

CURRICULUM

GUIDE

Math – Grade 6

Providence
Schools

QUARTER I

Content students have to learn

Processes students will learn and use

Unit 1.1 – Using Factors and Multiples (8 days)

- Understand relationships among factors, multiples, divisors, and products.
- Recognize and use properties of prime and composite numbers, even and odd numbers, and square numbers.
- Develop strategies for finding factors and multiples, least common multiples, and greatest common factors.
- Develop a variety of strategies for solving problems, such as building models, making lists and tables, drawing diagrams, and solving simpler problems.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Use and create representations to solve problems and organize thoughts and ideas.
- » Connect new mathematical ideas to those already studied and build upon them.
- » Connect understandings of mathematical concepts to real-world applications.

Unit 1.2 – Prime Factorization and Exponents (6 days)

- Develop a systematic strategy for finding prime factorizations.
- Understand that a number may have several different factorizations and that each whole number greater than 1 has exactly one factorization into a product of prime numbers (fundamental theorem of arithmetic).
- Develop strategies for using prime factorization to determine common multiples and factors.
- Understand how to order and compare numbers with whole number bases and whole number exponents.

- » Use mathematical symbols and notation.
- » Use and create representations to solve problems and organize thoughts and ideas.
- » Connect new mathematical ideas to those already studied and build upon them.
- » Explain in oral and written form the relationships among various mathematical concepts (e.g., the relationship between exponentiation and multiplication).

Unit 1.3 – Understanding and Representing Fractions (7 days)

- Understand how physical models (fraction strips) can be used to represent, compare, and order fractions.
- Understand and use equivalent fractions to reason about situations.
- Develop meaningful strategies for representing fraction amounts larger than 1 as both mixed numbers and improper fractions.
- Develop strategies for comparing and ordering fractions (including fractions greater than 1) without models.
- Develop benchmarking strategies that can be used to order and compare fractions along a number line.

- » Articulate ideas clearly and logically in both written and oral form.
- » Present, share, explain, and justify thinking with others.
- » Build upon the ideas of others to solve problems.
- » Use mathematical symbols and notation.
- » Use models to develop equivalent representations of the same mathematical concept.
- » Connect new mathematical ideas to those already studied and build upon them.

Unit 1.4 – Converting Between Fractions, Decimals, and Percents (9 days)

- Understand how physical models (hundredths strips and hundredths grids) and number lines can be used to represent, compare, and order decimals and percents.
- Understand ways to compare, order, and convert rational numbers across number formats.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Articulate ideas clearly and logically in both written and oral form.

QUARTER I

Content students have to learn

Processes students will learn and use

- Develop benchmarking strategies that can be used to order and compare rational numbers and to solve problems involving rational numbers.

Unit 1.5 – Symmetries, Polygons, and Angles (7 days)

- Understand how geometric properties can be used to classify triangles and quadrilaterals.
 - Investigate the symmetries of a shape—rotation, reflection, and translation.
 - Develop strategies for estimating angle measures using reference to a right angle and other benchmark angles.
 - Understand when precision in measurement is important.
- » Use models and technology to develop equivalent representations of the same mathematical concept.
 - » Connect new mathematical ideas to those already studied and build upon them.
- » Apply mathematical reasoning skills in other disciplines.
 - » Articulate ideas clearly and logically in both written and oral form.
 - » Understand that many real-world applications require an understanding of mathematical concepts (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon).
 - » Explain in oral and written form the relationships among various mathematical concepts.

Content students have to learn

Processes students will learn and use

**Unit 2.1 – Adding and Subtracting Fractions
(9 days)**

- Understand how to use benchmarks and other strategies to estimate the reasonableness of results of operations with fractions.
- Develop models to represent sums and differences of fractions.
- Apply number properties in problem-solving situations that require the adding and subtracting of fractions.
- Develop algorithms for adding and subtracting fractions.
- Understand when to apply addition and subtraction of fractions in problem-solving situations.
- Understand how to represent the inverse relationship between addition and subtraction of fractions by generating fact families.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.
- » Apply mathematical reasoning skills in other disciplines.
- » Use mathematical symbols and notation.
- » Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model.
- » Connect new mathematical ideas to those already studied and build upon them.

**Unit 2.2 – Multiplying with Fractions
(7 days)**

- Develop and use strategies and models for multiplying combinations of fractions, whole numbers, and mixed numbers to solve problems.
- Understand the effect of multiplying a given number by a whole number, fraction, or mixed number.
- Understand when multiplication is an appropriate operation in problem-solving situations.
- Understand how the multiplicative identity applies to fractions.
- Explore the relationships among two numbers and their product.
- Develop and use an efficient algorithm for fraction multiplication in problem solving.

- » Connect new mathematical ideas to those already studied and build upon them.
- » Connect understandings of mathematical concepts to real-world applications (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon).
- » Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model.
- » Use models and technology to develop equivalent representations of the same mathematical concept.
- » Use mathematical symbols and notation.

**Unit 2.3 – Dividing with Fractions
(6 days)**

- Develop and use strategies and models for dividing combinations of fractions, whole numbers, and mixed numbers to solve problems.
- Understand the effect of dividing a given number by a whole number, fraction, or mixed number.
- Understand when division is an appropriate operation in problem-solving situations that involve fractions.
- Understand how the reciprocal is used in fraction division.
- Explore the relationships among two numbers and their quotient.
- Explore the inverse of operations of multiplication and division.

- » Connect new mathematical ideas to those already studied and build upon them.
- » Understand that many real-world applications require an understanding of mathematical concepts (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon).
- » Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model.
- » Use models and technology to develop equivalent representations of the same mathematical concept.
- » Use mathematical symbols and notation.

Content students have to learn

Processes students will learn and use

**Unit 2.4 – Area and Perimeter of Quadrilaterals
(6 days)**

- Understand how area is related to covering a figure and perimeter is related to surrounding a figure.
- Develop strategies for finding areas and perimeters of rectangles and irregular figures.
- Develop formulas and procedures, stated in words and/or symbols, for finding areas and perimeters of rectangles.
- Explore situations in which measuring perimeter or area will help answer practical questions.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems.
- » Use models and technology to develop equivalent representations of the same mathematical concept.
- » Connect new mathematical ideas to those already studied and build upon them.

Unit 2.5 – Area and Perimeter of Triangles and Other Polygons (8 days)

- Develop strategies for finding areas and perimeters of triangles and parallelograms.
- Develop formulas and procedures, stated in words and/or symbols, for finding areas and perimeters of triangles and parallelograms.
- Explore situations in which measuring perimeter or area will help answer practical questions.
- Understand how to solve problems involving scale factor and its effect on linear dimensions in polygons and circles.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems.
- » Use models and technology to develop equivalent representations of the same mathematical concept.
- » Connect new mathematical ideas to those already studied and build upon them.

**Unit 2.6 – Circle Measures and 3-D Geometry
(7 days)**

- Develop strategies for finding areas and circumferences of circles.
- Develop formulas and procedures, stated in words and/or symbols, for finding areas and circumferences of circles.
- Understand the relationship among circumference, radius, and diameter in circles.
- Understand the properties and attributes of three-dimensional shapes.
- Build conceptual knowledge of volume by using models and formulas.
- Understand the relationship between the area of the base of a rectangular prism and the volume of that prism.

- » Use models and technology to develop equivalent representations of the same mathematical concept.
- » Use and create representations to solve problems and organize thoughts and ideas.
- » Connect new mathematical ideas to those already studied and build upon them.
- » Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model.
- » Use mathematical symbols and notation.

QUARTER 3

Content students have to learn

Processes students will learn and use

Unit 3.1 – Adding and Subtracting Decimals (6 days)

- Understand how to use benchmarks and other strategies to estimate the reasonableness of results of operations with decimals.
- Develop models to represent sums and differences of decimals.
- Apply number properties in problem-solving situations that require the adding and subtracting of decimals.
- Develop algorithms for adding and subtracting decimals.
- Understand when to apply addition and subtraction of decimals in problem-solving situations.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Articulate ideas clearly and logically in both written and oral form.
- » Use mathematical symbols and notation.
- » Formulate generalizations about operations with rational numbers.
- » Connect new mathematical ideas to those already studied and build upon them.
- » Explain in oral and written form the relationships among various mathematical concepts.

Unit 3.2 – Multiplying Decimals (8 days)

- Develop and use strategies and models for multiplying decimals to solve problems.
- Understand the effect of multiplying a given number by a whole number or decimal.
- Understand when multiplication is an appropriate operation in problem-solving situations.
- Explore the relationships between two numbers and their product.
- Develop and use an efficient algorithm for decimal multiplication in problem-solving situations.
- Develop strategies for estimating the relative size of a decimal product prior to finding an exact answer.

- » Formulate, test, and justify mathematical conjectures and arguments.
- » Construct and determine the validity of a mathematical argument or a solution.
- » Articulate ideas clearly and logically in both written and oral form.
- » Connect new mathematical ideas to those already studied and build upon them.
- » Explain in oral and written form the relationships among various mathematical concepts.

Unit 3.3 – Dividing Decimals (7 days)

- Develop and use strategies and models for dividing decimals to solve problems.
- Understand the effect of dividing a given number by a whole number or decimal.
- Understand when division is an appropriate operation in problem-solving situations.
- Explore the relationships between two numbers and their quotient.
- Develop and use an efficient algorithm for decimal division in problem-solving situations.
- Develop strategies for estimating the relative size of a decimal quotient prior to finding an exact answer.
- Understand how to predict the decimal form of a rational number (terminating or repeating).

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Articulate ideas clearly and logically in both written and oral form.
- » Use mathematical symbols and notation.
- » Formulate generalizations about operations with rational numbers.
- » Connect new mathematical ideas to those already studied and build upon them.
- » Explain in oral and written form the relationships among various mathematical concepts.

QUARTER 3

Content students have to learn

Processes students will learn and use

Unit 3.4 – Experimental and Theoretical Probabilities (9 days)

- Understand the differences between experimental and theoretical probability.
- Explore ways to test predictions through experimentation in problem-solving situations.
- Develop strategies for finding experimental and theoretical probabilities for both one- and two-stage events.
- Understand what it means for an event to have equally likely outcomes.
- Develop strategies for finding sample space in probability problem solving.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.
- » Understand that many real-world applications require an understanding of mathematical concepts.

Unit 3.5 – Making Decisions with Probability (7 days)

- Develop strategies for finding both experimental and theoretical probabilities for a variety of contexts and problem-solving situations.
- Develop strategies for analyzing probability situations and for using probability to make decisions in problem-solving situations.
- Understand and apply the fundamental counting principle in order to solve problems.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems.

Unit 3.6 – Ratios and Algebraic Reasoning (8 days)

- Develop understanding of ratios and rates by representing relationships described in problem-solving situations through verbal descriptions, algebraic rules, tables, and graphs.
- Develop strategies and procedures for identifying, representing, and extending patterns.
- Write rules with words and symbols that can be used to answer questions or find specific cases for linear and nonlinear relationships.

- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Use mathematical symbols and notation.
- » Use models to develop equivalent representations of the same mathematical concept.
- » Use and create representations to solve problems and organize thoughts and ideas.
- » Convert between representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).
- » Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model.

QUARTER 4

Content students have to learn

Processes students will learn and use

Unit 4.1 – Linear Relationships (8 days)

- Develop understandings of linear relationships and constant rate of change.
- Explore ways that linear relationships occur in the real world through problem solving.
- Develop strategies for representing linear relationships with tables, graphs, and equations.
- Develop strategies for solving equations with models and with symbols.

- » Connect new mathematical ideas to those already studied and build upon them.
- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Apply mathematical reasoning skills in other disciplines.
- » Use mathematical symbols and notation.
- » Use models and technology to develop equivalent representations of the same mathematical concept.
- » Use and create representations to solve problems and organize thoughts and ideas.
- » Convert between representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).

Unit 4.2 – Organizing and Interpreting Data (8 days)

- Interpret representations of data.
- Develop strategies for analyzing patterns and trends in distributions in order to solve problems.
- Understand ways to organize and display data.
- Develop strategies for testing hypotheses using data collection and data analysis.

- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Formulate, test, and justify mathematical conjectures and arguments.

Unit 4.3 – Using Graphs to Explore Data, Measures of Central Tendency, and Range (6 days)

- Interpret representations of data.
- Develop strategies for analyzing patterns and trends in distributions in order to solve problems.
- Understand that the mean represents a balance point in the data.
- Organize and display data.
- Develop strategies for testing hypotheses using data collection and data analysis.

- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Formulate, test, and justify mathematical conjectures and arguments.

Content students have to learn

Processes students will learn and use

**Unit 4.4 – Extending the Number System: Integers
(5 days)**

- Understand integers as extensions of the number system.
- Develop strategies for ordering and comparing integers.
- Explore number line and chip model representations of integer addition and subtraction.
- Use models to add and subtract integers in problem-solving situations.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.
- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Articulate ideas clearly and logically in both written and oral form.
- » Use models and technology to develop equivalent representations of the same mathematical concept.
- » Use representations to solve problems and organize thoughts and ideas.

**Unit 4.5 – Adding and Subtracting Integers
(7 days)**

- Develop and use algorithms for adding and subtracting integers.
- Understand strategies for modeling addition and subtraction of integers using distance/direction on a number line and a chip model.
- Understand that the commutative property holds for addition of rational numbers but not for subtraction of rational numbers.
- Understand and use the relationship between addition and subtraction to simplify computations.
- Understand how integers can be used in graphing contexts involving all four quadrants.
- Solve problems involving integer addition and subtractions.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.
- » Construct and determine the validity of a mathematical argument or a solution.
- » Apply mathematical reasoning skills in other disciplines.
- » Articulate ideas clearly and logically in both written and oral form.
- » Use mathematical symbols and notation.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.
- » Use models and technology to develop equivalent representations of the same mathematical concept.

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Schools

797 Westminster Street
Providence, RI 02903

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