

# Chapter 111. Texas Essential Knowledge and Skills for Mathematics

## Subchapter A. Elementary

### §111.7. Grade 5

(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.

(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, and 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.

(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.

(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.

(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 examples.

(b) Knowledge and skills.

Mathematical Process Standards	Reporting Category 1: Numerical Representations and Relationships	Reporting Category 2: Computations and Algebraic Relationships	Reporting Category 3: Geometry and Measurement	Reporting Category 4: Data Analysis and Personal Financial Literacy
<p>These student expectations will NOT be listed under a separate reporting category. Instead, they will be incorporated into test questions across reporting categories since the application of mathematical process standards is part of each knowledge statement.</p> <p><b>5.1</b> The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:</p> <p>(A) <b>apply</b> mathematics to problems arising in everyday life, society, and the workplace;</p> <p>(B) <b>use</b> a problem-solving model that incorporates <b>analyzing</b> given information, <b>formulating</b> a plan or strategy, <b>determining</b> a solution, <b>justifying</b> the solution, and <b>evaluating</b> the problem-solving process and the reasonableness of the solution;</p> <p>(C) <b>select</b> tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to <b>solve</b> problems;</p>	<p>The student will demonstrate an understanding of how to represent and manipulate numbers and expressions.</p> <p><b>5.2</b> 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:</p> <p>(A) <b>represent</b> the value of the digit in decimals through the thousandths <b>using</b> expanded notation and numerals;</p> <p>(B) <b>compare and order two decimals to thousandths and represent</b> comparisons using the symbols <math>&gt;</math>, <math>&lt;</math>, or <math>=</math>; and</p> <p>(C) <b>round</b> decimals to tenths or hundredths.</p> <p><b>5.4</b> The student applies mathematical process standards to develop concepts of expressions and equations. The student is expected to:</p> <p>(A) <b>identify</b> prime and composite numbers;</p> <p>(E) <b>describe</b> the meaning of parentheses and brackets in a numeric expression;</p> <p>(F) <b>simplify</b> numerical expressions that do not involve</p>	<p>The student will demonstrate an understanding of how to perform operations and represent algebraic relationships.</p> <p><b>5.3</b> 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:</p> <p>(A) <b>estimate</b> to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division;</p> <p>(B) <b>multiply with fluency</b> a three-digit number by a two-digit number using the standard algorithm;</p> <p>(C) <b>solve with proficiency</b> for quotients of up to a four-digit dividend by a two-digit divisor <b>using</b> strategies and the standard algorithm;</p> <p>(D) <b>represent</b> multiplication of decimals with products to the hundredths <b>using</b> objects and pictorial models, including area models;</p> <p>(E) <b>solve</b> 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;</p> <p>(F) <b>represent</b> quotients of decimals to the hundredths, up to four-digit dividends and two-digit whole number</p>	<p>The student will demonstrate an understanding of how to represent and apply geometry and measurement concepts.</p> <p><b>5.4</b> The student applies mathematical process standards to develop concepts of expressions and equations. The student is expected to:</p> <p>(G) <b>use</b> concrete objects and pictorial models <b>to develop</b> the formulas for the volume of a rectangular prism, including the special form for a cube (<math>V = l \times w \times h</math>, <math>V = s \times s \times s</math>, and <math>V = Bh</math>); and</p> <p>(H) <b>represent and solve</b> problems related to perimeter and/or area related to volume.</p> <p><b>5.5</b> The student applies mathematical process standards to classify two-dimensional figures by attributes and properties. The student is expected to:</p> <p>(A) <b>classify</b> two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.</p> <p><b>5.6</b> The student applies mathematical process standards to understand, recognize, and quantify volume. The student is expected to:</p> <p>(A) <b>recognize</b> 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</p>	<p>The student will demonstrate an understanding of how to represent and analyze data and how to describe and apply personal financial concepts.</p> <p><b>5.9</b> The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data. The student is expected to:</p> <p>(A) <b>represent</b> 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;</p> <p>(B) <b>represent</b> discrete paired data on a scatterplot; and</p> <p>(C) <b>solve</b> one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot.</p> <p><b>5.10</b> The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. The student is expected to:</p> <p>(A) <b>define</b> income tax, payroll tax, sales tax, and property tax;</p>

<p>(D) <b>communicate</b> mathematical ideas, reasoning, and their implications <b>using</b> multiple representations, including symbols, diagrams, graphs, and language as appropriate;</p> <p>(E) <b>create and use</b> representations to organize, record, and communicate mathematical ideas;</p> <p>(F) <b>analyze</b> mathematical relationships to connect and communicate mathematical ideas; and</p> <p>(G) <b>display, explain, and justify</b> mathematical ideas and arguments <b>using</b> precise mathematical language in written or oral communication.</p>	<p>exponents, including up to two levels of grouping;</p>	<p>divisors, using objects and pictorial models, including area models;</p> <p>(G) <b>solve</b> 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;</p> <p>(H) <b>represent and solve</b> addition and subtraction of fractions with unequal denominators referring to the same whole using objects and pictorial models and properties of operations;</p> <p>(I) <b>represent and solve</b> multiplication of a whole number and a fraction that refers to the same whole using objects and pictorial models, including area models;</p> <p>(J) <b>represent</b> division of a unit fraction by a whole number and the division of a whole number by a unit fraction such as <math>1/3 \div 7</math> and <math>7 \div 1/3</math> using objects and pictorial models, including area models;</p> <p>(K) <b>add and subtract</b> positive rational numbers fluently; and</p> <p>(L) <b>divide</b> whole numbers by unit fractions and unit fractions by whole numbers.</p> <p><b>5.4</b> The student applies mathematical process standards to develop concepts of expressions and equations. The student is expected to:</p> <p>(B) <b>represent and solve</b> multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity;</p>	<p>number of unit cubes (n cubic units) needed to fill it with no gaps or overlaps if possible; and</p> <p>(B) <b>determine</b> 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.</p> <p><b>5.7</b> The student applies mathematical process standards to select appropriate units, strategies, and tools to solve problems involving measurement. The student is expected to:</p> <p>(A) <b>solve</b> problems by calculating conversions within a measurement system, customary or metric.</p> <p><b>5.8</b> The student applies mathematical process standards to identify locations on a coordinate plane. The student is expected to:</p> <p>(A) <b>describe</b> 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;</p> <p>(B) <b>describe</b> the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane; and</p> <p>(C) <b>graph</b> in the first quadrant of the coordinate plane ordered pairs of</p>	<p>(B) <b>explain</b> the difference between gross income and net income;</p> <p>(C) <b>identify</b> the advantages and disadvantages of different methods of payment, including check, credit card, debit card, and electronic payments;</p> <p>(D) <b>develop</b> a system for keeping and using financial records;</p> <p>(E) <b>describe</b> actions that might be taken to balance a budget when expenses exceed income; and</p> <p>(F) <b>balance</b> a simple budget.</p>
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		(C) <b>generate</b> a numerical pattern when given a rule in the form $y = ax$ or $y = x + a$ and graph;  (D) <b>recognize</b> the difference between additive and multiplicative numerical patterns given in a table or graph;	numbers arising from mathematical and real-world problems, including those generated by number patterns or found in an input-output table.	
<b>Mathematical Process Standards</b>	<b>Reporting Category 1:</b> <b>Numerical Representations and Relationships</b>	<b>Reporting Category 2:</b> <b>Computations and Algebraic Reasoning</b>	<b>Reporting Category 3:</b> <b>Geometry and Measurement</b>	<b>Reporting Category 4:</b> <b>Data Analysis and Personal Financial Literacy</b>
These student expectations will NOT be listed under a separate reporting category. Instead, they will be incorporated into test questions across reporting categories since the application of mathematical process standards is part of each knowledge statement.	<b>Readiness Standards 2</b>	<b>Readiness Standards 6</b>	<b>Readiness Standards 3</b>	<b>Readiness Standards 1</b>
	<b>Supporting Standards 4</b>	<b>Supporting Standards 9</b>	<b>Supporting Standards 5</b>	<b>Supporting Standards 6</b>
	<b>Total Assessment Questions 6</b>	<b>Total Assessment Questions 17</b>	<b>Total Assessment Questions 9</b>	<b>Total Assessment Questions 4</b>

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