

Course Syllabus

Mathematics, Grade 7

Jefferson County Schools Curriculum, Final
Jefferson County Schools

The Terra Nova Complete Battery for Mathematics is "designed to help students show what they know and can do. Many questions call for critical thinking, reasoning, and problem solving. Questions allow students to use different strategies and to take individual paths to a solution. Real-world topics engage students' interest, and the extensive use of graphics reduces the need for explanatory text and provides a supportive context. Themes group items into meaningful configurations, and items are generally sequenced to promote initial success so that students will continue with confidence to more challenging questions.

The [Terra Nova] tests taps broad mathematical power, yet retains the specifics from the traditional curriculum. The first section of the test includes computation, computation in context, and estimation items, and is administered without calculators. The second section covers a broad range of core skills and may be administered with calculators. Some questions require the use of rulers, which are supplied with the testing materials."

The Tennessee Mathematics Curriculum Standards provide standards, performance indicators, and accomplishments for students in mathematics.

The Terra Nova Complete Battery assesses students in seventh grade (Level 17).

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Algebraic Concepts

The Algebraic Concepts Unit includes Competencies/Objectives which focus on algebraic equations and operations. Students explore the symbolic nature of algebraic concepts by identifying and extending patterns in algebra, by following algebraic procedures, and by proving theorems with properties.

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- The learner will be able to (IMPORTANT) analyze change in many different contexts.
- The learner will be able to (IMPORTANT) explore the relationships between symbolic expressions and graphs of lines.
- The learner will be able to (ESSENTIAL) comprehend the concept of equations.
- The learner will be able to (ESSENTIAL) apply exponents.
- The learner will be able to (ESSENTIAL) evaluate algebraic expressions when presented with the values of two or more variables.
- The learner will be able to (IMPORTANT) model algebraic expressions through manipulatives, technology, and pencil and paper.
- The learner will be able to (IMPORTANT) translate single-variable verbal and written expressions into algebraic expressions.
- The learner will be able to (ESSENTIAL) apply and create function rules.
- The learner will be able to (ESSENTIAL) represent, analyze, and extend geometric and numerical patterns.
- The learner will be able to (ESSENTIAL) interpret graphs which represent rates of change.
- The learner will be able to (ESSENTIAL) understand the concepts of inequalities.
- The learner will be able to (ESSENTIAL) recognize whole numbers that satisfy single-variable inequalities.
- The learner will be able to (ESSENTIAL) obtain solutions to single-step linear equations that illustrate real world scenarios.
- The learner will be able to (ESSENTIAL) obtain solutions to linear equations.

Course Syllabus

Mathematics, Grade 7

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (IMPORTANT) illustrate and analyze mathematical situations and structures by applying algebraic symbols.
- The learner will be able to (ESSENTIAL) demonstrate an understanding of the properties of various operations.
- The learner will be able to (ESSENTIAL) understand and/or apply geometric patterns.
- The learner will be able to (ESSENTIAL) use tables, graphs, and symbolic rules to generalize patterns in data.
- The learner will be able to (ESSENTIAL) solve problems by applying algebraic properties.
- The learner will be able to (IMPORTANT) comprehend quantitative relationships using mathematical models.
- The learner will be able to (ESSENTIAL) extend rate charts to solve real-world problems.
- The learner will be able to (IMPORTANT) apply unit rates to obtain problem solutions (e.g., miles per hour, words per minute).
- The learner will be able to (ESSENTIAL) calculate simple rates.
- The learner will be able to (ESSENTIAL) connect rational numbers to locations on the number line.
- The learner will be able to (ESSENTIAL) use ratios to represent quantitative relationships.
- The learner will be able to (IMPORTANT) comprehend patterns, relations, and functions.
- The learner will be able to (ESSENTIAL) construct a scatterplot to illustrate data in tabular form.
- The learner will be able to (IMPORTANT) explain the relationships between two quantities illustrated in a scatterplot.
- The learner will be able to (IMPORTANT) develop a comprehension for arithmetic sequences.

- The learner will be able to (ESSENTIAL) use symbols to illustrate mathematical statements and real world scenarios.
- The learner will be able to (IMPORTANT) explain how a change in one quantity or variable can bring about a change in another variable.
- The learner will be able to (IMPORTANT) illustrate an understanding of the variety of applications of variables.

Data Analysis and Probability

- The learner will be able to (ESSENTIAL) make interpretations of data displays.
- The learner will be able to (ESSENTIAL) interpret bar, line, and circle graphs involving real-world data.
- The learner will be able to (ESSENTIAL) make comparisons of data.
- The learner will be able to (IMPORTANT) find, use, and interpret measures of center and spread (e.g., mean, interquartile range).
- The learner will be able to (IMPORTANT) formulate questions, design studies, and gather real world data.
- The learner will be able to (IMPORTANT) create questions and gather, organize, and illustrate data to answer those questions.
- The learner will be able to (ESSENTIAL) draw conclusions from data.
- The learner will be able to (ESSENTIAL) choose a suitable display to illustrate a data set.
- The learner will be able to (IMPORTANT) create, interpret, and apply multiple bar graphs, multiple line graphs, and circle graphs that illustrate information from the real world.
- The learner will be able to (ESSENTIAL) describe the relationship that exists between a data sets and their graphical representations (i.e., bar graphs, stem-and-leaf plots, box plots and scatterplots) (Learning Accomplishment includes "line graphs, circle graphs, and histograms").

Course Syllabus

Mathematics, Grade 7

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (IMPORTANT) identify misleading representations of data.
- The learner will be able to (IMPORTANT) formulate conjectures and predictions based on collected data.
- The learner will be able to (IMPORTANT) formulate conjectures to create new questions for future research.
- The learner will be able to (ESSENTIAL) interpret the mean and median for a data set.
- The learner will be able to (ESSENTIAL) read pictographs.
- The learner will be able to (ESSENTIAL) identify the probability of a given situation.
- The learner will be able to (IMPORTANT) comprehend and apply basic concepts of probability.
- The learner will be able to (IMPORTANT) associate symbolic illustrations of probability to an experiment.
- The learner will be able to (ESSENTIAL) formulate and evaluate inferences and predictions according to sample data.
- The learner will be able to (ESSENTIAL) use proportional thinking to make conjectures about results of experiments and simulations.
- The learner will be able to (IMPORTANT) choose and use suitable statistical methods to analyze data.
- The learner will be able to (ESSENTIAL) understand concepts, processes, and properties of statistics.
- The learner will be able to (ESSENTIAL) connect the symbolic representation of a probability to an experiment.
- The learner will be able to (ESSENTIAL) create a tree diagram to find all the possible outcomes of a simple compound event.

Geometry

The Geometry Unit includes Competencies/Objectives which focus on exploring geometric concepts from multiple perspectives. Students study properties and construction of figures, proofs and theorems, history of geometry,

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- The learner will be able to (ESSENTIAL) combine geometric figures in creating other geometric figures.
- The learner will be able to (ESSENTIAL) determine congruence of line segments, angles, and polygons through direct comparison based upon characteristics.
- The learner will be able to (IMPORTANT) apply suitable mathematical vocabulary to describe similarity and congruence.
- The learner will be able to (IMPORTANT) relate symmetry and congruence to reflections about a line.
- The learner will be able to (IMPORTANT) plot points on a coordinate grid.
- The learner will be able to (IMPORTANT) draw geometric shapes with particular properties (e.g., side lengths, angle measure) using suitable instruments and techniques.
- The learner will be able to (ESSENTIAL) apply inductive and deductive reasoning to solve problems.
- The learner will be able to (ESSENTIAL) determine the measure of an angle of a triangle given the measures of the other two angles.
- The learner will be able to (ESSENTIAL) use ordered pairs to describe given points in a coordinate system.
- The learner will be able to (ESSENTIAL) identify parallel lines.
- The learner will be able to (ESSENTIAL) identify perpendicular lines.
- The learner will be able to (ESSENTIAL) understand the concepts of planes, points, lines, and rays.

Course Syllabus

Mathematics, Grade 7

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (ESSENTIAL) compare and classify polygons by properties.
- The learner will be able to (ESSENTIAL) use spatial reasoning skills.
- The learner will be able to (ESSENTIAL) obtain solutions to real world problems by applying visualization, spatial reasoning, and modeling.
- The learner will be able to (IMPORTANT) create a three-dimensional object from a representation in two dimensions and vice versa.
- The learner will be able to (IMPORTANT) analyze characteristics and properties of two-and three-dimensional figures.
- The learner will be able to (IMPORTANT) specify locations and explain spatial relationships by applying coordinate geometry and various other representational systems.
- The learner will be able to (ESSENTIAL) obtain solutions to problems using spatial visualization.
- The learner will be able to (ESSENTIAL) subdivide figures.
- The learner will be able to (ESSENTIAL) compare and classify triangles by angle size and length of sides.
- The learner will be able to (ESSENTIAL) use the concepts, properties, and relationships of three-dimensional solids.
- The learner will be able to (IMPORTANT) apply transformations and use symmetry to analyze mathematical situations.
- The learner will be able to (ESSENTIAL) identify the results of transformations of two-dimensional figures(i.e.,turns/rotations, flips/reflections/, slides/translations).

Measurement

The Measurement Unit includes Competencies/Objectives which focus on measurement concepts, applications, and analysis. Students study length, area, circumference, perimeter, volume, weight, formulas, distance, calendar,

money, tools, accuracy, units, constructions, patterns, and problem solving.

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- The learner will be able to (ESSENTIAL) create methods to determine the areas of more complex figures.
- The learner will be able to (ESSENTIAL) generate and apply the formulas for area of triangles, parallelograms, and trapezoids and circles (Learning Accomplishment includes "circumference of circles").
- The learner will be able to (ESSENTIAL) accurately convert, within a measurement system, from one unit to another.
- The learner will be able to (ESSENTIAL) determine the distance between two points on the x-or the y-axis in Quadrant 1.
- The learner will be able to (ESSENTIAL) estimate length, perimeter, circumference, area, and volume using a variety of strategies.
- The learner will be able to (IMPORTANT) comprehend the measurable characteristics of objects and the units, systems, and processes of measurement.
- The learner will be able to (IMPORTANT) use various techniques to estimate length, perimeter, and circumference area, and volume.
- The learner will be able to (IMPORTANT) apply appropriate techniques, tools, and formulas to determine measurements.
- The learner will be able to (ESSENTIAL) solve problems involving scale factors using ratios and proportion.

Course Syllabus

Mathematics, Grade 7

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (IMPORTANT) create tables and graphs to illustrate rates of change.
- The learner will be able to (IMPORTANT) create strategies in order to find the surface area and volume of given prisms and cylinders.
- The learner will be able to (ESSENTIAL) choose and use methods and tools to accurately determine perimeter, area, volume, surface area and angle measures to suitable levels of precision.
- The learner will be able to (IMPORTANT) comprehend both metric and customary systems of measurement.
- The learner will be able to (IMPORTANT) convert units within the same measurement system.
- The learner will be able to (IMPORTANT) understand, choose, and apply units of suitable size and type to measure angles, perimeter, area, surface area, and volume.
- The learner will be able to (ESSENTIAL) solve problems involving time.
- The learner will be able to (ESSENTIAL) perform calculations with money.
- The learner will be able to (ESSENTIAL) determine the perimeter of a geometric figure.
- The learner will be able to (ESSENTIAL) calculate the area of a given figure.
- The learner will be able to (ESSENTIAL) apply scales in maps.
- The learner will be able to (ESSENTIAL) use scale drawings.
- The learner will be able to (ESSENTIAL) construct two- and three-dimensional scale models of common objects.
- The learner will be able to (ESSENTIAL) determine the degree of accuracy of a measurement.
- The learner will be able to (ESSENTIAL) determine precision of measurement.

Number and Operations

- The learner will be able to (ESSENTIAL) use the appropriate symbols to compare fractions, decimals, percents, and integers (i.e., $<$, $>$, $=$).
- The learner will be able to (ESSENTIAL) correctly perform various computations.
- The learner will be able to (ESSENTIAL) perform computations in the context of given problems.
- The learner will be able to (ESSENTIAL) analyze strategies for calculating with fractions, decimals, and integers.
- The learner will be able to (IMPORTANT) choose and apply suitable strategies and tools for calculating with whole numbers, fractions, decimals, percents, and integers in problem solving scenarios (e.g., mental computation, estimation, calculators, computers, paper and pencil).
- The learner will be able to (IMPORTANT) comprehend the meaning of the arithmetic operations on fractions and decimals.
- The learner will be able to (ESSENTIAL) determine divisibility.
- The learner will be able to (ESSENTIAL) use estimation in solving problems.
- The learner will be able to (ESSENTIAL) make estimations with money.
- The learner will be able to (IMPORTANT) solve problems, compute fluently, and make problems estimates.
- The learner will be able to (ESSENTIAL) comprehend the concepts of equivalent forms.
- The learner will be able to (ESSENTIAL) illustrate numbers in various equivalent forms (i.e., mixed numbers, fractions, decimals, percents, and integers).
- The learner will be able to (IMPORTANT) develop comprehension for perfect squares (e.g., 1,4,9,16).

Course Syllabus

Mathematics, Grade 7

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (IMPORTANT) apply exponential notation.
- The learner will be able to (ESSENTIAL) find factors.
- The learner will be able to (IMPORTANT) apply physical, pictorial, and symbolic representations of integers.
- The learner will be able to (ESSENTIAL) develop the concepts of opposites, reciprocals, and integers.
- The learner will be able to (IMPORTANT) understand and use the inverse relationship between addition and subtraction and between multiplication and division to simplify computations and obtain problem solutions.
- The learner will be able to (ESSENTIAL) identify when information is extraneous or missing.
- The learner will be able to (ESSENTIAL) model problem scenarios.
- The learner will be able to (ESSENTIAL) find multiples.
- The learner will be able to (IMPORTANT) associate whole numbers, fractions, decimals, percents, and integers on the number line.
- The learner will be able to (ESSENTIAL) develop a comprehension of the properties of numbers.
- The learner will be able to (IMPORTANT) understand numbers, ways of representing numbers, relationships among numbers, and number systems.
- The learner will be able to (ESSENTIAL) create meaning for percents greater than one hundred and less than one.
- The learner will be able to (ESSENTIAL) identify numbers.
- The learner will be able to (IMPORTANT) use number theory concepts to solve problems (e.g., divisibility, factors, multiples, composite numbers, prime factorization, relatively prime).
- The learner will be able to (IMPORTANT) apply models to illustrate meaning and effects of arithmetic operations on integers.
- The learner will be able to (IMPORTANT) understand the operations and how they relate to one another.
- The learner will be able to (ESSENTIAL) apply order of operations when computing with whole numbers (no more than two parentheses and no exponents).
- The learner will be able to (IMPORTANT) use the order of operations when computing with whole numbers, decimals, and fractions.
- The learner will be able to (ESSENTIAL) solve two-step real world problems involving whole numbers, fractions, decimals, and percents.
- The learner will be able to (ESSENTIAL) comprehend number patterns.
- The learner will be able to (ESSENTIAL) use number patterns.
- The learner will be able to (IMPORTANT) create techniques to solve problems involving proportions (e.g., scaling, finding equivalent ratios).
- The learner will be able to (ESSENTIAL) use proportional reasoning to solve story problems.
- The learner will be able to (IMPORTANT) identify place value.
- The learner will be able to (ESSENTIAL) understand the concept of place value.
- The learner will be able to (ESSENTIAL) identify prime numbers, multiples of prime numbers, and composite numbers.
- The learner will be able to (ESSENTIAL) obtain solutions to non-routine problems.
- The learner will be able to (IMPORTANT) use the associative and commutative properties of addition and multiplication to simplify calculations with integers, fractions, and decimals.

Course Syllabus

Mathematics, Grade 7

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (IMPORTANT) comprehend and apply ratios and proportions to illustrate quantitative relationships.
- The learner will be able to (ESSENTIAL) comprehend the concepts of ratio and/or proportion.
- The learner will be able to (ESSENTIAL) apply techniques to estimate the results of rational number calculations in real world scenarios.
- The learner will be able to (IMPORTANT) judge the reasonableness of rational number estimates or calculations.
- The learner will be able to (ESSENTIAL) read numbers.
- The learner will be able to (IMPORTANT) apply a variety of models to illustrate the relationships within the real number system (e.g., Venn diagrams, webs).
- The learner will be able to (ESSENTIAL) select a reasonable solution to a real-world division problem in which the remainder must be considered.
- The learner will be able to (ESSENTIAL) apply scientific notation.
- The learner will be able to (IMPORTANT) understand square roots.