

Chapter 111. Texas Essential Knowledge and Skills for Mathematics

Subchapter B. Middle School

§111.27. Grade 7

(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) The ***primary focal areas*** in Grade 7 are

- number and operations,
- expressions, equations, and relationships,
- and measurement and data.

Students use concepts, algorithms, and properties of rational numbers to explore mathematical relationships and to describe increasingly complex situations. Students use concepts of proportionality to explore, develop, and communicate mathematical relationships, including number, geometry and measurement, and statistics and probability. 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 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.***

(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.

(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>7.1 The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:</p> <p>(A) <u>apply</u> mathematics to problems arising in everyday life, society, and the workplace;</p> <p>(B) <u>use</u> a problem-solving model that incorporates <u>analyzing</u> given information, <u>formulating</u> a plan or strategy, <u>determining</u> a solution, <u>justifying</u> the solution, and <u>evaluating</u> the problem-solving process and the reasonableness of the solution;</p>	<p>The student will demonstrate an understanding of how to represent and manipulate numbers and expressions.</p> <p>7.2 The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to:</p> <p>(A) <u>extend</u> previous knowledge of sets and subsets <u>using</u> a visual representation to describe relationships between sets of rational numbers.</p> <p>7.6 The student applies mathematical process standards to use probability and statistics to describe or solve problems involving proportional relationships. The student is expected to:</p> <p>(A) <u>represent</u> sample spaces for simple and compound events using lists and tree diagrams; and</p> <p>(B) <u>select and use</u> different simulations to represent simple and compound events with and without technology.</p> <p>(C) <u>make</u> predictions and <u>determine</u> solutions using</p>	<p>The student will demonstrate an understanding of how to perform operations and represent algebraic relationships.</p> <p>7.3 The student applies mathematical process standards to add, subtract, multiply, and divide while solving problems and justifying solutions. The student is expected to:</p> <p>(A) <u>add, subtract, multiply, and divide</u> rational numbers fluently; and</p> <p>(B) <u>apply and extend</u> previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers.</p> <p>7.4 The student applies mathematical process standards to represent and solve problems involving proportional relationships. The student is expected to:</p> <p>(A) <u>represent</u> constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including $d = rt$;</p> <p>(B) <u>calculate</u> unit rates from rates in mathematical and real-world problems;</p> <p>(C) <u>determine</u> the constant of proportionality ($k = y/x$) within mathematical and real-world problems;</p> <p>(D) <u>solve</u> problems involving ratios, rates, and percents, including multi-step</p>	<p>The student will demonstrate an understanding of how to represent and apply geometry and measurement concepts.</p> <p>7.4 The student applies mathematical process standards to represent and solve problems involving proportional relationships. The student is expected to:</p> <p>(E) <u>convert</u> between measurement systems, including the use of proportions and the use of unit rates.</p> <p>7.5 The student applies mathematical process standards to use geometry to describe or solve problems involving proportional relationships. The student is expected to:</p> <p>(A) <u>generalize</u> the critical attributes of similarity, including ratios within and between similar shapes;</p> <p>(B) <u>describe</u> π as the ratio of the circumference of a circle to its diameter; and</p> <p>(C) <u>solve</u> mathematical and real-world problems involving similar shapes and scale drawings.</p> <p>7.8 The student applies mathematical process standards to develop geometric relationships with volume. The student is expected to:</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>7.6 The student applies mathematical process standards to use probability and statistics to describe or solve problems involving proportional relationships. The student is expected to:</p> <p>(F) <u>use</u> data from a random sample to make inferences about a population;</p> <p>(G) <u>solve</u> problems using data represented in bar graphs, dot plots, and circle graphs, including part-to-whole and part-to-part comparisons and equivalents;</p> <p>7.12 The student applies mathematical process standards to use statistical representations to analyze data. The student is expected to:</p> <p>(A) <u>compare</u> two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads;</p> <p>(B) <u>use</u> data from a random sample to make inferences about a population; and</p> <p>(C) <u>compare</u> two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations.</p> <p>7.13 The student applies mathematical process standards to</p>

<p>(C) <u>select</u> tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to <u>solve</u> problems;</p> <p>(D) <u>communicate</u> mathematical ideas, reasoning, and their implications <u>using</u> multiple representations, including symbols, diagrams, graphs, and language as appropriate;</p> <p>(E) <u>create and use</u> representations to organize, record, and communicate mathematical ideas;</p> <p>(F) <u>analyze</u> mathematical relationships to connect and communicate mathematical ideas; and</p> <p>(G) <u>display, explain, and justify</u> mathematical ideas and arguments <u>using</u> precise mathematical language in written or oral communication.</p>	<p>experimental data for simple and compound events; and</p> <p>(D) <u>make</u> predictions and <u>determine</u> solutions using theoretical probability for simple and compound events.</p> <p>(E) <u>find</u> the probabilities of a simple event and its complement and <u>describe</u> the relationship between the two;</p> <p>(H) <u>solve problems using qualitative and quantitative predictions and comparisons from simple experiments; and</u></p> <p>(I) <u>determine</u> experimental and theoretical probabilities related to simple and compound events using data and sample spaces.</p>	<p>problems involving percent increase and percent decrease;</p> <p>7.7 The student applies mathematical process standards to represent linear relationships using multiple representations. The student is expected to:</p> <p>(A) <u>represent</u> linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form $y = mx + b$.</p> <p>7.10 The student applies mathematical process standards to use one-variable equations and inequalities to represent situations. The student is expected to:</p> <p>(A) <u>write</u> one-variable, two-step equations and inequalities to represent constraints or conditions within problems;</p> <p>(B) <u>represent</u> solutions for one-variable, two-step equations and inequalities on number lines; and</p> <p>(C) <u>write</u> a corresponding real-world problem given a one-variable, two-step equation or inequality.</p> <p>7.11 The student applies mathematical process standards to solve one-variable equations and inequalities. The student is expected to:</p> <p>(A) <u>model and solve</u> one-variable, two-step equations and inequalities;</p> <p>(B) <u>determine</u> if the given value(s) make(s) one-variable, two-step equations and inequalities true; and</p>	<p>(A) <u>model</u> the relationship between the volume of a rectangular prism and a rectangular pyramid having both congruent bases and heights and connect that relationship to the formulas;</p> <p>(B) <u>explain</u> verbally and symbolically the relationship between the volume of a triangular prism and a triangular pyramid having both congruent bases and heights and connect that relationship to the formulas;</p> <p>(C) <u>use</u> models to determine the approximate formulas for the circumference and area of a circle and connect the models to the actual formulas.</p> <p>7.9 The student applies mathematical process standards to solve geometric problems. The student is expected to:</p> <p>(A) <u>solve problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and triangular pyramids;</u></p> <p>(B) <u>determine</u> the circumference and area of circles;</p> <p>(C) <u>determine</u> the area of composite figures containing combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles; and</p> <p>(D) <u>solve</u> problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net.</p>	<p>develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to:</p> <p>(A) <u>calculate</u> the sales tax for a given purchase and calculate income tax for earned wages;</p> <p>(B) <u>identify</u> the components of a personal budget, including income, planned savings for college, retirement, and emergencies, taxes, and fixed and variable expenses, and calculate what percentage each category comprises of the total budget;</p> <p>(C) <u>create and organize</u> a financial assets and liabilities record and construct a net worth statement;</p> <p>(D) <u>use</u> a family budget estimator to determine the minimum household budget and average hourly wage needed;</p> <p>(E) <u>calculate and compare</u> simple interest and compound interest earnings; and</p> <p>(F) <u>analyze and compare</u> monetary incentives, including sales, rebates, and coupons.</p>
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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
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	Supporting Standards 5	Supporting Standards 7	Supporting Standards 5	Supporting Standards 8
	Total Assessment Questions 4-6	Total Assessment Questions 14-16	Total Assessment Questions 11-13	Total Assessment Questions 5-7
	Number of Points 4-8	Number of Points 16-21	Number of Points 11-16	Number of Points 5-9
Item Types by Point	1-point questions (multiple-choice and non-multiple-choice items)		30 questions	30 points
	2-point questions (non-multiple-choice items)		8 questions	16 points
	Total		38 questions	46 points

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