

Grade 6
New Bedford Public Schools - Mathematics Curriculum Map for 2014-2015

Concept Focus Unit	Domains/Standards	Time
<u>Unit 1:</u> Ratios	6.RP1, RP3 a,d, SMP: 1,4,5	12 days
<u>Unit 2:</u> Rates, including percent	6.NS.3,6NS8,6RP2,RP3b,c SMP: 2,5,7	10 days
<u>Unit 3:</u> Computation/Factors/Multiples	6.NS.2,3,4 (MA4a) SMP: 2,7	11 days
<u>Unit 4:</u> Dividing Fractions	6.NS1 SMP: 1,3,8	11 days
<u>Unit 5:</u> Representing Relationships	6.EE.6,6.EE.9,6.RP3,6.RP.3a,6.NS.3 SMP: 4,8	15 days
<u>Unit 6:</u> Extending the Number System	6.NS.5, 6.NS.6 -6a, 6.NS.7 a-d SMP: 2,3,4,5,6	13 days
<u>Unit 7:</u> Relationships in the coordinate plane (The Number System – Rational Numbers and Integers)	6.NS.6-b-c, 6.NS.8, 6.G 3 SMP: 7	12 days
<u>Unit 8:</u> Algebraic Expressions	6.EE.1,2-a-c,3,4 SMP: 2,3,7,8	12 days
<u>Unit 9:</u> Understanding, writing, and solving equations and inequalities	6.EE.5-8 SMP: 1,2,7	16 days
<u>Unit 10:</u> Problem Solving with 2-D shapes	6.G 1, 6.EE.2-c SMP: 1,4,6	11 days
<u>Unit 11:</u> Problem Solving with Volume and Surface Area	6.G2,4,6.EE.2c SMP: 5,6,7	11 days
<u>Unit 12:</u> Understanding Data Distributions (Statistics)	6.SP.1, 6.SP.2, 6.SP.3, SMP: 1,4	14 days
<u>Unit 13:</u> Analyzing Data	6.SP.4,5 a-d, SMP: 3,5,6,8	13 days
<u>PARCC testing:</u> Performance Based Assessment (PBA): March 16-April 10 computer-based; March 23 – April 3 paper-based End of Year assessment (EOY): May 4 – 29 computer-based; May 11 – 22 paper-based		
Review and Extend	All Standards	May/June
Final Assessment - District benchmark	All Standards	June

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* This Math Curriculum Map reflects PARCC released pacing/unit guides 1/15/13 Dana Center

September 20This NBPS

Math Curriculum map reflects the MA 2011 Mathematics Curriculum Frameworks and is aligned to the Common Core State Standards for mathematical content as well as the following eight standards of Mathematical practice.

Standards for Mathematical Practice (SMP)

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

The Standards for Mathematical Practice (SMP) will need to be an integral part of mathematical instruction. In grades 6-8, each instructional unit will highlight suggested standards of mathematical practice to focus on for that unit. Teachers are encouraged to use any standards of math practice that are appropriate for any given lesson but the assessment for that unit will incorporate the focus SMP for that unit. In this way, teachers will assure that each of the 8 SMP will be a focus in several units throughout the year.

WIDA English Language Development standard 3 - The Language of Mathematics

English language learners **communicate** information, ideas and concepts necessary for academic success in the content area of **Mathematics**.

Unit plans will include specific Performance Indicators (PI) and performance tasks and lesson plans will need to include specific language objectives appropriate to the content and ELD level of students.

Listed below are important and useful resources available on the Internet for teachers. Please add appropriate online resources as needed.

Website:	Notes:
www.ati-online.com (select Galileo K-12)	Each teacher will receive access information to the Galileo K-12 program, which will be used for district math assessments and intervention options. Common unit assessments, district benchmark assessments, assessment analysis reports, instructional dialogs (instructional supports), and student histories will be available to support standards-based instruction in mathematics.
http://katm.org/wp/?page_id=91	Grade level “flip books” with suggestions for integration of Standards for Math Practice for each standard, explanation of the content standard, instructional strategy recommendations, student misconceptions to address, etc. Developed with NC, Ohio, and Arizona departments of education.
www.parcconline.org	Implementation of the common core guidelines for gr. 3-8 and HS. This guide was used for reference as the district math curriculum maps were revised.
www.khanacademy.org	Khan Academy is a website with a library of over 3000 educational video clips. The mathematics videos explain important topics and concepts in mathematics.
www.wida.us	WIDA standards for ELL students include specific standards for content areas such as math. This website has a downloadable library of resources for teachers.

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UNIT 1: Ratios and Rates	Suggested number of days: 12								
Standards	Resources								
<i>Cluster Heading: Understand ratio concepts and use ratio reasoning to solve problems</i>									
6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, “The ratio of wings to beaks at the bird house was 2:1, because for every two wings there was one beak.” “For every vote candidate A received, candidate C received nearly 3 votes.”</i>	MA Model Curriculum Unit (MCU): Ratios, Rates, and Percents: Lessons 1-6								
<ul style="list-style-type: none"> • A ratio compares two related quantities. Ratios can be written in several forms – 2:1, 2 to 1, 2/1 • Equivalent ratios (in fraction form) are generated using multiplication or division by a form of one, (3/3, 12/12 etc) • Recall that the order of units and their corresponding numbers in a ratio is extremely important. 	Glencoe: Ch. 1 –Lessons and Assessments								
6.RP.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.	CMP Common core Investigations								
<ul style="list-style-type: none"> • Use tape and double number line diagrams to represent and solve ratio and rate problems. <p>❖ 6.RP.3a 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.</p> <ul style="list-style-type: none"> • Use input/output tables set up both vertically and horizontally • Plot function tables on the coordinate grid (See 6.NS.8 below) <p>❖ 6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>❖ Students should recognize that they can multiply by a fraction equal to 1 to find equivalent measures, i.e., 5 yards x (3 ft/1yd.) = 15 feet. (3ft/1yard is a form of 1 because 3 feet and 1 yard are equal quantities).</p> <p>❖ Use equivalent ratios to solve problems involving conversions within the same system of measurement</p> <ul style="list-style-type: none"> • Use tables to solve unit conversions: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">Feet</td><td style="padding: 2px;">inches</td></tr> <tr> <td style="padding: 2px;">1</td><td style="padding: 2px;">12 inches</td></tr> <tr> <td style="padding: 2px;">2</td><td style="padding: 2px;">24 inches</td></tr> <tr> <td style="padding: 2px;">3</td><td style="padding: 2px;">?</td></tr> </table>	Feet	inches	1	12 inches	2	24 inches	3	?	
Feet	inches								
1	12 inches								
2	24 inches								
3	?								
<i>Cluster heading: Apply and extend previous understandings of numbers to the system of rational numbers.</i>									
6.NS.8 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.	Students will need to apply these skills in the context of the lessons noted above								
<ul style="list-style-type: none"> • Plot coordinate points from an input/output table to find the pattern, decide if the relationship is constant as represented by a linear function, and use the information from the graph to find equivalent ratios in order to solve a problem. At this time, graphing is mostly done in the first quadrant. 									

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UNIT 1: RATIOS – Ratios and Rates (continued)	Suggested number of days: 12
<p><i>This unit introduces students to the concept of a ratio and engages them in using ratio and rate reasoning to solve problems. It builds upon students' work in earlier grades with whole number multiplication and division. The multiplicative reasoning for working with proportional relationships cuts across most grade 6 mathematical content domains and is therefore a crucial starting point for the grade 6 curriculum. This unit extends student understanding of ratio reasoning as they investigate the idea that every ratio can be associated with unit rates. Students represent rate relationships with tape diagrams, tables, graphs, and equations.</i></p>	
Standards	Resources
<i>Cluster Heading: Understand ratio concepts and use ratio reasoning to solve problems</i>	
<p>6.RP.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$ (b not equal to zero), and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $\frac{3}{4}$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger." (Footnote: Expectations for unit rates in this grade are limited to non-complex fractions.)</p> <ul style="list-style-type: none"> Find the unit rate as a represented by a ratio of # to 1, i.e., 6 miles in 2 hours has a unit rate of 3 miles per 1 hour or the ratio 3 miles/hour. <p>6.RP.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.</p> <ul style="list-style-type: none"> 6.RP.3b 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? <ul style="list-style-type: none"> Given a real world problem involving pricing, find the unit rate. Solve “better buy” problems by comparing unit rates. Find the constant speed of an object given the distance divided by the time. Use multiple representations to record and solve rate problems. 	<p>MA Model Curriculum Unit (MCU): Ratios, Rates, and Percents: Lessons 7-10</p> <p>Glencoe: Ch. 1 –Lessons and Assessments</p> <p>CMP Common core Investigations</p>
<i>Cluster Heading : Compute fluently with multi-digit numbers and find common factors and multiples.</i>	
<p>6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <ul style="list-style-type: none"> Add, subtract, multiply and divide multi-digit numbers including whole numbers and decimals. Accurately position decimals in addition, subtraction, multiplication and division problems Use fractions to show how multiplying the numerator and denominator by an appropriate power of ten changes the problem to a whole number division problem. i.e. $3.5/.15$ can be multiplied by 100/100 to become $350/15$. Relate this process to the standard algorithm. 	Students will need to apply these skills in the context of the lessons noted above

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Unit 1 – Rates and Ratios continued

Standards for Mathematical Practice – Unit 1	
1. Make sense of problems and persevere in solving them.	
2. Reason abstractly and quantitatively	
3. Construct viable arguments and critique the reasoning of others.	
4. Model with Mathematics	
5. Use appropriate tools strategically.	
7. Look for and make use of structure.	The content standards in this unit require that students make sense of real-world and mathematical problems (SMP1) by modeling relationships with ratios (SMP4) using a variety of tools strategically (equivalent ratios, tape diagrams, double number line diagrams, tables, graphs, and equations) (SMP5). Solving problems using ratio reasoning and rates calls for careful attention to the referents for a given situation (SMP2), as they show the relationship between two quantities in various forms. Lessons in this unit will require students to explain their thinking and reflect on other student's reasoning (SMP3). As students work with unit rates and analyze the relationship among the values, they look for and make use of structure (SMP7) as they work through solutions.

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UNIT 2: Rates (including percents)	Suggested number of days: 10
<i>This unit extends students' understanding of ratio reasoning as students are introduced to percent of a quantity as a rate per 100. Students will continue to represent rate relationships with tape diagrams, double number line diagrams, tables, and equations. Rate reasoning is central to the study of algebra and is a critical foundation for understanding slope, which is formalized in grades 7 and 8.</i>	
<ul style="list-style-type: none"> • 6.NS.3 Students build toward fluency throughout the grade: therefore this standard is reinforced in future units of study, particularly units 3 and 5. Teachers need to reinforce the use of the standard algorithm for each operation throughout the year. 	
Standards	Resources
Cluster Heading : Compute fluently with multi-digit numbers and find common factors and multiples.	
6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	MA Model Curriculum Unit (MCU): Ratios, Rates, and Percents: Lessons 11-14 Unit 1 and 2 culminating assessment follows lesson 14 CEPA (Curriculum Embedded Performance Assessment) 3-5 days
<i>Cluster Heading: Understand ratio concepts and use ratio reasoning to solve problems</i>	
6.RP.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.	Glencoe: Ch. 1 and 2 – Lessons and Assessments CMP Common core Investigations
<ul style="list-style-type: none"> • Use tape diagrams to represent and solve percent problems involving proportional reasoning. 	
6.RP.3c Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole given a part and the percent.	
<ul style="list-style-type: none"> ❖ Use 10x10 grids, decimal squares, or percent bars to model percents as needed. ❖ Use equivalent ratios to solve problems involving finding % . ❖ Write appropriate equations to solve percent problems. 	
Standards for Mathematical Practice – Unit 2	
1. Make sense of problems and persevere in solving them.	In this unit, students will make sense of real life problems and persevere to solve them (SMP1). As students work with unit rates and interpret percent as a rate per 100, and as they analyze the relationships among the values, they look for and make use of structure (SMP7). As students become more sophisticated in their application of ratio reasoning, they learn when it is best to solve problems with ratios, their associated unit rates, or percents using appropriate tools strategically (SMP5). Solving problems using ratio reasoning and rates calls for careful attention to the referents for a given situation (SMP2).
2. Reason abstractly and quantitatively	
5. Use appropriate tools strategically.	
7. Look for and make use of structure.	

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UNIT 3: Computation/Factors/Multiples		Suggested number of days: 11
<i>Students build on their work in earlier grades in working with factors and multiples (4.OA.B.4, 5.NF.B.4b) as they formalize the concepts and uses of greatest common factor (including the distributive property) and least common multiple. Although students have learned all four operations with multi-digit whole numbers and decimals in earlier grades, in this unit they formalize the related standard algorithms as they build proficiency and fluency.</i>		
<i>Standards</i>	<i>Resources</i>	
<i>Cluster Heading: Compute fluently with multi-digit numbers and find common factors and multiples</i>		
6.NS.2 Fluently divide multi-digit numbers using the standard algorithm.		
6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.		
<ul style="list-style-type: none"> • Add, subtract, multiply and divide decimals • Accurately position decimals in addition, subtraction, multiplication and division problems • Accurately position decimals in division problems • Use fractions to show how the decimal point shifts by a power of ten 		
6.NS.4 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 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express $36 + 8$ as $4(9 + 2)$.		
<ul style="list-style-type: none"> • The greatest common factor of two prime numbers is 1. • Use the greatest common factor and the distributive property to find the sum two whole numbers. 		
6.NS.4.a (MA) Apply number theory concepts, including prime factorization and relatively prime numbers, to the solution of problems. (MA.4.a)		
<ul style="list-style-type: none"> • Identify prime and composite numbers and apply concepts of prime and composite numbers, prime factorization, <i>GCF</i>, <i>LCM</i> to the solution of problems. • Understand and apply divisibility rules for 2,3,4,5,6,9,10 to the solution of problems • Numbers are relatively prime if their greatest common factor is 1 		
Standards for Mathematical Practice – Unit 3		
2. Reason abstractly and quantitatively		
7. Look for and make use of structure.		

Standards for Mathematical Practice – Unit 3	As students compute fluently with multi-digit numbers and find common factors and multiples, they need to look for and make use of structure (SMP7). They need to reason abstractly and computationally (SMP2) as they make sense of quantities and relationships in problem situations.
2. Reason abstractly and quantitatively	
7. Look for and make use of structure.	

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UNIT 4: Dividing Fractions		Suggested number of days: 11
<i>Standards</i>	<i>Resources</i>	
<i>Cluster heading: Apply and extend previous understandings of multiplication and division to divide fractions by fractions</i>		
6.NS.1 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. <i>For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. [In general, $(a/b) \div (c/d) = ad/bc$.] How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$-cup servings are in $2/3$ of a cup of yogurt? How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi?</i>	Glencoe: Chapter 4—Lessons and Assessments CMP Common core Investigations PH: Skills Handbook See Map Appendix for Illustration 1 – The Number system Suggested Website: Gr. 6 Flipbook http://katm.org/wp/?page_id=91	
<ul style="list-style-type: none"> • Use visual models and equations to divide whole numbers by fractions and fractions by fractions to solve word problems that relate to real life. 		

Standards for Mathematical Practice – Unit 4	
1. Make sense of problems and persevere in solving them.	Extending previous understandings of multiplication and division to divide fractions by fractions requires that students look for and express regularity in repeated reasoning (SMP8). Dividing fractions typically has been a challenging concept for students; therefore, it is beneficial to require that students construct and critique arguments (SMP3) as they interpret and compute quotients of fractions and that they persevere in solving word problems involving division of fractions (SMP1). This can support their conceptual understanding and development of procedural fluency.
3. Construct viable arguments and critique the reasoning of others.	
8. Look for and express regularity in repeated reasoning.	

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UNIT 5: Representing Relationships	Suggested number of days: 15								
The standards addressed in this unit represent major work for grade 6 and is therefore placed in the first half of the school year. In this unit of study, students extend their understanding of ratio and rate reasoning to represent proportional relationships in multiple ways, including relationships among measurement units such as cups and gallons or meters and kilometers. Students also represent common non-proportional relationships explored in earlier grades, such as area of a square and volume of a cube.									
<ul style="list-style-type: none"> • 6.NS.3 In investigating and representing relationships among variables, students continue to build fluency with operations on multi-digit whole numbers, multi-digit decimals and fractions. • 6RP3a Students apply their ratio reasoning from earlier units of study as they investigate and represent proportional relationships. 									
Cluster heading: Reason about and solve one-variable equations and inequalities	Resources								
6.EE.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.	*Glencoe: Ch. 4 – Lesson 5; Ch 6- lesson 3 and 4; Ch. 8- Lessons 1-4 and Assessments								
<ul style="list-style-type: none"> • Connect writing expressions with story problems and/or drawing pictures to show a context for the work 									
Cluster heading: Represent and analyze quantitative relationships between dependent and independent variables.									
6.EE.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. <i>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.</i>	<p>See Glencoe lessons above*</p> <p>CMP Common core Investigations</p> <p>PH: 2-3, 10-8</p> <p>Suggested websites: Gr.6 Flipbook - http://katm.org/wp/?page_id=91, National Library of Virtual Manipulatives – Grapher, function machines</p> <p>See Map Appendix: Algebra Four-block template</p>								
<ul style="list-style-type: none"> • This cluster is closely tied to the unit on ratios, rates, and proportional relationships, allowing the ideas in each to be connected and taught together. • Use multiple representations such as describing the relationship using an equation, table, graphs, or words to express the same information • Use process (function) diagrams, input/output tables, and words to illustrate the output as a function of the independent variable, e.g. $x \rightarrow [+3] \rightarrow y$ or “add three to x to get y” or “take the input and add three to get the output”, or 									
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th style="text-align: center;">Input</th><th style="text-align: center;">Output</th></tr> <tr> <td style="text-align: center;">1</td><td style="text-align: center;">4</td></tr> <tr> <td style="text-align: center;">2</td><td style="text-align: center;">5</td></tr> <tr> <td style="text-align: center;">x</td><td style="text-align: center;">$x + 3$</td></tr> </table>	Input	Output	1	4	2	5	x	$x + 3$
Input	Output								
1	4								
2	5								
x	$x + 3$								
<ul style="list-style-type: none"> • Generalize the above patterns – find a “rule” 									

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UNIT 5: Representing Relationships - continued <i>Standards</i>	Suggested number of days: 15
<i>Cluster heading: Reason about and solve one-variable equations and inequalities</i>	
6.RP.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.	PH: 6-1 to 6-4
<ul style="list-style-type: none"> • Review and apply understandings and representations from Units 1 and 2 to continue to solve problems. 	CMP Common core Investigations
6.RP.3a 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.	See Map Appendix for Algebra Four-block template
<ul style="list-style-type: none"> • Use input/output tables set up both vertically and horizontally • Plot function tables on the coordinate grid 	
<i>Cluster Heading: Compute fluently with multi-digit numbers and find common factors and multiples</i>	
6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	PH: 1.4,1.5,1.7,1.8,1.9 CMP2: <u>Bits & Pieces III</u> Inv.1.2 ACE questions Inv. 2.1, 2.3, 2.4 ACE Inv. 3.3 ACE
<ul style="list-style-type: none"> • Add, subtract, multiply and divide decimals • Accurately position decimals in addition, subtraction, multiplication and division problems • Accurately position decimals in division problems • Use fractions to show how the decimal point shifts by a power of ten 	

Standards for Mathematical Practice - Unit 5	Students look for and express regularity in repeated reasoning (SMP8) as they generate algebraic models (SMP4) to represent relationships.
4. Model with Mathematics	
8. Look for and express regularity in repeated reasoning.	

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UNIT 6: Extending the Number System	Suggested number of days: 13
This unit builds on students' earlier study of systems of numbers (natural numbers, whole numbers, and positive fractions and decimals) as students investigate values less than zero. They formalize an understanding of integers and their relationship to the set of rational numbers. Students develop an understanding of how integers are used in real-world contexts, including the meaning of absolute value. In grade 7, students learn to operate with positive and negative rational numbers.	
Standards	Resources
<i>Cluster Heading: Apply and extend previous understandings of numbers to the system of rational numbers</i>	
6.NS.5 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, debits/credits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	Glencoe: Chapters 5 –Lessons 1-3 and Assessments CMP Common core Investigations See Map Appendix: Illustration 1 – The Number system PH: 10-1, 10-6
<ul style="list-style-type: none"> • Use examples such as having/owing and above/below zero to show how describe opposites in a mathematical way. • Opposites can be shown on horizontal and vertical number lines. • The difference between numbers can be found by counting the distance between numbers on a grid. (Count the spaces, not the lines). 	Suggested websites: Gr.6 Flipbook - http://katm.org/wp/?page_id=91 , National Library of Virtual Manipulatives - Geoboard - Coordinate
6.NS.6 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.	
<ul style="list-style-type: none"> • 6.NS.6a 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. • Use all four quadrants in the coordinate grid • A number and its opposite are equidistant from zero (reflections about zero). • Zero is its own opposite. • The point where the x-axis and the y-axis intersect is the origin. • Given an ordered pair, students identify the quadrant based on the signs $(+,+)$, $(+,-)$, $(-,+)$, $(-,-)$. • Plot rational numbers on a number line (either vertical or horizontal). • Identify the value of given points on a number line. 	

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UNIT 6: Extending the Number System - continued		Suggested number of days: 13
<i>Standards</i>	<i>Resources</i>	
<i>Cluster Heading: Apply and extend previous understandings of numbers to the system of rational numbers</i>		
<p>6.NS.7 Understand ordering and absolute value of rational numbers.</p> <ul style="list-style-type: none"> ❖ 6.NS.7a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. <i>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.</i> ❖ 6.NS.7b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. <i>For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C.</i> ❖ 6.NS.7c. 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. <i>For example, for an account balance of -30 dollars write $-30 = 30$ to describe the size of the debt in dollars</i> ❖ 6.NS.7d. Distinguish comparisons of absolute value from statements about order. <i>For example recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars</i> <ul style="list-style-type: none"> • Absolute value of a number is its distance from zero. This distance is always positive. • Students use inequalities to express the relationship between two rational numbers, understanding the value of numbers is smaller moving to the left on a number line, and greater moving to the right. • Write statements using $<$ or $>$ to compare rational numbers in context. However, explanations should reference the context. (see example 6.NS.7a &b notes above). • Varied real life situations should be used. Ex. In real-world context such as - an ocean depth of 900 feet, write $-900 = 900$ to describe the distance below sea level. • For negative numbers, as the negative number increases (moves to the left on the number line) the value of the number decreases. 	<p>Glencoe: Chapter 5 –Lessons 1-3 and Assessments</p> <p>CMP Common core Investigations</p> <p>PH: 10-1, 12-2</p> <p>See Map Appendix: Table 5-Properties of inequality</p>	

Standards for Mathematical Practice – Unit 6	
2. Reason abstractly and quantitatively	The content standards for this unit require that students' exploration of rational numbers include how they model real life situations (SMP4) .
3. Construct viable arguments and critique the reasoning of others.	Students reason abstractly and quantitatively (SMP2) in precise ways when they write ,interpret, and explain (SMP3, 6SMP6) statements of order in real-world contexts. Number lines (both vertical and horizontal), the coordinate plane, and the content-specific notation within this unit ar all tools with which students need explicit practice so that, over time, they are able to strategically select and use them to solve problems with positive and negative rational numbers (SMP5).
4. Model with Mathematics	
5. Use appropriate tools strategically.	
6. Attend to precision.	

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UNIT 7: Relationships in the Coordinate Plane		Suggested number of days:12
Students expand their understanding of rational numbers as they extend the coordinate plane to include all four quadrants. Students apply their understanding of absolute value to determine distances in the coordinate plane.		
<i>Standards</i>	<i>Resources</i>	
<i>Cluster Heading:</i> Apply and extend previous understanding of numbers to the system of rational numbers		
<p>6.NS.6 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.</p> <ul style="list-style-type: none"> ❖ 6.NS.6b 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.6c 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. <ul style="list-style-type: none"> • Use all four quadrants in the coordinate grid. • The point where the x-axis and the y-axis intersect is the origin. • Given an ordered pair, identify the quadrant based on the signs (+,+), (+,-), (-,+), (-,-). • Identify the coordinates of given points on a number line. • Plot rational numbers on a vertical and horizontal number line. <p>6.NS.8 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.</p> <ul style="list-style-type: none"> • Find the distance between points whose ordered pairs have the same x-coordinate (vertical) or same y-coordinate (horizontal). • Graph coordinates for polygons and find missing vertices based on properties of triangles and quadrilaterals. 	<p>Glencoe: Chapters 5 –Lessons 4-7 and Assessments</p> <p>CMP Common core Investigations</p> <p>PH: 10-1, 10-6, 10-7</p> <p>Suggested websites: Gr.6 Flipbook - http://katm.org/wp/?page_id=91, National Library of Virtual Manipulatives - Geoboard - Coordinate</p>	
<i>Cluster Heading:</i> Solve real-world and mathematical problems involving area, surface area, and volume		
<p>6.G.3 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</p> <ul style="list-style-type: none"> • Some possible uses are altitudes, map grids, sea level, etc. 		
Standards for Mathematical Practice – Unit 7	As students explore how the signs of the coordinates indicate locations in the coordinate plane, they apply the practice of looking for and making use of structures (SMP7).	
7. Look for and make use of structure.		

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UNIT 8: Algebraic Expressions	Suggested number of days: 12
In earlier grades, students have worked extensively with numerical expressions and have been using letters to represent unknowns in problem solving situations since Grade 3 (3.OA.8, 4.OA.3, 5.MD.5b). Students also have experience in prior grades with investigating and applying properties of operation in numerical contexts, such as the associative, distributive, and commutative properties. In this unit, students build on their work from earlier grades by working systematically with algebraic expressions, thereby laying the groundwork for more formal work in writing and solving equations in later grades.	
Cluster Heading: Apply and extend previous understanding of arithmetic to algebraic expressions	Resources
6.EE.1 Write and evaluate numerical expressions involving whole-number exponents. <ul style="list-style-type: none"> • Solve problems using bases that are whole numbers, positive decimals, or positive fractions. 6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers. <ul style="list-style-type: none"> ❖ 6.EE.2a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation “Subtract y from 5” as $5 - y$. ❖ 6.EE.2b. 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. <ul style="list-style-type: none"> • Write expressions from verbal descriptions using letters and numbers. • Emphasize that order is important when writing subtraction and division problems. ❖ 6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problem. 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 $-s^2$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$	Glencoe: Chapters 6 –Lessons 1-6 (3 and 4 may be a review); Ch. 8 – Lesson 1; and Assessments CMP Common core Investigations PH: 1-10, 2-2, 2-3, 2-8 Note: teachers will need to add problems with fractions
<ul style="list-style-type: none"> • Replace variables with a given value, evaluate and simplify the expression. • Accurately apply the order of operations. • Use symbols as well as letters to represent variables. • Use process diagrams (arrow notation) and inverse relationships. 	

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UNIT 8: Algebraic Expressions - continued	Suggested number of days: 12	
Standards	Resources	
<i>Cluster Heading: Apply and extend previous understanding of arithmetic to algebraic expressions</i>		
6.EE.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 $3y$.	Glencoe: Chapters 6 –Lessons 1-4;Ch. 8 –lesson 1 and Assessments CMP Common core Investigations PH: 2-9 See Map Appendix: for Table 3 – Properties of Operations	
<ul style="list-style-type: none"> • Use the distributive property and factoring to create equivalent expressions. <p>6.EE.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.</p> <ul style="list-style-type: none"> • Generate equivalent expressions using the associative, commutative, and distributive properties. 	Suggested manipulatives: Algebra tiles Suggested websites: Gr.6 Flipbook - http://katm.org/wp/?page_id=91;# , National Library of Virtual Manipulatives – Algebra tiles	

Standards for Mathematical Practice – Unit 8	
2. Reason abstractly and quantitatively	As students apply properties of operations to generate equivalent expressions or identify when two expressions are equivalent, they much reason abstractly and computationally (SMP2) while looking for and making use of structure (SMP7). As students construct and critique arguments (SMP3), related to whether or not a given set of expressions is equivalent, the deepen their conceptual understanding and fluency with this content. Working with exponents and coefficients of variables are both tools for expressing regularity in repeated reasoning (SMP8).
3. Construct viable arguments and critique the reasoning of others.	
7. Look for and make use of structure.	
8. Look for and express regularity in repeated reasoning	

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Unit 9 – Understanding, Writing, and Solving Equations and Inequalities	Suggested number of days: 16
In earlier grades, students have written numerical expressions and equations. In this unit, students extend their learning to solving one-variable equations and inequalities. This unit further develops students' understanding of the meaning of variables, including determining whether a variable represents a specific number or a set of numbers.	
<i>Cluster Heading: Reason about and solve one-variable equations and inequalities</i>	
6.EE.5 Understand solving an equation or inequality as a process for 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.	** Glencoe: Ch. 6 – Lesson 3, 4 (rev.); Ch. 7 – Lessons 1 – 5; Ch. 8 – Lessons 2,5,6,7 ; and Assessments
<ul style="list-style-type: none"> • Use substitution to show that given value(s) will make the equation or inequality true. 	CMP Common core Investigations PH: 2-5, 2-6,2-7, 12-1 (inequality)
6.EE.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.	Suggested websites: Gr.6 Flipbook - http://katm.org/wp/?page_id=91 , National Library of Virtual Manipulatives – Algebra balance scales, Decimal block subtraction,
<ul style="list-style-type: none"> • Write expressions to represent real world problem or mathematical problem relationships. E.g., “the length is increased by 3” as $L + 3$ or “The car’s speed decreased by 10 mph” as $S - 10$. • Use variables for unknown numbers in an equation to solve a problem. 	See Map Appendix: Table 4 and 5 Properties of Equality and Inequality Suggested websites: Function machines - http://nlvm.usu.edu National Library of Virtual Manipulatives
6.EE.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.	
<ul style="list-style-type: none"> • Translate given equations to related equations using inverse operation and use this relationship to solve. E.g, $3 + x = 7$ translates to $x = 7 - 3$. • Use inverse operations to solve one-step equations • Instructional supports: <ul style="list-style-type: none"> ○ Use balance model to show how to isolate the variable by “undoing” operations to solve for the variable ○ Use process (function)diagrams to solve equations: 	
$x - \boxed{+3} \rightarrow y$ or “add three to x to get y” or do the inverse to find out the input. If $x - \boxed{+3} \rightarrow 7$ then by using the inverse operation or working backward $7 - 3 = x$	
<ul style="list-style-type: none"> • Use the properties of equality to solve problems involving addition and subtraction, or multiplication and division of integers and fractions. 	

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Unit 9 – Understanding, Writing, and Solving Equations and Inequalities- continued	Suggested number of days: 16
Standards	Resources
<i>Cluster Heading: Reason about and solve one-variable equations and inequalities</i>	
6.EE.8 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.	** See Glencoe references above PH: 12.1, 12-2, 12-3
<ul style="list-style-type: none"> Students should write inequalities to represent a condition in a real-world or mathematical situation. For example, $C < 2$ years old represents the condition that airplane tickets do not need to be purchased for children up to 2 years of age. Students represent solutions on a number line. 	See Map Appendix: Table 5 – Properties of Inequality

Standards for Mathematical Practice – Unit 9	
1. Make sense of problems and persevere in solving them.	As with the previous unit, when students reason about and solve one-variable equations and inequalities they reason abstractly and computationally (SMP2) while looking for and making use of structure (SMP7) – for example, recognizing that solving the equations $5 + x = 10$ is the same thinking as $x = 10 - 5$. Solving real world problems by writing and solving equations is new at Grade 6 and requires students' perseverance and careful analysis of the given information. (SMP1).
2. Reason abstractly and quantitatively	
7. Look for and make use of structure.	

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UNIT 10: Problem Solving with 2-D Shapes		Suggested number of days: 11
This unit builds upon students' learning in earlier grades with finding areas of rectangles (4.MD.3, 5.NF.4b) as they investigate triangles, special quadrilaterals, and polygons. It also provides students with opportunities to develop their understanding and use of equations in geometric contexts.		
<i>Standards</i>	<i>Resources</i>	
<i>Cluster heading: Solve real-world and mathematical problems involving area,.....</i>		
6.G.1 Find 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	Glencoe: Ch. 9 – Lessons 1,2,3,6; Ch. 10 – Lesson 1,3,4,5 –Lessons 1-3 and Assessments CMP Common core Investigations CMP2: <u>Covering and Surrounding</u> Inv. 1.1, 1.2, 1.3, 3.1, 3.2, 4.1, 4.2 5.2- 5.4, ACE questions	
<ul style="list-style-type: none"> • Use the formulas for Area of triangle and rectangle and have an understanding of how the formula works and relates to the measure • Understand area is the number of square units inside a figure • Find areas of complex shapes. For example, decompose a trapezoid into a rectangle and two triangles as a possible way to find the area. <p>❖ 6.G.MA.1a. Use the relationship between radius, diameter, and center of a circle to find the circumference and area.</p> <ul style="list-style-type: none"> • Given radius or diameter of a circle, find the circumference or area <p>❖ 6.G.MA.1b. Solve real-world and mathematical problems involving the measurements of circles.</p> <ul style="list-style-type: none"> • Understand how to use formulas to compute area and circumference • Create problems involving various circles, such as bicycle tires or clocks, circular plates or swimming pools • Compute perimeter • Apply the concepts of area and perimeter to the solution of problems 	PH: 9-3, 9-4,9-5 , 9-6	
<i>Cluster Heading: Apply and extend previous understanding of arithmetic to algebraic expressions</i>		
6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.	Integrate use of formulas into lessons. Previous MCAS items	
<p>❖ 6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problem. 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 $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$</p> <ul style="list-style-type: none"> • In this unit, students use algebraic expressions and formulas related to Area and Perimeter (circumference) of circles in the MA standards. Formulas such as $A = \pi r^2$, $C = \pi d$ or $C = 2\pi r$ 		

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Unit 10 – Problem Solving with 2-D Shapes – continued...

Standards for Mathematical Practice – Unit 10	
1. Make sense of problems and persevere in solving them.	The standards in this unit require that students persevere in solving problems (SMP1) and model real-world scenarios with mathematical models including equations (SMP4), with a degree of precision appropriate for the given situation (SMP6).
4. Model with mathematics	
6. Attend to precision	

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UNIT 11: Problem Solving with Volume and Surface Area	Suggested number of days: 11
Building on their knowledge of volume from earlier grades (5MD5), students learn how to find volume of rectangular prisms with fractional side lengths. Students also model 3-D figures with nets and use the nets to find surface area. Students apply their ability to evaluate expressions as they calculate area, surface area, and volume using appropriate formulas.	
<i>Standards</i>	<i>Resources</i>
<i>Cluster heading: Solve real-world and mathematical problems involving area, surface area, and volume.</i>	
6.G.4 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. <ul style="list-style-type: none"> • Know and use the appropriate formulas for areas of 2-d figures. • Find the surface area of rectangular prisms using nets to represent 3-D figure as composition of 2-D shapes and find total area by adding areas of smaller sections. 	<u>Glencoe:</u> Chapter 10 – Lessons and Assessments <u>CMP</u> Common core Investigations <u>PH:</u> 9-7, 9-8, 9-9 <u>Note:</u> Be sure to incorporate fractional edge lengths
6.G.2 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. <ul style="list-style-type: none"> • Use manipulatives such as unit cubes to pack various rectangular prisms. • Apply formulas. $V = bh$ where b is the area of the base often written as $V = Bh$ to avoid confusion with the base of a 2-d figure. 	
<i>Cluster Heading: Apply and extend previous understanding of arithmetic to algebraic expressions</i>	
6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers. <ul style="list-style-type: none"> ❖ 6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problem. 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 $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$ • Students use algebraic expressions and formulas to correctly calculate area, surface area, and volume. 	Integrate use of formulas into lessons. Previous MCAS items

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Unit 11 – Problem Solving with Volume and Surface Area continued

Standards for Mathematical Practice – Unit 11	
5. Use appropriate tools strategically.	As students investigate volume of surface area of 3-D figures, they select and use appropriate tools – such as formulas, nets, and unit cubes – strategically (SMP5) . Understanding how net models of 3-D figures relate to their surface areas requires that students look for and make use of structure (SMP7). Applying formulas to find volumes with fractional edge lengths requires that students attend to the degree of precision appropriate for a given situation (SMP6).
6. Attend to precision	
7. Look for and make use of structure.	

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UNIT 12: Understanding Data Distribution	Suggested number of days: 14
This unit is the first of two grade 6 units addressing data and statistics. While this content could be organized coherently in different ways, this suggested sequence begins with this unit focused on developing understanding of statistical variability. In this unit, students investigate and describe the variability of given data, including center, spread, and overall shape. They also discuss and explore how measures of center can be used to summarize a set of data, using data sets and representations of data that are provided to them. This unit lays a foundation for the following unit in which students use their understanding to create their own representations for a given set of data, and analyze data, including determining measures of center and variability.	
Cluster Heading: Develop understanding of statistical variability	
6.SP.1 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.	**Glencoe: Ch. 11 – Lessons 1 – 5; Ch. 12- Lessons 1 - 6 and Assessments
<ul style="list-style-type: none"> • Develop questions that have many possible outcomes and compare them to questions that only have one outcome <p>*Note: for 7th or 8th grade resources, conference with a 7th or 8th grade teacher to avoid overlap Additional resources: PH: (Gr. 7) 11.1- 11.3, (Gr. 8) 10-7</p>	CMP Common core Investigations
6.SP.2 - 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.	CMP2: Data about Us Inv. 1.1, 1.2, 1.3, 1.4, 3.1 ACE PH: 7.1, 7.2,
<ul style="list-style-type: none"> • Describe and find mean, median, mode, maximum, minimum, range of a data set <ul style="list-style-type: none"> • Compare data sets using mean, median, mode, maximum, minimum, range of a data set • Organize and display data using mean, median, mode, maximum, minimum, and range 	
6.SP.3 - Recognize that a measure of center for a numerical data set summarized all of its values with a single number, while a measure of variation describes how its values vary with a single number.	
<ul style="list-style-type: none"> • There are different statistics for describing the “center” of a numerical data set: mean, median, mode • Range is the number summarizing variation • An outlier is a data item that is far apart from the rest of the data. 	

Standards for Mathematical Practice – Unit 12	The development of students' understanding of statistical variability requires that they persevere in making sense of given data sets (SMP1). They also investigate how measures of center and variability model and summarize data (SMP4).
1. Make sense of problems and persevere in solving them.	
4. Model with mathematics	

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UNIT 13: Analyzing Data		Suggested number of days: 13
This unit builds on the understanding developed in the previous unit as students represent and analyze data sets and determine the measures of variability and center.		
<i>Standards</i>	<i>Resources</i>	
<i>Cluster heading: Summarize and describe distributions</i>		
6.SP.4 - Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	**Glencoe: Ch. 11 – Lessons 1 – 5; Ch. 12- Lessons 1 - 6 and Assessments CMP Common core Investigations- Note: good explanation of mean standard deviation in CC additional investigations	
<ul style="list-style-type: none"> Construct and analyze line plots that visually represents a frequency table on a number line Construct and analyze histograms (a type of bar graph) that shows the frequency of each data item with equal sized spaces and no spaces between the bars Construct and analyze box plots; remind student to find the 5 number summary: median, minimum, maximum, lower quartile, upper quartile 		
6.SP.MA 4.a Read and Interpret circle graphs	CMP2: <u>Data about Us</u> Inv. 2.3, 2.4 ACE questions	
<ul style="list-style-type: none"> Interpret circle graphs where the entire circle represents one whole or 100% 	PH: 7-1, 7-2, 7.5	
6.SP.5 Summarize numerical data sets in relation to their context, such as by:		
<ul style="list-style-type: none"> ❖ 5a Reporting the number of observations. ❖ 5b Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. ❖ 5c Giving quantitative measures of center (median and/or mean) and variability (inter-quartile 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. ❖ 5d 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. 		
<ul style="list-style-type: none"> Using histograms, students determine the number of values between specified intervals. The inter-quartile range describes the variability between the middle 50% of a data set; it is found by subtracting the lower quartile from the upper quartile. It represents the length of the box in a box-plot. The inter-quartile range is not affected by outliers. Given a box plot and the total number of data values, students identify the number of data points that are represented by the box (interquartile range – middle 50% of data) Consideration may need to be given to how the data was collected (random sampling). Explain the affect an additional data point might be on the mean, median, mode, etc. 		

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Unit 13 – Analyzing Data ...continued

Standards for Mathematical Practice – Unit 13	
3. Construct viable arguments and critique the reasoning of others.	
5. Use appropriate tools strategically.	
6. Attend to precision	
8. Look for and express regularity in repeated reasoning	Summarizing and describing distributions requires that students use appropriate statistical measures strategically (SMP5) and attend to precision in finding and applying those measures (SMP6). 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 requires that students construct and critique arguments (SMP3). Students look for and apply regularity in repeated reasoning when they explore how adding or removing data points from a data set effects the measures of center and variability (SMP8).

Domains: ALL

PARCC Testing

Mathematics Grade 6

**Performance Based Assessment (PBA): March 16-April 10 computer-based, March 23 – April 3 paper-based
End of Year assessment (EOY): May 4 – 29 – computer-based, May 11 – 22 paper-based**

REVIEW AND EXTEND 6TH GRADE CURRICULUM

In Grade 6, instructional time should focus 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.

The Review and Extend portion of the map is a time for you to review or re-teach areas of concern or to extend your students' learning to a higher level. The following are suggested standards as recommended by the PARCC implementation plan that may help your planning. You may use additional appropriate resources that you find helpful. Please take the time to note additional resources for yourself and to share with others.

	Standards	Resources/Notes
All strands	Prepare for final exam in June - Review and Extend Curriculum as needed based on assessment data from unit tests and benchmark assessments.	PH, CMP Units Previous MCAS items
6.RP.3	When students work toward meeting this standard, they use a range of reasoning and representations to analyze proportional relationships.	
6.NS.1	This is a culminating standard for extending multiplication and division to fractions.	
6.NS.8	When students work with rational numbers in the coordinate plane to solve problems, they combine and consolidate elements from the other standards in this cluster.	

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REVIEW AND EXTEND 6TH GRADE CURRICULUM		
Additional standards to be addressed based on assessment results.		
	Standards	Resources/Notes
6.EE.3	By applying properties of operations to generate equivalent expressions, students use properties of operations that they are familiar with from previous grades' work with numbers — generalizing arithmetic in the process.	
6.EE.7	<p>When students write equations of the form $x + p = q$ and $px = q$ to solve real-world and mathematical problems, they draw on meanings of operations that they are familiar with from previous grades' work. They also begin to learn algebraic approaches to solving problems</p> <p><i>For example, suppose Daniel went to visit his grandmother, who gave him \$5.50. Then he bought a book costing \$9.20 and had \$2.30 left. To find how much money he had before visiting his grandmother, an algebraic approach leads to the equation $x + 5.50 - 9.20 = 2.30$. An arithmetic approach without using variables at all would be to begin with 2.30, then add 9.20, then subtract 5.50. This yields the desired answer, but students will eventually encounter problems in which arithmetic approaches are unrealistically difficult and algebraic approaches must be used.</i></p>	
	Review and apply understanding of fractions, decimals, and % to problem solving situations	PH, CMP Units Previous MCAS items

JUNE

FINAL ASSESSMENTS	
Final District Math Benchmark Assessment	

GRADE 6 MATH CURRICULUM MAP

APPENDIX

FROM MA. MATH 2011 CURRICULUM:

- TABLE 1 – COMMON ADDITION AND SUBTRACTION SITUATIONS
- TABLE 2 – COMMON MULTIPLICATION AND DIVISION SITUATIONS
- TABLE 3 – PROPERTIES OF OPERATIONS
- TABLE 4 – PROPERTIES OF EQUALITY
- TABLE 5 – PROPERTIES OF INEQUALITY
- ILLUSTRATION 1 – THE NUMBER SYSTEM
- ONLINE RESOURCES

ADDITIONAL RESOURCE:

- ALGEBRA FOUR-BLOCK TEMPLATE

TABLE 1. Common addition and subtraction situations.¹

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? $? + 3 = 5$
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$

	Total Unknown	Addend Unknown	Both Addends Unknown²
Put Together/ Take Apart³	Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5, 5 - 3 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$

	Difference Unknown	Bigger Unknown	Smaller Unknown
Compare⁴	(“How many more?” version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? (“How many fewer?” version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? $2 + ? = 5, 5 - 2 = ?$	(Version with “more”): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? $2 + 3 = ?, 3 + 2 = ?$	(Version with “more”): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?, ? + 3 = 5$

¹ Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).

² These *take apart* situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean *makes* or *results in* but always does mean *is the same number as*.

³ Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation especially for small numbers less than or equal to 10.

⁴ For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using *more* for the bigger unknown and using *less* for the smaller unknown). The other versions are more difficult.

TABLE 2. Common multiplication and division situations.⁵

	Unknown Product	Group Size Unknown ("How many in each group?" Division)	Number of Groups Unknown ("How many groups?" Division)
	$3 \times 6 = ?$	$3 \times ? = 18$ and $18 \div 3 = ?$	$? \times 6 = 18$ and $18 \div 6 = ?$
Equal Groups	<p>There are 3 bags with 6 plums in each bag. How many plums are there in all?</p> <p><i>Measurement example.</i> You need 3 lengths of string, each 6 inches long. How much string will you need altogether?</p>	<p>If 18 plums are shared equally into 3 bags, then how many plums will be in each bag?</p> <p><i>Measurement example.</i> You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?</p>	<p>If 18 plums are to be packed 6 to a bag, then how many bags are needed?</p> <p><i>Measurement example.</i> You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?</p>
Arrays,⁶ Area⁷	<p>There are 3 rows of apples with 6 apples in each row. How many apples are there?</p> <p><i>Area example.</i> What is the area of a 3 cm by 6 cm rectangle?</p>	<p>If 18 apples are arranged into 3 equal rows, how many apples will be in each row?</p> <p><i>Area example.</i> A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?</p>	<p>If 18 apples are arranged into equal rows of 6 apples, how many rows will there be?</p> <p><i>Area example.</i> A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?</p>
Compare	<p>A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?</p> <p><i>Measurement example.</i> A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?</p>	<p>A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost?</p> <p><i>Measurement example.</i> A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?</p>	<p>A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue hat?</p> <p><i>Measurement example.</i> A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?</p>
General	$a \times b = ?$	$a \times ? = p$ and $p \div a = ?$	$? \times b = p$ and $p \div b = ?$

⁵ The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

⁶ The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

⁷ Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

TABLE 3. The properties of operations. Here a, b and c stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system, and the complex number system.

<i>Associative property of addition</i>	$(a + b) + c = a + (b + c)$
<i>Commutative property of addition</i>	$a + b = b + a$
<i>Additive identity property of 0</i>	$a + 0 = 0 + a = a$
<i>Existence of additive inverses</i>	For every a there exists $-a$ so that $a + (-a) = (-a) + a = 0$.
<i>Associative property of multiplication</i>	$(a \times b) \times c = a \times (b \times c)$
<i>Commutative property of multiplication</i>	$a \times b = b \times a$
<i>Multiplicative identity property of 1</i>	$a \times 1 = 1 \times a = a$
<i>Existence of multiplicative inverses</i>	For every $a \neq 0$ there exists $1/a$ so that $a \times 1/a = 1/a \times a = 1$.
<i>Distributive property of multiplication over addition</i>	$a \times (b + c) = a \times b + a \times c$

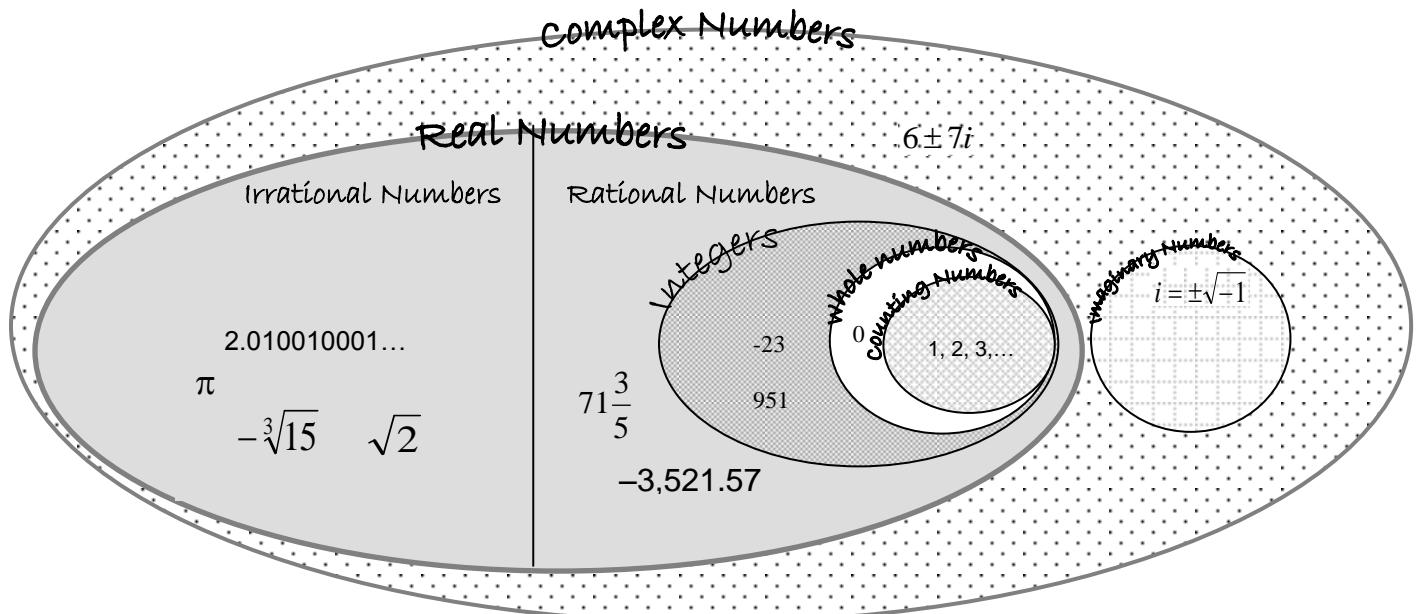
TABLE 4. The properties of equality. Here a, b and c stand for arbitrary numbers in the rational, real, or complex number systems.

<i>Reflexive property of equality</i>	$a = a$
<i>Symmetric property of equality</i>	If $a = b$, then $b = a$.
<i>Transitive property of equality</i>	If $a = b$ and $b = c$, then $a = c$.
<i>Addition property of equality</i>	If $a = b$, then $a + c = b + c$.
<i>Subtraction property of equality</i>	If $a = b$, then $a - c = b - c$.
<i>Multiplication property of equality</i>	If $a = b$, then $a \times c = b \times c$.
<i>Division property of equality</i>	If $a = b$ and $c \neq 0$, then $a \div c = b \div c$.
<i>Substitution property of equality</i>	If $a = b$, then b may be substituted for a in any expression containing a .

TABLE 5. The properties of inequality. Here a, b and c stand for arbitrary numbers in the rational or real number systems.

Exactly one of the following is true: $a < b$, $a = b$, $a > b$.
If $a > b$ and $b > c$ then $a > c$.
If $a > b$, then $b < a$.
If $a > b$, then $-a < -b$.
If $a > b$, then $a \pm c > b \pm c$.
If $a > b$ and $c > 0$, then $a \times c > b \times c$.
If $a > b$ and $c < 0$, then $a \times c < b \times c$.
If $a > b$ and $c > 0$, then $a \div c > b \div c$.
If $a > b$ and $c < 0$, then $a \div c < b \div c$.

ILLUSTRATION 1. The Number System.



Below is a listing of some websites that provide valuable resources to support math instruction. The list is only a partial list of the many online resources for teachers now becoming available. Additional links to websites are also included in grade level maps. Please add others as you find appropriate.

Website	Description
http://www.doe.mass.edu/frameworks/math/0311.pdf	Massachusetts 2011 Mathematics Curriculum Frameworks, which incorporate the Common Core State Standards for content and the standards of mathematical practice.
http://www.doe.mass.edu/candi/model/files.html	Model Curriculum Units for ELA and Math developed by teachers and administrators in Massachusetts as examples of instructional units aligned to our standards and the Common Core State Standards. Units include unit plans, standards-based lesson plans, assessments, student handouts, etc.
www.parcconline.org/samples/item-task-prototypes click on a grade and content area listed on the left	PARCC's sample items - The Partnership for Assessment of Readiness for College and Careers (PARCC) has released a new set of sample test items in English language arts/literacy and mathematics. These sample items will help schools prepare their students for the new PARCC assessments. With this new set, PARCC now has posted over 70 sample items on its website in grades 3–11 in both subjects.
www.wida.us	WIDA standards for ELL students include specific standards for content areas such as math. This website has a downloadable library of helpful resources and information for teachers.
www.pearsonsuccessnet.com	Website link to register for online access to Teacher edition/answer keys/assessments for CMP 2 and CMP2 Common Core Investigations booklet with lessons, lesson plans, student pages, and assessments. Prentice Hall resources available as well
http://www.connected.mcgraw-hill.com	Website link to Glencoe Math materials with online lesson presentations, unit and lesson planning resources, student work pages, differentiation suggestions, ELL supports, tiered instructional options, and assessments. See your district administrator for access codes for registration.
https://www.teachingchannel.org/	You will need to register for this site but there is no cost. The Teaching Channel videos are very helpful to teachers, parents, and administrators and there are many classroom examples that highlight the Common Core standards for content and math practice.
http://katm.org/wp/?page_id=91	Grade level “flip books” with suggestions for integration of Standards for Math Practice for each standard, explanation of the content standard, instructional strategy recommendations, student misconceptions to address, etc. Developed with NC, Ohio, and Arizona departments of education.
http://illuminations.nctm.org/	This website has grade level resources for lessons, online activities, etc. that are standards-based. The website has been developed by the National Council for Teachers of Mathematics - NCTM
www.mathsolutions.com	Marilyn Burns Associates provides lesson plans and instructional resources for teachers aligned to the common core.
http://nlvm.usu.edu	National Library of Virtual Manipulatives provides grade level appropriate learning activities for most major math concepts. The activities are easy to follow and can provide support for teaching a concept, practice, assessment, or for homework help. Students can access the site from home as well.

Algebra Four-block Template

verbal explanation/process diagram

Table

Equation

Graph

