Number and Operations.	Supporting Information
5(3)(I) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to represent and solve multiplication of a whole number and a fraction that refers to the same whole using objects and pictorial models, including area models.**	When paired with 5(1)(A), the expectation is that students solve problems. The intent of this SE is not a sole focus on the computation. Specificity addresses the accuracy of the mathematics. The equivalent values should be used to describe the same whole. Within the TEKS, fluency with fraction multiplication occurs in grade 6 [6(3)(E)]. For example, 3 × 2/3 would be 
5(3)(J) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to represent division of a unit fraction by a whole number and the division of a whole number by a unit fraction such as 1/3 ÷ 7 and 7 ÷ 1/3 using objects and pictorial models, including area models.**	When paired with 5(1)(A), the expectation is that students solve problems. The intent of this SE is not a sole focus on the computation. Within the TEKS, fluency with fraction division occurs in grade 6 [6(3)(E)]. A unit fraction is a fraction with a numerator of 1. Students first see unit fractions in grade 3 with 3(3)(C).
5(3)(K) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to add and subtract positive rational numbers fluently.**	The addition and subtraction of positive rational numbers includes whole numbers, decimals, and fractions, including improper fractions and mixed numbers. Within a problem situation, students may be asked to add 0.2, 5/2, 3 1/5, and 2/5. When paired with 5(1)(A), students are expected to solve real-world problems. The intent of this SE is not a sole focus on the computation. The word "fluently" has been added. "Procedural fluency refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently" (National Research Council, 2001, p. 121). This SE builds to the grade 7 skills on operations with rational numbers.
5(3)(L) **Number and operations.** The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. **The student is expected to divide whole numbers by unit fractions and unit fractions by whole numbers.**	When paired with 5(1)(A), the expectation is that students solve real-world problems, which involves dividing whole numbers by unit fractions and unit fractions by whole numbers. Within the TEKS, fluency with fraction division occurs in grade 6 [6(3)(E)].

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TEKS: Algebraic Reasoning.	Supporting Information
5(4)(A) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to identify prime and composite numbers.**	When paired with 5(1)(C), students may use real (concrete) objects to identify prime and composite numbers. When paired with 5(1)(D), students may use pictorial models including arrays as a representation to identify prime and composite numbers. When paired with 5(1)(F), students may analyze factor pairs to connect the concepts of prime and composite numbers to defining characteristics of factors using patterns in factor pairs. The concept of prime factorization appears in grade 6 and then reappears in the Algebra I TEKS A(10)(E) as students begin to find linear factors of polynomials.
5(4)(B) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to represent and solve multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.**	"Multistep problems involving the four operations with whole numbers" includes meaningful problem situations. When paired with 5(1)(D), students may use diagrams, such as strip diagrams, to represent the known and unknown quantities in a multistep problem. The letter standing for the unknown quantity may be any part of the equation.
5(4)(C) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to generate a numerical pattern when given a rule in the form $y = ax$ or $y = x + a$ and graph.**	This SE provides clarity for which types of patterns align to grade 5 expectations. This SE refers to patterns that are bivariate (two-variable or input/output) and does not directly refer to sequences.
5(4)(D) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to recognize the difference between additive and multiplicative numerical patterns given in a table or graph.**	The SE specifies the relationship between paired sets of data. The focus is on additive versus multiplicative patterns. The relationships are of form $y = x + a$ (additive) or $y = ax$ (multiplicative) where x is the input value and y is the output value. This SE is related to 5(4)(C) where students generate a pattern given an additive or multiplicative rule and its graph. This SE is related to 5(8)(C) where students graph the relationships found in input/output tables. The graphical representation has been added. However, graphing in the first quadrant will be the relevant skill for these relationships. While new to algebraic reasoning, this skill is not new to grade 5. This skill builds to the introduction of simple lines ($y = kx$ and $y = x + b$) in grade 6.
5(4)(E) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to describe the meaning of parentheses and brackets in a numeric expression.**	This SE supports 5(4)(F). Student are expected to recognize which operations are within the set of parenthesis and/or brackets and understand that those operations should be accomplished before attempting the remaining operations in the expression. For example, 3 + (2 x 6) is 3 + 12 not 5 x 6. Students are expected to describe the relationship between numbers and operations separated by parentheses and brackets. For example, 4(14 + 5) is 4 times as large as (14 + 5). When paired with 5(4)(F), the expectation is that students describe the meaning of parentheses and brackets up to two levels of grouping. Some grouping symbols are listed below. Parenthesis - ( ) Bracket - [ ] Braces - { }

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TEKS: Algebraic Reasoning.	Supporting Information
5(4)(F) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to simplify numerical expressions that do not involve exponents, including up to two levels of grouping.**	An example of two levels of grouping is [3 + (3 + 4)] ÷ (5 − 3). Students are expected to use the order of operations to simplify numerical expressions. Because fluency with addition and subtraction of positive rational numbers is expected within the TEKS, expressions may include fractional values when adding or subtracting. Using multiplication and division would be district decisions. Exponents are included in the order of operations for grade 6 [6(7)(A)].
5(4)(G) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to use concrete objects and pictorial models to develop the formulas for the volume of a rectangular prism, including the special form for a cube (*V* = *l* x *w* x *h*, *V* = *s* x *s* x *s*, and *V* = *Bh*).**	The SE specifies the use of concrete objects and pictorial models. Volume is specifically tied to rectangular prisms, and three formulas have been stated within the SE.
5(4)(H) **Algebraic reasoning.** The student applies mathematical process standards to develop concepts of expressions and equations. **The student is expected to represent and solve problems related to perimeter and/or area and related to volume.**	Students are expected to determine perimeter of polygons, area of rectangles and composite figures formed by rectangles, and volume of rectangular prisms. “Use appropriate . . . formulas” is stated more appropriately as “represent and solve.” Students may still be expected to measure lengths to determine perimeter, area, and volume if the problem requires it. Because fluency with the addition and subtraction of positive rational numbers is expected within the TEKS, lengths may reflect fractional measures, including decimals with perimeter, to reinforce rational number operations.

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TEKS: Geometry and Measurement.	Supporting Information

5(5) **Geometry and measurement.** The student applies mathematical process standards to classify two-dimensional figures by attributes and properties.

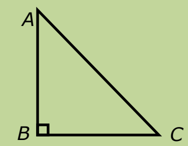
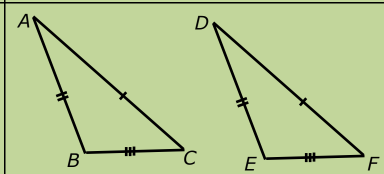
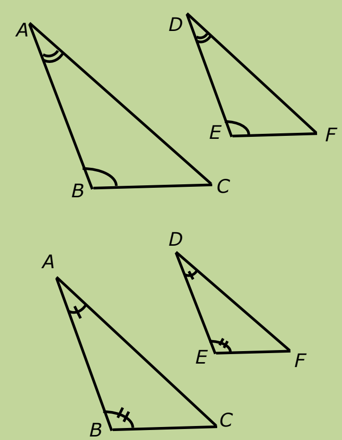
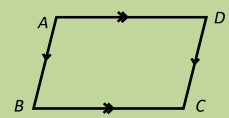
The student is expected to classify two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.

The SE focuses on classification by attributes and properties.

An attribute is a characteristic or component of a geometric figure. The attributes of a square include side lengths and angle measures. The attributes combine to form the properties of a square: 4 right angles, 4 congruent sides, 2 sets of parallel sides.

The SE clarifies the purpose of identifying essential attributes: classification within a hierarchy of set and subsets. For example, all rectangles have the property that opposite sides are parallel; therefore, every rectangle is a parallelogram.

The SE specifies the use of graphic organizers as a classification tool.

Geometric Idea	Notation	Meaning
Right Angle		m$\angle ABC$ = 90°
Congruent Sides		$\overline{AB} \cong \overline{DE}$ $\overline{BC} \cong \overline{EF}$ $\overline{AC} \cong \overline{DF}$
Congruent Angles		In both pairs of triangles: $\angle A \cong \angle D$ $\angle B \cong \angle E$ $\angle C \cong \angle F$
Parallel lines		$\overline{AB} \parallel \overline{DC}$ $\overline{AD} \parallel \overline{BC}$

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TEKS: Geometry and Measurement.	Supporting Information
5(6)(A) **Geometry and measurement.** The student applies mathematical process standards to understand, recognize, and quantify volume. **The student is expected to recognize a cube with side length of one unit as a unit cube having one cubic unit of volume and the volume of a three-dimensional figure as the number of unit cubes (*n* cubic units) needed to fill it with no gaps or overlaps if possible.**	The SE specifies how to use concrete objects and pictorial models and develops formulas as described in 5(4)(G).
5(6)(B) **Geometry and measurement.** The student applies mathematical process standards to understand, recognize, and quantify volume. **The student is expected to determine the volume of a rectangular prism with whole number side lengths in problems related to the number of layers times the number of unit cubes in the area of the base.**	The SE specifies how to use concrete objects and pictorial models and develops formulas as described in 5(4)(G). This SE supports $V = Bh$.

TEKS: Geometry and Measurement.	Supporting Information
5(7) **Geometry and measurement.** The student applies mathematical process standards to select appropriate units, strategies, and tools to solve problems involving measurement. **The student is expected to solve problems by calculating conversions within a measurement system, customary or metric.**	Specificity provides the purpose for performing conversions. The conversions should serve the purpose of solving a problem. Performing conversions will still be required to solve problems. These conversions may include decimal values with metric units or fractional values with customary units that align to the Number and Operations strand. Conversions may be multi-step within a measurement system such as yards to feet to inches.

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TEKS: Geometry and Measurement.	Supporting Information
5(8)(A) **Geometry and measurement.** The student applies mathematical process standards to identify locations on a coordinate plane. **The student is expected to describe the key attributes of the coordinate plane, including perpendicular number lines (axes) where the intersection (origin) of the two lines coincides with zero on each number line and the given point (0, 0); the *x*-coordinate, the first number in an ordered pair, indicates movement parallel to the *x*-axis starting at the origin; and the *y*-coordinate, the second number, indicates movement parallel to the *y*-axis starting at the origin.**	The SE adds specificity for what students are expected to understand regarding the structure of the coordinate plane. Students are expected to graph ordered pairs only in the first quadrant.
5(8)(B) **Geometry and measurement.** The student applies mathematical process standards to identify locations on a coordinate plane. **The student is expected to describe the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane.**	This SE makes the process of graphing explicit.
5(8)(C) **Geometry and measurement.** The student applies mathematical process standards to identify locations on a coordinate plane. **The student is expected to graph in the first quadrant of the coordinate plane ordered pairs of numbers arising from mathematical and real-world problems, including those generated by number patterns or found in an input-output table.**	The SE condenses "locate and name points on a coordinate plane using ordered pairs of whole numbers" to "graph ordered pairs." Students may be expected to graph points with fractional values because of work in grade 4 on the number line with 4(3)(G): Represent fractions and decimals to the tenths or hundredths as distances from zero on a number line. The fractional values may be between grid lines or represented by grid lines. The graphing in this SE is related to 5(4)(C) and 5(4)(D) which is the reason for including "real-world problems" and "including those generated by number patterns or found in an input-output table."

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<table>
<tr><th>TEKS: Data Analysis</th><th>Supporting Information</th></tr>
<tr><td>5(9)(A) Data Analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data.

The student is expected to represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots.</td><td>Data may be in the form of whole numbers, decimals, and/or fractions.

A bar graph may be used to represent frequencies of an item, a category, a number, or a range of numbers. For example, the horizontal axis is labeled with the item, category, number, or range of numbers being counted. The vertical axis is labeled with appropriate frequencies. The length of the bar represents the frequency of the items, categories, numbers, or range of numbers being counted. This SE limits the representation of data using a bar graph to categorical data. Students begin work with bar graphs in grade 1.

A dot plot may be used to represent frequencies. A number line may be used for counts related to numbers. A line labeled with categories may be used as well if the context requires. Dots (or X’s) are recorded vertically above the number line to indicate frequencies. Dots may represent one count or multiple counts if so noted. Students begin work with dot plots in grade 3.

A stem-and-leaf plot organizes data in numerical order according to place value. The stem represents the place values preceding the last digit(s). The leaves represent the last digits. The leaves provide the frequency counts for the range of numbers included in that row of the stem-and-leaf plot. The SE does not indicate double-sided stem-and-leaf plots; including them would be a district decision.

<table>
<tr><th>Stem</th><th>Leaves</th></tr>
<tr><td>7</td><td>1 1 2 3 4 4</td></tr>
<tr><td>8</td><td>2 3</td></tr>
<tr><td>9</td><td>4 4 4 7 8</td></tr>
<tr><td>10</td><td>0</td></tr>
</table>

Students begin work with stem-and-leaf plots in grade 4.</td></tr>
<tr><td>5(9)(B) Data Analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data.

The student is expected to represent discrete paired data on a scatterplot.</td><td>A scatterplot graphs two sets of data as corresponding numbers represented as ordered pairs. A scatterplot is comparable to a Quadrant I graph with paired data as ordered pairs.

This complements 5(8)(C).</td></tr>
<tr><td>5(9)(C) Data Analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data.

The student is expected to solve one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot.</td><td>A frequency table shows how often an item, a number, or a range of numbers occurs. Tallies and counts are used to record frequencies.

Students begin work with frequency tables in grade 3.

Students begin work with dot plots in grade 3.

Students begin work with bar graphs in grade 1.

Students begin work with stem-and-leaf plots in grade 4.

Students begin work with scatterplots in grade 5.

This skill reinforces student expectations 5(8)(A), 5(8)(B), and 5(9)(A).</td></tr>
</table>

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TEKS: Personal Financial Literacy.	Supporting Information
5(10)(A) **Personal financial literacy.** The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. **The student is expected to define income tax, payroll tax, sales tax, and property tax.**	Income tax is a tax paid on the money that a person or business receives as income. It is paid by the employee. Texas currently does not collect income tax from its residents. Payroll tax is a tax an employer withholds from an employee's salary to pay on the employee's behalf. Social security is an example of payroll tax. Sales tax is a tax paid on the purchase of goods and/or services and collected by the seller. Property tax is based upon real property held and is paid directly by the owner.
5(10)(B) **Personal financial literacy.** The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. **The student is expected to explain the difference between gross income and net income.**	This SE builds on the concept of profit in 4(10)(B). Gross income is the total amount earned before costs of all expenses. Net income is the difference of the total amount earned, or gross income, and the cost of expenses including but not limited to taxes. For some individuals, the difference between the two are taxes as listed on their paycheck. For those who are self-employed, net income would be gross income less their expenses for their business.
5(10)(C) **Personal financial literacy.** The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. **The student is expected to identify the advantages and disadvantages of different methods of payment, including check, credit card, debit card, and electronic payments.**	This SE builds to 6(14)(B), where students are expected to distinguish between debit cards and credit cards. This builds from 4(10)(E)–describe basic purpose of financial institutions.
5(10)(D) **Personal financial literacy.** The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. **The student is expected to develop a system for keeping and using financial records.**	This SE builds to 6(14)(C), where students are expected to balance a check register that includes deposits, withdrawals, and transfers. When paired with 5(1)(C), students may use technology in the development of a tracking system for financial records.
5(10)(E) **Personal financial literacy.** The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. **The student is expected to describe actions that might be taken to balance a budget when expenses exceed income.**	This SE builds to 6(14)(C), where students are expected to balance a check register that includes deposits, withdrawals, and transfers. This SE connects to 5(10)(D).
5(10)(F) **Personal financial literacy.** The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. **The student is expected to balance a simple budget.**	This SE builds to 6(14)(C), where students are expected to balance a check register that includes deposits, withdrawals, and transfers. This SE connects to 5(10)(D) and (E).

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