

Connecticut State Department of Education

Mathematics Curriculum Framework

Middle School – Grades 6-8

Essential Questions

Algebraic Reasoning: Patterns And Functions

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

Numerical and Proportional Reasoning

How are quantitative relationships represented by numbers?

Geometry and Measurement

How do geometric relationships and measurements help us to solve problems and make sense of our world?

Working with Data: Probability and Statistics

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

Math Standards

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

1.1 Students should understand and describe patterns and functional relationships.

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

Students should analyze physical phenomena and patterns to identify relationships and make generalizations.

Students should analyze physical phenomena, functions and patterns to identify relationships and make generalizations.

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

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

Students should describe the effects of characteristics of mathematical relationships on the way the relationships are represented.

Students should describe the effects of characteristics of linear relationships on the way the relationships are represented verbally and in tables, graphs and equations.

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

Students should solve real- world problems using algebraic methods.

Students should demonstrate how to maintain equivalence in equations.

Students should solve problems using a variety of algebraic methods.

Students should maintain equivalence in equations to determine solutions.

Students should solve problems using various algebraic methods and properties.

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.

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

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

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

Students should interpret and connect fraction notation to division.

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

Students should represent real-world situations and solutions to problems using the appropriate symbolic form (fractions, decimals or percents).

Students should understand the use of scientific notation as related to powers of ten as an efficient method for writing and comparing very large numbers.

Students should use percents to make comparisons between groups of unequal size.

Students should compare and order integers, powers and roots using number lines and grids.

Students should extend the understanding of scientific notation to very small numbers.

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

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

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

Students should extend the operations of addition, subtraction, multiplication and division to negative numbers.

Students should solve problems involving fractions, decimals, ratios and percents.

Students should make generalizations about operations with very large and very small numbers.

Students should connect the exponential growth and decay models to repeated multiplication by the same factor.

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

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

Students should classify polygons according to their properties.

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

Students should describe and classify polygons according to their transformational properties.

Students should explore the relationships among sides, angles, perimeters, areas, surface areas and volumes of congruent and similar polygons and solids.

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

Students should construct similar polygons on coordinate grids.

Students should understand how 3-dimensional objects can be represented in 2 dimensions using base plans (footprints), orthogonal views, nets and isometric drawings.

Students should model geometric relationships in a variety of ways.

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

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

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

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

Students should use a variety of concrete methods, including displacement, to find volumes of solids.

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

Working with Data: Probability and Statistics – Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

4.1 Students should collect, organize and display data using appropriate statistical and graphical methods.

Students should display and compare sets of data using various systematic or graphical representations.

Students should select the appropriate visual representation of data based on the kind of data collected and the purpose for their use.

Students should construct appropriate representations of data based on the size and kind of data set and the purpose for their use.

4.2 Students should analyze data sets to form hypotheses and make predictions.

Students should describe the shape of data sets using the measures of spread and central tendency.

Students should understand that measures of central tendency and spread can be used to describe data sets and justify conclusions.

Students should make and evaluate statistical claims and justify conclusions with evidence.

4.3 Students should understand and apply basic concepts of probability.

Students should understand that probabilities are more reliable to use as predictors when there is a large number of trials.

Students should express probability using various numerical representations.

Students should compare and determine experimental and theoretical probabilities.

Students should determine possible outcomes using a variety of counting techniques.