

CURRICULUM

GUIDE

Math – Grade 7

Providence
Schools

QUARTER I

Content students have to learn

Processes students will learn and use

Unit 1.1 – Adding and Subtracting Integers (5 days)

- Understand how to order and compare integers.
- Develop and use algorithms for adding and subtracting integers.
- Model addition and subtraction of integers using distance/direction on a number line and a chip model.
- Observe that the commutative property holds for addition of rational numbers but not for subtraction of rational numbers.
- Understand and apply the relationship between addition and subtraction to simplify computations.
- Recognize and solve problems involving addition and subtraction of integers.
- Extend and apply coordinate graphing to all four quadrants.

- » 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.
- » 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.

Unit 1.2 – Integer Operations and Properties of Operations (9 days)

- Use a number line/motion model to develop the relationship between repeated addition and multiplication with integers.
- Develop and use algorithms for multiplying and dividing integers.
- Examine number patterns to confirm the algorithm for multiplication.
- Explore division of integers using the relationship between multiplication and division found in fact families.
- Develop skill at multiplying and dividing integers in order to solve problems.
- Understand and apply properties of numbers, field properties, and order of operations, particularly as related to integer operations.

- » 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 – Variables, Tables, and Coordinate Graphs (8 days)

- Understand patterns and relationships as represented in tables and graphs.
- Develop methods for representing relationships using tables, graphs, and verbal descriptions.
- Develop an informal understanding of slope and constant rate of change.
- Explore and understand the limitations of various representations of relationships.
- Develop strategies for setting up coordinate graphs—scale, independent and dependent variables, etc.

- » 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 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.

Unit 1.4 – Analyzing Graphs and Tables (5 days)

- Understand relationships involving both constant and varying rates of change as represented in tables, graphs, and verbal descriptions.
- Develop strategies for using patterns in data to make predictions about values between and beyond given data values.
- Collect, organize, and display data in a coordinate graph in order to solve problems and study relationships.

- » Articulate ideas clearly and logically in both written and oral form.
- » Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems.
- » Use and create representations to solve problems and organize thoughts and ideas.
- » Convert among representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).

QUARTER I

Content students have to learn

Processes students will learn and use

Unit 1.5 – Rules and Equations (5 days)

- Develop an understanding of how to write equations to represent relationships between variables.
 - Describe how a linear pattern of change shows up in a table, a graph, or an equation.
 - Use tables, graphs, and equations to answer questions and solve problems.
 - Understand how change in one variable relates to change in another variable for linear relationships.
 - Understand how to translate a problem situation into an algebraic expression or equation.
- » Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems.
 - » 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 among representations (e.g., a table of values, an equation, and a graph may all be representations of the same function).
 - » 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).

Content students have to learn

Processes students will learn and use

**Unit 2.1 – Enlarging and Reducing Shapes
(4 days)**

- Develop an initial understanding of mathematical similarity.
- Compare approximate measurements of corresponding parts in similar figures.
- Determine which features of similar figures are different and which are the same.
- Make accurate comparisons of measurements of similar figures.

- » 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.
- » Use and create representations to solve problems and organize thoughts and ideas.

**Unit 2.2 – Similar Figures
(5 days)**

- Understand the use of algebraic rules to produce similar figures and translations on a coordinate grid.
- Contrast similar figures with nonsimilar figures.
- Develop more formal understandings of the concept of similarity, including the vocabulary of scale factor.
- Understand the relationships of angles, side lengths, perimeters, and areas of similar polygons.
- Understand what types of transformations of a figure will result in a congruent figure.

- » 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.
- » Use and create representations to solve problems and organize thoughts and ideas.

**Unit 2.3 – Similar Polygons
(7 days)**

- Understand how scaling in similar figures affects the areas of polygons.
- Connect the ratio of the areas of two similar figures to the scale factor.
- Generalize the relationship between scale factor and area.
- Explore how to find missing measures in similar figures using scale factor.
- Understand reflections and rotations in the coordinate plane.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- » Connect new mathematical ideas to those already studied and build upon them.

**Unit 2.4 – Geometry: Angle Relationships
(6 days)**

- Explore and understand the patterns among angles created when two or more parallel lines are cut by another line.
- Develop a more sophisticated understanding of parallel lines and parallelograms.
- Determine relationships between the number of sides and the angle sum of a regular polygon.
- Decide whether any three side lengths will make a triangle.
- Understand that the sum of two side lengths of a triangle must be greater than the third side length.

- » Formulate, test, and justify mathematical conjectures and arguments.
- » Construct and determine the validity of a mathematical argument or a solution.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.
- » Explain in oral and written form the relationships among various mathematical concepts (e.g., the relationship between exponentiation and multiplication).

QUARTER 2

Content students have to learn

Processes students will learn and use

Unit 2.5 – Making Comparisons (7 days)

- Develop strategies for presenting quantitative comparisons of information.
- Develop strategies for making judgments and choices when given comparative statements about quantities.
- Analyze and create comparison statements from given data.
- Formalize understandings of rational numbers, rates, and percents by reasoning proportionally in problem-solving contexts.
- Understand how equivalent ratios can be used to make more sophisticated comparisons in order to answer questions and solve problems.

- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Construct and determine the validity of a mathematical argument or a solution.
- » Articulate ideas clearly and logically in both written and oral form.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.
- » 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.

Unit 2.6 – Comparing and Scaling Rates (6 days)

- Examine and connect the idea of unit rates to what students already know about ratios and linear relationships.
- Further develop understanding of unit rates and how to compute and interpret them.
- Introduce and formalize the meaning of unit rate and computation strategies for computing unit rates.
- Relate unit rate to the slope of the line representing the equation of the underlying relationship.
- Understand what it means to divide in rate situations.

- » Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- » 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 (e.g., the relationship between exponentiation and multiplication).

Unit 2.7 – Making Sense of Proportions (6 days)

- Set up and solve proportions that arise in a variety of contexts—similarity, rates, percents, comparisons.
- Develop strategies, such as the use of ratios and scaling up or scaling down (finding equivalent ratios), to find the missing value in a proportion.
- Develop insight and flexibility in choosing strategies for solving problems requiring proportional reasoning.

- » Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- » Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.
- » Use and create representations to solve problems and organize thoughts and ideas.
- » Connect new mathematical ideas to those already studied and build upon them.

Unit 2.8 – Tax, Tips, and Discounts (5 days)

- Explore strategies for solving problems involving tax, tips, and discounts.
- Understand the relationships among tax, tip, and total bill in restaurant situations.
- Understand ways that mental computation and rounding are commonly used in computing tips.
- Explore how different types of discounts—for example, percent off vs. \$10 off—affect the final cost of an item.
- Use percents to solve problems in a variety of contexts.

- » Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- » 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 (e.g., the relationship between exponentiation and multiplication).

Content students have to learn

Processes students will learn and use

Unit 3.1 – Exploring Linear Relationships with Tables and Graphs (12 days)

- Understand the patterns of change between the independent and dependent variables for linear relationships.
- Explore how change in the value of one variable relates to change in the value of a second variable.
- Understand connections among representations of linear relationships (tables, graphs, equations) by identifying rate of change and intercepts.
- Translate information about linear relations given in a table, a graph, or an equation to one of the other forms.
- Write equations for linear relationships and describe what information the variables and numbers in the equations represent.

- » 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 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).
- » 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.

Unit 3.2 – Solving Equations (6 days)

- Understand how points on a line are related to the solutions to the algebraic rule representing that line.
- Investigate strategies for solving equations with tables and graphs.
- Investigate strategies for solving equations using models and symbols.
- Understand the connections between solutions in graphs and tables and the solutions of equations.
- Understand how the properties of equality are used to solve equations.
- Solve equations using a variety of strategies in problem-solving contexts.

- » Articulate ideas clearly and logically in both written and oral form.
- » Use mathematical symbols and notation.
- » 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).
- » 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.

Unit 3.3 – Exploring Slope (5 days)

- Explore the concept of slope as the ratio of vertical change to horizontal change between two points on a line or ratio of rise over run.
- Understand the connection between slope and rate of change.
- Understand how to determine slope from a variety of representations—tables, graphs, two given points, etc.
- Explore patterns among lines that have the same slope (parallel lines) or that have slopes that are negative reciprocals of each other (perpendicular lines).

- » Articulate ideas clearly and logically in both written and oral form.
- » Use mathematical symbols and notation.
- » 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).
- » 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).

QUARTER 3

Content students have to learn

Processes students will learn and use

Unit 3.4 – Exponent Applications (5 days)

- Understand how the area of a square and its side length are related.
- Use the relationship between side length and area of a square to develop a working definition of square root.
- Use perfect squares to develop techniques for estimating square roots to the nearest whole number.
- Develop an understanding of scientific notation as a method for representing very large and very small numbers.

- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Use mathematical symbols and notation.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

Unit 3.5 – Surface Area and Volume (10 days)

- Review area of polygons.
- Understand how to find the area of circles.
- Understand how nets relate to the surface area of a prism.
- Understand the relationship between the dimensions of a rectangular prism and its surface area and volume.
- Develop a strategy for finding the surface area of a rectangular prism.
- Connect the dimensions of a rectangular prism to its volume and surface area.
- Understand that prisms can be filled systematically in identical layers and that this layering leads to the formula for volume.
- Develop a formula for finding the volume of a rectangular prism.

- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » 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.
- » Use mathematical symbols and notation.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.
- » 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)

Content students have to learn

Processes students will learn and use

**Unit 4.1 – Surface Area and Volume of Prisms and Cylinders
(8 days)**

- Develop understanding of volume and surface area of prisms.
- Develop a strategy for finding the volume of a cylinder using its dimensions.
- Connect this strategy to the idea of layers in rectangular and other prisms.
- Develop a strategy for finding the surface area of a cylinder.
- Apply understanding of volume to solve problems.
- Understand that a variety of different threedimensional figures can have the same volume but different surface areas.

- » Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- » 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.
- » Formulate, test, and justify mathematical conjectures and arguments; 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 4.2 – Experimental and Theoretical Probability
(6 days)**

- Review, understand, and apply basic probability concepts, such as fair game, experimental probability, theoretical probability, and fraction notation for expressing probabilities.
- Apply counting techniques to determine the number of possible outcomes in probability situations.
- Understand uses of experimental and theoretical probability in problem-solving situations.
- Understand how payoff is considered in determining the fairness of a game.

- » 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.
- » Construct and determine the validity of a mathematical argument or a solution.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.
- » 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).

**Unit 4.3 – Finding Probabilities Using Area Models
(5 days)**

- Explore how an area model can be used to analyze the theoretical probabilities for twostage outcomes.
- Explore ways to simulate and analyze probability situations involving two-stage outcomes.
- Distinguish between equally likely and nonequally likely outcomes by collecting data and analyzing experimental probabilities.
- Continue to use counting techniques to count the number of outcomes in probability situations.
- Understand strategies for comparing experimental and theoretical probability.

- » 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 and create representations to solve problems and organize thoughts and ideas.
- » 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).

QUARTER 4

Content students have to learn

Processes students will learn and use

Unit 4.4 – Probability and Counting Techniques (8 days)

- Understand the difference between the probability of an outcome and the long-term average of many trials in a situation with a payoff.
- Explore ways to determine the expected value in a probability situation.
- Use probability to make predictions and use simulations to test them.
- Use counting techniques and the Fundamental Counting Principal in problem-solving situations.

Unit 4.5 – Making Sense of Measures of Center (Mean and Median) (6 days)

- Understand and interpret bar graphs and line plots in order to make predictions and justify conclusions.
- Understand how measures of central tendency (mean, median, mode), spread, and dispersion can be used to analyze data.
- Collect, organize, display, and interpret data.
- Understand how to make and use hypotheses about data sets.

Unit 4.6 – Comparing Distributions: Equal Numbers of Data Values (10 days)

- Understand and interpret bar graphs, line plots, and circle graphs to make predictions and justify conclusions.
- Understand how measures of central tendency (mean, median, mode), spread, and dispersion can be used to analyze data.
- Collect, organize, display, and interpret data.
- Understand how to make and test hypotheses about data sets.
- Develop and use strategies for comparing equal-sized data sets to solve problems.

- » Connect new mathematical ideas to those already studied and build upon them.
- » Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems.
- » Use mathematical symbols and notation.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

- » Use problem-solving strategies appropriately and effectively for a given situation.
- » Determine, collect, and organize the relevant information needed to solve real-world problems.
- » Formulate, test, and justify mathematical conjectures and arguments.
- » Articulate ideas clearly and logically in both written and oral form.
- » Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

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