FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmark	Grade Level Expectation	Clarification Statement	Content Limits
MA.A.1.3.1: The student associates verbal names, written word names, and standard numerals with integers, fractions, decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.	1. Knows word names and standard numerals for integers, fractions, decimals, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, absolute value, radicals, and ratios.		
MA.A.1.3.2: The student understands the relative size of integers, fractions, and decimals; numbers expressed as percents; numbers with exponents; numbers in scientific notation; radicals; absolute value; and ratios.	1. Compares and orders fractions, decimals, integers, and radicals using graphic models, number lines, and symbols. 2. Compares and orders numbers expressed in absolute value, scientific notation, integers, percents, numbers with exponents, fractions, decimals, radicals, and ratios.	Students will identify, order, and / or compare the relative size of numbers. MC	• Items involving scientific notation of whole numbers and decimals should be limited to whole numbers less than a billion and greater than a billionth. • Negative exponents should be used in scientific notation only. • The proportion of items for this bench mark that assess radicals and absolute values should be small.
MA.A.1.3.3: The student understands concrete and symbolic representations of rational numbers and irrational numbers in real-world situations.	1. Knows examples of rational and irrational numbers in real-world situations. 2. Describes the meanings of rational and irrational numbers using physical or graphical displays. 3. Constructs models to represent rational and irrational numbers.		
MA.A.1.3.4: The student understands that numbers can be represented in a variety of equivalent forms, including integers, fractions, decimals, percents, scientific notation, exponents, radicals, and absolute value.	1. Knows the relationships among fractions, decimals, and percents given a real-world context. 2. Simplifies expressions using integers, exponents, and radicals. 3. Knows equivalent forms of large and small numbers in scientific and standard notation. 4. Identifies and explains the absolute value of a number.	Students will express numbers in equivalent forms. MC, GR	• The place values of the fractional part of decimal numbers should range from tenths through ten-thousandths. • Scientific notation of whole numbers and decimals is limited to hundred millions through hundred- millionths. • Negative exponents should be used in scientific notation only. • Items will not include repeating decimals. • The proportion of items for this benchmark that assesses radicals and absolute value should be small.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmark	Grade Level Expectation	Clarification Statement	Content Limits
MA.A.2.3.1: The student understands and uses exponential and scientific notation.	1. Expresses rational numbers in exponential notation including negative exponents (for example, $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$). 2. Expresses numbers in scientific or standard notation including decimals between 0 and 1. 3. Evaluates numerical or algebraic expressions that contain exponential notation.	Students will represent or solve a simple problem using numbers in exponential and / or scientific notation. MC, GR	• Negative exponents may be used in scientific notation only. • Scientific notation of decimal fractions should be limited to hundred-millionths. • There is no limit on whole numbers when they are expressed in scientific notation.
MA.A.2.3.2: The student understands the structure of number systems other than the decimal number system.	1. Expresses base ten numbers as equivalent numbers in different bases, such as base two, base five, and base eight. 2. Discusses the application of the binary (base two) number system in computer technology. 3. Expresses non-base ten numbers as equivalent numbers in base ten.		
MA.A.3.3.1: The student understands and explains the effects of addition, subtraction, multiplication, and division on whole numbers, fractions, including mixed numbers, and decimals, including the inverse relationships of positive and negative numbers.	1. Knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, decimals, integers. 2. Knows the inverse relationship of positive and negative numbers. 3. Applies the properties of real numbers to solve problems (commutative, associative, distributive, identity, equality, inverse, and closure).	Students will recognize the appropriate operation for a stated effect, the effects of operations, and / or the relationships between operations. MC	• Items with fractions are limited to positive, single-digit numerators and denominators and / or decimals not to exceed the thousandths place. • Place value of decimals is not to exceed the thousandths place. • Items assessing the inverse relationship should be limited to integers.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmark	Grade Level Expectation	Clarification Statement	Content Limits
MA.A.3.3.2: The student selects the appropriate operation to solve problems involving addition, subtraction, multiplication, and division of rational numbers, ratios, proportions, and percents, including the appropriate application of the algebraic order of operations.	1. Knows the appropriate operations solve real-world problems involving integers, ratios, rates, proportions, numbers expressed as percents, decimals, and fractions. 2. Solves real-world problems involving integers, ratios, proportions, numbers expressed as percents, decimals, and fractions in two- or three-step problems. 3. Solves real-world problems involving percents including percents greater than 100% (for example percent of change commission). writes and simplifies expressions from real world situations using the order of operations.	Students will simplify mathematical expressions using the correct order of operations or identify the correct order of operations. MC, GR	• Items should include one- or two-digit whole numbers and exponents up to the fifth power. • In order to focus the assessment on the order of operations, items should use numbers that students can solve without a calculator.
MA.A.3.3.3: The student adds, subtracts, multiplies, and divides whole numbers, decimals, and fractions, including mixed numbers, to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.	1. Solves multi-step real-world problems involving fractions, decimals, and integers using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.	Students will solve a single- or multi-step problem using appropriate computations. MC, GR	• Items may include problems dealing with percents used to find sales tax, discount, simple interest, and percent increase or decrease.
MA.A.4.3.1: The student uses estimation strategies to predict results and to check the reasonableness of results.	1. Knows appropriate estimation techniques for a given situation using real numbers. 2. Estimates to predict results and to check reasonableness of results.	Students will determine estimates and / or explain estimation strategies or their appropriateness. SR	• The data presented to students may be either precise values, a range of values, or a combination of precise values and estimates of other values.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmark	Grade Level Expectation	Clarification Statement	Content Limits
MA.A.5.3.1: The student uses concepts about numbers, including primes, factors, and multiples, to build number sequences.	1. Knows if numbers are relatively prime. 2. Applies number theory concepts to determine the terms in a real number sequence. 3. Applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.		
MA.B.1.3.1: The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.	1. Uses concrete and graphic models to explore and derive formulas for surface area and volume of three-dimensional regular shapes, including pyramids, prisms, and cones. 2. Solves and explains real-world problems involving surface area and volume of three-dimensional shapes.	Students will solve a problem involving perimeter, area, surface area, circumference, or volume. Items may assess finding linear measure, weight, capacity, time, temperature, perimeter, area, circumference, and the surface area or volume of prisms and cylinders. GR, SR	• The number of two- or three dimensional figures assessed in an item should not exceed two. • Where possible, items involving circumferences and areas of circles should use numbers compatible with $\frac{22}{7}$ as a representation of π even though students may use 3.14 in solving the problem. • Items involving π should be short response.
MA.B.1.3.2: The student uses concrete and graphic models to derive formulas for finding rates, distance, time, and angle measures.	1. Applies formulas for finding rates, distance, time and angle measures. 2. Describes and uses rates of change (for example, temperature as it changes throughout the day, or speed as the rate of change in distance over time) and other derived measures.	Students will develop and/or apply a procedure or formula to solve and/or explain a problem involving rates, distance, time, or angle measures. GR, SR	• Items involving rate should not be limited to time/distance problems, but should include other rated measures: e.g., rates of change for temperature as it changes throughout the day, or speed at the rate of change in distance over time, and other derived measures.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmark	Grade Level Expectation	Clarification Statement	Content Limits
MA.B.1.3.3: The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.	1. Knows how a change in a figure's dimensions affects its perimeter, area, circumference, surface area, or volume. 2. Knows how changes in the volume, surface area, area, or perimeter of a figure affect the dimensions of the figure. 3. Solves real-world or mathematical problems involving the effects of changes either to the dimensions of a figure or to the volume, surface area, area, perimeter or circumference of figures.	Students will determine the effects of changing dimensions on other measures or solve problems involving the effects of changing dimensions. MC, GR	• The changes in dimensions of a figure that are increases should result in similar figures using scale factors that are whole numbers. • The changes in dimensions of a figure that are decreases should result in similar figures using scale factors that are common-unit fractions with denominators of 2, 3, or 4. • Changes in figures involving volume should be based primarily on rectangular solids.
MA.B.1.3.4: The student constructs, interprets, and uses scale drawings such as those based on number lines and maps to solve real-world problems.	1 Interprets and applies various scales including those based on number lines, graphs, models, and maps. (Scale may include rational numbers.) 2. Constructs and uses scale drawings to recreate a given situation.	Students will interpret and solve a problem using scale drawings. MC, GR	• Measurements may be in either metric or customary units. • Scales should use only rational numbers.
MA.B.2.3.1: The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.	1. Finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures.		
MA.B.2.3.2: The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.	1. Solves problems using mixed units within each system, such as feet and inches, hours and minutes. 2. Solves problems using the conversion of measurements within the customary system. 3. Solves problems using the conversions of measurement within the metric system.	Students will solve a problem involving conversions of other units. MC, GR	• All conversions of units must be within the same system of measurement (metric or customary). • Items may involve mixed units within each system, such as converting hours and minutes to seconds.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmark	Grade Level Expectation	Clarification Statement	Content Limits
MA.B.3.3.1: The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight / mass, temperature, money, perimeter, area, and volume, in either customary or metric units.	1. Knows a variety of strategies to estimate, describe, make comparisons, and solve real-world and mathematical problems involving measurements.		
MA.B.4.3.1: The student selects appropriate units of measurement and determines and applies significant digits in a real-world context. (Significant digits should relate to both instrument precision and to the least precise unit of measurement).	1. Selects the appropriate unit of measure for a given situation. 2. Knows the precision of different measuring instruments. 3. Determines the appropriate precision unit for a given situation. 4. Identifies the number of significant digits as it relates to the least precise unit of measure. 5. Determines the greatest possible error of a given measurement and the possible actual measurement of an object.		
MA.B.4.3.2: The student selects and uses appropriate instruments, technology, and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.	1. Applies significant digits in the real-world context. 2. Selects and uses appropriate instruments, technology, and techniques to measure quantities and dimensions to a specified degree of accuracy.		
MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to regular and irregular geometric shapes in two- and three-dimensions.	1. Determines and justifies the measures of various types of angles based upon geometric relationships in two- and three-dimensional shapes. 2. Compares regular and irregular polygons and two- and three-dimensional shapes. 3. Draws and builds three-dimensional figures from various perspectives (for example, flat patterns, isometric drawings, nets). 4. Knows the properties of two- and three-dimensional figures.	Students will identify and / or analyze two- and three-dimensional shapes using their basic properties and relationships. MC, GR	• Items will assess identifying basic properties of lines, congruent figures, various types of angles, and angle relationships (including complementary, supplementary, and vertical angles). • Items will assess attributes of regular and irregular polygons represented as flat patterns, isometric drawings, nets, and three-dimensional figures. • Items assessing three-dimensional figures will use rectangular prisms, right circular cylinders, pyramids, cones, spheres, or hemispheres. • Items should utilize only a single figure, with no comparisons to other figures or transformations.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmark	Grade Level Expectation	Clarification Statement	Content Limits
MA.C.2.3.1: The student understands the geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, parallelism, and transformations, including flips, slides, turns, and enlargements.	1. Use the properties of parallelism, perpendicularity, and symmetry in solving real-world problems. 2. Identifies congruent and similar figures in real-world situations and justifies the identification. 3. Identifies and performs the various transformations (reflection, translation, rotation, dilation) of a given figure on a coordinate plane.	Students will identify, apply and/or explain various geometric concepts related to spatial generalization, including parallelism, perpendicularity, symmetry, congruency, similarity, and transformations, including reflections, translations, rotations, or dilations. MC, GR, ER	• Items should assess only geometric concepts of two-dimensional figures • Items may include graphics of three dimensional objects. • Items may involve applications of the Pythagorean theorem, • Items involving circumferences and areas of circles should use numbers compatible with $\frac{22}{7}$ as a representation of π even though students may use 3.14 in solving the problem. • Items involving π should be either MC or ER.
MA.C.2.3.2: The student predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).	1. Continues a tessellation pattern using the needed transformations. 2. Creates an original tessellating tile and tessellation pattern using a combination of transformations.	Students will predict and/or verify a pattern involving tessellations and/or identify figures that have been or can be tessellated. MC	• Items will assess tessellations or figures to be tessellated.
MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.	1. Observes, explains, makes and tests conjectures regarding geometric properties and relationships (among regular and irregular shapes of two and three dimensions). 2. Applies the Pythagorean Theorem in real-world problems (for example, finds the relationship among sides in 45° - 45° and 30° - 60° right triangles).	Students will apply algebraic and geometric properties and relationships to solve geometric problems. MC, SR	• Items will not assess three-dimensional figures. • Items may assess vertical distance, horizontal distance, and simple applications of the Pythagorean theorem.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmarks	Grade Level Expectation	Clarification Statement	Content Limits
MA.C.3.3.2: The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system (graph) and applies simple properties of lines.	1. Given an equation or its graph, finds ordered-pair solutions (for example, $y = 2x$). 2. Given the graph of a line, identifies the slope of the line (including the slope of vertical and horizontal lines). 3. Given the graph of a linear relationship, applies and explains the simple properties of lines on a graph, including parallelism, perpendicularity, and identifying the *x*- and *y*- intercepts, the midpoint of a horizontal or vertical line segment, and the intersection point of two lines.	Students will identify and/or plot coordinates of a point, apply simple properties of lines, explain the procedure used, and/or interpret the results. MC, SR	• Items will assess all four quadrants. • Items involve finding the *x*-intercept, the *y*-intercept, the midpoint of a horizontal or vertical line segment, or the intersection of two lines. • Items may assess the slope of lines (including the slope of vertical and horizontal lines) and determine the *x*- and *y*- intercepts of a line. • Items may assess parallel or perpendicular properties of lines.
MA.D.1.3.1: The student describes a wide variety of patterns, relationships, and functions through models, such a manipulatives, tables, graphs, expressions, equations, and inequalities.	1. Reads, analyzes, and describes graphs of linear relationships. 2. Uses variables to represent unknown quantities in real-world problems. 3. Uses the information provided in a table, graph, or rule to determine if a function is linear and justifies reasoning. 4. Finds a function rule to describe tables of related input-output variables. 5. Predicts outcomes based upon function rules.	Students will recognize, analyze, and/or apply patterns, sequences, relationships, and functions in a variety of settings. MC, GR	• Items should not use more than two variables or include more than two operations. • Items involving function tables should be able to be solved using a pattern in the *y*-values or a pattern in the relationship between the *x*- and *y*-values.
MA.D.1.3.2: The student creates and interprets tables, graphs, equations, and verbal descriptions to explain cause-and-effect relationships.	1. Interprets and creates tables and graphs (function tables). 2. Writes equations and inequalities to express relationships. 3. Graphs equations and inequalities to explain cause-and-effect relationships. 4. Interprets the meaning of the slope of a line from a graph depicting a real-world situation.	Students recognize, create, and/or evaluate a rule, expression, and/or equation for cause-and-effect relationships. MC, GR, SR	• Functions may be from all four quadrants. • Items should not include more than three operations. • When the student is required to create or recognize an expression from a table, graph, or verbal description, a linear expression should be used. • Items should rely primarily on tables or graphs to present and/or interpret cause-and-effect relationships.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmarks	Grade Level Expectation	Clarification Statement	Content Limits
MA.D.2.3.1: The student represents and solves real-world problems graphically with algebraic expressions, equations, and inequalities.	1. Translates verbal expressions and sentences into algebraic expressions, equations, and inequalities. 2. Translates algebraic expressions, equations, or inequalities representing real-world relationships into verbal expressions or sentences. 3. Solves single- and multiple-step linear equations and inequalities in concrete or abstract form. 4. Graphs linear equations on the coordinate plane using tables of values. 5. Graphically displays real-world situations represented by algebraic equations or inequalities. 6. Evaluates algebraic expressions, equations, and inequalities by substituting integral values for variables and simplifying the results. 7. Simplifies algebraic expressions that represent real-world situations by combining like terms and applying the properties of real numbers.	Students will translate a verbal description or a graphic to an equation or inequality or translate an equation or inequality to a verbal description to solve a real-world problem. MC, SR	• Items should include only one or two variables and no more than two operations. • The use of concrete and symbolic expressions should be limited to rational numbers.
MA.D.2.3.2: The student uses algebraic problem-solving strategies to solve real-world problems involving linear equations and inequalities.	1. Simplifies algebraic expressions with a maximum of two variables. 2. Solves single- and multi-step linear equations and inequalities that represent real-world situations.	Students will represent and/or solve problems involving equations and/or inequalities. MC, GR	• Items should contain no more than two variables and no more than two operations. • Items should include only linear equations or inequalities.
MA.E.1.3.1: The student collects, organizes, and displays data in a variety of forms, including tables, line graphs, charts, bar graphs, to determine how different ways of presenting data can lead to different interpretations.	1. Reads and interprets data displayed in a variety of forms including histograms. 2. Constructs and interprets displays of data, (including circle, line, bar, and box-and-whisker graphs) and explains how different displays of data can lead to different interpretations.	Students will read and interpret data displayed in a variety of forms and construct, interpret, and/or explain displays of data, and/or explain how different displays of data lead to different interpretations. MC, GR, ER	• Items may include pictographs, charts, stem-and leaf plots, box-and-whisker plots, scatter plots, data tables, circle graphs, single- and multiple-bar graphs, and single- and multiple-line graphs, and Venn diagrams. • No more than twelve pieces or pairs of data are to be displayed.

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmarks	Grade Level Expectation	Clarification Statement	Content Limits
MA.E.1.3.2: The student understands and applies the concepts of range and central tendency (mean, median, and mode).	1. Finds the mean, median, and mode of a set of data using raw data, tables, charts, or graphs. 2. Interprets measures of dispersion (range) and of central tendency. 3. Determines appropriate measures of central tendency for a given situation or set of data.	Students will apply the concepts of range, mean, median, and/or mode to solve a problem. MC, GR	• Items will assess finding the range, mean, median, or mode of a set of data presented in a chart, table, graph, or other listing. • Items that assess understanding of these concepts may ask students to draw conclusions from an analysis of range and/or central tendency measures. • No more than ten pieces of data should be used for calculations of the mean. • No more than three categories of information should be used in data sets.
MA.E.1.3.3: The student analyzes real-world data by applying appropriate formulas for measures of central tendency and organizing data in a quality display, using appropriate technology, including calculators and computers.	1. Determines the mean, median, mode, and range of a set of real world data using appropriate technology. 2. Organizes, graphs, and analyzes a set of real-world data using appropriate technology.		
MA.E.2.3.1: The student compares experimental results with mathematical expectations of probabilities.	1. Compares and explains the results of an experiment with the mathematically expected outcomes. 2. Calculates simple mathematical probabilities for independent and dependent events.	Students will identify possible outcomes and compare and/or explain the results of experiments (empirical data) with the expected results (theoretical probabilities) of the experiment. SR	• Items may include probabilities for independent and dependent events. • Mathematical expectations of probabilities will be assessed using simple empirical data or theoretical probabilities.
MA.E.2.3.2: The student determines odds for and odds against a given situation.	1. Predicts the mathematical odds for and against a specified outcome in a given real-world situation.	Students will determine odds for or odds against a specific outcome, or the probability of a simple event occurring. MC, GR	• Situations assessed may include finding the mathematical odds for and against a specified outcome. • Compound events are limited to independent occurrences. • Items assessing compound events should not exceed sixteen outcomes in a sample space. • Probabilities should be based on whole number, fractions, or decimals, and should not include negative numbers. • Items should use the phrases “odds in favor of” and “ odds against.”

FCAT MATHEMATICS CONTENT MATRIX
GRADE 8

Benchmarks	Grade Level Expectation	Clarification Statement	Content Limits
MA.E.3.3.1: The student formulates hypotheses, designs experiments, collects and interprets data, and evaluates hypotheses by making inferences and drawing conclusions based on statistics (range, mean, median, and mode) and tables, graphs, and charts.	1. Formulates a hypothesis and designs an experiment. 2. Performs the experiment and collects, organizes, and displays the data. 3. Evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.	Students will design experiments, formulate or evaluate hypotheses and conclusions based on experimental situations, and/or identify common uses and misuses of statistical information. MC, SR	• Items should emphasize interpretation, not collection or computation. • Common misuses of probability and statistics should be limited to: • inadequate or non representative sample size; • incomplete or incorrect graphs; • over-generalized results; • use of raw data, percents, or statistics (range, median, mean, mode) to misrepresent the data collected; and • misinterpretation of the likelihood and significance of the results.
MA.E.3.3.2: The student identifies the common uses and misuses of probability or statistical analysis in the everyday world.	1. Knows appropriate uses of statistics and probability in real world situations. 2. Knows when statistics and probability are used in misleading ways. 3. Identifies and uses different types of sampling techniques (for example, random, systematic, stratified). 4. Knows whether a sample is biased.		