

Course Syllabus

Mathematics, Grade 6

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 sixth grade (Level 16).

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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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by proving theorems with properties.

- The learner will be able to (ESSENTIAL) comprehend rules for algebra.
- The learner will be able to (IMPORTANT) analyze change in many different contexts.
- The learner will be able to (ESSENTIAL) select an equation that represents a given mathematical relationship.
- The learner will be able to (IMPORTANT) model algebraic expressions through manipulatives, technology, and pencil and paper.
- The learner will be able to (ESSENTIAL) evaluate an algebraic expression by substituting a given value for a variable.
- The learner will be able to (ESSENTIAL) apply function rules to complete tables.
- The learner will be able to (ESSENTIAL) comprehend rules for functions.
- The learner will be able to (ESSENTIAL) represent, analyze, and extend geometric and numerical patterns (SPI is extend only).
- The learner will be able to (ESSENTIAL) understand the concepts of inequalities.
- 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) comprehend the concepts of operation sense.
- The learner will be able to (ESSENTIAL) represent operations.
- The learner will be able to (ESSENTIAL) generalize patterns present in data by applying tables and graphs (SPI -tables only).
- The learner will be able to (IMPORTANT) apply graphs to model basic real world problems.

Course Syllabus

Mathematics, Grade 6

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (IMPORTANT) represent and 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) comprehend patterns, relations, and functions.
- The learner will be able to (IMPORTANT) find missing addends and factors represented as variables in basic equations.
- The learner will be able to (IMPORTANT) use symbols to illustrate mathematical statements and real world scenarios.
- The learner will be able to (ESSENTIAL) understand the basic concept of a variable as representing an unknown quantity.
- The learner will be able to (IMPORTANT) explain how a change in one variable can bring about a change in another variable.
- The learner will be able to (IMPORTANT) develop a beginning conceptual understanding of the various uses of variables.
- The learner will be able to (IMPORTANT) study many different illustrations of data and evaluate how accurately the data is shown by the graph.
- The learner will be able to (ESSENTIAL) form inferences from gathered data.
- The learner will be able to (IMPORTANT) comprehend how data collection techniques affect the nature of the data set.
- The learner will be able to (ESSENTIAL) understand and describe the relationship that exists between a data set and its graphical representation (i.e., bar graphs, circle, graphs, and stem-and-leaf-plots).
- The learner will be able to (ESSENTIAL) represent the likelihood of an event using a number from 0-1.
- The learner will be able to (IMPORTANT) formulate and test conjectures about the results of experiments and simulations.
- The learner will be able to (ESSENTIAL) interpret bar and line graphs to answer questions and solve real-world problems.
- The learner will be able to (ESSENTIAL) read a line graph.
- The learner will be able to (ESSENTIAL) determine the mean of a data set.
- The learner will be able to (ESSENTIAL) determine the median from a stem-and-leaf-plot.
- The learner will be able to (ESSENTIAL) determine the mode of a data set.
- The learner will be able to (IMPORTANT) determine all possible outcomes in basic probability activities.
- The learner will be able to (ESSENTIAL) identify the probability of a given situation.
- The learner will be able to (ESSENTIAL) make conjectures and predictions based on a given set of data (Learning Accomplishment includes "to formulate new questions for future studies").

Data Analysis and Probability

- The learner will be able to (ESSENTIAL) make interpretations of data displays.
- The learner will be able to (ESSENTIAL) read bar graphs.
- The learner will be able to (IMPORTANT) find, use, and interpret measures of center and spread (e.g., mean, median, mode, 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.

Course Syllabus

Mathematics, Grade 6

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (IMPORTANT) develop and evaluate inferences and predictions that are based on data.
- The learner will be able to (IMPORTANT) comprehend and apply the basic concept of probability.
- The learner will be able to (IMPORTANT) model scenarios by making up and completing experiments or simulations to determine probability.
- The learner will be able to (ESSENTIAL) obtain solutions to problems by applying data.
- The learner will be able to (IMPORTANT) create, interpret, and apply single bar graphs and single line graphs to answer questions and solve real world problems.
- The learner will be able to (ESSENTIAL) establish the biased or non-biased nature of a sample.
- The learner will be able to (IMPORTANT) describe the importance of sample size in investigations.
- The learner will be able to (IMPORTANT) select and use suitable statistical methods to analyze data.
- The learner will be able to (IMPORTANT) conduct a survey applying random sampling.
- The learner will be able to (ESSENTIAL) use a tree diagram or organized list to determine all possible outcomes of a simple compound event.
- The learner will be able to (ESSENTIAL) classify angles as acute, obtuse, right, or straight.
- The learner will be able to (ESSENTIAL) comprehend the concept of an angle.
- The learner will be able to (ESSENTIAL) classify two-dimensional figures using properties.
- The learner will be able to (ESSENTIAL) apply an understanding of the coordinate system.
- The learner will be able to (ESSENTIAL) use ordered pairs to describe given points in Quadrant 1 of a coordinate plane.
- The learner will be able to (ESSENTIAL) apply suitable mathematical language to identify characteristics of lines (e.g., parallel, perpendicular, intersecting).
- The learner will be able to (IMPORTANT) draw plane and solid geometric shapes with given properties (e.g., side lengths, angle measurement).
- The learner will be able to (ESSENTIAL) make comparisons and classifications of the properties of quadrilaterals.
- The learner will be able to (ESSENTIAL) use spatial reasoning skills.
- The learner will be able to (IMPORTANT) obtain solutions to real world problems by applying visualization and spatial reasoning.
- The learner will be able to (ESSENTIAL) connect two-dimensional and three-dimensional representations.
- The learner will be able to (IMPORTANT) describe similarity and congruence.
- The learner will be able to (IMPORTANT) analyze characteristics and properties of two-and three-dimensional geometric figures.
- The learner will be able to (ESSENTIAL) use spatial reasoning to identify the three-dimensional figure created from a two-dimensional representation (net) of that figure (i.e., cube, rectangular prism, pyramid, cone, or cylinder).

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, transformations, logic, and problem solving.

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Mathematics, Grade 6

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- 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 (IMPORTANT) explain line and rotational symmetry in plane figures.
- The learner will be able to (IMPORTANT) apply transformations and use symmetry to study mathematical situations.
- The learner will be able to (IMPORTANT) explain the motion or series of motions that are necessary to match two congruent shapes.
- The learner will be able to (ESSENTIAL) investigate, predict, and describe the results of transformations (i.e., rotations/turns, flips/reflections, slides/translations) of two-dimensional figures.
- The learner will be able to (ESSENTIAL) use the concepts, properties, and relationships of two-dimensional shapes.
- The learner will be able to (IMPORTANT) explain, classify, and comprehend the relationships among types of two-dimensional figures.
- The learner will be able to (IMPORTANT) recognize the need for precise measurements.
- The learner will be able to (ESSENTIAL) calculate the area of a given figure.
- The learner will be able to (ESSENTIAL) use the appropriate formula to calculate the area of parallelograms and triangles.
- The learner will be able to (ESSENTIAL) measure capacity.
- The learner will be able to (IMPORTANT) apply various manipulatives to create formulas to determine the circumference of a circle.
- The learner will be able to (ESSENTIAL) perform measurement conversions from one unit to another.
- The learner will be able to (ESSENTIAL) use strategies to estimate perimeter and area of rectangles.
- The learner will be able to (IMPORTANT) develop the formula for the area of trapezoids and circles by applying manipulatives.
- The learner will be able to (ESSENTIAL) make measurement estimations.
- The learner will be able to (IMPORTANT) use various techniques to estimate length, perimeter, circumference, area, and volume.
- 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) apply appropriate techniques, tools, and formulas to determine measurements.
- The learner will be able to (ESSENTIAL) perform calculations with money.
- The learner will be able to (ESSENTIAL) solve measurement problems using ratio and proportion.
- The learner will be able to (ESSENTIAL) solve real-world problems involving perimeter and area of rectangles.

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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Mathematics, Grade 6

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (ESSENTIAL) determine the distance between two points on the x- or y-axis in Quadrant 1.
- The learner will be able to (IMPORTANT) apply scales to read maps.
- 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 (IMPORTANT) explore the surface area and volume of given prisms and cylinders using models and manipulatives.
- The learner will be able to (ESSENTIAL) solve problems involving time.
- The learner will be able to (ESSENTIAL) use a ruler.
- The learner will be able to (IMPORTANT) comprehend the metric and customary systems of measurement.
- The learner will be able to (ESSENTIAL) comprehend the relationships between units and convert from one unit to another within the same system.
- The learner will be able to (ESSENTIAL) understand, choose, and apply units of suitable size and type to measure angles, perimeter, area, capacity, volume, and weight.
- The learner will be able to (IMPORTANT) apply techniques to estimate the results of real world calculations that involve whole numbers, fractions, and decimals in real world scenarios.
- The learner will be able to (ESSENTIAL) determine the reasonableness of computations and numerical estimations.
- The learner will be able to (IMPORTANT) choose and apply suitable strategies and tools for calculating with whole numbers, fractions, decimals, and percents in problem solving scenarios (e.g., mental computation, estimation, calculators, computers, paper and pencil).
- The learner will be able to (IMPORTANT) understand the meaning and effects of arithmetic operations on fractions and decimals.
- The learner will be able to (ESSENTIAL) determine divisibility.
- The learner will be able to (ESSENTIAL) comprehend the concepts of equivalent forms.
- The learner will be able to (ESSENTIAL) develop comprehension of equivalent number representations (i.e., whole numbers, mixed numbers, fractions, decimals, percents).
- The learner will be able to (IMPORTANT) identify when an approximation is more appropriate than an exact answer in various problem scenarios.
- The learner will be able to (ESSENTIAL) use estimation in solving problems.
- The learner will be able to (ESSENTIAL) use estimation to select a reasonable solution to a computation involving whole numbers, fractions and/or decimals.
- The learner will be able to (ESSENTIAL) read, write, and represent whole numbers in expanded notation.
- The learner will be able to (ESSENTIAL) conceptually understand expanded notation.

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.

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Mathematics, Grade 6

Jefferson County Schools Curriculum, Final
Jefferson County Schools

- The learner will be able to (ESSENTIAL) find factors.
- The learner will be able to (ESSENTIAL) develop an understanding of the concept of fractional parts.
- The learner will be able to (IMPORTANT) apply physical, pictorial, and symbolic representations of integers.
- The learner will be able to (IMPORTANT) develop comprehension for integers using real world connections.
- The learner will be able to (IMPORTANT) apply the inverse relationship between addition and subtraction to simplify computation and obtain problem solutions.
- The learner will be able to (ESSENTIAL) find multiples.
- The learner will be able to (ESSENTIAL) connect whole numbers, mixed numbers, fractions, and decimals to locations on the number line.
- 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 (IMPORTANT) understand numbers, ways of representing numbers, relationships among numbers, and number systems.
- The learner will be able to (IMPORTANT) 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 (ESSENTIAL) comprehend the concept of percent.
- The learner will be able to (IMPORTANT) develop number theory concepts (i.e., divisibility, factors, multiples).
- The learner will be able to (ESSENTIAL) solve real world, one-step problems which involve whole numbers and decimals (Learning Accomplishment includes fractions).
- The learner will be able to (IMPORTANT) understand 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 parentheses or exponents).
- The learner will be able to (IMPORTANT) use the order of operations when calculating with whole numbers and decimals.
- The learner will be able to (ESSENTIAL) find an element that is missing in a pattern.
- The learner will be able to (ESSENTIAL) understand rules for patterns.
- The learner will be able to (ESSENTIAL) identify the place value of a given digit.
- The learner will be able to (ESSENTIAL) demonstrate an understanding of prime and composite numbers.
- The learner will be able to (IMPORTANT) solve problems, compute fluently, and make reasonable estimates.
- 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.
- The learner will be able to (IMPORTANT) apply the distributive property to simplify computations with integers, fractions, and decimals.
- The learner will be able to (IMPORTANT) develop and use strategies to determine if two ratios form a proportion.
- The learner will be able to (ESSENTIAL) use proportional reasoning to solve story problems.
- The learner will be able to (IMPORTANT) apply various representations of ratios (e.g., 3 to 5, $3/5$, 3:5).

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Mathematics, Grade 6

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Jefferson County Schools

- The learner will be able to (IMPORTANT) develop comprehension for ratios using real world models and scenarios.
- The learner will be able to (ESSENTIAL) comprehend the concepts of ratio and/or proportion.
- The learner will be able to (IMPORTANT) judge the reasonableness of rational number estimates or computations.
- The learner will be able to (ESSENTIAL) connect ratios to a variety of models, real-world situations, and symbolic representations.
- The learner will be able to (ESSENTIAL) read numbers.
- 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) develop a strategy for solving a problem.
- The learner will be able to (ESSENTIAL) explain various strategies.