

**Chambersburg Area School District Mathematic Curriculum
Advanced 6th Grade**

Grade 6 mathematics is about (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
 4. Model with mathematics.
 5. Use appropriate tools strategically.
 6. Attend to precision.
 7. Look for and make use of structure.
8. Look for and makes sense of regularity in repeated reasoning.

Unit of Study	Unit 1: Ratios and Unit Rates (6th U1)	
Time Frame/Pacing	26 Days	
Big Ideas	Mathematical relationships among numbers can be represented, compared, and communicated.	
Unit Essential Questions	- How is mathematics used to quantify, compare, represent, and model numbers? - How can mathematics support effective communication?	
PA Core Standards		PA Assessment Anchors
CC.2.1.6.D.1		M06.A-R.1
PA Eligible Content	M06. A-R.1.1.1 Use ratio language and notation (such as 3 to 4, 3:4, 3/4) to describe a ratio relationship between two quantities. Example 1: “The ratio of girls to boys in a math class is 2:3, because for every 2 girls there are 3 boys.” Example 2: “For every five vote’s candidate A received, candidate B received four votes.	
	M06.A-R.1.1.2 Find the unit rate a/b associated with a ratio $a: b$ (with $b \neq 0$), and use rate language in the context of a ratio relationship. Example 1: “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar.” Example 2: “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.	
	M06.A-R.1.1.3 Construct tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and/or plot the pairs of values on the coordinate plane. Use tables to compare ratios.	
	M06.A-R.1.1.4 Solve unit rate problems including those involving unit pricing and constant speed. Example: If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?	

	M06.A-R.1.1.5 Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.												
Learning Objectives (Concepts Taught)	Students will be introduced to concepts of ratio and rate. Students develop fluidity in using multiple forms of ratio language and ratio notation. They construct viable arguments and communicate reasoning about ratio equivalence as they solve ratio problems in real-world contexts. Students will gain an understanding of equivalent ratios as ratios having the same value.												
Performance Objectives (Skills Demonstrated)	• Develop an understand of what a ratio is and the three different ways to write a ratio. • Students will build ratio tables and study their additive and multiplicative structure in order to solve ratio problems. • Students will be able represent equivalent ratios. • Students will understand the differences and similarities between a ratio and rate. • Students will be able to represent scenarios and solve problems (unit pricing, constant speed and constant rate of work) using unit rate. • Students are introduced to percent and find percent of a quantity as a rate per 100.												
Key Vocabulary:	<table> <tr> <td>Distance</td><td>Rate</td></tr> <tr> <td>Equivalent Ratios</td><td>Ratio Relationship</td></tr> <tr> <td>Measurement of a Quantity</td><td>Type of Quantity</td></tr> <tr> <td>Percent</td><td>Unit of Measurement</td></tr> <tr> <td>Percent of a Number</td><td>Unit Rate</td></tr> <tr> <td>Quantity</td><td>Value of a Ratio</td></tr> </table>	Distance	Rate	Equivalent Ratios	Ratio Relationship	Measurement of a Quantity	Type of Quantity	Percent	Unit of Measurement	Percent of a Number	Unit Rate	Quantity	Value of a Ratio
Distance	Rate												
Equivalent Ratios	Ratio Relationship												
Measurement of a Quantity	Type of Quantity												
Percent	Unit of Measurement												
Percent of a Number	Unit Rate												
Quantity	Value of a Ratio												
Assessments	Mid-Module Assessment End of Module Assessment												
Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 1 Topic A Representing and Reasoning About Ratios Lessons 1-2: Ratios Lessons 3-4: Equivalent Ratios Lessons 5-6: Solving Problems by Finding Equivalent Ratios Lesson 7: Associated Ratios and the Value of a Ratio Lesson 8: Equivalent Ratios Defined Through the Value of a Ratio Module 1 Topic B Collections of Equivalent Ratios Lesson 9: Table of Equivalent Ratios Lesson 10: The Structure of Ratio Tables - Additive and Multiplicative Lesson 11: Comparing Ratios Using Ratio Tables Lesson 12: From Ratio Tables to Double Number Line Diagrams Lesson 13: From Ratio Tables to Equations using the Value of a Ratio Lesson 14: From Ratio Tables, Equations, & Double # Line Diagrams to Plots on the Coordinate Plane Lesson 15: A Synthesis of Representations of Equivalent Ratio Collections Module 1 Topic C Unit Rates Lesson 16: From Ratios to Rates Lesson 17: From Rates to Ratios Lesson 18: Finding a Rate by Dividing Two Quantities Lessons 19-20: Comparison Shopping - Unit Price and Related Measurement Conversions Lessons 21-22: Getting the Job Done - Speed, Work, Measurement Units Lesson 23: Problem-Solving Using Rates, Unit Rates, and Conversions Module 1 Topic D Percent Lesson 24: Percent and Rates per 100 Lesson 25: A Fraction as a Percent Lesson 26: Percent of a Quantity Lessons 27-29: Solving Percent Problems (see notes below) Complete example 1 from Lesson 27, and have students complete two of the five columns in the exercise. From there, move into the Example from Lesson 28, and have students complete three of the six rows in the Exercise. Finally, have students complete the Exploratory Challenge 2 from Lesson 29. Additional Supplemental Resources PTi3 Unit 5 Cycle 1 Unit 6 Cycles 1 & 2												

	ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8	
Authentic Examples (real-world tasks)	Dan Meyers 3 Act Math Finals Week Partial Product Nana's Paint Mix Up Neptune Split Time Leaky Faucet Nana's Chocolate Milk Coke vs. Sprite	Super Bear Shower vs. Bath Speed of Light Print Jobs Graham Fletcher 3 Act Math The Clapper Rope Jumper Estimation 180 3 Act Math Candle Eyes
Visual Representations & Strategies	Tape Diagrams Double Number Lines Ratio Tables Coordinate Plane	
Writing in Math	Common Assessment: Grade 6 2018 Item Sampler #17	
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks	

Unit of Study	Unit 2: Arithmetic Operations Including Division of Fractions (6th U2)	
Time Frame/Pacing	18 Days	
Big Ideas	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	
Unit Essential Questions	- What does it mean to estimate or analyze numerical quantities? - When is it appropriate to estimate versus calculate? - What makes a tool and/or strategy appropriate for a given task?	
PA Core Standards		PA Assessment Anchors
CC.2.1.6.E.1 CC.2.1.6.E.2 CC.2.1.6.E.3		M06.A-N.1 M06.A-N.2
PA Eligible Content	M06.A-N.1.1.1 Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions. Example 1: Given a story context for $(2/3) \div (3/4)$, explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = (a/b) \times (d/c) = ad/bc$.) Example 2: How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi? Example 3: How many $2\frac{1}{4}$-foot pieces can be cut from a $15\frac{1}{2}$-foot board? M06.A-N.2.1.1 Solve problems involving operations (+, −, ×, ÷) with whole numbers, decimals (through thousandths), straight computation or word problems. M06.A-N.2.2.1 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. M06.A-N.2.2.2 Apply the distributive property to express a sum of two whole numbers, 1 through 100, with a common factor as a multiple of a sum of two whole numbers with no common factor. Example: Express $36 + 8$ as $4(9 + 2)$.	
Learning Objectives (Concepts Taught)	Students use their existing understanding of the four operations to add, subtract, multiply and divide decimals. Students study the division of whole numbers and fractions. Students will use these ideas to solve real-world problems. Students look for and uncover patterns while modeling quotients of fractions to ultimately discover the relationship between multiplication and division. Using this relationship, students create equations and formulas to represent and solve problems. Later in the module, students learn the direct correlation of division of fractions to division of decimals along with the application of this concept. They use estimation to justify their answers. Within decimal multiplication, students begin to practice the distributive property.	
Performance Objectives (Skills Demonstrated)	- Operations with decimals - Dividing whole numbers and fractions - Determine the GCF - Determine the LCM	
Key Vocabulary:	Factor Greatest Common Factor Least Common Multiple Multiple Multiplicative Inverse	
Assessments	Mid-Module Assessment End of Module Assessment	

Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 2 Topic A Dividing Fractions by Fractions Lesson 1: Interpreting Division of a Fraction by a Whole Number - Visual Models Lesson 2: Interpreting Division of a Whole Number by a Fraction - Visual Models Lessons 3-4: Interpreting and Computing Division of a Fraction by a Fraction - More Models Lesson 5: Creating Division Stories Lesson 6: More Division Stories Lesson 7: The Relationship Between Visual Fractions Models and Equations Lesson 8: Dividing Fractions and Mixed Numbers Module 2 Topic B Multi-Digit Decimal Operations - Adding, Subtracting, and Multiplying Lesson 9: Sums and Differences of Decimals Lesson 10: The Distributive Property and the Products of Decimals Lesson 11: Fraction Multiplication and the Products of Decimals Module 2 Topic C Dividing Whole Numbers and Decimals Lesson 12: Estimating Digits in a Quotient Lesson 13: Dividing Multi-Digit Numbers Using the Algorithm Lesson 14: The Division Algorithm - Converting Decimal Division into Whole # Division Using Fractions Lesson 15: The Division Algorithm - Converting Decimal Division into Whole # Division Using Mental Math Module 2 Topic D Number Theory - Thinking Logically About Multiplicative Arithmetic Lessons 16-17 Even and Odd Numbers & Divisibility Tests for 3 and 9 Lesson 18: Least Common Multiple and Greatest Common Factor Lesson 19: The Euclidean Algorithm as an Application of the Long Division Algorithm ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8 Additional Supplemental Resources PTi3 Unit 2 Cycles 1 & 2 Unit 3 Cycle 3
Authentic Examples (real-world tasks)	2018 Item Sampler #6 Dan Meyers 3 Act Math Nana's Lemonade Shipping Routes G Fletcher 3 Act Math Kool-Aid Kid The Apple Geared Up Estimation 180 3 Act Math Dot & Line
Visual Representations & Strategies	Counters Fraction Tiles Tape Diagrams Area Models
Writing in Math	Common Assessment: End-of-Module Assessment, Question #3a, b, and c
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks

Unit of Study	Unit 3: Rational Numbers (6th U3)	
Time Frame/Pacing	23 Days	
Big Ideas	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	
Unit Essential Questions	• What does it mean to estimate or analyze numerical quantities? • When is it appropriate to estimate versus calculate? • What makes a tool and/or strategy appropriate for a given task?	
PA Core Standards		PA Assessment Anchors
CC.2.1.6.E.4		M06.A-N.3
PA Eligible Content	M06.A-N.3.1.1 Represent quantities in real world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge). M06.A-N.3.1.2 Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., $-(-3) = 3$, and that 0 is its own opposite). M06.A-N.3.1.3 Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane. M06.A-N.3.2.1 Write, interprets, and explains statements of order for rational numbers in real world contexts. Example: Write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C. M06.A-N.3.2.2 Interpret the absolute value of a rational number as its distance from 0 on the number line and as a magnitude for a positive or negative quantity in a real-world situation. Example: For an account balance of -30 dollars, write $-30 = 30$ to describe the size of the debt in dollars, and recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars. M06.A-N.3.2.3 Solve real-world and mathematical problems by plotting points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	
Learning Objectives (Concepts Taught)	Students will extend on their prior knowledge of the number line (both horizontally and vertically) to include the opposites of whole numbers. The number line serves as a model to relate integers and other rational numbers to statements of order in real-world contexts. The number line model is extended to two-dimensions as students use the coordinate plane to model and solve real-world problems involving rational numbers.	
Performance Objectives (Skills Demonstrated)	• Students will focus on the number line to the left of zero. • Students will represent numbers and the opposites. • Students apply the understanding of numbers placed on a number line to order rational numbers. Students will be able to describe the relationship between rational numbers in real-world situations with respect to a number’s position on the number line. • Students will interpret absolute value and apply the understanding in order to interpret absolute value as magnitude for a positive or negative quantity. • Students extend their understanding of ordering rational numbers in one dimension (on a number line) to the two-dimensional space of the coordinate plane. They will construct the plane’s vertical and horizontal axes, discovering the relationship between the four quadrants and the signs of the coordinates that lie in each quadrant.	
Key Vocabulary:	Absolute Value	Positive Number

	Comparing Coordinate Plane Horizontal Number line Integer Negative Number Opposite Origin	Quadrant Rational Number X-axis X-coordinate Vertical Number line Y-axis Y- coordinate
Assessments	Mid-Module Assessment End of Module Assessment	
Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 3 Topic A Understanding Positive and Negative Numbers on the Number Line Lesson 1: Positive and Negative Numbers on the Number Line - Opposite Direction and Value Lessons 2-3: Real-World Positive and Negative Numbers and Zero Lesson 4: The Opposite of a Number Lesson 5: The Opposite of a Number's Opposite Lesson 6: Rational Numbers on the Number Line Module 3 Topic B Order and Absolute Value Lessons 7-8: Ordering Integers and Other Rational Numbers (notes for L8: consider reserving the opening exercise and exercise 1 for fluency review in later lessons) Lesson 9: Comparing Integers and Other Rational Numbers Lesson 10: Writing and Interpreting Inequality Statements Involving Rational Numbers Lesson 11: Absolute Value - Magnitude and Distance Lesson 12: Relationship Between Absolute Value and Order Lesson 13: Statements of Order in the Real World Module 3 Topic C Rational Numbers and the Coordinate Plane Lesson 14: Ordered Pairs Lesson 15: Locating Ordered Pairs on the Coordinate Plane Lesson 16: Symmetry in the Coordinate Plane Lesson 17: Drawing the Coordinate Plane and Points on the Plane Lesson 18: Distance on the Coordinate Plane Lesson 19: Problem Solving and the Coordinate Plane ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8 Additional Supplemental Resources PTi3 Unit 4 Cycles 1 & 2	
Authentic Examples (real-world tasks)	2018 Item Sampler #3	
Visual Representations & Strategies	Horizontal and Vertical Number Lines Coordinate Plane	
Writing in Math	Common Assessment: End-of-Module Assessment, Question #2a, b, c, and d	
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks	

Unit of Study	Unit 4: Expressions and Equations (6th U4)	
Time Frame/Pacing	36 Days	
Big Ideas	Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Patterns exhibit relationships that can be extended, described, and generalized.	
Unit Essential Questions	• How are relationships represented mathematically? • How can expressions, equations, and inequalities be used to quantify, solve, model and/or analyze mathematical situations? • How can data be organized and represented to provide insight into the relationship between quantities? • How can patterns be used to describe relationships in mathematical situations? • How can recognizing repetition or regularity assist in solving problems more efficiently?	
PA Core Standards		PA Assessment Anchors
CC.2.2.6.B.1 CC.2.2.6.B.2 CC.2.2.6.B.3		M06.B-E.1 M06.B-E.2 M06.B-E.3
PA Eligible Content	M06.B-E.1.1.1 Write and evaluate numerical expressions involving whole-number exponents. M06.B-E.1.1.2 Write algebraic expressions from verbal descriptions. Example: Express the description “five less than twice a number” as $2y - 5$. M06.B-E.1.1.3 Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity). Example: Describe the expression $2(8 + 7)$ as a product of two factors. M06.B-E.1.1.4 Evaluate expressions at specific values of their variables, including expressions that arise from formulas used in real-world problems. Example: Evaluate the expression $b^2 - 5$ when $b = 4$. M06.B-E.1.1.5 Apply the properties of operations to generate equivalent expressions. Example 1: Apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$. Example 2: Apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$. Example 3: Apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$. M06.B-E.2.1.1 Use substitution to determine whether a given number in a specified set makes an equation or inequality true. M06.B-E.2.1.2 Write algebraic expressions to represent real-world or mathematical problems. M06.B-E.2.1.3 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all non-negative rational numbers.	

	M06.B-E.2.1.4 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem and/or represent solutions of such inequalities on number lines. M06.B-E.3.1.1 Write an equation to express the relationship between the dependent and independent variables. Example: In a problem involving motion at a constant speed of 65 units, write the equation $d = 65t$ to represent the relationship between distance and time. M06.B-E.3.1.2 Analyze the relationship between the dependent and independent variables using graphs and tables, and/or relate these to an equation.	
Learning Objectives (Concepts Taught)	Students extend their arithmetic work to include using letters to represent numbers. Students understand that letters are simply “stand-ins” for numbers and that arithmetic is carried out exactly as it is with numbers. Students explore operations in terms of verbal expressions and determine that arithmetic properties hold true with expressions because nothing has changed—they are still doing arithmetic with numbers. Students determine that letters are used to represent specific but unknown numbers and are used to make statements or identities that are true for all numbers or a range of numbers. Students will use this knowledge to write expressions, equivalent expressions, equations and inequalities. Then, they will learn to solve expressions and equations algebraically, using a table and graphing on a coordinate plane. Finally, students will learn that inequalities can have multiple solution and they will represent inequalities on number line.	
Performance Objectives (Skills Demonstrated)	• Write and evaluate numerical expressions involving whole-number exponents. • Write, read, and evaluate expressions in which letters stand for numbers. • Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. • Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. • Apply the properties of operations to generate equivalent. • Identify when two expressions are equivalent • Reason about and solve one-variable equations and inequalities. • Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. • Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set • Solve real-world and mathematical problems by writing and solving equations • Write an inequality to represent a constraint or condition in a real-world authentic problem. • Use variables to represent two quantities in a real-world problem that change in relationship to one another.	
Key Vocabulary:	Additive Inverse Algebraic Expression Base Coefficient Dependent Variable Distributive Property Equations Exponent Exponential Form Equation Equivalent Expressions Exponential Notation for Whole Independent Variable	Number Exponents Expression Linear Expression Number Sentence Numerical Expression Order of Operations Solution of an Equation Standard Form Term Truth Values of a Number Sentence Value of a Numerical Expression Variable
Assessments	Mid-Module Assessment End of Module Assessment	

Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 4 Topic A Relationships of the Operations Lesson 1: The Relationship of Addition and Subtraction Lesson 2: The Relationship of Multiplication and Division Lesson 3: The Relationship of Multiplication and Addition Lesson 4: The Relationship of Division and Subtraction Module 4 Topic B Special Notations of Operations Lesson 5: Exponents Lesson 6: The Order of Operations Module 4 Topic C Replacing Letters with Numbers Lesson 7: Replacing Letters with Numbers Lesson 8: Replacing Numbers with Letters Module 4 Topic D Expanding, Factoring, and Distributing Expressions Lesson 9: Writing Addition and Subtraction Expressions Lesson 10: Writing and Expanding Multiplication Expressions Lesson 11: Factoring Expressions Lesson 12: Distributing Expressions Lessons 13-14: Writing Division Expressions (note for L13 & 14: complete exs 1-3, then move into ex 1 from L14. Have students complete the exercises, exit ticket, and problem set from L14.) Module 4 Topic E Expressing Operations in Algebraic Form Lesson 15: Read Expressions in Which Letters Stand for Numbers Lessons 16-17: Write Expressions in Which Letters Stand for Numbers (note for L17: consider reserving the station activity from L17 for use as a fluency activity later) Module 4 Topic F Writing and Evaluating Expressions and Formulas Lesson 18: Writing and Evaluating Expressions - Addition and Subtraction Lesson 19: Substituting to Evaluate Addition and Subtraction Expressions Lesson 20: Writing and Evaluating Expressions - Multiplication and Division Lesson 21: Writing and Evaluating Expressions - Multiplication and Addition Lesson 22: Writing and Evaluating Expressions - Exponents Module 4 Topic G Solving Equations Lessons 23-24: True and False Number Sentences Lesson 25: Finding Solutions to Make Equations True Lesson 26: One-Step Equations - Addition and Subtraction Lesson 27: One-Step Equations - Multiplication and Division Lesson 29: Multi-step Problems - All Operations Module 4 Topic H Applications of Equations Lesson 30: One-Step Problems in the Real World Lesson 31: Problems in Mathematical Terms Lesson 32: Multi-Step Problems in the Real World Lesson 33: From Equations to Inequalities Lesson 34 Writing and Graphing Inequalities in Real-World Problems ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8 Additional Supplemental Resources PTi3 Unit 7 Cycles 1, 2, & 3 Unit 8 Cycles 1 & 2 Unit 9 Cycles 1, 2, & 3 Unit 10, Cycle 1 Unit 11, Cycle 1
Authentic Examples (real-world tasks)	2018 Item Sampler #7, 8, 9 Estimation 180 3 Act Math Woody's Raise Inequalities

Visual Representations & Strategies	Bar Model Geometric Figures Protractor
Writing in Math	Common Assessment: End-of-Module Assessment, Question #4a and b
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks

Unit of Study		Unit 5: Area, Surface Area, and Volume Problems (6th U5)	
Time Frame/Pacing		19 Days	
Big Ideas		Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	
Unit Essential Questions		- How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? - How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? - How can geometric properties and theorems be used to describe, model, and analyze situations?	
PA Core Standards		PA Assessment Anchors	
CC.2.3.6.A.1			
PA Eligible Content		M06.C-G.1.1.1 Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided. M06.C-G.1.1.2 Find the area of irregular or compound polygons. Example: Find the area of a room in the shape of an irregular polygon by composing and/or decomposing. M06.C-G.1.1.3 Determine the volume of right rectangular prisms with fractional edge lengths. Formulas will be provided. M06.C-G.1.1.4 Given coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals). Formulas will be provided. M06.C-G.1.1.5 Represent three-dimensional figures using nets made up of rectangles and triangles. M06.C-G.1.1.6 Determine the surface area of triangular and rectangular prisms (including cubes). Formulas will be provided.	
Learning Objectives (Concepts Taught)		Students will utilize their previous experiences in shape composition and decomposition in order to understand and develop formulas for area, volume, and surface area. They will use composition and decomposition to determine the area of triangles, quadrilaterals, and other polygons. Using prior knowledge about using coordinate planes students will, find edge lengths of polygons (the distance between two vertices using absolute value) and draw polygons given coordinates. From these drawings students will determine the area of polygons.	
Performance Objectives (Skills Demonstrated)		- Determine the area of rectangles, squares, parallelograms, trapezoids and triangles. - Determine the area of complex figures by composing or decomposing the figures. - Determine the lengths and area of shapes when plotted on a coordinate plane. - Determine the volume of rectangular prisms with fractional edges. - Determine the surface area of rectangular and triangular prisms.	
Key Vocabulary:		Altitude and Base of a Triangle Area Cube Hexagon Irregular Figures Line Perpendicular to a Plane Net Parallelogram	Right Rectangular Prism Square Square Pyramid Surface Area Surface of a Prism Trapezoid Triangular Region

	Parallel Planes Pentagon Rectangles	Triangular Prism Triangular Pyramid Volume
Assessments	Mid-Module Assessment End of Module Assessment	
Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 5 Topic A Area of Triangles, Quadrilaterals, and Polygons Lesson 1: The Area of Parallelograms Through Rectangle Facts Lesson 2: The Area of Right Triangles Lesson 3: The Area of Acute Triangles Using Height and Base Lesson 4: The Area of All Triangles Using Height and Base Lessons 5-6: The Area of Polygons through Composition and Decomposition Module 5 Topic B Polygons on the Coordinate Plane Lesson 7: Distance on the Coordinate Plane Lesson 8: Drawing Polygons in the Coordinate Plane Lessons 9-10: Determining Perimeter, Area, and Distance on the Coordinate Plane Module 5 Topic C Volume of Right Rectangular Prisms Lesson 11: Volume with Fractional Edge Lengths and Unit Cubes Lesson 12: From unit Cubes to the Formulas for Volume Lessons 13-14: Using the Formulas for Volume Module 5 Topic D Nets and Surface Area Lessons 15-16: Representing and Constructing 3-Dimensional Figures Using Nets Lesson 17: From Nets to Surface Area Lesson 18: Determining Surface Area of Three-Dimensional Figures Lesson 19: Surface Area and Volume in the Real World ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8 Additional Supplemental Resources PTi3 Unit 12 Cycle 2 Unit 13 Cycles 1 & 2	
Authentic Examples (real-world tasks)	Amusement Park Project 2018 Item Sampler #11	Dan Meyers 3 Act Math Bubble Wrap Girl Scout Cookies Dandy Candies
Visual Representations & Strategies	Coordinate Planes Nets Prisms Rulers	
Writing in Math	Common Assessment: End-of-Module Assessment, Question #6a and b	
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks	

Unit of Study	Unit 6: Statistics (6th U6)	
Time Frame/Pacing	25 Days	
Big Ideas	Data can be modeled and used to make inferences.	
Unit Essential Questions	- How does the type of data influence the choice of display? - How can probability and data analysis be used to make predictions?	
PA Core Standards		PA Assessment Anchors
CC.2.4.6.B.1		M06.D-S.1
PA Eligible Content	M06.D-S.1.1.1 Display numerical data in plots on a number line, including dot plots, histograms, and box-and-whisker plots. M06.D-S.1.1.2 Determine quantitative measures of center (e.g., median, mean, and/or mode) and variability (e.g., range, interquartile range and/or mean absolute deviation). M06.D-S.1.1.3 Describe any overall pattern and any deviations from the overall pattern with reference to the context in which the data were gathered. M06.D-S.1.1.4 Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	
Learning Objectives (Concepts Taught)	Students move from simply representing data into analyzing data. They will summarize numerical data in relation to their concept and shape of distribution.	
Performance Objectives (Skills Demonstrated)	- Students will recognize a statistical question as one that can be answered by collecting data - Students learn that the data collected to answer a statistical question have a distribution that is often summarized in terms of center, variability, and shape - See and represent data distributions using dot plots, histograms and box-and-whisker plots - Describing the distribution by shape: Symmetrical or Skewed - Students will determine the measures of center and variability by finding the: mean, median, mode, range, interquartile range, absolute deviation, mean absolute deviation	
Key Vocabulary:	Absolute Deviation Box Plot (PA Core uses box-and-whisker plots) Dot Plot (PA Core uses line plots) Frequency Frequency Table Histogram Interquartile Range (IQR) Mean Mode Range	Mean Absolute Deviation (MAD) Median Outliers Quartiles Relative Frequency Relative Frequency Histogram Relative Frequency Table Statistical Question Variability
Assessments	Mid-Module Assessment End of Module Assessment	
Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 6 Topic A Understanding Distributions Lesson 1: Posing Statistical Questions Lesson 2: Displaying a Data Distribution Lesson 3: Creating a Dot Plot Lesson 4: Creating a Histogram Lesson 5: Describing a Distribution Displaved in a Histogram	

	Module 6 Topic B Summarizing a Distribution That is Approximately Symmetric Using the Mean and MAD Lesson 6: Describing the Center of a Distribution Using the Mean Lesson 7: The Mean as a Balance Point Lesson 8: Variability in a Data Distribution Lesson 9: The Mean Absolute Deviation (MAD) Lessons 10-11: Describing Distributions Using the Mean and MAD Module 6 Topic C Summarizing a Distribution That Is Skewed Using the Mean and the Interquartile Range Lesson 12: Describing the Center of a Distribution Using the Median Lesson 13: Describing Variability Using the Interquartile Range (IQR) Lesson 14: Summarizing a Distribution Using a Box Plot Lesson 16: Understanding Box Plots Module 6 Topic D Summarizing and Describing Distributions Lesson 18: Connecting Graphical Representations and Numerical Summaries Lesson 19: Comparing Data Distributions Lesson 20: Describing Center, Variability, & Shape of a Data Distribution from a Graphical Representation ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8 Additional Supplemental Resources PTi3 Units 14 & 15
Authentic Examples (real-world tasks)	2018 Item Sampler #14, 15, 16
Visual Representations & Strategies	Dot Plots Histograms Box Plots
Writing in Math	Common Assessment: End-of-Module Assessment, Question #1a, b, c, d, and e
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks

Unit of Study	Unit 7: Ratios & Proportional Relationships (7th U1)	
Time Frame/Pacing	27 days	
Big Ideas	- Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. - Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.	
Unit Essential Questions	- How are relationships represented mathematically? - How can expressions, equations, and inequalities be used to quantify, solve, model and/or analyze mathematical situations? - How can data be organized to provide insight into the relationship between quantities?	
PA Core Standards		PA Assessment Anchors
7.RP.A.1 = CC.2.1.7.D.1 7.RP.A.2 = CC.2.1.7.D.1 7.RP.A.3 = CC.2.1.7.D.1 7.EE.B.4 = CC.2.2.7.B.3 7.G.A.1 = CC.2.3.7.A.1		M07.A-R.1 M07.B-E.2 M07.C-G.2
PA Eligible Content	M07.A-R.1.1.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. Example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction $\frac{1}{2} \div \frac{1}{4}$ miles per hour, equivalently 2 miles per hour. M07.A-R.1.1.2 Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin). M07.A-R.1.1.3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. M07.A-R.1.1.5 Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r), where r is the unit rate. M07.C-G.1.1.1 Solve problems involving scale drawings of geometric figures, including finding length and area.	
Learning Objectives (Concepts Taught)	In Module 1, students build on their Grade 6 experiences with ratios, unit rates, and fraction division to analyze proportional relationships. They decide whether two quantities are in a proportional relationship, identify constants of proportionality, and represent the relationship by equations.	

Performance Objectives (Skills Demonstrated)	- Identify proportional relationships - Relate equivalent ratios to the constant of proportionality - Represent proportional relationships with equations ($y = kx$), ratio tables, graphs and scale drawings - Compute unit rates for ratios and rates - Identify and use scale factor	
Key Vocabulary:	Constant of Proportionality Unit Rate One-to-One Correspondence Between Two Figures in the Plane (Transformation) Proportional Relationship Proportional To Scale Drawing	Scale Factor rate slope independent variables dependent variables pattern
Assessments	Mid-Module Assessment Task 7.RP.A.2, CC.2.1.7.D.1 End-of-Module Assessment Task 7.RP.A.1, 7.RP.A.2, 7.RP.A.3, 7.EE.B.4a, 7.G.A.1, CC.2.1.7.D.1, CC.2.2.7.B.3, CC.2.3.7.A.1	
Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 1 Topic A Proportional Relationships Lesson 1: An Experience in Relationships as Measuring Rate Lesson 2: Proportional Relationships Lessons 3 & 4: Identifying Proportional & Non-proportional Relationships in Tables Lessons 5 & 6: Identifying Proportional & Non-proportional Relationships in Graphs Module 1 Topic B Unit Rate and the Constant of Proportionality Lesson 7: Unit Rate as the Constant of Proportionality Lessons 8 & 9: Representing Proportional Relationships with Equations Lesson 10: Interpreting Graphs of Proportional Relationships (use as assessment?) Module 1 Topic C Ratios and Rates Involving Fractions Lesson 11: Ratios of Fractions and Their Unit Rates Lesson 14: Multi-Step Ratio Problems Lesson 15: Equations of Graphs of Proportional Relationships involving Fractions Module 1 Topic D Ratios of Scale Drawings Lesson 16: Relating Scale Drawings to Ratios and Rates Lesson 17: The Rate as the Scale Factor Lesson 18: Computing Actual Lengths from a Scale Drawing Lesson 19: Computing Actual Areas from a Scale Drawing ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8 Additional Supplemental Resources Big Ideas Math Chapter 5 PTi3 Units 4 & 5	
Authentic Examples (real-world tasks)	2018 Item Sampler #4, 5,6 Dan Meyers 3 Act Math World Record Balloon Dog Gas Station Ripoff Graduation	Graham Fletchy 3 Act Math Thumbs On Fire
Visual Representations & Strategies	Ratio Table Coordinate Plane	

Writing in Math	PSSA Grade 7 Mathematics Item Sampler - Use Item #5 as an open response without the multiple choice options provided.
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks

Unit of Study	Unit 8: Rational Numbers (7th U2)	
Time Frame/Pacing	25 days	
Big Ideas	- Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. - Patterns exhibit relationships that can be extended, described, and generalized.	
Unit Essential Questions	- How can expressions, equations, and inequalities be used to quantify, solve, model and/or analyze mathematical situations? - How can patterns be used to describe relationships in mathematical situations? - How can recognizing repetition or regularity assist in solving problems more efficiently?	
PA Core Standards		PA Assessment Anchors
7.NS.A.1 = CC.2.1.7.E.1 7.NS.A.2 = CC.2.1.7.E.1 7.NS.A.3 = CC.2.1.7.E.1 7.EE.B.4 = CC.2.2.7.B.3		M07.A-N.1 M07.B-E.2
PA Eligible Content	M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.	
	M07.A-N.1.1.2 Represent addition and subtraction on a horizontal or vertical number line.	
	M07.A-N.1.1.3 Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats.	
	M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression $\frac{1}{2} \cdot (x + 6)$ is equivalent to $\frac{1}{2} \cdot x + 3$. Example 2: The expression $5.3 - y + 4.2$ is equivalent to $9.5 - y$ (or $-y + 9.5$). Example 3: The expression $4w - 10$ is equivalent to $2(2w - 5)$.	
	M07.B-E.2.1.1 Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. Example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50 an hour (or $1.1 \times \$25 = \$27.50$). M07.B-E.2.2.1 Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r	

	are specific rational numbers. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? M07.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem. Example: If you want to place a towel bar that is $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.						
Learning Objectives (Concepts Taught)	Module 2 builds on previous understanding of the number line. They learn to add, subtract, multiply, and divide rational numbers. Module 2 includes rational numbers as they appear in expressions and equations.						
Performance Objectives (Skills Demonstrated)	• Develop rules to add, subtract, multiply, and divide integers • Write, describe, and solve equations containing rational numbers						
Key Vocabulary:	<table border="0"> <tr> <td>Additive Identity</td><td>Multiplicative Identity</td></tr> <tr> <td>Additive Inverse</td><td>Repeating Decimal</td></tr> <tr> <td>Absolute Value</td><td>Terminating Decimal</td></tr> </table>	Additive Identity	Multiplicative Identity	Additive Inverse	Repeating Decimal	Absolute Value	Terminating Decimal
Additive Identity	Multiplicative Identity						
Additive Inverse	Repeating Decimal						
Absolute Value	Terminating Decimal						
Assessments	Mid-Module Assessment Task 7.NS.A.1, 7.NS.A.2, CC.2.1.7.E.1 End-of-Module Assessment Task 7.NS.A.1, 7.NS.A.2, 7.NS.A.3, 7.EE.A.2, 7.EE.B.4a, CC.2.1.7.E.1, CC.2.2.7.B.3						
Resources and Differentiation Tools	PRIMARY RESOURCE: Eureka Module 2 Topic A Addition & Subtraction of Integers & Rational Numbers Lesson 1: Opposite Quantities Combine to Make Zero Lesson 2: Using the Number Line to Model the Addition of Integers Lesson 3: Understanding Addition of Integers Lesson 4: Efficiently Adding Integers & Other Rational Numbers Lesson 5: Understanding Subtraction of Integers & Other Rational Numbers Lesson 6: The Distance Between Two Rational Numbers Lesson 7: Addition and Subtraction of Rational Numbers Lessons 8 & 9: Applying the Properties of Operation to Add & Subtract Rational #s Module 2 Topic B Multiplication & Division of Integers & Rational Numbers Lesson 10: Understanding Multiplication of Integers Lesson 11: Develop Rules for Multiplying Signed Numbers Lesson 12: Division of Integers Lesson 13: Converting Between Fractions and Decimals Using Equivalent Fractions Lesson 14: Converting Rational Numbers to Decimals Using Long Division Lesson 15: Multiplication and Division of Rational Numbers (FOCUS exercise 3) Lesson 16: Applying the Properties of Operations to Multiply & Divide Rational #s Module 2 Topic C Applying Operations with Rational #s to Expressions & Equations Lesson 17: Comparing Tape Diagram Solutions to Algebraic Solutions Lesson 18: Writing, Evaluating, & Finding Equivalent Expressions w/Rational #s Lesson 19: Writing, Evaluating, and Finding Equivalent Expressions with Rational #s Lesson 20: Investments-Performing Operations with Rational #s (supplement) Lessons 22 & 23: Solving Equations Using Algebra						

	Additional Supplemental Resources Big Ideas Chapters 1 & 2 PTi3 Units 2 & 3 ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8
Authentic Examples (real-world tasks)	2018 Item Sampler #2 G Fletchy 3 Act Math Deep Freeze
Visual Representations & Strategies	Integer Game Number Line Tape Diagram
Writing in Math	Grade 7 Mathematics Item Sampler #2 - Use as an open response. Eliminate the multiple choice items and insert “Explain Your Answer”.
Higher Level DOK Tasks	How to Increase Cognitive Demand for Math Tasks

Unit of Study	Unit 9: Expressions and Equations (7th U3)	
Time Frame/Pacing	29 days	
Big Ideas	- Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. - Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	
Unit Essential Questions	- How can expressions, equations, and inequalities be used to quantify, solve, model and/or analyze mathematical situations? - How can geometric properties and theorems be used to describe, model, and analyze situations?	
PA Core Standards		PA Assessment Anchors
7.EE.A.1 = CC.2.2.7.B.1 7.EE.B.3 = CC.2.2.7.B.3 7.EE.B.4 = CC.2.2.7.B.3 7.G.B.4 = CC.2.3.7.A.1 7.G.B.5 = CC.2.3.7.A.1 7.G.B.6 = CC.2.3.7.A.1		M07.B-E.1 M07.B-E.2 M07.C-G.2
PA Eligible Content	M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression $\frac{1}{2} \cdot (x + 6)$ is equivalent to $\frac{1}{2} \cdot x + 3$. Example 2: The expression $5.3 - y + 4.2$ is equivalent to $9.5 - y$ (or $-y + 9.5$). Example 3: The expression $4w - 10$ is equivalent to $2(2w - 5)$. M07.B-E.2.2.1 Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? M07.B-E.2.2.2 Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. Example: A salesperson is paid \$50 per week plus \$3 per sale. This week she wants her pay to be at least \$100. Write an inequality for the number of sales the salesperson needs to make and describe the solutions. M07.C-G.2.2.1 Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.	

Learning Objectives (Concepts Taught)	Module 3 expands students' previous work with generating equivalent expressions and solving equations. Students solve real-life and mathematical problems using numerical and algebraic expressions and equations. Their work with expressions and equations is applied to finding unknown angles and problems involving area, volume, and surface area.	
Performance Objectives (Skills Demonstrated)	• Generate equivalent expressions using inverse operations • Solve equations and inequalities containing rational numbers • Derive formulas to describe area, volume, and surface area	
Key Vocabulary:	Expanded Form Factored Form Standard Form Coefficient	Term Circle/ Disk Circumference/ Diameter/ pi
Assessments	Mid-Module Assessment Task 7.EE.A.1, 7.EE.A.2, 7.EE.B.3, 7.EE.B.4, 7.G.B.5, CC.2.2.7.B.1, CC.2.2.7.B.3 End-of-Module Assessment Task 7.EE.A.1, 7.EE.A.2, 7.G.B.4, 7.G.B.5, 7.G.B.6, CC.2.3.7.A.1, CC.2.2.7.B.1, CC.2.2.7.B.3	
Resources and Differentiation Tools	Module 3 Topic A Use Properties of Operations to Generate Equivalent Expressions Lessons 1 & 2: Generating Equivalent Expressions Lessons 3 & 4: Writing Products as Sums and Sums as Products Lesson 5: Using the Identity and Inverse to Write Equivalent Expressions Lesson 6: Collecting Rational Number Like Terms (exclude ex. 4 & 5) Module 3 Topic B Solve Problems Using Expressions, Equations, and Inequalities Lesson 7: Understanding Equations Lessons 8 & 9: Using If-Then Moves in Solving Equations Lessons 10 & 11: Angle Problems and Solving Equations Lesson 12: Properties of Inequalities Lesson 13: Inequalities Lesson 14 Solving Inequalities Lesson 15: Graphing Solutions to Inequalities Module 3 Topic C Use Equations and Inequalities to Solve Geometry Problems Lesson 16: The Most Famous Ratio of All Lessons 17& 18: The Area of a Circle & More Problems on Area and Circumference Lesson 19: Unknown Area Problems on the Coordinate Plane Lesson 21: Surface Area Lesson 23: The Volume of a Right Prism (Lesson 24 exit ticket?) Lesson 25: Volume and Surface Area ELL Mathematics Overlay for Listening and Reading in Grades 6-8 ELL Mathematics Overlay for Speaking and Writing in Grades 6-8	
	Additional Supplemental Resources Big Ideas Chapters 3, 4, 8 PTi3 Units 6, 7, 8, 9, 10	
Authentic Examples (real-world tasks)	2018 Item Sampler #10, 11 Estimation 180 3 Act Math Stacking Cups Inequalities	
Visual Representations & Strategies	Area Model Coordinate Plane Geometric Figures Nets	Number Line Tape Diagram Protractor

Writing in Math	End-of-Module Assessment, Question #2a,b, and c
Higher Level DOK Tasks	<u>How to Increase Cognitive Demand for Math Tasks</u>