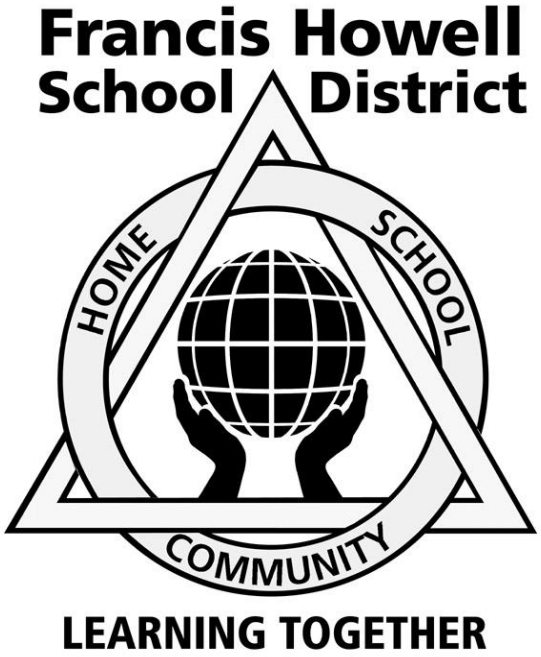
Math 6
Mathematics Curriculum



Board Approved: July 17, 2014

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Francis Howell School District

Mission Statement

Francis Howell School District is a learning community where all students reach their full potential.

Vision Statement

Francis Howell School District is an educational leader that builds excellence through a collaborative culture that values students, parents, employees, and the community as partners in learning.

Values

Francis Howell School District is committed to:

- Providing a consistent and comprehensive education that fosters high levels of academic achievement for all
- Operating safe and well-maintained schools
- Promoting parent, community, student, and business involvement in support of the school district

- Ensuring fiscal responsibility
- Developing character and leadership

Francis Howell School District Graduate Goals

Upon completion of their academic study in the Francis Howell School District, students will be able to:

1. Gather, analyze and apply information and ideas.
2. Communicate effectively within and beyond the classroom.
3. Recognize and solve problems.
4. Make decisions and act as responsible members of society.

Mathematics Graduate Goals

Upon completion of their mathematics study in the Francis Howell School District, students will be able to:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Course Rationale

In order to be effective citizens in the 21st century, students need to understand mathematics. Students often encounter problem situations that require reasoning, computation, and communication. We regularly study the most efficient methods for reaching solutions, but also realize that examining different solution methods help develop more flexible solving skills. The instruction and assessment is focused on instilling students with enduring understandings of mathematics. Math 7 seeks to help students develop a strong foundation for future mathematics courses and conceptual understanding in real-life problem solving.

Course Description for Math 6

This course is designed to provide students with a strong foundation for future mathematics courses and conceptual understanding in real-life problem solving. The focus is on four critical areas: 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.

Francis Howell School District
Math 6 Curriculum Map

Quarter	CC Standard	Description	MP	Resource
Chapter 1 - EXPRESSIONS AND EQUATIONS UNIT				
1	6.NS.B.2	01-2 Divide Multi-Digit Whole Numbers	1, 2, 6	6th Grade Textbook
1	6.EE.A.3	Relationships of Operations from Expressions and Equations TEACHER MATERIALS (p.12-46).	3, 4, 8	NY TM: Expressions and Equations
1	6.EE.A.1	01-3 Exponents	1, 2, 7	6th Grade Textbook
1	6.EE.A.2	01-4 Order of Operations	3, 4, 7	6th Grade Textbook
1	6.NS.B.4	01-5 Properties and Mental Math (commutative, distributive and associative)	3, 6, 8	6th Grade Textbook
Chapter 2 - EXPRESSIONS AND EQUATIONS UNIT				
1	6.EE.A.2c 6.EE.A.4	Replacing Letters and Numbers Expressions and Equations TEACHER MATERIALS (p.68-111).	3, 4, 8	NY TM: Expressions and Equations
1	6.EE.A.2c	Expanding Expressions TEACHER MATERIALS (p.68-112).	3, 4, 8	NY TM: Expressions and Equations
1	6.EE.A.2	02-1 Variables and Expressions	5, 7, 8	6th Grade Textbook

1	6.EE.A.2	Expressing Operations in Algebraic Form TEACHER MATERIALS (p.146-170)	2, 3, 4	NY TM: Expressions and Equations
1	6.EE.A.2	02-2 Translating Between Words and Math	2, 3, 4	6th Grade Textbook
1	6.EE.A.2	02-3 Translating Between Tables and Expressions	2, 3, 8	6th Grade Textbook
1	6.EE.A.3	02-3b LAB: Explore Area and Perimeter of Rectangles	5	6th Grade Textbook
1	6.EE.B.5	02-4 Equations and Their Solutions	1, 2, 7	6th Grade Textbook
1	6.EE.B.7	02-5 Addition Equations	3, 4, 5	6th Grade Textbook
1	6.EE.B.6	02-6 Subtraction Equations	1, 2, 6, 7	6th Grade Textbook
1	6.EE.B.7	02-7 Multiplication Equations	2, 3, 4	6th Grade Textbook
1	6.EE.B.6	02-8 Division Equations	2, 3, 8	6th Grade Textbook
Chapter 3 - NUMBER SYSTEMS UNIT				
2	6.NS.B.3	03-3a LAB: Explore Decimal Addition and Subtraction	5	6th Grade Textbook
2	6.NS.B.3 6.EE.B.7	03-3b Adding and Subtracting Decimals	1, 2, 3	6th Grade Textbook
2	6.NS.B.3	03-4a LAB: Explore Decimal Multiplication and Division	5	6th Grade Textbook
2	6.EE.B.7	03-4b Multiplying Decimals (describe the effects of multiplication)	2, 6, 7	6th Grade Textbook
2	6.NS.B.3	03-5 Dividing Decimals by Whole Numbers	1, 2, 8	6th Grade Textbook

2	6.NS.B.3	03-6 Dividing Decimals by Decimals	1, 2, 5	6th Grade Textbook
2	6.NS.B.3	03-7 Interpreting the Quotient	3, 4, 7	6th Grade Textbook
2	6.EE.B.7	3-8 Solving Decimal Equations	1, 3, 6	6th Grade Textbook
Chapter 4 - NUMBER SYSTEMS UNIT				
2	6.NS.B.4	04-2 Greatest Common Factor	1, 6	6th Grade Textbook
2	6.EE.A.4	Replacing Letters and Numbers Expressions and Equations TEACHER MATERIALS (p.113-132).	3, 4, 7	NY TM: Expressions and Equations
2	6.EE.A.4	04-3 Equivalent Expressions	3, 4, 7	6th Grade Textbook
2	6.NS.C.7	04-7 Comparing and Ordering Fractions	1, 6, 7	6th Grade Textbook
Chapter 5 - NUMBER SYSTEMS UNIT				
2	6.NS.B.4	05-1 Least Common Multiple	6, 7, 8	6th Grade Textbook
2	6.EE.B.7	05-4 Solving Fraction Equations: Addition and Subtraction	2, 4, 6	6th Grade Textbook
2	6.NS.A.1	05-6a LAB: Model Fraction Division	5	6th Grade Textbook
2	6.NS.A.1	05-6b LAB: Model Fraction Division in Context	5	6th Grade Textbook
2	6.NS.A.1	05-6c Dividing Fractions and Mixed Numbers	2, 3, 5	6th Grade Textbook

2	6.EE.B.7	05-7 Solving Fraction Equations: Multiplication and Division	2, 3, 4	6th Grade Textbook
Chapter 6 - STATISTICS AND PROBABILITY UNIT				
3	6.SP.A.2	06-1a LAB: Collect Data to Explore Mean	5	6th Grade Textbook
3	6.SP.A.3	06-1b Mean, Median, Mode, and Range	1, 5, 7	6th Grade Textbook
3	6.SP.A.3	06-2 Additional Data and Outliers	2, 3, 6	6th Grade Textbook
3	6.SP.A.1	06-3 Measures of Variation	1, 2, 6	6th Grade Textbook
3	6.SP.B.4	06-4a Line Plots, Frequency Tables, and Histograms	3, 4, 5	6th Grade Textbook
3	6.SP.B.5	06-4b LAB: Frequency Distribution	5	6th Grade Textbook
3	6.SP.B.5	06-4c LAB: Use a Survey to Collect Data	5	6th Grade Textbook
3	6.SP.B.5	06-5 Describing Distributions	3, 5, 6	6th Grade Textbook
Chapter 7 - RATIOS AND PROPORTIONS UNIT				
3	6.RP.A.2	07-1 Ratios and Rates	1, 2, 4	6th Grade Textbook

3	6.RP.A.3	07-2 Using Tables to Explore Equivalent Ratios and Rates	1, 5, 6	6th Grade Textbook
3	6.NS.C.6	7-3a Ordered Pairs	1, 4, 7	6th Grade Textbook
3	6.RP.A.3	07-3b EXT Graphing Equivalent Ratios and Rates	5	6th Grade Textbook
3	6.RP.A.1	07-4 Proportions	2, 4, 8	6th Grade Textbook
3	6.RP.A.3	07-5 Percents	3, 4	6th Grade Textbook
3	6.RP.A.3	07-6 Percents, Decimals, and Fractions	1, 6, 7	6th Grade Textbook
3	6.RP.A.3	7-7 Percent of a Number	2, 4, 6	6th Grade Textbook
3	6.RP.A.3	7-8 Solving Percent Problems-	4, 5, 8	6th Grade Textbook
Chapter 8 - GEOMETRY UNIT				
4	6.RP.A.3	08-1 Converting Customary Units	1, 2, 3	6th Grade Textbook
4	6.RP.A.3	08-2 Converting Metric Units	1, 6, 7	6th Grade Textbook
4	6.G.A.1	08-3 Area of Rectangles and Parallelograms	3, 4, 6	6th Grade Textbook
4	6.G.A.1	08-4 Area of Triangles and Trapezoids	4, 7, 8	6th Grade Textbook
4	6.G.A.1	08-5 Area of Composite Figures	3, 4, 7	6th Grade Textbook
4	6.G.A.2	08-6a LAB Explore Volume of Prisms	5	6th Grade Textbook

4	6.G.A.2	08-6b Volume of Prisms	1, 5, 8	6th Grade Textbook
4	6.G.A.4	08-7 Surface Area	2, 6, 8	6th Grade Textbook
Chapter 9 - INTEGERS UNIT				
4	6.NS.C.5	09-1 Integers and Absolute Value	3, 4, 5	6th Grade Textbook
4	6.NS.C.7	09-2a Comparing and Ordering Integers	5, 7, 8	6th Grade Textbook
4	6.NS.C.6	09-2b EXT Negative Rational Numbers	5, 7	6th Grade Textbook
4	6.NS.C.6	09-3 The Coordinate Plane	1, 4, 7	6th Grade Textbook
4	6.G.A.3	09-4 Polygons in the Coordinate Plane	4, 6, 8	6th Grade Textbook
4	6.NS.C.8	09-5 Transformations in the Coordinate Plane	3, 7, 8	6th Grade Textbook
Chapter 10 - INTEGERS UNIT				
4	6.EE.C.9	10-1 Tables and Functions	1, 4, 8	6th Grade Textbook
4	6.EE.C.9	10-2a Graphing Functions	2, 3, 5	6th Grade Textbook
4	6.EE.C.9	10-2b Function Notation		6th Grade Textbook

4	6.RP.A.3	10-3 Slope and Rate of Change (linear and nonlinear)	2, 5, 7	6th Grade Textbook
4	6.EE.B.8	10-4 Inequalities	1, 4, 6	6th Grade Textbook

Content Area: Math	**Course: Math 6**	**UNIT 1: Expressions and Equations**
Unit Description: Students will simplify expressions and solve equations using inverse operations.	**Unit Timeline**: ≈ 6 weeks	

DESIRED RESULTS

Transfer Goal - ***Students will be able to independently use their learning to…***

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Understandings – ***Students will understand that… (Big Ideas)***

1. Expressions can be simplified by combining like terms.
2. Exponents are tells how many times a number called a base is multiplied by itself.
3. Order of Operations are essential to simplifying expressions.
4. Commutative, Associative, and Distributive Properties are used to identify or create equivalent expressions.
5. A variable is a letter representing an unknown value.
6. Translating between words and math are essential skills to solving real-world problems.

7. Tables can be used to write expressions from sequences.
8. Evaluating an equation means to substitute for the variable and then simplify the expression.
9. Equations can be solved using inverse operations.

Essential Questions: *Students will keep considering…*

- What is a variable?
- What is a coefficient?
- How do constants impact functions?
- What are terms?
- How can I translate words to math?
- How do I evaluate an expression?
- How do I simplify expressions by using order of operations?
- What terms can I combine to simplify an expression?
- What are equivalent expressions?
- How do I solve an equation?

Students Will Know…	Standard	Students Will Be Able to …	Standard
Previously, they… ● Divided whole numbers. ● Used the order of operations without exponents. ● Wrote numerical expressions involving whole numbers. ● Solved problems using addition, subtraction, multiplication, and division of whole numbers. They will study… ● Using the order of operations including exponents. ● Using properties to compute. ● Representing whole numbers by using exponents. ● Writing algebraic expressions involving whole numbers. ● When two expressions may be equivalent. (i.e., when the two expressions name the same number regardless of which value is substituted into them). ● Using addition, subtraction, multiplication, and division to solve one-step equations involving whole numbers. ● Determining whether a number is a solution to an equation. They can use the skills learned to… ● Express numbers in scientific and standard notation. ● Work with expressions involving other types of numbers. ● Solve one-step equations involving decimals and fractions. ● Solve one-step inequalities. *See Vocabulary at the end of this unit.*	6.EE.A.1 6.EE.A.2 6.EE.A.1 6.EE.A.2 6.EE.A.3 6.EE.A.4 6.EE.B.5 6.EE.B.6 6.EE.B.8	**<u>Mathematical Practices</u>** Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Construct viable arguments and critique the reasoning of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning. **<u>Grade Level Standards</u>** **Apply and extend previous understandings of arithmetic to algebraic expressions.** Write and evaluate numerical expressions involving whole-number exponents. Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.*	MP1 MP2 MP3 MP4 MP5 MP6 MP7 MP8 **6.EE.A** 6.EE.A.1 6.EE.A.2 6.EE.A.2a 6.EE.A.2b

		b. 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. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms*.	6.EE.A.2c
		c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6\ s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$*.	6.EE.A.3
		Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y*.	6.EE.A.4
		Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*	**6.EE.B**
		Reason about and solve one-variable equations.	6.EE.B.5
		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.	6.EE.B.6
		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.	6.EE.B.7
		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 nonnegative rational numbers.	**6.EE.C**
		Represent and analyze quantitative relationships between dependent and independent variables.	6.EE.C.9
		Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*	6.NS.B.2
		Fluently divide multi-digit numbers using the standard algorithm.	

EVIDENCE of LEARNING			
Understanding	Standards MP1	**Unit Performance Assessment**: **Description of Assessment Performance Task(s):**	R/R Quadrant **C**

#3, #5, #6, #7	MP3 MP4 6.EE.A.1 6.EE.A.2 6.EE.A.3	***Unit Performance Assessment: Expressions and Equations*** (See Appendix 1.A and 1.B) Students are being asked to: ● Apply both area models and algebraic equations to a real-world garden scenario ● Critique the reasoning of others ● Apply properties of math to determine equivalent expressions ● Evaluate algebraic expressions using order of operations **Teacher will assess:** Students will be able to: ● Recognize and apply the properties of math to evaluate expressions. ● Model mathematics using charts and tiles. ● Evaluate expressions using order of operations. The five selected responses and the performance task will assess the student's knowledge of operations with integers both as a skill and in a real-life situation. The performance task will assess the student's ability to use acquired knowledge to solve a problem. **<u>Performance:</u>** **Mastery:** ***Students will show that they really understand when they…*** complete the formative with a score of 80% or better. **Scoring Guide:** See Appendix 1.A and 1.B	

SAMPLE LEARNING PLAN				
Pre-assessment: Equations and Expressions Unit Pre-Test (Appendix 1.HH)				
Understanding	**Standards**	**Major Learning Activities:**	**Instructional Strategy:**	**R/R Quadrant:**
#3	MP6 MP7 6.NS.B.2	1. Activity: 1-2 Divide Multi-Digit Whole Numbers from *Holt-McDougal Mathematics Grade 6* (p.10-13). ● Objective: Students use the algorithm for division and interpret the quotient and remainder in a real-world setting. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 1-2 Divide Multi-Digit Whole Numbers from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). *o* Independent Practice: Practice problems on p.12-13. ● Appendix Documents: Appendix 1.C and 1.D - Chapter 1: Operations and Properties NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.E and 1.F - Cooperative Learning Structure: 1.2 Divide Multi-Digit Whole Numbers	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#2	MP1 MP2 MP7 6.EE.A.1	*2.* Activity: 1-3 Exponents from *Holt-McDougal Mathematics Grade 6* (p.14-17). ● Objective: Students represent numbers by using exponents. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 1-3 Exponents (cubes) Squares to 12 and Cubes to 5 from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). o Independent Practice: Practice problems on p.16-17. ● Appendix Documents: Appendix 1.C and 1.D - Chapter 1 - Operations and Properties NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.G and 1.H - Cooperative Learning Structure - 1.3 Exponents	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**

#3	MP3 MP4 MP7 6.EE.A.2 6.EE.A.2c	3. Activity: 1-4 Order of Operations from *Holt-McDougal Mathematics Grade 6* (p.22-25). ● Objective: Students will use the order of operations to simplify expressions. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 1-4 Order of Operations from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). o Independent Practice: Practice problems on p.24-25. o Appendix Documents: Appendix 1.C and 1.D - Chapter 1 - Operations and Properties NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.I and 1.J - Cooperative Learning Structure - 1.4 Order of Operations	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#4	MP3 MP6 MP8 6.EE.A.3 6.NS.A.4	4. Activity: 1-5 Properties and Mental Math (commutative, distributive and associative) from *Holt-McDougal Mathematics Grade 6* (p.35-38). ● Objective: Students will use number properties to compute mentally. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 1-5 Properties and Mental Math (commutative, distributive and associative) from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). o Independent Practice: Practice problems on p.37-38. ● Appendix Documents: Appendix 1.C and 1.D - Chapter 1 - Operations and Properties NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.K and 1.L - Cooperative Learning Structure - 1.5 Properties of Mental Math	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#1	6.EE.A.2c 6.EE.A.4	5. Activity: Replacing Letters and Numbers from Expressions and Equations TEACHER MATERIALS (p.68-91). ● Replacing Letters and Numbers Lesson (p.70-79) ● Replacing Numbers and Letters Lesson (p.80-91)	● Similarities and Differences	**B**

#1	MP5 MP7 MP8 6.EE.A.2	6. Activity: Expanding, Factoring, and Distributing Expressions TEACHER MATERIALS (p.92-112) ● Writing Addition and Subtraction Expressions Lesson (p.94-100) ● Writing and Explaining Multiplication Expressions Lesson (p.80-91)	● Similarities and Differences	**B**
#1, #5	MP5 MP7 MP8 6.EE.A.2 6.EE.A.2b	7. Activity: 2-1 Variables and Expressions from *Holt-McDougal Mathematics Grade 6* (p.46-49). ● Objective: Students will use the order of operations to simplify expressions. ● Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 2-1 Variables and Expressions from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). o Independent Practice: Practice problems on p.48-49. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.O and 1.P - Cooperative Learning Structure - 2.1 Variables and Expressions	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#6	MP2 MP3 MP4 6.EE.A.2 6.EE.A.2a 6.EE.A.2b	8. Activity: Expressing Operations in Algebraic Form TEACHER MATERIALS (p.146-170) ● Read Expressions in Which Letters Stand for Numbers Lesson (p.147-151) ● Writing and Explaining Multiplication Expressions Lesson (p.152-170)	● Similarities and Differences	**B**
#6	MP2 MP3 MP4 6.EE.A.2 6.EE.A.2a 6.EE.A.2b	9. Activity: 2-2 Translating Between Words and Math from *Holt-McDougal Mathematics Grade 6* (p.50-53). ● Objective: Students will translate between words and math. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 2-2 Translating Between Words and Math from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…).	● Summarizing and Note Taking ● Cooperative Learning - Round Robin	**B**

		○ Independent Practice: Practice problems on p.52-53. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.Q and 1.R - Cooperative Learning Structure - 2.2 Translating Between Words and Math (Warm Up and Fan N' Pick cards)	● Optional -Flipped Classroom Model	
#7	MP2 MP3 MP8 6.EE.A.2 6.EE.A.2a	10. Activity: 2-3 Translating Between Tables and Expressions from *Holt-McDougal Mathematics Grade 6* (p.54-57). ● Objective: Students will write expressions for tables and sequences. Lesson Itinerary. ○ Guided Notes or watch video and complete guided notes on 2-3 Translating Between Tables and Expressions from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.56-57. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.S and 1.T - Cooperative Learning Structure - 2.3 Translating Between Tables and Expressions (Warm Up and Fan N' Pick cards)	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#7	MP5 6.EE.A.2 6.EE.A.3	11. Activity: 2-3b Explore Area and Perimeter of Rectangles from *Holt-McDougal Mathematics Grade 6* (p.58-59). ● Objective: Students will use grid paper to model the perimeter and area of rectangles. Lesson Itinerary. ○ Guided Notes or watch video and complete guided notes on 2-3 Translating Between Tables and Expressions from the online textbook. ○ Think-Pair-Share: p.58-59. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)	● Cooperative Learning -Think-Pair-Share (Kagan Group Seating)	**B**

#8	MP1 MP2 MP7 6.EE.A.4 6.EE.B.5	13. Activity: 2-4 Equations and Their Solutions from *Holt-McDougal Mathematics Grade 6* (p.62-65). ● Objective: Students will determine whether a number is a solution of an equation. Lesson Itinerary. o Watch video and complete guided notes on 2-4 Equations and Their Solutions from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). o Independent Practice: Practice problems on p.56-57. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.U and 1.V - Cooperative Learning Structure – 2.4 Equations and Their Solutions	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#9	MP3 MP4 MP5 6.EE.B.6 6.EE.B.7	14. Activity: 2-5 Addition Equations from *Holt-McDougal Mathematics Grade 6* (p.66-69). ● Objective: Students will solve whole number addition equations using inverse operations. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 2-5 Addition Equations from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). o Independent Practice: Practice problems on p.68-69. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.W and 1.X - Cooperative Learning Structure - 2.5 Addition Equations	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#9	MP1 MP2 MP6 MP7	15. Activity: 2-6 Subtraction Equations from *Holt-McDougal Mathematics Grade 6* (p.70-72). ● Objective: Students will solve whole number subtraction equations using inverse operations. Lesson Itinerary.	● Summarizing and Note Taking	**B**

	6.EE.B.6	○ Guided Notes or watch video and complete guided notes on 2-6 Subtraction Equations from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.71-72. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.Y and 1.Z - Cooperative Learning Structure - 2.6 Subtraction Equations (Warm Up with real-world problems and Fan N' Pick cards)	● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	
#9	MP2 MP3 MP4 6.EE.B.6 6.EE.B.7	16. Activity: 2-7 Multiplication Equations from *Holt-McDougal Mathematics Grade 6* (p.73-76). ● Objective: Students will solve whole number multiplication equations using inverse operations. ● Lesson Itinerary. ○ Guided Notes or watch video and complete guided notes on 2-7 Multiplication Equations from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.75-76. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.AA and 1.BB - Cooperative Learning Structure - 2.7 Multiplication Equations	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#9	MP2 MP3 MP8 6.EE.B.6	17. Activity: 2-8 Division Equations from *Holt-McDougal Mathematics Grade 6* (p.77-79). ● Objective: Students will solve whole number division equations using inverse operations. ● Lesson Itinerary. ○ Guided Notes or watch video and complete guided notes on 2-8 Division Equations from the online textbook.	● Summarizing and Note Taking ● Cooperative Learning - Showdown,	**B**

		○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.78-79. ● Appendix Documents: Appendix 1.M and 1.N - Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 1.CC and 1.DD - Cooperative Learning Structure - 2.8 Division Equations	Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	
#3	MP4 MP7 6.EE.A.2c 6.EE.A.3 6.EE.A.4 6.EE.B.5 6.EE.B.6	18. Activity: Equating Math with Candy (Nextpert Gold Seal Lesson) ● Objective: o Algebraic Concepts and Relationships: Students use algebraic methods to investigate, model, and solve equations through combining like terms and solving for the variable. Students evaluate and record the steps and show the steps of solving the problem using candy, bags, toothpicks, and paperclips. o Problem-Solving and Mathematical Reasoning: Students apply a variety of problem-solving strategies to investigate and solve problems with the aid of team collaboration and working with manipulatives. ● Appendix Document: Appendix 1.EE – Equating Math with Candy instructions with Scoring Guide	● Nonlinguistic Representations ● Similarities and Differences ● Cooperative Learning	**D**
#6, #7	MP1 MP4 MP7 MP8 6.EE.C.9	19. Activity: Multi-Step Problems in the Real World Lessons 32 from New York State Common Core Mathematics Curriculum Grade 6, Module 4, p. 338-345: http://www.engageny.org/resource/grade-6-mathematics-module-4 ● Objective: Students will analyze an equation in two variables, choose an independent variable and a dependent variable, make a table and make a graph for the equation by plotting the points in the table. ● Appendix Documents: Appendix 2.FF and 2.GG - EngageNY Grade 6 Common Core Mathematics Curriculum for Expressions and Equations (Module 4)	● Nonlinguistic Representations ● Similarities and Differences	**C**

UNIT RESOURCES

Teacher Resources:
● *Holt McDougal Mathematics Grade 6* textbook
● *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com
● Illustrative Mathematics: http://www.illustrativemathematics.org/
● Learnzillion: http://learnzillion.com/
● Grade 6 New York State Common Core Mathematics Curriculum: http://www.engageny.org/resource/grade-6-mathematics
● Schoology
● Cooperative Learning Structures
  ● Chapter 1 - Operations and Properties NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)
  ● Chapter 2 - Introduction to Algebra NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)
  ● Cooperative Learning Structure - 1.2 Dividing Multi-Digit Whole Numbers
  ● Cooperative Learning Structure - 1.3 Exponents
  ● Cooperative Learning Structure - 1.4 Order of Operations
  ● Cooperative Learning Structure - 1.5 Properties of Mental Math
  ● Cooperative Learning Structure - 2.1 Variables and Expressions
  ● Cooperative Learning Structure - 2.2 Translating Between Words and Math
  ● Cooperative Learning Structure - 2.3 Translating Between Tables and Expressions
  ● Cooperative Learning Structure - 2.5 Addition Equations
  ● Cooperative Learning Structure - 2.6 Subtraction Equations
  ● Cooperative Learning Structure - 2.7 Multiplication Equations
  ● Cooperative Learning Structure - 2.8 Division Equations

- www.engageny.org

Student Resources:

- Thinking Blocks: http://www.mathplayground.com/thinkingblocks.html
- Learnzillion: http://learnzillion.com/
- *Holt McDougal Mathematics Grade 6* textbook
- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com

Vocabulary:

These are words and definitions students will need to understand to complete the objectives for the unit.

- Dividend – the number to be divided.
- Divisor – the number by which the dividend is divided.
- Exponent – tells how many times a number called a base is used as a factor.
- Base – the number that is going to be raised to a power.
- Exponential Form – a number written with a base and an exponent
- Numerical Expression – mathematical phrase that includes only numbers and operation symbols.
- Simplify – finding the value of an expression.
- Order of Operations – the procedure for finding the value of an expression.(PEMDAS)
- Variable – a letter or symbol that represents a quantity that can change.
- Constant – a quantity that does not change.
- Algebraic Expression – an expression containing one or more variables and may contain operation symbols.
- Evaluate – substituting a number for the variable and then find the value by simplifying.
- Equation – a mathematical statement that two expressions are equal.
- Solution – a value for an equation that makes it true.
- Substitution – replacing a variable with a value.
- Inverse Operations – the operation that reverses the effect of another operation.

Content Area: Math	Course: Math 6	UNIT 2: Number Systems
Unit Description: Students apply and extend previous understandings of multiplication and division to divide fractions by fractions, compute fluently with multi-digit numbers and find common factors and multiples.	**Unit Timeline:** 6 weeks	

DESIRED RESULTS
Transfer Goal - ***Students will be able to independently use their learning to…*** ● Make sense of problems and persevere in solving them ● Reason abstractly and quantitatively ● Construct viable arguments and critique the reasoning of others ● Model with mathematics ● Use appropriate tools strategically ● Attend to precision ● Look for and make use of structure ● Look for and express regularity in repeated reasoning

Understandings – ***Students will understand that… (Big Ideas)***

1. Since decimals and fractions represent quantities less than or between whole numbers, they are similar.

2. Their knowledge of adding and subtracting multi-digit numbers will be used to find sums and differences of decimals.
3. When two proper fractions/decimals are multiplied, their product is less than its factors.
4. When two proper fractions/decimals are divided, their quotient is greater than its dividends.
5. Factors create products and are finite while multiples are the products of factors and infinite.
6. The process for solving one-step equations can be expanded to include fractions and decimals.

Essential Questions: ***Students will keep considering…***

- How do I use models to solve multiplication and division of fractions?
- Why does the process of invert and multiply work when dividing fractions?
- How will I know when to use the GCF or LCM to solve problems?
- What context clues do I look for to decide whether to multiply or divide when solving word problems?
- How can I use my knowledge of solving one-step equations with whole numbers to solve one-step equations with fractions or decimals?

Students Will Know…	Standard	Students Will Be Able to …	Standard
How to: ● Solve decimal equations. ● Solve equations with fractions. ● Formulate the Greatest Common Factor (GCF) of a set of whole numbers. ● Formulate the Least Common Multiple (LCM) of a set of whole numbers. ● Add, subtract, multiply and divide fractions and mixed numbers. ● Add, subtract, multiply, and divide decimals. *See Vocabulary at the end of this unit.*	6.EE.B.7 6.EE.B.7 6.NS.B.4 6.NS.B.4 6.NS.A.1 6.NS.B.3	**<u>Mathematical Practices</u>** Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Construct viable arguments and critique the reasoning of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning. **<u>Grade Level Standards</u>** **Apply and extend previous understandings of multiplication and division to divide fractions by fractions.** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. **Compute fluently with multi-digit numbers and find common factors and multiples.** Fluently divide multi-digit numbers using the standard algorithm	 MP1 MP2 MP3 MP4 MP5 MP6 MP7 MP8 **6.NS.A** 6.NS.A.1 **6.NS.B** 6.NS.B.2

		Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation	6.NS.B.3
		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. Use the distributive property to express a sum of two whole numbers with 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.	6.NS.B.4
		Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	6.NS.C.6
		a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; 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.	6.NS.C.6a
		b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	6.NS.C.6b
		c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	6.NS.C.6c
		Understand ordering and absolute value of rational numbers.	6.NS.C.7
		a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is*	6.NS.C.7a

		located to the right of –7 on a number line oriented from left to right.	
		b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 ºC > –7 ºC to express the fact that –3 ºC is warmer than –7 ºC.*	6.NS.C.7b
		c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.	6.NS.C.7c
		d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*	6.NS.C.7d
		Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.	6.EE.A.4
		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 nonnegative rational numbers.	6.EE.B.7

EVIDENCE of LEARNING			
Understanding #1, #2, #3, #4, #5	Standards MP1 MP2 MP3 MP4 MP5 MP6 MP7 MP8 6.NS.A.1 6.NS.B.3 6.NS.B.4 6.EE.A.4 6.EE.B.7	**Unit Performance Assessment**: **Description of Assessment Performance Task(s):** ***Unit Performance Assessment: The Number System*** (See Appendix 2.A) Students will take the Number Systems Unit Test Part 1 and Part 2. Part 1 assesses all of the standards they have learned in a multiple choice format. Part 2 is the Performance Task which requires students to model with mathematics, construct viable arguments and critique the reasoning of others. **Teacher will assess:** Students will be able to… ● Correctly add, subtract, multiply and divide decimals and solve decimal equations. ● Correctly solve equations with decimals and fractions ● Correctly multiply and divide fractions ● Correctly find GCF and LCM of groups of numbers and use them to solve problems. ● Correctly use GCF to create equivalent expressions ● Correctly be able to compare and order fractions ● Correctly divide fractions by using models and be able to explain the algorithm. **Performance:** **Mastery:** ***Students will show that they really understand when they…*** complete the formative with a score of 80% or better. **Scoring Guide:** See Appendix 2.B	R/R Quadrant **C**

SAMPLE LEARNING PLAN				
Pre-assessment: District Benchmark Assessment				
Understanding	**Standards**	**Major Learning Activities:**	**Instructional Strategy:**	**R/R Quadrant:**
#2	MP4 MP5 6.NS.B.3 6.NS.C.6	1. Activity: 3.3a LAB Explore Decimal Addition and Subtraction *Holt-McDougal Mathematics Grade 6* pg. 102-103. ● Objective: Students will add and subtract decimals to solve real-world problems. ● Appendix Document: Appendix 2.C and 2.D – Chapter 3 Decimals Notes	● Cooperative Learning	**B**
#2	MP1 MP2 MP3 6.NS.B.3	2. Activity: 3.3 Exit Card ● Objective: Students will add and subtract decimals to solve real-world problems. Prompt: "Matt has $250.00 in his checkbook. He has to pay three bills this month. The gas bill is $64.78; the electric bill is $154.30 and the cable bill is $57.83. Does Matt have enough in his account to pay all the bills? How much will he have left over or how much is he short?" This activity can be done as a Cooperative Learning activity. ● Appendix Document: Appendix 2.C and 2.D – Chapter 3 Decimals Notes Appendix 2.E and 2.F – 3.3 Adding and Subtracting Decimals Fan N' Pick Cards	● Homework and Practice ● Cooperative Learning	**B**
#3	MP5 6.NS.B.3	3. Activity: 3.4a LAB Explore Decimal Multiplication and Division *Holt-McDougal Mathematics Grade 6* pg. 110-11. ● Objective: Students will use area models to multiply and divide decimals. ● Appendix Document:	● Cooperative Learning	**B**

		Appendix 2.C and 2.D – Chapter 3 Decimals Notes		
#3	MP2 MP6 MP7 6.NS.B.3	4. Activity: Chapter 3.4b Multiplying Decimals Fan and Pick, followed by in-class practice. *Holt-McDougal Mathematics Grade 6* pg. 112-115 # 1-2, 11-12, 53-54, 49-51 ● Objective: Students will use the Cooperative learning Structure called Fan N' Pick to multiply decimals by using an algorithm or using models. Then they will solve practice problems. ● Appendix Documents: Appendix 2.C and 2.D – Chapter 3 Decimals Notes Appendix 2.G and 2.H – 3.4 Multiplying Decimals Fan N' Pick Cards	● Cooperative Learning - Fan and Pick ● Homework and Practice	**B**
#4	MP1 MP2 MP8 6.NS.B.3	5. Activity: Chapter 3.5 Dividing Decimals by Whole Numbers Showdown, followed by in-class practice. *Holt-McDougal Mathematics Grade 6* pg. 116-118 #9, 18, 26-28, 30 ● Objective: Students will use a Cooperative Learning Structure in order to use division to solve real-world problems. Options can be found in Appendix 0.B - Cooperative Learning Flip Chart Reference. ● Appendix Documents: Appendix 2.C and 2.D – Chapter 3 Decimals Notes Appendix 2.I and 2.J – 3.5 Dividing Decimals by Whole Numbers Fan N' Pick Cards	● Cooperative Learning ● Homework and Practice	**B**
#4	MP1 MP2 MP5 6.NS.B.3	6. Activity: Chapter 3.6 Dividing Decimals by Decimals Showdown, followed by in-class practice. *Holt-McDougal Mathematics Grade 6* pg. 119-122 # 7-8, 18-20, 37, 38-39, 40-41 ● Objective: Students will use a Cooperative Learning Structure in order to use division to solve real-world problems. Options can be found in Appendix 0.B - Cooperative Learning Flip Chart Reference. ● Appendix Documents: Appendix 2.C and 2.D – Chapter 3 Decimals Notes Appendix 2.K and 2.L – 3.6 Dividing Decimals and Whole Numbers by Decimals Fan N' Pick Cards	● Cooperative Learning ● Homework and Practice	**B**
		7. Activity: Chapter 3.7 Interpreting the Quotient		

#4	MP3 MP4 MP7 6.NS.B.3 ISTE.S-4	Warm-Up: On-line Interactive Practice Quiz (my.hrw.com) In-class practice *Holt-McDougal Mathematics Grade 6* pg. 124-125 #10-12 ● Objective: Students will use division to solve problems and infer the answer to the problem. ● Appendix Document: Appendix 2.C and 2.D – Chapter 3 Decimals Notes	● Homework and Practice	**C**
#6	MP1 MP3 MP6 6.EE.B.7	8. Activity: Chapter 3.8 Solving Decimal Equations Warm-Up: Solving one-step equations with whole numbers followed by in-class practice *Holt-McDougal Mathematics Grade 6* pg. 126-129 #7-8, 18-19, 30-33, 35-36 ● Objective: Students will use the Cooperative learning Structure called Fan N' Pick to evaluate one-step equations with decimals. ● Appendix documents: Appendix 2.C and 2.D – Chapter 3 Decimals Notes Appendix 2.M and 2.N – 3.8 Solving Decimal Equations Fan N' Pick Cards	● Cooperative Learning - Fan N' Pick ● Homework and Practice	**B**
#5	MP1 MP6 6.NS.B.4	9. Activity: Chapter 4.2 Greatest Common Factor In-class practice *Holt-McDougal Mathematics Grade 6* pg. 153-154 #7, 17-18, 37-40 ● Objective: Students will use the Cooperative learning Structure called Fan N' Pick in order to formulate the Greatest Common Factor (GCF) of two or more whole numbers less than 100 and know when to use GCF to solve problems. ● Appendix documents: Appendix 2.O and 2.P - Chapter 4 Number Theory and Fractions Notes Appendix 2.Q and 2.R – 4.2 Greatest Common Factor Fan N' Pick Cards	● Cooperative Learning - Fan N' Pick ● Homework and Practice	**B**
#5	MP3 MP4 MP7 6.EE.B.4	10. Activity: Chapter 4.3 Equivalent Expressions In-class practice *Holt-McDougal Mathematics Grade 6* pg. 158-159 #13-18, 31-49, 52 ● Objective: Students will use the Cooperative learning Structure called Fan N' Pick in order to factor numerical and algebraic expressions and write equivalent numerical and algebraic expressions. ● Appendix documents: Appendix 2.O and 2.P - Chapter 4 Number Theory and Fractions Notes Appendix 2.S and 2.T – 4.3 Equivalent Expressions Fan N' Pick Cards	● Cooperative Learning - Fan N' Pick ● Homework and Practice	**B**

#1	MP1 MP6 MP7 6.NS.C.7	11. Activity: Chapter 4.7 Comparing and Ordering Fractions Line-up – Give students a card as they come into class; each card with a different fraction (i.e. ½, 1-2/3, 7/8, etc.). Give students five minutes to line up in order from least to greatest without talking to each other. You can extend the activity if you see a lot of mistakes by allowing 30 seconds to talk and fix. Then discuss how they figured it out. In-class practice: *Holt-McDougal Mathematics Grade 6* pg. 178-179 #27-42, 43-45, 50-52 ● Objective: Students will compare and order fractions using a variety of strategies. ● Appendix document: Appendix 2.U – Fraction Cards (these fractions are less than 1; others greater than 1 can be made)	● Nonlinguistic Representations ● Homework and Practice	**C**
#5	MP6 MP7 MP8 6.NS.B.4	12. Activity: Chapter 5.1 Least Common Multiple In-class practice: *Holt-McDougal Mathematics Grade 6* pg. 196-197 #1, 14, 33-36, & 40 ● Objective: Students will use the Cooperative learning Structure called Fan N' Pick in order to formulate the Least Common Multiple (LCM) of a group of numbers and know when to use the LCM to solve problems. ● Appendix documents: Appendix 2.V and 2.W - Chapter 5 Fraction Operation Notes Appendix 2.X and 2.Y – 5.1 Least Common Multiple Fan N' Pick Cards	● Cooperative Learning - Fan N' Pick ● Homework and Practice	**B**
#6	MP1 MP2 MP3 MP4 MP6 MP8 6.NS.B.3	13. Activity: School Festival SBAC Performance Task ● Objective: Students will use the Cooperative learning Structure called Rally Coach in order to apply previous understandings about fractions to solve a complex Performance Task. The teacher will scaffold students through each Part and allow students to work cooperatively to solve the task. The teacher will allow the students to discuss their mathematics prior and correct misunderstandings prior to moving to the next Part of the Performance Task. http://dese.mo.gov/divimprove/assess/documents/asmt-sbac-math-gr5-sample-items.pdf ● Appendix documents: Appendix 2.Z - School Festival SBAC Performance Task and Scoring Guide	● Cooperative Learning - Rally Coach ● Setting Objectives and Providing Feedback ● Homework and Practice	**D**
#6	MP2 MP4	14. Activity: Chapter 5.4 Solving Fraction Equations: Addition and Subtraction In-class practice: *Holt-McDougal Mathematics Grade 6* pg. 208-209 #7, 14-15, 22-24, 26-31	● Cooperative Learning	**B**

	MP6 6.EE.C.7	• Objective: Students will use the Cooperative Learning Structure in order to solve equations by adding and subtracting fractions. • Appendix Documents: Appendix 2.V and 2.W - Chapter 5 Fraction Operation Notes Appendix 2.AA and 2.BB – 5.4 Solving Fraction Equations Fan N' Pick Cards	• Homework and Practice	
#4	MP5 6.NS.A.1	15. Activity: Division of Fractions Lessons 1-8 from New York State Common Core Mathematics Curriculum Grade 6, Module 2: http://www.engageny.org/resource/grade-6-mathematics-module-2 • Objective: Students will divide fractions and mixed numbers by modeling and using the standard algorithm. Students will use number lines, fraction strips and real-world scenarios to gain conceptual understanding of the division of fractions. • Appendix Documents: Appendix 2.CC and 2.DD - EngageNY Grade 6 Common Core Mathematics Curriculum for Arithmetic Operations Including Division of Fractions (Module 2)	• Nonlinguistic Representations • Cues, Questions and Advance Organizers • Homework and Practice	**B**
#6	MP2 MP3 MP4 6.EE.B.7	16. Activity: Solving Fraction Equations: Multiplication and Division In-class practice: *Holt-McDougal Mathematics Grade 6* pg. 226-227 #5, 14-15, 28-33, 36, 38-39 • Objective: Students will use the Cooperative learning Structure called Fan N' Pick in order to solve one-step equations with fractions using multiplication and division. • Appendix documents: Appendix 2.V and 2.W - Chapter 5 Fraction Operation Notes Appendix 2.EE and 2.FF – 5.4 Solving Multiplication and Division Fraction Equations Fan N' Pick Cards	• Cooperative Learning - Fan N' Pick • Homework and Practice	**B**
#1, #5	MP1 MP3 MP4 MP7 6.NS.B.3 6.NS.B.4	17. Pumpkin Puzzle • Objective: Students will work in groups to demonstrate their understanding of fractions, percents, and decimals. Teachers can extend this activity by asking students to predict how many shapes will fit on the inside of the Pumpkin. • Materials: Puffy shapes (https://www.discountschoolsupply.com/Product/ProductDetail.aspx?product=2843)	• Nonlinguistic Representations • Homework and Practice	**C**

		• Appendix documents: Appendix 2.GG – Pumpkin Puzzle Student Sheet Appendix 2.HH – Pumpkin Puzzle Instructions and Extensions	• Summarizing and Note Taking • Generating and Testing Hypotheses	

UNIT RESOURCES
Teacher Resources: • *Holt McDougal Mathematics Grade 6* textbook • *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com • Illustrative Mathematics: http://www.illustrativemathematics.org/ • Learnzillion: http://learnzillion.com/ • Grade 6 New York State Common Core Mathematics Curriculum: http://www.engageny.org/resource/grade-6-mathematics
Student Resources: • Thinking Blocks: http://www.mathplayground.com/thinkingblocks.html • Learnzillion: http://learnzillion.com/ • *Holt McDougal Mathematics Grade 6* textbook

- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com

Vocabulary:

These are words and definitions students will need to understand to complete the objectives for the unit.

- Factor – a number or expression that is multiplied by another number or expression to get a product
- Greatest Common Factor – the greatest common number that is a factor of two or more given numbers
- Least Common Multiple – the smallest positive number that is a multiple of two or more given numbers.
- Reciprocal – for a real number a not equal to zero, the reciprocal of a is 1/a. The product of reciprocals is 1.

Content Area: Math	**Course: Math 6**	**UNIT 3: Statistics and Probability**
Unit Description: Students will develop an understanding of statistical variability and will describe and summarize distributions.	**Unit Timeline**: ≈ 4 weeks	

DESIRED RESULTS

Transfer Goal - ***Students will be able to independently use their learning to…***

- Make sense of problems and persevere in solving them.

- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Understandings – ***Students will understand that… (Big Ideas)***

1. Mean, median, mode and range can be used to describe data.
2. Problems can be solved by collecting, organizing, and analyzing data.

Essential Questions: *Students will keep considering…*

- What are the measures of central tendency: mean, median, and mode?
- How are frequency tables helpful for creating histograms?
- What are the most accurate representations of the measure of central tendency of a data set?
- How do outliers impact the measures of central tendency?
- How does the interquartile range signal the presence of an outlier?
- How does the choice of interval size affect the appearance of a histogram?
- What does it mean for histograms to display data with quantitative independent variables?
- How do box-and-whisker plots show how data is distributed?

Students Will Know…	Standard	Students Will Be Able to …	Standard
		<u>Mathematical Practices</u>	
Previously, they…			
● Described characteristics of data such as the shape of the data and the middle number.		Make sense of problems and persevere in solving them.	MP1
● Graphed a given set of data using an appropriate graphical representation.		Reason abstractly and quantitatively.	MP2
		Construct viable arguments and critique the reasoning of others.	MP3
They will study…		Model with mathematics.	MP4
● Using mean, median, mode and range to describe data.	6.SP.3 6.SP.2	Use appropriate tools strategically.	MP5
● Solving problems by collecting, organizing, and analyzing data.	6.SP.1	Attend to precision.	MP6
● Describing distributions of data.		Look for and make use of structure.	MP7
	6.SP.4		
They can use the skills learned to…	6.SP.5	Look for and express regularity in repeated reasoning.	MP8
● Recognize misuses of graphical information and evaluate conclusions based on data analysis.	6.SP.5a 6.SP.5b	**<u>Grade Level Standards</u>**	
● Display distributions of data correctly for projects in social studies and science.	6.SP.5c 6.SP.5d	**Develop understanding of statistical variability.**	**6.SP.A**
See Vocabulary at the end of this unit.		Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	6.SP.A.1
		Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	6.SP.A.2
		Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a	6.SP.A.3

		measure of variation describes how its values vary with a single number. **Summarize and describe distributions.** Display numerical data in plots on a number line, including dot plots, histograms, and box plots. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	**6.SP.B** 6.SP.B.4 6.SP.B.5 6.SP.B.5a 6.SP.B.5b 6.SP.B.5c 6.SP.B.5d

EVIDENCE of LEARNING			
Understanding #1, #2	Standards MP6 6.SP.A.1	**Unit Performance Assessment**: **Description of Assessment Performance Task(s):** ***Unit Performance Assessment: Statistics and Probability*** (See Appendix 3.A and 3.B)	R/R Quadrant **C**

	6.SP.A.2 6.SP.A.3 6.SP.B.4	Students are being asked to: ● Calculate measures of central tendency (mean, median, and mode) from a data set ● Calculate the range of a data set. ● Determine which measure of central tendency best describes the data set. ● Determine the variation of a data set by calculating the interquartile range and the mean absolute deviation. ● Identify how to correctly display data distributions using box-and-whisker plots. **Teacher will assess:** Students will be able to… ● Correctly calculate the measures of central tendency, range, and variation ● Correctly evaluate the statistics of a basketball game. The nine selected responses and the performance task will assess the student's knowledge of operations with integers both as a skill and in a real-life situation. The performance task will assess the student's ability to evaluate the statistics involved in a basketball game. **<u>Performance:</u>** **Mastery:** ***Students will show that they really understand when they…*** complete the formative with a score of 80% or better. **Scoring Guide:** See Appendix 3.A and 3.B	

SAMPLE LEARNING PLAN				
Pre-assessment: District Benchmark Assessment				
Understanding	**Standards**	**Major Learning Activities:**	**Instructional Strategy:**	**R/R Quadrant:**
#1, #2	MP4 MP5 6.SP.A.2	1. Activity: LAB Collect Data to Explore Mean *Holt-McDougal Mathematics Grade 6* pg. 245. ● Objective: Students will collect data and use counters to find the mean of a set of data. ● Lesson Itinerary. o Teach and Discuss: Have students discuss how using counters to represent data is similar to creating a pictograph and a bar graph. o Close: Finding the mean of a set of data is like finding a common level among stacks of chips. o Assessment: Use counters to represent the data set. Rearrange the counters to find the mean of the data.	● Cooperative Learning - Think-Pair-Share ● Nonlinguistic Representations	**B**
#1, #2	MP1 MP5 MP7 6.SP.A.2 6.SP.A.3	2. Activity: 6-1 Mean, Median, Mode and Range from *Holt-McDougal Mathematics Grade 6* (p.246-249). ● Objective: Students will find the range, mean, median, and mode of a data set. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 6-1 Mean, Median, Mode, and Range from the online textbook. o Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). o Independent Practice: Practice problems on p.248-249. ● Appendix Documents: Appendix 3.C and 3.D - Chapter 6 – Data Collection and Analysis NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 3.E and 3.F - Cooperative Learning Structure – 6-1 Mean, Median, Mode and Range	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#2	MP2 MP3 MP6 6.SP.A.3	*3.* Activity: 6-2 Additional Data and Outliers from *Holt-McDougal Mathematics Grade 6* (p.250-253). ● Objective: Students will learn the effect of additional data and outliers. Lesson Itinerary.	● Summarizing and Note Taking	**B**

		○ Guided Notes or watch video and complete guided notes on 6-2 Additional Data and Outliers from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.252-253. ● Appendix Documents: Appendix 3.C and 3.D - Chapter 6 – Data Collection and Analysis NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 3.G and 3.H - Cooperative Learning Structure - 6-2 Additional Data and Outliers	● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	
#1, #2	MP1 MP2 MP6 6.SP.A.1 6.SP.A.3 6.SP.B.4	4. Activity: 6-3 Measures of Variation from *Holt-McDougal Mathematics Grade 6* (p.254-257). ● Objective: Students calculate, interpret, and compare measures of variation in a data set. Lesson Itinerary. ○ Guided Notes or watch video and complete guided notes on 6-3 Measures of Variation from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.256-257. ● Appendix Documents: Appendix 3.C and 3.D - Chapter 6 – Data Collection and Analysis NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 3.I and 3.J - Cooperative Learning Structure - 6-3 Measures of Variation	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#2	MP3 MP4 MP5 6.SP.A.2 6.SP.B.4 6.SP.B.5a	5. Activity: 6-4 Line Plots, Frequency Tables, and Histograms from *Holt-McDougal Mathematics Grade 6* (p.260-263). ● Objective: Students will record and organize data in line plots, frequency tables and histograms. Lesson Itinerary. ○ Guided Notes or watch video and complete guided notes on 6-4 Line Plots, Frequency Tables, and Histograms from the online textbook.	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick	**B**

		○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.262-263. ● Appendix Documents: Appendix 3.C and 3.D - Chapter 6 – Data Collection and Analysis NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 3.K and 3.L - Cooperative Learning Structure - 6-4 Line Plots, Frequency Tables, and Histograms	● Optional -Flipped Classroom Model	
#2	MP5 6.SP.A.2 6.SP.B.5a ISTE-S.3 ISTE-S.4	6. Activity: Frequency Distribution Extension from *Holt-McDougal Mathematics Grade 6* (p.264-265). ● Objective: Students will describe the frequency distribution of a data set and make a cumulative frequency table and histogram. Lesson Itinerary. ○ Introduce: Motivate students by collecting information using an online polling tool (polleverywhere.com, google forms or others: http://cooltoolsforschools.wikispaces.com/Quiz+and+Poll+Tools) about the number of hours they and their classmates spend on after-school activities. As a class create a frequency table and a histogram to represent the frequency distribution of the data. ○ Teach: Review the definition of mode and how it is the only measure of central tendency found on histograms. ○ Close: Summarize – Ask students to explain the difference between the frequency distribution of a data set and the cumulative frequency of the data.	● Cooperative Learning - Think-Pair-Share ● Nonlinguistic Representations ● Technology Integration with an online poll	**B**
#2	MP5 6.SP.B.5a ISTE-S.3 ISTE-S.4	7. Activity: Use a Survey to Collect Data from *Holt-McDougal Mathematics Grade 6* (p.266). ● Objective: Students use a survey using an online survey tool (polleverywhere.com, surveymonkey.com, google forms or others: http://cooltoolsforschools.wikispaces.com/Quiz+and+Poll+Tools) to collect and display data. Lesson Itinerary. ○ Teach: Discuss the importance of asking the same questions each time. Ask students why it is important that the first question they ask is whether the person has been surveyed by any other team.	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick	**B**

		○ Close: A properly conducted survey will yield dependable data. ○ Assessment: 1. Explain why members of the survey team should ask the same set of questions. 2. When someone says that they have already answered the survey questions, what could be the result asking the questions again?	● Optional -Flipped Classroom Model	
#1, #2	MP3 MP5 MP6 6.SP.B.5 6.SP. B.5a 6.SP. B.5b 6.SP. B.5c 6.SP. B.5d	8. Activity: 6-5 Describing Distributions from *Holt-McDougal Mathematics Grade 6* (p.268-271). ● Objective: Students will describe and compare data distributions by their center, spread, and shape using box-and-whisker plots or dot plots. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.270-271. ● Appendix Documents: Appendix 3.C and 3.D - Chapter 6 – Data Collection and Analysis NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 3.M and 3.N - Cooperative Learning Structure - 6-5 Describing Distributions	● Cooperative Learning - Think-Pair-Share ● Nonlinguistic Representations	**B**

UNIT RESOURCES

Teacher Resources:

- *Holt McDougal Mathematics Grade 6* textbook
- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com
- Illustrative Mathematics: http://www.illustrativemathematics.org/
- Learnzillion: http://learnzillion.com/
- Grade 6 New York State Common Core Mathematics Curriculum: http://www.engageny.org/resource/grade-6-mathematics
- Schoology
- Cooperative Learning Structures
  - Chapter 6 – Data Collection and Analysis NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)
  - Cooperative Learning Structure - 6-1 Mean, Median, Mode and Range
  - Cooperative Learning Structure - 6-2 Additional Data and Outliers
  - Cooperative Learning Structure - 6-3 Measures of Variation
  - Cooperative Learning Structure - 6-4 Line Plots, Frequency Tables, and Histograms
  - Cooperative Learning Structure - 6-5 Describing Distributions
- www.engageny.org

Student Resources:

- *Holt McDougal Mathematics Grade 6* textbook
- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com
- Learnzillion: http://learnzillion.com/
- Thinking Blocks: http://www.mathplayground.com/thinkingblocks.html
-

Vocabulary:

These are words and definitions students will need to understand to complete the objectives for the unit.

- Box-and-Whisker Plot – A data display that shows how data are distributed by using the median, quartiles, least value, and greatest value.
- Cumulative Frequency – The frequency of all data values that are less than or equal to a given value.
- Frequency – The number of times a data value occurs.
- Frequency Distribution – Description of the number of values in a data set that fall into each interval.
- Frequency Table – Tells the number of items an event, category, or group occurs.
- Histogram – A bar graph that shows the number of data items that occur within each interval.

- Interquartile Range – The difference between the first and third quartiles. It is a measure of the spread of the middle 50% of the data. A small interquartile range means that the data in the middle of the set are close in value. A large interquartile range means that the data in the middle are spread out.
- Line Plot – Uses a number line and x's or other symbols to show frequencies of values.
- Mean – The sum of all the items divided by the number of items in the set. (Sometimes called the average.)
- Median – The middle-value when the data are in numerical order, or the mean of the two middle values if there are an even number of items.
- Mode – The value or values that occur most often. There may be more than one mode for a data set. When all values occur an equal number of times, the data has no mode.
- Outlier – An outlier is a value in a set that is very different from the other values.
- Quartile – Quartiles are three values, one of which is the median, that divide a data set into fourths. Each quartile contains one-fourth, or 25%, of the data.
- Range – The difference between the greatest and least values in the set.
- Variation – The spread of the values.

Content Area: Math	Course: Math 6	UNIT 4: Ratio and Proportions
Unit Description: Students connect ratio and rate to whole number multiplication and division using concepts of ratio and rate to solve multi-step problems.	**Unit Timeline: 6** weeks	

DESIRED RESULTS

Transfer Goal - ***Students will be able to independently use their learning to build upon their abilities in mastering the 8Mathematical Practices***

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Understandings – ***Students will understand that… (Big Ideas)***

1. Ratio and rate connect to whole number multiplication and division.
2. The concept of ratio and rate can be used to solve problems real world problems
3. The concept of unit rate can be used to make predictions in proportional relationships
4. The proper labeling of a unit rate allows for cross curricular unit cancelling and conversions
5. Proportional ratios are linear and can be observed algebraically through line graphs
6. The application of rates in different situations require specific real world understandings and knowledge
7. The same point on a number line can be expressed as a fraction, decimal, or percent
8. Operations with fractions, decimals, and percentages is possible ONLY when working within the same form

Essential Questions: ***Students will keep considering…***

- How is a rate different from a ratio?
- In which form is a rate most helpful in problem solving?

- How would a problem solver use a ratio to support a decision based on a given circumstance?
- How can rates be compared as decimals, percentages, and fractions?
- What should I do when comparing rates that appear in different forms?
- Can we apply the same rules for solving proportions as we did when solving equations?
- What is the connection between a unit rate and the slope of a line?

Students Will Know…	Standard	Students Will Be Able to …	Standard

Previously, they… ● Solved Multiplication Equations ● Multiplied Decimals ● Found the Greatest Common Factor ● Translated Between Tables and Expressions ● Translated Between Words and Math ● Solved Decimal Equations ● Assigned Variables and Wrote Algebraic Expressions ● Divided Multi-Digit Whole Numbers ● Divided Decimals by Whole Numbers ● Divided Decimals by Decimals	6.EE.B.7 6.EE.B.7 6.NS.B.4 6.EE.A.2 6.EE.A.2 6.EE.B.7 6.EE.B.2 6.NS.B.2 6.NS.B.3 6.NS.B.3	**<u>Mathematical Practices</u>** Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Construct viable arguments and critique the reasoning of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning.	 MP1 MP2 MP3 MP4 MP5 MP6 MP7 MP8
They will study… ● How to write two quantities as a ratio ● The value of a unit rate as it relates to unit pricing ● How to use the unit rate to make predictions ● How equivalent ratios in a table show up on the (x,y) coordinate plane as a linear relationship ● When to set-up a proportion to find a missing quantity ● Rate and ratio reasoning toward real world problems ● How to locate and calculate a unit rate from a table ● How to write & solve a 1 step equation to solve for the missing percent or number ● How to write and show the position of an ordered pair in a coordinate plane	 6.RP.A.1 6.RP.A.2 6.RP.A.3 6.RP.A.3 6.NS.C.6 6.RP.A.1 6.RP.A.3 6.RP.A.3 6.RP.A.3 6.NS.C.6	**<u>Grade Level Standards</u>** Understand the concept of a ratio and use ratio language to describe a ratio relationship between 2 quantities. Understand the concept of a unit rate a/b associated with a ratio a:b and use rate language in the context of a ration relationship. *For example: "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar." We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.	 6.RP.A.1 6.RP.A.2 6.RP.A.3
They can use the skills learned to… ● Determine the better deal in everyday consumer situations ● Figure sales tax, discounts, and unit prices ● Make logical comparisons between 2 entities ● Make predictions from various mathematical forms ● Increase a student's comfort level in solving 1 step equations			

See Vocabulary at the end of this unit.		a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For 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?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 time the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. Find and position integers and other rational numbers on a Horizontal or vertical number line diagram; find and position Pairs of integers and other rational numbers on a coordinate plane.	6.RP.A.3a 6.RP.A.3b 6.RP.A.3c 6.RP.A.3d 6.NS.C.6c

EVIDENCE of LEARNING			
Understanding # 1, #2, #3, #4, #5, #6, #7, #8	Standards MP1 MP2 MP3 MP4 MP5 MP6 MP7 MP8 6.RP.A.1 6.RP.A.2 6.RP.A.3 6.NS.C.6	**Unit Performance Assessment**: **Description of Assessment Performance Task(s):** ***Unit Performance Assessment: Ratio and Proportion*** (See Appendix 4.A) **Teacher will assess:** Students will be able to… ● Apply ratio/rate understanding to decode word problem to make comparisons possible. ● Model real world scenarios found in situations faced everyday by consumers. ● Refute or defend a consumer based decision. **Performance:** **Mastery:** ***Students will show that they really understand when they…*** complete the formative with a score of 80% or better. **Scoring Guide:** See Appendix 4.B	R/R Quadrant **C**

SAMPLE LEARNING PLAN				
Pre-assessment: District Benchmark Assessment				
Understanding	**Standards**	**Major Learning Activities:**	**Instructional Strategy:**	**R/R Quadrant:**
# 1, #2	MP 2 MP 6 MP 7 6.RP.A.2 ISTE-S.3	*1.* Activity: 7-1 Ratio and Rates from *Holt-McDougal Mathematics Grade 6* (p. 286-289). ● Objective: Students will decode information found in a sentence, table, or diagram to write a ratio or rate based on a real life situation. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 7-1 Ratio and Rates from the online textbook. o Warm-Up and Complete an exit card or exit ticket using problems from the textbook in combination with cooperative learning structures found in Flip Booklet. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice: Practice Problems on p. 288-289. o Students will have access to a computer for the purpose of going online to find product sizes and cost in order to make comparison calculations to answer the question: What is the Better Deal? ● Appendix Documents: Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 4.E and 4.F - Cooperative Learning Structure-7.1 Ratio and Rates	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#3	MP 1 MP 2 MP 6 MP 7 6.RP.A.3	2. Activity: 7-2 Using Tables to Explore Equivalent Ratios and Rates from *Holt-McDougal Mathematics Grade 6* (p. 290-293). ● Objective: Students will multiply or divide a ratio to find an equivalent ratio in order to assistance them in persevering to find missing information in a table. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 7-2 Using Tables to Explore Equivalent Ratios and Rates from the online textbook. o Warm-Up and Complete an exit card or exit ticket using problems from the textbook in combination with cooperative learning structures found in Flip Booklet. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice Problems on p. 292-293. ● Appendix Documents: Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**

		Appendix 4.G and 4.H - Cooperative Learning Structure-7.2 Using Tables to Explore Equivalent Ratios		
#5	MP 1 MP 4 MP 7 6.NS.C.6	3. Activity: 7-3 Ordered Pairs from *Holt-McDougal Mathematics Grade 6* (p. 295-297) ● Objective: Students will use a coordinate grid to plot locations as a pre-requisite for representing the (independent, dependent) variables on the x-y axis. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on 7-3 Ordered Pairs from the online textbook. o Warm-up and Complete an exit card or exit ticket using problems from the textbook using cooperative learning structures found in Flip Booklet. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice Problems on p. 296-297 ● Appendix Documents: Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 4.I and 4.J - Cooperative Learning Structures - 7.3 Ordered Pairs NOTES	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#3, #5	MP1 MP3 MP4 MP7 6.RP.A.3	4. Activity: EXTENSION Graphing Equivalent Ratios and Rates from *Holt-McDougal Mathematics Grade 6* (p. 298-299) ● Objective: Students will discover that a series of equivalent ratios produces a graph with a constant rate (Linear Relationship) Lesson Itinerary. o Guided Notes or watch video and complete guided notes on Graphing Equivalent Ratios and Rates from the online textbook. o Warm-up and Complete an exit card or exit ticket using problems from the textbook in combination with cooperative learning structures found in Flip Booklet. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice Problems on p. 299	● Cooperative Learning ● Nonlinguistic Representations	**B**
#1, #2, #3, #4	MP 2 MP 4 MP 8 6.RP.A.1 ISTE-S.3	5. Activity: 7-4 Proportions from *Holt-McDougal Mathematics Grade 6* (p. 302-305) ● Objective: Students will utilize their knowledge of scale factor or the setting up/solving of 1 step equations to persevere in finding a missing value or variable. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on Proportions from the online textbook. o Warm-up and Complete an exit card or exit ticket using problems from the textbook in combination with cooperative learning structures found in Flip Booklet. (0.B – Cooperative Learning Flip Chart Reference)	● Cooperative Learning ● Nonlinguistic Representations	**C**

		o Independent Practice Problems on p. 304-305. o Students will create their own proportion word problems based on their individual interests and understanding on a computer or their personal handheld device that can be passed to a classmate to set-up and solve with proper labeling. ● Appendix Documents: Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 4.K and 4.L - Cooperative Learning Structures - 7.4 Proportions		
#1	MP 3 MP 4 6.RP.A.3	6. Activity: 7-5 Percents from *Holt-McDougal Mathematics Grade 6* (p. 309-312) ● Objective: Students will learn to define a percentage as part of a whole through modeling on a 10 by 10 grid and through expressing it as a fraction. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on Percents from online textbook. o Warm-up and Complete an exit card or exit ticket using problems from the textbook using cooperative learning structures found in Flip Booklet. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice Problems on p. 311-312. ● Appendix Documents: Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 4.M and 4.N - Cooperative Learning Structures - 7.5 Percents	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#7, #8	MP 1 MP 6 MP 7 6.RP.A.3	7. Activity: 7-6 Percents, Decimals, and Fractions from *Holt-McDougal Mathematics Grade 6* (p. 313-316) ● Objective: Students will learn multiple approaches to converting fractions, decimals, and percentages to one form in order to compare their relative location on a number line. Lesson Itinerary. o Guided Notes or watch video and complete guided notes on Percents, Decimals, and Fractions from online textbook. o Warm-up and Complete an exit card or exit ticket using problems from the textbook in combination with cooperative learning structures found in Flip Book. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice Problems on p. 315-316. ● Appendix Documents: Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**

		Appendix 4.O and 4.P - Cooperative Learning Structures - 7.6 Percents, Decimals, and Fractions		
#6, #8	MP 2 MP 4 MP 6 6.RP.A.3 ISTE-S.3 ISTE-S.6	8. Activity: 7-7 Percent of a Number from *Holt-McDougal Mathematics Grade 6* (p. 318-321) ● Objective: Students will act as consumers to model and solve real life word problems by representing the given situation as an equation or as a proportion. Lesson Itinerary. o Students will have access to a computer for the purpose of writing out and then calculating tax or discount amount from an advertisement found online. o Students will have access to a computer tip tool for the purpose of calculating a tip based on both 15% and 20% rates. o Guided Notes or watch video and complete guided notes on Percent of a Number from online textbook. o Warm-up and Completion of an exit card or exit ticket using problems from the textbook in combination with cooperative learning structures found in Flip Book. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice Problems on p. 320-321. ● Appendix Documents: Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 4.Q and 4.R - Cooperative Learning Structures - 7.7 Percent of a Number	● Homework and Practice ● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**C**
#6, #8	MP 4 MP 5 MP 8 6.RP.A.3 ISTE-S.3	9. Activity: 7-8 Solving Percent Problems from *Holt-McDougal Mathematics Grade 6* (p. 322-325) ● Objective: Students will model and solve real life mathematical word problems by representing the given situation as an equation or as a proportion. Lesson Itinerary. o Students will have access to a computer for the purpose of writing out and then calculating tax or discount amount from an advertisement found online. o Guided Notes or watch video and complete guided notes on Solving Percent Problems from online textbook. o Warm-up and Completion of an exit card or exit ticket using problems from the textbook in combination with cooperative learning structures found in Flip Book. (0.B – Cooperative Learning Flip Chart Reference) o Independent Practice Problems on p. 324-325. ● Appendix Documents:	● Homework and Practice ● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**C**

		Appendix 4.C and 4.D - Chapter 7- Proportional Relationships NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.) Appendix 4.S and 4.T - Cooperative Learning Structures - 7.8 Solving Percents		

UNIT RESOURCES

Teacher Resources:

- *Holt McDougal Mathematics Grade 6* textbook
- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com
- Illustrative Mathematics: http://www.illustrativemathematics.org/
- Learnzillion: http://learnzillion.com/
- Grade 6 New York State Common Core Mathematics Curriculum: http://www.engageny.org/resource/grade-6-mathematics
- Schoology
- Cooperative Learning Flip-Book designed by Angela Dickson (Bryan Middle School, Francis Howell School District)
- Cooperative Learning Structures
  - Chapter 7- Ratio and Proportion NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)
  - Cooperative Learning Structure-7.1 Ratio and Rates
  - Cooperative Learning Structure-7.2 Using Tables to Explore Equivalent Ratios and Rates
  - Cooperative Learning Structure-7.3 Order Pairs
  - Cooperative Learning Structure-7.4 Proportions
  - Cooperative Learning Structure-7.5 Percents
  - Cooperative Learning Structure-7.6 Percents, Decimals, and Fractions
  - Cooperative Learning Structure-7.7 Percent of a Number
  - Cooperative Learning Structure-7.8 Solving Percent Problems

Student Resources:

- *Holt McDougal Mathematics Grade 6* textbook
- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com
- Learnzillion: http://learnzillion.com/
- Thinking Blocks: http://www.mathplayground.com/thinkingblocks.html
- An internet connected device with capabilities to download required applications for use in class.

Vocabulary:

These are words and definitions students will need to understand to complete the objectives for the unit.

- Ratio-a comparison of two quantities using division.
- Equivalent Ratios-ratios that name the same comparison.
- Rate-a ratio that compares two quantities measured in units.
- Unit Rate-a rate in which the second quantity in the comparison is one unit.
- Coordinate Grid-a grid formed by the intersection of horizontal and vertical lines that is used to locate points.

- Ordered Pair- a pair of numbers that can be used to locate a point on a coordinate plane.
- Proportion- an equation that states that two ratios are equivalent.
- Percent-a ratio comparing a number to 100.

Content Area: Math	Course: Math 6	UNIT 5: Geometry
Unit Description: Students will Solve real-world and mathematical problems involving area, surface area, and volume.	**Unit Timeline:** 4 weeks	

DESIRED RESULTS

Transfer Goal - ***Students will be able to independently use their learning to…***

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Understandings – ***Students will understand that… (Big Ideas)***

1. Formulas can be used to calculate area.
2. Multiple smaller shapes can be used to construct one larger shape and the area of these smaller shapes can be used to calculate the area of the constructed shape.
3. There are different types of measurement depending on what you are measuring.

Essential Questions: *Students will keep considering…*

- How does what we measure influence how we measure?
- How can space be defined through numbers and measurement?
- How does investigating figures help us build our understanding of mathematics?
- What is the relationship between 2-dimensional shapes, 3-dimensional shapes and our world?

Students Will Know…	Standard	Students Will Be Able to …	Standard
They will study… ● The new vocabulary words and be able to apply them to the concepts. ● Area and surface area is expressed in square units. ● Volume is expressed in units cubed. ● Two –dimensional shapes can be assembled to form three-dimensional figures ● How to perform operations with multi-digit whole numbers and with decimals to hundredths. ● How to solve problems involving multiplication of fractions and mixed numbers. They can use the skills learned to… ● Given irregular figures, students will be able to divide the shape into triangles and rectangles ● Given a polygon, students will find the area using the decomposing shapes. ● Given a polygon students will calculate the area by decomposing into composite figures (triangles and rectangles). ● Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. ● Calculate the volume of a right rectangular prism. ● Apply the formula to solve real world mathematical problems involving volume with fractional edge lengths. ● Represent 3D figures using nets of triangles and rectangles. ● Solve real world problems involving surface areas using nets.	6.G.A.1 6.G.A.2 6.G.A.4	**<u>Mathematical Practices</u>** Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Construct viable arguments and critique the reasoning of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning. **<u>Grade Level Standards</u>** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	MP1 MP2 MP3 MP4 MP5 MP6 MP7 MP8 6.G.A.1 6.G.A.2

See Vocabulary at the end of this unit.		Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	6.G.A.3
		Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	6.G.A.4
		Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	6.RP.A.3d

EVIDENCE of LEARNING			
Understanding #1, #2	Standards 6.G.A.1	**Unit Performance Assessment**: **Description of Assessment Performance Task(s):** ***Unit Performance Assessment: Geometry*** (See Appendix 5.A) Students are being asked to: ● Calculate the area of a variety of figures. ● Identify shapes within the sketch of a birdhouse. ● Critique the work of another to calculate the area of the front of a birdhouse. **Teacher will assess:** Students will be able to… ● Accurately calculate area and apply it to real-world situations. This formative assessment should be completed after Learning Activities 1 and 2. It will include 6 multiple choice problems on area where they will be asked to demonstrate their understanding of 6.G.A.1. The 2 performance events are included to find area of composite figures. **Performance:** **Mastery:** ***Students will show that they really understand when they…*** complete the formative with a score of 80% or better. **Scoring Guide:** See Appendix 5.A	R/R Quadrant **B**

SAMPLE LEARNING PLAN				
Pre-assessment: District Benchmark Assessment				
Understanding	**Standards**	**Major Learning Activities:**	**Instructional Strategy:**	**R/R Quadrant:**
#5	MP1 MP2 MP3 6.RP.A.3	1. Activity: Converting to Customary Units *Holt-McDougal Mathematics Grade 6* p. 342-345. ● Objective: Students will convert to different customary units. ● Appendix Documents: Appendix 5.B and 5.C - Cooperative Learning Structure - 8.1 Customary Units	● Cooperative Learning	**B**
#5	MP1 MP6 MP7 6.RP.A.3d	2. Activity: Converting to Metric Units *Holt-McDougal Mathematics Grade 6* p. 346-347. ● Objective: Students will convert to different metric units. ● Appendix Documents: Appendix 5.D and 5.E - Cooperative Learning Structure – 8.2 Converting Metric Units	● Cooperative Learning	**B**
#1, 2	MP3 MP4 MP6 6.G.A.1	3. Activity: Area of Rectangles and Parallelograms *Holt-McDougal Mathematics Grade 6* p. 350-353. ● Objective: Students will find the area of rectangles and parallelograms. ● Appendix Documents: Appendix 5.F and 5.G - Cooperative Learning Structure – 8.3 Area of Rectangles and Parallelograms	● Cooperative Learning	**B**
#1, #2	MP3 MP4 MP7 MP8	4. Activity: Area of Triangles, Quadrilaterals, and Polygons – Lessons 1-6 from New York State Common Core Mathematics Curriculum Grade 6, Module 5 TEACHER MATERIALS, p. 11-92: http://www.engageny.org/resource/grade-6-mathematics-module-5	● Summarizing and Note Taking	**B and C**

	6.G.A.1	● Objective: Students will use formula to calculate the area of polygons and shapes composed of polygons. Lesson Itinerary. o The Area of Right Triangles (EngageNY p. 28-37) OR 8-4 Area of Triangles and Trapezoids from *Holt-McDougal Mathematics Grade 6* o The Area of All Triangles Using Height and Base (EngageNY p. 38-63) OR 8-4 Area of Triangles and Trapezoids from *Holt-McDougal Mathematics Grade 6* o The Area of Polygons Through Composition and Decomposition (EngageNY p. 64-83) OR 8-4 Area of Triangles and Trapezoids and 8-5 Area of Composite Figures from *Holt-McDougal Mathematics Grade 6* o Area in the Real World (EngageNY p. 84-92) ● Appendix Documents: Appendix 5.H and 5.I - EngageNY Grade 6 Common Core Mathematics Curriculum for Area, Surface Area and Volume Problems (Module 5) Appendix 5.J and 5.K - Cooperative Learning Structure – 8.4 Area of Triangles and Trapezoids Appendix 5.L and 5.M - Cooperative Learning Structure – 8.5 Area of Composite Figures	● Identifying Similarities and Differences ● Nonlinguistic Representations ● Homework and Practice ● Cooperative Learning	
#1, #3	MP4 MP6 6.G.A.3	5. Activity: Polygons on the Coordinate Plane – Lessons 7-10 from New York State Common Core Mathematics Curriculum Grade 6, Module 5 TEACHER MATERIALS, p. 93-142: http://www.engageny.org/resource/grade-6-mathematics-module-5 ● Objective: Students will 1) draw polygons in the coordinate plane given coordinates for the vertices, 2) use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate and 3) apply these techniques in the context of solving real-world and mathematical problems. Lesson Itinerary. o Distance on the Coordinate Plane (EngageNY p. 94-104) o Drawing Polygons in the Coordinate Plane (EngageNY p. 105-116) o Determining Perimeter and Area of Polygons on the Coordinate Plane (EngageNY p. 117-132) o Distance, Perimeter, and Area in the Real World (EngageNY p. 133-141) o OR 9-4 Polygons in the Coordinate Plane from *Holt-McDougal Mathematics Grade 6*	● Summarizing and Note Taking ● Identifying Similarities and Differences ● Nonlinguistic Representations ● Homework and Practice	**B and C**

		• Appendix Documents: Appendix 5.H and 5.I - EngageNY Grade 6 Common Core Mathematics Curriculum for Area, Surface Area and Volume Problems (Module 5)		
#1, #3	MP1 MP5 MP8 6.G.A.2	6. Activity: Volume of Right Rectangular Prisms – Lessons 11-14 from New York State Common Core Mathematics Curriculum Grade 6, Module 5 TEACHER MATERIALS, p. 150-210: http://www.engageny.org/resource/grade-6-mathematics-module-5 • Objective: Students will 1) find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, 2) show that the volume is the same as would be found by multiplying the edge lengths of the prism and 3) apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. Lesson Itinerary. o Volume with Fractional Edge Lengths and Unit Cubes (EngageNY p. 151-169) o Drawing Polygons in the Coordinate Plane (EngageNY p. 170-185) o From Unit Cubes to the Formulas for Volume (EngageNY p. 117-132) o The Formulas for Volume (EngageNY p. 186-198) OR 8-6 Volume of Prisms from *Holt-McDougal Mathematics Grade 6* o Volume in the Real World (EngageNY p. 199-210) • Appendix Documents: Appendix 5.H and 5.I - EngageNY Grade 6 Common Core Mathematics Curriculum for Area, Surface Area and Volume Problems (Module 5) Appendix 5.N and 5.O - Cooperative Learning Structure – 8.6 Volume of Prisms	• Summarizing and Note Taking • Identifying Similarities and Differences • Nonlinguistic Representations • Homework and Practice • Cooperative Learning	**B and C**
# 1, #2, #5	MP2 MP6 MP8 6.G.A.2 6.G.A.4	7. Activity: Nets and Surface Areas – Lessons 15-19a from New York State Common Core Mathematics Curriculum Grade 6, Module 5 TEACHER MATERIALS, p. 211-314: http://www.engageny.org/resource/grade-6-mathematics-module-5 • Objective: Students will 1) represent three-dimensional figures using nets made up of rectangles and triangles, 2) use the nets to find the surface area of these figures and 3) apply these techniques in the context of solving real-world and mathematical problems. Students will also 1) find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, 2) show that the volume is the same as would be found by multiplying the edge lengths of the prism and 3) apply the formulas V = l w h and V = b h to find volumes of right	• Summarizing and Note Taking • Identifying Similarities and Differences • Nonlinguistic Representations	**B and C**

		rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. Lesson Itinerary. o Representing Three-Dimensional Figures Using Nets (EngageNY p. 213-245) o Constructing Nets (EngageNY p. 246-261) o From Nets to Surface Area (EngageNY p. 262-276) *o* Determining Surface Area of Three-Dimensional Figures (EngageNY p. 277-287) OR 8-7 Surface Area from *Holt-McDougal Mathematics Grade 6* *o* Surface Area and Volume in the Real World (EngageNY p. 288-300) *o* Applying Surface Area and Volume to Aquariums (EngageNY p. 301-314) ● Appendix Documents: Appendix 5.B and 5.C - EngageNY Grade 6 Common Core Mathematics Curriculum for Area, Surface Area and Volume Problems (Module 5) Appendix 5.P and 5.Q - Cooperative Learning Structure – 8.7 Surface Area	● Homework and Practice ● Cooperative Learning	
#2, #5	MP5 6.G.A.2	8. Activity: LAB Explore Volume of Prisms *Holt-McDougal Mathematics Grade 6* p. 366. ● Objective: Students will use centimeter cubes to find the volume of prisms.	● Nonlinguistic Representations ● Homework and Practice	**B**
# 1, #2, #3	MP5 6.G.A.4	9. Activity: LAB Model Three-Dimensional Figures *Holt-McDougal Mathematics Grade 6* p. 372-373. ● Objective: Students will use a net to build a three-dimensional figure.	● Nonlinguistic Representations ● Homework and Practice	**B**
#1, #2, #3, #4	MP2 6.G.A.1 6.G.A.2 6.G.A.3 6.G.A.4	10. Activity: Real-World Connections *Holt-McDougal Mathematics Grade 6* p. 379 ● Objective: Assess students' ability to apply concepts and skills from the chapter in a real-world context.	● Homework and Practice	**B**

UNIT RESOURCES
Teacher Resources: ● *Holt McDougal Mathematics Grade 6* textbook (Sections 8-3 to 8-7 and Section 9-4) ● *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com ● Illustrative Mathematics: http://www.illustrativemathematics.org/ ● Learnzillion: http://learnzillion.com/ ● Grade 6 New York State Common Core Mathematics Curriculum: http://www.engageny.org/resource/grade-6-mathematics ● Scholastic Math Magazines
Student Resources: ● *Holt McDougal Mathematics Grade 6* textbook ● *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com ● Learnzillion: http://learnzillion.com/ ● Thinking Blocks: http://www.mathplayground.com/thinkingblocks.html ●
Vocabulary: These are words and definitions students will need to understand to complete the objectives for the unit. ● Net-arrangement of 2 dimensional figures that can be folded to form a polyhedron ● Surface Area-the sum of the areas of the faces, or surfaces, of a 3 dimensional figure ● Area-number of square units needed to cover a surface ● Volume-number of cubic units needed to fill a given space ● Rectangular Prism-a polyhedron whose bases are rectangles and whose other faces are rectangles ● Triangular Prism-a polyhedron whose bases are triangles and whose other faces are rectangles ● Cylinder-a 3 dimensional figure with 2 parallel congruent circular bases connected by a curve lateral surface

Content Area: Math	Course: Math 6	UNIT 6: Integers
Unit Description: Students will work with integers to graph points in the coordinate plane; compare and order integers; and identify and use functions to determine missing values.	**Unit Timeline**: 5 weeks	

DESIRED RESULTS
Transfer Goal - ***Students will be able to independently use their learning to…*** ● Make sense of problems and persevere in solving them. ● Reason abstractly and quantitatively. ● Construct viable arguments and critique the reasoning of others. ● Model with mathematics. ● Use appropriate tools strategically. ● Attend to precision. ● Look for and make use of structure. ● Look for and express regularity in repeated reasoning.

Understandings – ***Students will understand that… (Big Ideas)***

1. Graphing integers on a coordinate plane requires an x-coordinate and a y-coordinate.
2. The absolute value of integers is its distance from zero.
3. You can use a number line to compare and order integers.
4. Rational numbers include whole number, decimals, fractions, percents, and integers.
5. You can locate and graph points on a coordinate plane.
6. You can draw polygons in the coordinate plane and find the lengths of their sides.
7. Transformations are the changing positions of figures in the coordinate plane using reflection, rotation, and translation with congruent figures.
8. Equations can be written from data in a table and used to predict missing values.
9. Functions may be linear and plotted on the coordinate plane using ordered pairs and graphs.
10. Dependent variables (y) are impacted directly by independent variables (x).
11. Identifying the rate of change will determine the slope of a line on a coordinate plane.
12. Inequalities can be graphed on a number line.

Essential Questions: ***Students will keep considering…***

- How do I graph integers on a coordinate plane?
- How do you find an integer's opposite?
- How do you compare and order integers?
- How do you locate and graph points on a coordinate plane?
- How do you draw polygons in the coordinate plane and find the lengths of their sides?
- How do you use translation, reflection, and rotation to change the positions of figures in the coordinate plane?
- How do you use data in a table to write an equation for a function?
- How do you use the equation to find missing values and make predictions?
- How do you represent linear functions using ordered pairs and graphs?
- Why are the x- and y- axes classified as independent and dependent variables?
- Why is it important to know slope and the rate of change?

Students Will Know…	Standard	Students Will Be Able to …	Standard
Previously, they…		**Mathematical Practices**	
● Graphed and located ordered pairs of whole numbers on a coordinate grid.	6.EE.C.9	Make sense of problems and persevere in solving them.	MP1
● Compared and ordered whole numbers, decimals, and fractions.	6.RP.A.3	Reason abstractly and quantitatively.	MP2
● Created and analyzed different types of graphs.	6.SP.B.4		
● Graphed ordered pairs on the coordinate plane.		Construct viable arguments and critique the reasoning of others.	MP3
● Studied ratios and rates.	6.RP.A.2		
● Solved algebraic equations by using inverse operations.	6.EE.B.5	Model with mathematics.	MP4
		Use appropriate tools strategically.	MP5
They will study…			
● Using integers to represent real-life situations.	6.NS.C.5	Attend to precision.	MP6
● Graphing and locating ordered pairs on four quadrants of a coordinate plane.	6.EE.C.9	Look for and make use of structure.	MP7
● Using transformations to change the positions of figures in the coordinate plane.	6.G.A.3	Look for and express regularity in repeated reasoning.	MP8
● Special relationships between variables called functions.	6.EE.C.9	**Grade Level Standards**	
● Graphing functions on the coordinate plane.	6.EE.C.9		
● Finding rates of change that describe functions.	6.RP.A.3	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	6.EE.B.8
● Writing inequalities.	6.EE.B.8		
They can use the skills learned to…			
● Interpret graphs of functions that represent real-world situations.	6.EE.C.9		
● Solve multi-step equations with integers and positive and negative fractions and decimals.	6.EE.B.5	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and*	6.EE.B.9
● Find the total cost of items or services that charge by the number of units purchased.	6.RP.A.3		
● Analyze data and make predictions about linear functions in math and science courses.	6.EE.C.9		
See Vocabulary at the end of this unit.			

		times, and write the equation d = 65t to represent the relationship between distance and time.	
		Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	6.NS.C.5
		Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	6.NS.C.6
		Understand ordering and absolute value of rational numbers.	6.NS.C.7
		a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*	6.NS.C.7a
		b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 ºC > –7 ºC to express the fact that –3 ºC is warmer than –7 ºC.*	6.NS.C.7b
		c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.	6.NS.C.7c
		d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance*	6.NS.C.7d

		less than –30 dollars represents a debt greater than 30 dollars.	
		Solve real-world and mathematical problems by graphing 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.	6.NS.C.8
		Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	6.G.A.3
		Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.	6.RP.A.3

EVIDENCE of LEARNING			
Understanding	Standards	**Unit Performance Assessment**: **Description of Assessment Performance Task(s):**	R/R Quadrant
#1, #2, #3, #4, #5, #6, #7	MP3 MP4 MP7 6.NS.C.5 6.NS.C.6 6.NS.C.7 6.G.A.3	***Unit Performance Assessment: Integers*** (See Appendix 6.A and 6.B) Students are being asked to: ● Graph integers on a coordinate plane that requires an x-coordinate and a y-coordinate. ● Compare the absolute value of integers. ● Order integers from least to greatest. ● Locate and graph points on a coordinate plane. ● Draw polygons in the coordinate plane and find the lengths of their sides. ● Reflect and rotate points in the coordinate plane.	**C**

		Teacher will assess: Students will be able to… ● Correctly use integers to graph points in the coordinate plane. ● Compare and order integers. ● Apply transformations (reflection, rotation, and translation) to a figure on the coordinate plane. ● Graph integers on the coordinate plane. ● Use the coordinate plane to depict the location of objects in a campsite. ● Move a coordinate to change the shape of the campsite and explain their reasoning. The eleven selected responses and the performance task will assess the student's knowledge of integers and the coordinate plane both as a skill and in a real-life situation. The performance task will assess the student's ability to use the coordinate plane to depict the location of objects in a campsite and change its shape to a non-quadrilateral by moving a point. **<u>Performance:</u>** **Mastery:** ***Students will show that they really understand when they…*** complete the formative with a score of 80% or better. **Scoring Guide:** See Appendix 6.A and 6.B	

SAMPLE LEARNING PLAN				
Pre-assessment: District Benchmark Assessment				
Understanding	**Standards**	**Major Learning Activities:**	**Instructional Strategy:**	**R/R Quadrant:**
#1, #2	MP3 MP4 MP5 6.NS.C.5 6.NS.C.6 6.NS.C.7	1. Activity: 9-1 Integers and Absolute Value from *Holt-McDougal Mathematics Grade 6* (p.392-395). ● Objective: Students identify and graph integers and find opposites. Lesson Itinerary. ○ Watch video and complete guided notes on 9-1 Integers and Absolute Value from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.394-395. ● Appendix Documents: Appendix 6.C and 6.D - Chapter 9 – Integers and the Coordinate Plane NOTES Appendix 6.E and 6.F - Cooperative Learning Structure – 9.1 Integers and Absolute Value	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#3	MP5 MP7 MP8 6.NS.C.7	2. Activity: 9-2 Comparing and Ordering Integers from *Holt-McDougal Mathematics Grade 6* (p.396-399). ● Objective: Students will compare and order integers. Lesson Itinerary. ○ Watch video and complete guided notes on 9-2 Comparing and Ordering Integers from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.398-399. ● Appendix Documents: Appendix 6.C and 6.D - Chapter 9 – Integers and the Coordinate Plane NOTES Appendix 6.G and 6.H - Cooperative Learning Structure – 9.2 Comparing and Ordering Integers	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#4	MP2 6.NS.C.6	3. Activity: EXTENSION Negative Rational Numbers from *Holt-McDougal Mathematics Grade 6* (p.400-401). ● Objective: Students will use the order of operations to simplify expressions. Lesson Itinerary.	● Cooperative Learning -	**B**

		○ INTRODUCE: MOTIVATE - Have students suggest several rational numbers. Draw a number line, and choose students to graph the rational numbers they chose. Then, use the number line to make comparison statements for the rational numbers. ○ TEACH: GUIDED INSTRUCTION - In this lesson, students learn to compare, and order rational numbers. First introduce rational numbers and teach students how to graph them on a number line. Then, use the number line to compare and order rational numbers. ○ CLOSE: SUMMARIZE – Review rational numbers with the students and how to use a number line to compare and order them. ○ Independent Practice: Practice problems on p.400-401.	Think-Pair-Share ● Nonlinguistic Representations	
#5	MP1 MP4 MP7 6.NS.C.6	4. Activity: 9-3 The Coordinate Plane from *Holt-McDougal Mathematics Grade 6* (p.404-407). ● Objective: Students will locate and graph points on a coordinate plane. Lesson Itinerary. ○ Watch video and complete guided notes on 9-3 The Coordinate Plane from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.406-407. ● Appendix Documents: Appendix 6.C and 6.D - Chapter 9 – Integers and the Coordinate Plane NOTES Appendix 6.I and 6.J - Cooperative Learning Structure – 9.3 The Coordinate Plane	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#6	MP4 MP6 MP8 6.G.A.3	5. Activity: 9-4 Polygons in the Coordinate Plane from *Holt-McDougal Mathematics Grade 6* (p.408-411). ● Objective: Students will draw polygons in the coordinate plane and find the lengths of their sides. Lesson Itinerary. ○ Watch video and complete guided notes on 9-4 Polygons in the Coordinate Plane from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.410-411.	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped	**B**

		● Appendix Documents: Appendix 6.C and 6.D - Chapter 9 – Integers and the Coordinate Plane NOTES Appendix 6.K and 6.L - Cooperative Learning Structure – 9.4 Polygons in the Coordinate Plane	Classroom Model	
#7	MP3 MP7 MP8 6.NS.C.6	6. Activity: 9-5 Transformations in the Coordinate Plane from *Holt-McDougal Mathematics Grade 6* (p.412-415). ● Objective: Students will use translations, reflections, and rotations to change the positions of figures in the coordinate plane. Lesson Itinerary. ○ Watch video and complete guided notes on 9-5 Transformations in the Coordinate Plane from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.414-415. ● Appendix Documents: Appendix 6.C and 6.D - Chapter 9 – Integers and the Coordinate Plane NOTES Appendix 6.M and 6.N - Cooperative Learning Structure – 9.5 Transformations in the Coordinate Plane	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#8	MP1 MP4 MP8 6.EE.C.9	7. Activity: 10-1 Tables and Functions from *Holt-McDougal Mathematics Grade 6* (p.432-435). ● Objective: Students will use data in a table to write an equation for a function and use the equation to find a missing value. Lesson Itinerary. ○ Watch video and complete guided notes on 10-1 Tables and Functions from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.434-435. ● Appendix Documents: Appendix 6.O and 6.P - Chapter 10 – Functions Notes Appendix 6.Q and 6.R - Cooperative Learning Structure – 10.1 Tables and Functions	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**
#9	MP2 MP3	8. Activity: 10-2 Graphing Functions from *Holt-McDougal Mathematics Grade 6* (p.436-439). ● Objective: Students will represent linear functions using ordered pairs and graphs.		**B**

	MP5 6.EE.C.9	Lesson Itinerary. ○ Watch video and complete guided notes on 10-2 Graphing Functions from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.438-439. ● Appendix Documents: Appendix 6.O and 6.P - Chapter 10 – Functions Notes Appendix 6.S and 6.T - Cooperative Learning Structure – 10.2 Graphing Functions	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	
#10	MP1 6.EE.C.9	9. Activity: EXTENSION Function Notation from *Holt-McDougal Mathematics Grade 6* (p.440-441). ● Objective: Students will identify the independent and dependent variables in a real-world situation. ● Lesson Itinerary. ○ INTRODUCE: MOTIVATE – Present a real-world situation, such as hours worked and money earned. Explain that one of these variables is *dependent* on the other. ○ TEACH: GUIDED INSTRUCTION – Explain that the words *dependent* and *independent* can be interchanged with input and output respectively, words that have been used in previous lessons. ○ SUMMARIZE: SUMMARIZE – Ask students to describe the difference between a dependent variable and an independent variable in a function, using their own words. Students may use an example to explain. ○ Independent Practice: Practice problems on p.440-441.	● Cooperative Learning - Think-Pair-Share ● Nonlinguistic Representations	**C**
#11	MP2 MP5 MP7 6.RP.A.3	10. Activity: 10-3 Slope and Rate of Change from *Holt-McDougal Mathematics Grade 6* (p.442-445). ● Objective: Students will find rates of change and slope. Lesson Itinerary.	● Summarizing and Note Taking ● Cooperative Learning -	**B**

		○ Watch video and complete guided notes on 10-3 Slope and Rate of Change from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.444-445. ● Appendix Documents: Appendix 6.O and 6.P - Chapter 10 – Functions Notes Appendix 6.U and 6.V - Cooperative Learning Structure – 10.3 Slope and Rate of Change	Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	
#12	MP1 MP4 MP6 6.EE.B.8	11. Activity: 10-4 Inequalities from *Holt-McDougal Mathematics Grade 6* (p.446-449). ● Objective: Students read and write inequalities and graph them on a number line. Lesson Itinerary. ○ Watch video and complete guided notes on 10-4 Inequalities from the online textbook. ○ Warm-Up and Complete an exit card using problems from the textbook using cooperative learning structures (Fan N' Pick, Showdown, Round Robin, etc…). ○ Independent Practice: Practice problems on p.448-449. ● Appendix Documents: Appendix 6.O and 6.P - Chapter 10 – Functions Notes Appendix 6.W and 6.X - Cooperative Learning Structure – 10.4 Inequalities	● Summarizing and Note Taking ● Cooperative Learning - Showdown, Rally Coach or Fan N' Pick ● Optional -Flipped Classroom Model	**B**

UNIT RESOURCES

Teacher Resources:

- *Holt McDougal Mathematics Grade 6* textbook (Sections 8-3 to 8-7 and Section 9-4)
- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com
- Illustrative Mathematics: http://www.illustrativemathematics.org/
- Learnzillion: http://learnzillion.com/
- Grade 6 New York State Common Core Mathematics Curriculum: http://www.engageny.org/resource/grade-6-mathematics
- Schoology
- Cooperative Learning Structures
  - Chapter 9 – Integers and the Coordinate Plane NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)
  - Chapter 10 - Functions NOTES (May be used in conjunction with the Online Textbook Videos as the notes are aligned to the videos.)
  - Cooperative Learning Structure – 9.1 Integers and Absolute Value
  - Cooperative Learning Structure – 9.2 Comparing and Ordering Integers
  - Cooperative Learning Structure – 9.3 The Coordinate Plane
  - Cooperative Learning Structure – 9.4 Polygons in the Coordinate Plane
  - Cooperative Learning Structure – 9.5 Transformations in the Coordinate Plane
  - Cooperative Learning Structure – 10.1 Tables and Functions
  - Cooperative Learning Structure – 10.2 Graphing Functions
  - Cooperative Learning Structure – 10.3 Slope and Rate of Change
  - Cooperative Learning Structure – 10.4 Inequalities

Student Resources:

- *Holt McDougal Mathematics Grade 6* textbook (Sections 8-3 to 8-7 and Section 9-4)
- *Holt McDougal Mathematics Grade 6* textbook on-line: my.hrw.com
- Illustrative Mathematics: http://www.illustrativemathematics.org/
- Learnzillion: http://learnzillion.com/
- Thinking Blocks: http://www.mathplayground.com/thinkingblocks.html

Vocabulary:

These are words and definitions students will need to understand to complete the objectives for the unit.

- Positive numbers – numbers greater than 0. They may be written with a positive (+), but they are usually written without it.
- Negative numbers – numbers less than 0. They are always written with a negative sign (-).
- Opposites – number with the same distance from 0 but on different sides of 0. Zero is its own opposite.
- Integers – the set of all whole numbers and their opposites.

- Rational numbers – a number that can be written as a ratio, with any integer as the numerator, and any integer except 0 as the denominator.
- Coordinate plane – a coordinate grid formed by two number lines in a plane that intersect at right angles. The point of intersection is the zero on each number line.
- Axes – two number lines on the coordinate plane.
- X-axis – the horizontal axis on a coordinate plane.
- Y-axis – the vertical line on a coordinate plane.
- Quadrants – Four areas in the coordinate plane divided by two axes.
- Origin – Point where the axes intersect. The ordered pair for the origin is (0, 0)
- Coordinates – Numbers in an ordered pair.
- X-coordinate – The first number in a coordinate.
- Y-coordinate – The second number in a coordinate.
- Translation – A transformation in a coordinate plane where a figure moves along a straight line. (Remember all figures are congruent in each of these transformations.)
- Reflection – A transformation in a coordinate plane where a figure shows a mirror image. (Remember all figures are congruent in each of these transformations.)
- Rotation – A transformation in a coordinate plane where a figure moves around in a fixed position. (Remember all figures are congruent in each of these transformations.)
- Function – A rules that relates two quantities so that each input value corresponds to exactly one output value.
- Input – The value (x) substituted into an expression or function.
- Output – The value (y) that results from the substitution of a given input into an expression or function.
- Linear equation – The equation whose solutions form a straight line on a coordinate plane.
- Independent variable – Variable (x) representing the input of a function.
- Dependent variable – Variable (y) representing the output of a function.
- Rate of change – A ratio compares the difference between two output values to the difference between the corresponding input values.
  rate of change = change in y-values / change in x-values
- Slope – The constant rate of change.
- Inequality –Statement where two quantities are either equal or may not be equal. An inequality uses one of the following symbols.
- Algebraic inequality – An inequality that contains a variable.
- Solution set – An inequality may have more than one solution. Together, all of the solutions form a solution set.
- Compound inequality – The result of combining two inequalities. The words “and” and “or” are used to describe how the two parts are related.