GRADE 6 MATH

Description

6th grade math offers a study of the four areas of mathematics. These include an emphasis on numerical relationships and their operations, including equivalent fractions, decimals, percents, and whole numbers (integers). Students will also work with data and use measures of central tendency to interpret and analyze appropriately selected graphs. Students will investigate spatial relationships, which include geometry and measurement. This course contains high-level instruction in order to prepare students for the CMT in mathematics in the spring of the school year.

Course Overview

Course Goals	Essential Questions	Assessments
Students should: • model and describe patterns and functional relationships. • use algebraic symbols to represent and interpret data in the real world. • use numbers and their properties to compute and reasonably estimate measures and quantities. • develop and apply units and formulas and use appropriate tools to estimate and measure. • use variety of numerical representations in the base ten system to describe quantitative relationships. • use spatial reasoning, location and geometric relationships to solve problems. • collect, organize and display data using appropriate graphical methods. • understand and apply basic concepts of probability. • analyze data to form hypotheses and make predictions. • model and analyze quantitative data.	• How do patterns and functions help us describe data and physical phenomena and solve a variety of problems? • How are quantitative relationships represented by numbers? • How do geometric relationships and measurements help us to solve problems and make sense of the world? • How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?	*Common Assessments* *Skill Assessments*

Content Outline	Standards	Grade Level Skills
I. Unit 1 - Algebriac Reasoning: Patterns and Functions II. Unit 2 - Numerical and Proportional Reasoning III. Unit 3 - Geometry and Measurement IV. Unit 4 - Working with Data: Probability and Statistics	State of Connecticut Math Curriculum Frameworks Connecticut State Standards are met in the following areas: • *Algebraic Reasoning: Patterns And Functions* • *Numerical and Proportional Reasoning* • *Geometry and Measurement* • *Working with Data: Probability and Statistics*	Students will: • Skills Matrix

Pacing Guide			
1st Marking Period	2nd Marking Period	3rd Marking Period	4th Marking Period
September October November	December January February	March April	May June
Unit 1 **Algebriac Reasoning: Patterns and Functions** 2.5 weeks	Unit 2 **Numerical and Proportional Reasoning** 16.5 weeks	Unit 3 **Geometry and Measurement** 8 weeks	Unit 4 **Working with Data: Probability and Statistics** 5 weeks

Unit 1 - Algebriac Reasoning: Patterns and Functions, 2.5 weeks **top**

Standards

Algebraic Reasoning: Patterns And Functions – Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools and technologies.

Students should understand and describe patterns and functional relationships.

    1.1a Students should identify relationships and make generalizations through the use of patterns.

Students should represent and analyze quantitative relationships in a variety of ways.

    1.2a Students should represent and analyze mathematical relationships with the help of tables, graphs, equations, and inequalities.

Students should use operations, properties, and algebraic symbols to determine equivalence and solve problems.

    1.3a Students should solve real world problems using algebraic methods.

    1.3b Students should demonstrate how to maintain equivalence in equations.

Unit Objectives

Students will be able to:

- model and describe patterns and functional relationships.
- use algebraic symbols to represent and interpret data in the real world.
- use numbers and their properties to compute and reasonably estimate measures and quantities.
- develop and apply units and formulas and use appropriate tools to estimate and measure.

Essential Question

- How do patterns and functions help us describe data and physical phenomena and solve a variety of problems?

Focus Questions

- How are algebraic expressions, equations, and inequalities related?
- How do table and graphs help analyze equations and inequalities?
- What is the rate of change between two variables, either constant or varying?
- How are relationships that are expressed in words, translated into algebraic expressions, equations and inequalities?

Assessment

- *Deep Sea Discoveries* - Using data involving sea depths and historical dates, students will analyze information found from ancient shipwrecks.

Skill Objectives

Students will:

- represent numerical situations with algebraic expressions, equations and inequalities.
- explore using variables as placeholders, to denote a pattern, to write a formula and to represent a function or relation.
- explore how codes are used to communicate information.
- use substitution to evaluate algebraic expressions and formulas.
- describe, extend and analyze numeric, geometric and statistical patterns and use them to identify trends and justify predictions.
- identify linear functions from tables, graphs or equations and use graphs to analyze the nature of changes in linear

		relationships.
		• solve simple linear equations using materials that model equivalence such as a balance or guess-and-check.
		• solve simple linear equations using order of operations and algebraic properties.
		• create and use tables, graphs, words, equations and inequalities to represent, analyze and describe relationships, with constant and varying rates of change.
		• build models of equivalent ratios and use proportions to solve problems. (For example, scale drawings, similar polygons, equivalent mixtures, probability and unit rates.)

Unit 2 – Numerical and Proportional Reasoning, 16.5 weeks top

Standards

Numerical and Proportional Reasoning – Quantitative relationships can be expressed numerically in multiple ways in order to make connections and simplify calculations using a variety of strategies, tools and technologies.

Students should understand that a variety of numerical representations can be used to describe quantitative relationships.

  2.1a Students should relate whole numbers, fractions, decimals and integers to number lines, scales, the coordinate plane and problem solving situations.

  2.1b Students should express place value patterns using exponents to write powers of ten.

  2.1c Students should interpret and connect fraction notation to division.

  2.1d Students should compare quantities and solve problems using ratios, rates, and percents.

Students should use numbers and their properties to compute flexibly and fluently, and to reasonably estimate measures and quantities.

  2.2a Students should solve problems using a variety of computational strategies including the use of calculators.

  2.2b Students should describe when products or quotients with fractions and decimals can yield a larger or smaller result that either factor.

Unit Objective	**Essential Question**	**Assessment**
Students will be able to: • use variety of numerical representations in the base ten system to describe quantitative relationships	• How are quantitative relationships represented by numbers? **Focus Questions** • How are the base ten number system and fractions, decimals, percents and ratios related? • How can modeling whole numbers, fractions, decimals and integers on a number line, scale or coordinate plane help solve a problem? • Which computational strategy would you use to solve a problem? • How can you find place value patterns by using exponents to write powers of ten? • How can you find a decimal by dividing numerator by the denominator? • Why are products/quotients sometimes smaller when you multiply or divide fractions and/or decimals? • How can you express a percent as part	• *Shop 'til you Drop* - Students will go on a family shopping trip to the grocery store. From a given price list, student will calculate the total bill keeping in mind that some items are taxable and others are not. **Skill Objectives** Students will: • locate, order and compare whole numbers and integers on number lines, scales and the coordinate grid. • use absolute value to represent distance between two points on a number line. • choose appropriate linear, area and set models and pictures of fractions, decimals, mixed numbers, and improper fractions to locate, label, order, compare, round, and estimate values on number lines, coordinate grids, scales and measuring tools. • explore magnitude of decimal values by comparing 0.1 and 0.01 more and less than a given number. • explain orally and in writing when a situation requires an exact answer or when an estimate is sufficient. • use estimation to predict reasonable answers and recognize and explain when an estimate will be more or less than an exact answer.

	of a hundred? • How can you use a ratio and rate to compare quantities?	• estimate and use a variety of computational strategies (mental computation, paper-and-pencil, and calculator) to add, subtract, multiply and divide multi-digit numbers in the context of multi-step word and practical problems. • use the order of operations and algebraic properties (associative, commutative, distributive, inverse operations and additive and multiplicative identities) to estimate and solve multi-step problems. • use factors of composite numbers, multiples of 10, 100 and 1000 and divisibility rules to estimate products and missing factors. • choose, construct and use a variety of models and pictures to estimate and demonstrate addition and subtraction of fractions, decimals and mixed numbers, and relate the models to the use of equivalent forms and common denominators. • estimate and use calculators to add, subtract and multiply fractions and decimals. • create and solve a variety of problems involving fractions, decimals, mixed numbers, money and simple percents. • explore place value patterns when multiplying and dividing decimals by 10, 100, 1000 and multiples of 10. • use models, number patterns and common factors to rewrite a rational number in its equivalent fraction, decimal, ratio and percent forms and as powers of ten. • compare large numbers using expanded forms and powers of ten. • develop, describe and use a variety of ways to estimate and calculate with large numbers and connect the strategies to powers of ten. • use models and common factors to identify equivalent fractions and decimals. • use models to explore the definition of division with decimals, fractions and mixed numbers. • write and round division problems in fraction form to estimate an answer to a division problem. • construct and use models and the distributive property to estimate reasonable answers and multiply fractions, decimals, mixed numbers and percents. • recognize that multiplication by a unit fraction is equivalent to dividing by the fraction's denominator. • interpret finding a fractional part of a set as a two-step division

		- use models, number patterns and the distributive property to estimate and find the percent of an amount. - use benchmarks and number patterns to estimate and find percents. - use ratios and proportions to calculate simple rate conversions. - build models of equivalent ratios and use proportions to solve problems. (For example, scale drawings, similar polygons, equivalent mixtures, probability and unit rates.)

Unit 3 - Geometry and Measurement, 8 weeks top

Standards

Geometry and Measurement – Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools and technologies.

Students should use properties and characteristics of two- and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas and solve problems.

   3.1a Students should classify polygons according to their properties.

   3.1b Students should examine the relationships between the measures of area of 2-dimensonal objects and volumes of 3-dimensional objects.

Students should use spatial reasoning, location and geometric relationships to solve problems.

   3.2a Students should construct similar polygons on coordinate grids.

Students should develop and apply units, systems, formulas and appropriate tools to estimate and measure.

   3.3a Students should solve problems involving measurement through the use of a variety of tools, techniques and strategies.

   3.3b Students should use specific ratios to convert between measures of length, area, volume, mass, and capacity in the customary and metric systems.

Unit Objectives	Essential Question	Assessment
Students will be able to: • develop and apply units and formulas and use appropriate tools to estimate and measure. • use spatial reasoning, location and geometric relationships to solve problems.	• How do geometric relationships and measurements help us to solve problems and make sense of the world? **Focus Questions** • How does the metric system relate to the powers of ten and ratios with multiples of ten? • How does the formula of a rectangle support the formula for the areas of triangles, parallelograms, trapezoids and circles? • How can problems involving measurement be solved through the use of appropriate tools, techniques and strategies?	• *The Great Cover –up* - Students are on a building committee for school and they are allowed to choose the carpet for the all purpose room. Students will need to choose between two carpet prices and work within a given budget. **Skill Objectives** Students will: • explore the different ratios used to convert between units of length, area and volume in the customary system. Recognize and use powers of ten as conversion ratios in the metric system. • explore similarity of polygons and the effect of dilations (a reduction or enlargement) on changes of perimeter and area. • use the relationships of sides and angles to classify sets and subsets of polygons. • estimate and measure angles based on rotation about a point. Locate points on a circular coordinate system. Build and use angle measurement tools such as: a protractor, and ruler.

		- make and test conjectures about side and angle relationships and congruence. - use the rectangle as a basic shape to model and develop formulas for the area of triangles, parallelograms, trapezoids and circles. - explore symmetry on rectangular and circular coordinate grids. - explore the relationship of radius, diameter, circumference and area of the circle. Approximate the value of pi. - choose among nonstandard and standard referents to estimate length, area, volume, mass and angle measures. - develop and use strategies to determine the volume of rectangular solids and cylinders. - select and use appropriate units, strategies and tools to estimate, measure and solve problems involving length, perimeter, area, volume, capacity, weight, mass, temperature, and angles. - use different ratios to convert between units of length, area and volume in the customary and metric system. - recognize and use powers of ten as conversion ratios in the metric system.

Unit 4 - Working with Data: Probability and Statistics, 5 weeks <u>top</u>

Standards
Working with Data: Probability and Statistics – Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.
Students should collect, organize and display data using appropriate statistical and graphical methods.
  4.1a Students should display and compare sets of data using various systematic or graphical representations.
Students should analyze data sets to form hypotheses and make predictions.
  4.2a Students should describe the shape of data sets using the measures of spread and central tendency.
Students should understand and apply basic concepts of probability.
  4.3a Students should understand that probabilities are more reliable to use as predictors when there is a large number of trials.
  4.3b Students should express probability, using various numerical representations.

Unit Objectives
Students will be able to:
- collect, organize and display data using appropriate graphical methods.
- understand and apply basic concepts of probability.
- analyze data to form hypotheses and make predictions.
- model and analyze quantitative data.

Essential Question
- How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

Focus Questions
- How can sets of data be displayed using various graphical representations?
- How can measures of central tendency be used to describe sets of data?
- How can probability be expressed?
- How can probability be used to predict outcomes?

Assessment
- *And Now a Word from our Sponsor...* - Utilizing statistics involving television viewer habits, students will compare and contrast data between various gender and age categories. They will report their findings by creating their own graphs.

Skill Objectives
Students will:
- select and use appropriate graphical representations including histograms, double bar graphs, back-to-back stem-and leaf plots and scatter plots.
- make conjectures, design simulations and samplings. Organize, display, and analyze the data appropriately.
- recognize and describe patterns and trends in data from tables and graphs. Make and defend predictions based on those patterns and trends
- construct circle graphs and recognize that they represent data proportionally.
- solve problems involving the organization of data, including sorting by multiple attributes.
- use systematic listing and counting strategies, including simple combinations and permutations, to solve problems.
- describe the shape of data sets using measures of spread (range and outliers) and central tendency (mode, median

		and mean). • recognize that changes in a data set can affect the mode, median, mean and range. • identify the effect the number of trials has on predicting outcomes over the long run. • design and conduct probability experiments and make predictions about outcomes that are equally likely or not equally likely. • express probabilities as fractions, ratios, decimals and percents.