Positive Outcomes Charter School
2019-2024 Renewal Application

Appendix 2B

Mathematics Curriculum Documents

7th grade – Red book

Ways in which students demonstrate the standards of Mathematical Practices:

Positive Outcomes Charter School (POCS) utilizes multiple formative and summative methods for assessing and allowing students to demonstrate successful application of the Standards of mathematical Practice. Beyond the Big Ideas curriculum, POCS uses data collected from Khan Academy, Benchmarking from Scholastic Math Inventory (SMI), and Progress Monitoring (Khan Academy, Smarter Balance Interim testing, and Big Ideas Extension and differentiation materials for each chapter) Formative assessments include: Monitoring progress questions/quizzes every two weeks, Lesson mini assessments, Exit tickets, and class journal work. Summative assessments include: Benchmark assessments (SMI assessments) each marking period and unit assessments and/or performance assessments at the end of the unit.

Math practices addressed with:

MP 1 – Students investigate with the exploration for each lesson then express their reasoning and sense-making in communicate your answer. Students are also asked to explain their understanding of problems or answers during collaborative learning (partner shares, etc.) and journaling. Students are given "Open ended" and "Writing" problems.

MP2 – Students are given "Critical Thinking", "Abstract Reasoning", and "Thought Provoking" problems. Students are asked to verbalize their interpretations of a problem (given either in words or symbols) and explain how the words relate to the symbols.

MP3 – Students are given "Error Analysis", "Making an Argument" and "How do you see it" problems. Students are also asked to critique theirs and others work through collaborative learning and journaling.

MP4 – Students are given multiple real-life examples to connect the mathematical symbolic expressions to real-life and verbal applications. Students are given "Modeling with Mathematics" and "Mathematical Connections" problems. Students are asked to transfer from tables, to graphs, to equations/expressions throughout.

MP5 – Students are asked to use graphing calculators and graph paper with tables, graphs, and equations to manipulate and solve problems. Explicit graphing calculator instruction is utilized to help students understand how to manipulate and use the tool.

MP6 – Students are asked to use precise language with the "Vocabulary" and "Core Concept" problems. They are also asked to give answers in specific formats (such as to a tenth or hundredth). Students are asked to explain, using precise language, through verbal discourse as well as math journaling.

MP7 – Students complete several problems that require justification and explanations. They are given problems such as "Comparing Methods", "Justifying Steps" , and "Analyzing". Students are asked to identify specifics within equations and then transfer this knowledge to other equations.

MP8 – Students evaluate equations and solutions of their own and others. They are given estimation problems to focus on the regularity to identify errors before they begin and after they complete work. Students are also asked to analyze errors. Students focus on repetition and regularity through math journal work and collaborative discourse.

Additional resources and materials addressing the big ideas and focus for grade level math:
POCS is a school designed to work with students who have experienced academic challenges in a traditional school setting. Students who enroll in our school typically arrive with significant deficiencies in Mathematics skills. Consequently, looking at our historical data has always been a challenge for us because the average level of performance greatly varies with each cohort of students. Each of our students has a different story of struggle and adversity that brought them to our school. Over the years POCS has implemented numerous programs and strategies to enable the students to show growth toward proficiency. Over the years our students have shown significant growth the longer they attend POCS.
In 2011 POCS adapted elements from the Big Picture Learning model including our students to connect learning to real life experiences. We ask our seventh – ninth grade students to participate in service learning projects, reflect on the experience and connect the activity to their mathematical learning. All students have Response to Intervention (RTI) each day for ELA or Math. The students are leveled to meet the needs of the individual students. During the RTI period, students work on Math 180, Khan Academy, and teacher created materials to meet their individual needs. POCS offers extensive tutoring for all students with the teachers reaching out to parents of students who would benefit from the extra time and work. POCS has small classes averaging 10 - 13 students per class. POCS has developed a Setting B for students in need of smaller class instruction focusing on the individual needs of the student.

Unit/Concept	Estimated Time	CCSS	Topics/ Mathematical Practices	Vertical Alignment
Scavenger Hunt	1 Day			
Chapter 1	14 Days	7.NS.1a-d, 7.NS.2a-d, 7.NS.3	Chapter Opener Lesson 1.1 Integers and Absolute Value MP 6 Lesson 1.2 Adding Integers MP 8 Lesson 1.3 Subtracting Integers MP 8 Lesson 1.4 Multiplying Integers MP 8 Lesson 1.5 Dividing Integers MP 8	Basis for understanding integers, utilized throughout 8th grade and HS.

Chapter 2	12 Days	7.NS.1a-d 7.NS.2a-d 7.NS.3	Chapter Opener Lesson 2.1 Rational Numbers MP 4 & 3 Lesson 2.2 Adding Rational Numbers MP 2 Lesson 2.3 Subtracting Rational Numbers MP 2 Lesson 2.4 Multiplying and Dividing Rational Numbers MP 2, 3 & 6	Basis for understanding rational numbers, utilized throughout 8th grade and HS.
Chapter 3	15 Days	7.EE.1 7.EE.2 7.EE.4a	Chapter Opener Lesson 3.1 Algebraic Expressions MP 3 Lesson 3.2 Adding and Subtracting Linear Expressions MP 2 & 7 Lesson 3.3 Solving Equations Using Addition or Subtraction MP 2 & 4 Lesson 3.4 Solving Equations Using Multiplication or Division MP 1 & 4 Lesson 3.5 Solving Two-Step Equations MP 2, 4	Basis for understanding algebraic expressions and how to manipulate equations – utilized heavily in HS and again in 8th grade
Chapter 4	12 Days	7.EE.4b	Chapter Opener Lesson 4.1 Writing and Graphing Inequalities MP 6 Lesson 4.2 Solving Inequalities Using Addition or Subtraction MP 4 & 6 Lesson 4.3 Solvng Inequalities using Multiplication or Division MP 1 & 3 Lesson 4.4 Solving Two-Step Inequalities MP 3	Basis for understanding inequalities, heavily used in HS and again 8th grade
Chapter 5	17 Days	7.RP.1 7.RP.2a-d 7.RP.3	Chapter Opener Lesson 5.1 Ratios and Rates MP 7 Lesson 5.2 Proportions MP 3 Lesson 5.3 Writing Proportions MP 2 & 8 Lesson 5.4 Solving Proportions MP 3 & 4	Heavily utilized in 10th grade (similarity) and 9th grade (slope & rates) and 8th grade (slopes)

			Lesson 5.5 Slope MP 4 Lesson 5.6 Direct Variation MP 4	
Chapter 6	18	7.RP.3 7.EE.3	Chapter Opener Lesson 6.1 Percents and Decimals MP 3 & 4 Lesson 6.2 Comparing and Ordering Fractions, decimals, and Percents MP2 Lesson 6.3 The Percent Proportion MP 2, 4, & 5 Lesson 6.4 The Percent Equation MP 3 Lesson 6.5 Percents of Increase and Decrease MP 5 & 8 Lesson 6.6 Discounts and Markups MP 4 Lesson 6.7 Simple Interest MP 4	Basis of understanding portions of units and portions of numbers. Heavily used throughout 8th grade and HS.
Chapter 7	12	7.G.1 7.G.2 7.G.5	Chapter Opener Lesson 7.1 Adjacent and Vertical Angles MP 3 & 6 Lesson 7.2 Complementary and Supplementary Angles MP 3 & 5 Lesson 7.3 Triangles MP 3, & 5 Lesson 7.4 Quadrilaterals MP 3 & 5 Lesson 7.5 Scale Drawings MP 3 & 6	Introduction of Geometric concepts, utilized throughout 10th grade Geometry and again in 8th grade.
Chapter 8	12	7.G.4 7.G.6	Chapter Opener Lesson 8.1 Circles and Circumference MP 6, 5 & 8 Lesson 8.2 Perimeters of Composite Figures MP 3 & 4 Lesson 8.3 Areas of Circles MP 4 & 8 Lesson 8.4 Areas of Composite Figures MP 1	Introduction of Geometric concepts, utilized throughout 10th grade Geometry and again in 8th grade.
Chapter 9	16	7.G.3 7.G.4 7.G.6	Chapter Opener Lesson 9.1 Surface Areas of Prisms M 3 & 4	Introduction of Geometric concepts, used again in 8th grade

			Lesson 9.2 Surface Areas of Pyramids MP 4 Lesson 9.3 Surface Areas of Cylinders MP 1 & 4 Lesson 9.4 Volumes of Prisms MP 1,4, 5, 6 & 8 Lesson 9.5 Volumes of Pyramids MP 2, 4, 5, 6 & 8	
Chapter 10	20	7.SP.1 7.SP.2 7.SP.3 7.SP.4 7.SP.5 7.SP.6 7.SP.7a-b 7.SP.8a-c	Chapter Opener Lesson 10.1 Outcomes and Events MP 3 & 4 Lesson 10.2 Probability MP 6 Lesson 10.3 Experimental and Theoretical Probability MP 3,5 & 6 Lesson 10.4 Compound Events MP 4 & 6 Lesson 10.5 Independent and Dependent Events MP 4 & 6 Lesson 10.6 Sample and Populations MP 2 & 3 Lesson 10.7 Generating Multiple Samples MP 3 & 5	Introduction of probability concepts, addressed again in 9th grade, 11th grade, and in Prob/Stats and addressed as data displays in 8th grade.

8th grade – Blue book

Ways in which students demonstrate the standards of Mathematical Practices:

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Math practices addressed with:

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MP2 – Students are given "Critical Thinking", "Abstract Reasoning", and "Thought Provoking" problems. Students are asked to verbalize their interpretations of a problem (given either in words or symbols) and explain how the words relate to the symbols.

MP3 – Students are given "Error Analysis", "Making an Argument" and "How do you see it" problems. Students are also asked to critique theirs and others work through collaborative learning and journaling.

MP4 – Students are given multiple real-life examples to connect the mathematical symbolic expressions to real-life and verbal applications. Students are given "Modeling with Mathematics" and "Mathematical Connections" problems. Students are asked to transfer from tables, to graphs, to equations/expressions throughout.

MP5 – Students are asked to use graphing calculators and graph paper with tables, graphs, and equations to manipulate and solve problems. Explicit graphing calculator instruction is utilized to help students understand how to manipulate and use the tool.

MP6 – Students are asked to use precise language with the "Vocabulary" and "Core Concept" problems. They are also asked to give answers in specific formats (such as to a tenth or hundredth). Students are asked to explain, using precise language, through verbal discourse as well as math journaling.

MP7 – Students complete several problems that require justification and explanations. They are given problems such as "Comparing Methods", "Justifying Steps" , and "Analyzing". Students are asked to identify specifics within equations and then transfer this knowledge to other equations.

MP8 – Students evaluate equations and solutions of their own and others. They are given estimation problems to focus on the regularity to identify errors before they begin and after they complete work. Students are also asked to analyze errors. Students focus on repetition and regularity through math journal work and collaborative discourse.

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Unit/Concept	Estimated Time	CCSS	Topics/ Mathematical Practices	Vertical Alignment
Scavenger Hunt	1 Day			
Chapter 1	12 Days	8.EE.7a-b	Chapter Opener Lesson 1.1 Solving Simple Equations MP 3 & 7 Lesson 1.2 Solving Multi-Step Equations MP 1 Lesson 1.3 Solving Equations with Variables on Both sides MP 6 Lesson 1.4 Rewriting Equations and Formulas MP 4, 7, & 8	7th grade introduced simple expressions and equations, continued throughout HS as the basis for math equations.
Chapter 2	19 Days	8.G.1a-c 8.G.2 8.G.3 8.G.4	Chapter Opener Lesson 2.1 Congruent Figures MP 1 & 5 Lesson 2.2 Translations MP 3 Lesson 2.3 Reflections MP 3 Lesson 2.4 Rotations MP 3	Introduced Geometric concepts in 7th, heavily used in 10th grade Geometry.

			Lesson 2.5 Similar Figures MP 3 & 6 Lesson 2.6 Perimeters and areas of Similar Figures MP 8 Lesson 2.7 Dilations MP 3, 4 & 6	
Chapter 3	13 Days	8.G.5	Chapter Opener Lesson 3.1 Parallel Lines and Transversals MP 5 Lesson 3.2 Angles of Triangles MP 3 Lesson 3.3 Angles of Polygons MP 3, 4 & 8 Lesson 3.4 Using Similar Triangles MP 5 Lesson 3.5 Solving Two-Step Equations MP 2, 4	Introduced in 7th grade, building upon that and prior 8th grade knowledge, continued instruction in 10th grade Geometry.
Chapter 4	129 Days	8.EE.5 8.EE.6 8.F.4	Chapter Opener Lesson 4.1 Graphing Linear Equations MP 3 & 4 Lesson 4.2 Slope of a Line MP 1, 2, 3, & 6 Lesson 4.3 Graphing Proportional Relationships MP 2 Lesson 4.4 Graphing Linear Equations in Slope-Intercept Form MP 1, 2, 3 & 8 Lesson 4.5 Graphing Linear Equations in Standard Form MP 7 Lesson 4.6 Writing Equations in Slope-Intercept Form MP 1 & 4 Lesson 4.7 Writing Equations in Point-Slope Form MP1, 3 & 7	Concepts introduced in 7th grade, continued heavily in 9th grade and used heavily throughout high school.
Chapter 5	13 Days	8.EE.7a-b 8.EE.8a-c	Chapter Opener Lesson 5.1 Solving Systems of	Introduced in 7th grade, continued in 8th and 9th, revisited in 11th grade Algebra 2.

			Linear Equations by Graphing MP 1 & 2 Lesson 5.2 Solving Systems of Linear Equations by Substitution MP 1 & 7 Lesson 5.3 Solving Systems of Linear Equations by Elimination MP 1 & 7 Lesson 5.4 Solving Special Systems of Linear Equations MP 1	
Chapter 6	14	8.F.1 8.F.2 8.F.3 8.F.4 8.F.5	Chapter Opener Lesson 6.1 Relations and Functions MP 1 & 2 Lesson 6.2 Representations of Function MP 3 & 4 Lesson 6.3 Linear Functions MP 1 & 8 Lesson 6.4 Comparing Linear and Nonlinear Functions MP 4, 6 & 8 Lesson 6.5 Analyzing and Sketching Graphs MP 2, 3 & 6	Introduction of functions, instruction continued in 9th grade, revisited in 11th grade Algebra 2.
Chapter 7	15	8.NS.1 8.NS.2 8.EE.2 8.G.6 8.G.7 8.G.8	Chapter Opener Lesson 7.1 Finding Square Roots MP 1 & 6 Lesson 7.2 Finding Cube Roots MP 1, 2, 5 & 6 Lesson 7.3 The Pythagorean Theorem MP 3, 4 & 6 Lesson 7.4 Approximating Square Roots MP 1 & 5 Lesson 7.5 Using the Pythagorean Theorem MP 3 & 7	Necessary basis of squaring and roots Introduction of exponents in 7th grade, instruction continues through all of HS.
Chapter 8	13	8.G.9	Chapter Opener	Introduce in 7th grade with SA, revisited

			Lesson 8.1 Volume of Cylinders MP 1, 2, 3, & 4 Lesson 8.2 Volume of Cones MP 2 & 4 Lesson 8.3 Volumes of Spheres MP 1 & 4 Lesson 8.4 Surface Areas and Volumes of Similar Solids MP 8	in 10th grade Geometry
Chapter 9	12	8.SP.1 8.SP.2 8.SP.3 8.SP.4	Chapter Opener Lesson 9.1 Scatter Plots MP 1 Lesson 9.2 Lines of Fit MP 1, 4, & 6 Lesson 9.3 Two-Way Tables MP 2 Lesson 9.4 Volumes of Prisms MP 1,4, 5, 6 & 8 Lesson 9.5 Choosing a Data Display MP 3 & 4	Introduced in 7th grade, revisited in 9th, 11th and Prob/Stats
Chapter 10	18	8.EE.1 8.EE.3 8.EE.4	Chapter Opener Lesson 10.1 Exponents MP 6 & 8 Lesson 10.2 Product of Powers Property MP 5, 6 & 8 Lesson 10.3 Quotient of Powers Property MP 4 & 8 Lesson 10.4 Zero and Negative Exponents MP 3 & 8 Lesson 10.5 Reading Scientific Notation MP 2 & 5 Lesson 10.6 Writing Scientific Notation MP 1, 4 & 5 Lesson 10.7 Operations in Scientific Notation MP 1, 3, 5 & 7	Introduced in 7th, continued instruction through 9th and revisited in 11th Algebra 2.

Algebra 1

Algebra 1 - 9th grade
Ways in which students demonstrate the standards of Mathematical Practices: Positive Outcomes Charter School (POCS) utilizes multiple formative and summative methods for assessing and allowing students to demonstrate successful application of the Standards of mathematical Practice. Beyond the Big Ideas curriculum, POCS uses data collected from Khan Academy, Benchmarking from Scholastic Math Inventory (SMI), and Progress Monitoring (Khan Academy, Smarter Balance Interim testing, and Big Ideas Extension and differentiation materials for each chapter) Formative assessments include: Monitoring progress questions/quizzes every two weeks, Lesson mini assessments, Exit tickets, and class journal work. Summative assessments include: Benchmark assessments (SMI assessments) each marking period and unit assessments and/or performance assessments at the end of the unit. Math practices addressed with: MP 1 – Students investigate with the exploration for each lesson then express their reasoning and sense-making in communicate your answer. Students are also asked to explain their understanding of problems or answers during collaborative learning (partner shares, etc.) and journaling. Students are given "Open ended" and "Writing" problems. Explain to themselves the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals • Make conjectures about the form and meaning of the solution attempt. • Plan a solution pathway rather than simply jumping into a solution. • Consider analogous problems and try special cases and simpler forms of the original problen in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Transform algebraic expressions or change the viewing window on their graphing calculator to get information. • Explain correspondences between equations, verbal descriptions, tables, and graphs. • Draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Use concrete objects or pictures to help conceptualize and solve a problem. • Check their answers to problems using a different method. • Ask themselves, "Does this make sense?" • Understand the approaches of others to solving complex problems and identify correspondences between approaches. MP2 – Students are given "Critical Thinking", "Abstract Reasoning", and "Thought Provoking" problems. Students are asked to verbalize their interpretations of a problem (given either in words or symbols) and explain how the words relate to the symbols. Make sense of quantities and their relationships in problem situations. • Bring two complementary abilities to bear on problems involving quantitative relationships: Decontextualize (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents) and Contextualize (pause as needed during the manipulation process in order to probe into the referents for the symbols involved) • Use quantitative reasoning that entails creating a coherent representation of the problem at hand, considering the units involved, and attending to the meaning of quantities, not just how to compute them . • Know and flexibly use different properties of operations and objects. MP3 – Students are given "Error Analysis", "Making an Argument" and "How do you see it" problems. Students are also asked to critique theirs and others work through collaborative learning and journaling. Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical

progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases. • Recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments. • Distinguish correct logic or reasoning from that which is flawed and, if there is a flaw, explain what it is Elementary students construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Later students learn to determine domains to which an argument applies. • Listen or read the arguments of others, decide whether they make sense, and ask useful question to clarify or improve arguments.

MP4 – Students are given multiple real-life examples to connect the mathematical symbolic expressions to real-life and verbal applications. Students are given "Modeling with Mathematics" and "Mathematical Connections" problems. Students are asked to transfer from tables, to graphs, to equations/expressions throughout.

Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation • Map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze those relationships mathematically to draw conclusions. • Interpret their mathematical results in the context of the situation. • Reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MP5 – Students are asked to use graphing calculators and graph paper with tables, graphs, and equations to manipulate and solve problems. Explicit graphing calculator instruction is utilized to help students understand how to manipulate and use the tool.

• Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.

MP6 – Students are asked to use precise language with the "Vocabulary" and "Core Concept" problems. They are also asked to give answers in specific formats (such as to a tenth or hundredth). Students are asked to explain, using precise language, through verbal discourse as well as math journaling.

Try to communicate precisely to others. In the elementary grades, students give carefully formulated explanations to each other. In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.

MP7 – Students complete several problems that require justification and explanations. They are given problems such as "Comparing Methods", "Justifying Steps" , and "Analyzing". Students are asked to identify specifics within equations and then transfer this knowledge to other equations.

Mathematically proficient students: • Look closely to discern a pattern or structure. Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. In the expression x_2 + 9x + 14, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.

MP8 – Students evaluate equations and solutions of their own and others. They are given estimation problems to focus on the regularity to identify errors before they begin and after they complete work. Students are also asked to analyze errors. Students focus on repetition and regularity through math journal work and collaborative discourse.

Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation (y-2)/(x-1)=3. Noticing the regularity in the way terms cancel when expanding (x-1)(x+1), (x-1)(x_2+x+1), and (x-1)(x_3+x_2+x+1) might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.

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Unit / Concept / SAT Category	Estimated Time	CCSS	Topics/ Mathematical practices	Vertical Alignment Introduced in 7th, continued in 8th,
Unit 1 Solving Linear Equations Heart of Algebra (30%)	8 days	A.CED.1 A.CED.4 A.REI.A A.REI.3 N.Q.A.1	Solving Simple Equation / MP3, MP4, MP5, MP6 Solving Multi-Step Equations / MP3, MP4 Solving Equations with Variables on Both Sides/ MP1, MP2, MP4, MP6, MP7 Rewriting Equations and Formulas/ MP3, MP7	Utilized through Geometry and Algebra 2. Used as a basis of Algebraic foundations necessary for all Algebra 1, Geometry, and Algebra 2.
Unit 2 Solving Linear Inequalities Heart of Algebra (30%)	10 days	A.CED.1 A.REI.3	Writing and Graphing Inequalities / MP2, MP5, MP6 Solving Inequalities Using Addition or Subtraction / MP2, MP4, MP5, MP6, MP7 Solving Inequalities Using Multiplication or Division / MP5, MP7, MP8 Solving Multi-Step Inequalities / MP1, MP3, MP5, MP7 Solving Compound Inequalities / MP2, MP3, MP6 Solving Absolute Value Inequalities / MP1	Introduced in 7th, continued in 8th, Utilized in Geometry and reviewed and utilized in Algebra 2. Used as a basis of inequalities, used again in Chap 3 & 5 in Algebra 1.

Unit 3 Graphing Linear Inequalities Heart of Algebra (30%)	11 Days	A.CED.2 A.REI.10 F.IF.1 F.IF.2 F.IF.4 F.IF.5 F.IF.7A F.IF.7B F.IF.9 F.BF.3 F.LE.1B F.LE.5 N.Q.A.2 N.Q.A.3	Functions / MP3 Linear Functions / MP2, MP3, MP5, MP6 Function Notation / MP1, MP6, MP8 Graphing Linear Equations in Standard Form / MP1, MP3, MP4 Graphing Linear Equations in Slope-Intercept Form / MP2, MP3, MP5 Transformations of Graphs of Linear Functions / MP5 Graphing Absolute Value Functions / MP5, MP7	Introduced in 7th, continued in 8th Utilized in Geometry and reviewed in Algebra 2. Functions are expanded upon in Algebra 2. Heavily used and expanded upon in Algebra 2. Used as a basis of functions. Graphing functions again in unit 8.
Unit 4 Writing Linear Functions Heart of Algebra (30%) Problem Solving and Data Analysis (30%)	10 days	A.CED.2 A.REI.10 F.IF.3 F.IF.7B F.BF.1A F.BF.2 F.LE.1B F.LE.2 F.LE.5 S.ID.6A S.ID.6B S.ID.6C S.ID.7 S.ID.8 S.ID.9 N.Q.A.2 N.Q.A.3	Writing Equations in Slope-Intercept Form / MP1, MP2, MP4, MP6 Writing Equations in Point-Slope Form / MP1, MP2, MP5 Writing Equations of Parallel and Perpendicular Lines / MP1, MP2, MP3, MP5, MP6 Scatter Plots and Lines of Fit/ MP1, MP2, MP5, MP6 Analyzing Lines of Fit / MP1, MP2, MP6 Arithmetic Sequence / MP5, MP6, MP7 Piecewise Functions / MP1, MP4, MP5	Introduced in 7th , continued in 8th Utilized, reviewed and expanded upon in Geometry, Algebra 2, and Prob & Stats. Used as a basis for equations of lines, utilized in Geometry and Algebra 2. Rest used as a basis for Prob & Stats.

Unit 5 Solving Systems of Linear Equations Heart of Algebra (30%)	14 days	A.CED.3 A.REI.5 A.REI.6 A.REI.11 A.REI.12 N.Q.A.2 N.Q.A.3	Solving Linear Equations by: Graphing / MP3, MP4, MP5, MP6 Substitution / MP3, MP6, MP7 Elimination / MP1, MP7 Solving Special Systems of Linear Equations / MP4, MP7, MP8 Solving Equations by Graphing / MP2, MP5 Graphing Linear Inequalities in two variables / MP5, MP6 Systems of Linear Inequalities / MP1, MP3, MP7	Introduced in 7th & 8th, Utilized, reviewed, and expanded upon in Algebra 2. Used as a basis for understanding how two equations fit together. Used again in Nonlinear systems in Algebra 2.
Unit 6 Exponential Functions and Sequences Passport to Advanced Mathematics (30%)	11 days	N.RN.1 N.RN.2 A.CED.1 A.CED.2 A.REI.1 A.REI.11 A.SSE.3C F.IF.3 F.IF.4 F.IF.7E F.IF.8B F.IF.9 F.BF.1A F.BF.1C F.BF.2 F.BF.3 F.LE.1A F.LE.2 N.Q.A.2 N.Q.A.3	Properties of Exponents / MP3, MP7, MP8 Radicals and Rational Exponents / MP2, MP3 Exponential Functions / MP3, MP8 Exponential Growth and Decay / MP3, MP4 Solving Exponential Equations / MP3, MP5 Geometric Sequences / MP4, MP5, MP8 Recursively Defined Sequences / MP7	Introduced in 7th & 8th, Utilized, reviewed, and expanded upon in Algebra 2 and Prob & Stats. Used as basis for exponential understanding necessary for polynomials, exponential, logarithmic, and other math with exponents.

Unit 7 Polynomial Equations and Factoring Passport to Advanced Mathematics (30%)	15 days	A.APR.1 A.APR.3 A.REI.4B A.SSE.2 A.SSE.3A	Adding and Subtracting Polynomials / MP2, MP6, MP7 Multiplying Polynomials / MP1 Special Products of Polynomials / MP1, MP5, MP6, MP7 Solving Polynomial Equations in Factored Form / MP5 Factoring $x^2 + bx + c$ / MP2 Factoring $ax^2 + bx + c$ / MP4 Factoring Special Products / MP7 Factoring Polynomials Completely / MP2	Utilized in Geometry, Algebra 2, and Prob/Stats Reviewed and expanded upon in Algebra 2 and Prob/Stats. Used as a basis for polynomials. Used heavily in Algebra 2 with quadratic functions and equations. Used again in next chapter as well.
Unit 8 Graphing Quadratic Equations Passport to Advanced Mathematics (30%)	13 days	A.CED.2 A.SSE.3A A.APR.3 F.IF.4 F.IF.6 F.IF.7A F.IF.8C F.IF.9 F.BF.1A F.BF.3 F.LE.3 N.Q.A.2 N.Q.A.3	Graphing $f(x) = ax^2$ / MP2, MP7 Graphing $f(x) = ax^2 + c$ / MP1, MP5 Graphing $f(x) = ax^2 + bc + c$ / MP3, MP7 Graphing $f(x) = a(x-h)^2 + k$ / MP1, MP5, MP7 Using Intercept Form / MP2, MP3, MP5 Comparing Linear, Exponential, and Quadratic Functions / MP3, MP4, MP5	Utilized, Reviewed, and expanded upon in Algebra 2 Expanding upon last chapter. Expanded upon in Algebra 2. Used as basis for understanding various functions and their characteristics.
Unit 11 Data Analysis and Displays Problem Solving and Data Analysis (30%)	13 days	S.ID.1 S.ID.2 S.ID.3 S.ID.5	Measures of Center and Variation / MP2, MP3 Box-and-Whisker Plots / MP2, MP4 Shapes of Distributions / MP6 Two-Way Tables / MP2, MP4, MP5 Choosing a Data Display / MP3, MP4, MP5	Introduced in 7^{th} , continued in 8^{th}, Utilized, reviewed, and expanded upon in Prob/Stats.

				Used again in Prob/Stats to delve into how to use these basic data displays to determine probability.
	105 days			

Unit - Concept - SAT Category	Total days	Breakdown of days	Marking period
Unit 1 Solving Linear Equations Heart of Algebra (30%)	8 days	1.1 - Skipped 1.2 - 1 day 1.3 - 1 day Review/Quiz 1.4 - 1 day 1.5 - 2 days Review / Test - 2 days	MP1
Unit 2 Solving Linear Inequalities Heart of Algebra (30%)	10 days	2.1 - 1 day 2.2 - 1 day 2.3 - 1 day Review/Quiz - 2 days 2.4 - 2 days 2.5 - 1 day Review / Test - 2 days	MP 1
Unit 3 Graphing Linear Inequalities Heart of Algebra (30%)	11 Days	3.1 - 1 day 3.2 - 1 day 3.3 - 2 days Review/ Quiz - 2 days 3.4 - 1 day 3.5 - 2 days Review/ Test - 2 days	MP 1
Unit 4 Writing Linear Functions Heart of Algebra (30%) Problem Solving and Data Analysis (30%)	10 days	4.1 - 2 days 4.2 - 1 day 4.3 - 1 day Review/Test - 2 days 4.4 - 1 day 4.5 - 1 day Review/Quiz - 2 days 4.6 - Skip 4.7 - Skip	MP 2

Unit 5 Solving Systems of Linear Equations Heart of Algebra (30%)	14 days	5.1 - 1 day 5.2 - 2 days 5.3 - 2 days 5.4 - 1 day Review/Quiz - 1 day 5.5 - 1 day 5.6 - 2 days 5.7 - 2 days Review/Test - 2 days	MP 2
Unit 6 Exponential Functions and Sequences Passport to Advanced Mathematics (30%)	11 days	6.1 - 2 days 6.2 - 1 day 6.3 - 2 days Review/Quiz - 2 days 6.4 - 2 days 6.5 - 1 day Reivew/Test - 1 day	MP 3
Unit 7 Polynomial Equations and Factoring Passport to Advanced Mathematics (30%)	15 days	7.1 - 2 days 7.2 - 2 days 7.3 - 1 day 7.4 - 2 days Review / Quiz - 1 day 7.5 - 2 days 7.6 - 1 day 7.7 - 1 day 7.8 - 1 day Review/Test - 2 days	MP 3

Unit 8 Graphing Quadratic Equations Passport to Advanced Mathematics (30%)	13 days	8.1 - 1 day 8.2 - 1 day Review - 1 day 8.3 - 2 days Review/Quiz - 2 days 8.6 - 2 days Review / Test - 2 days Maybe 8.4 - 2 days 8.5 Skip	MP 4
Unit 11 Data Analysis and Displays Problem Solving and Data Analysis (30%)	13 days	11.1 - 3 days 11.2 - 2 days 11.3 - 2 days Review/Quiz - 2 days 11.4 - 3 days 11.5 - 3 days Review/Test - 2 days	MP 4

Geometry

Geometry - 10th
Ways in which students demonstrate the standards of Mathematical Practices: Positive Outcomes Charter School (POCS) utilizes multiple formative and summative methods for assessing and allowing students to demonstrate successful application of the Standards of mathematical Practice. Beyond the Big Ideas curriculum, POCS uses data collected from Khan Academy, Benchmarking from Scholastic Math Inventory (SMI), and Progress Monitoring (Khan Academy, Smarter Balance Interim testing, and Big Ideas Extension and differentiation materials for each chapter) Formative assessments include: Monitoring progress questions/quizzes every two weeks, Lesson mini assessments, Exit tickets, and class journal work. Summative assessments include: Benchmark assessments (SMI assessments) each marking period and unit assessments and/or performance assessments at the end of the unit. Math practices addressed with: MP 1 – Students investigate with the exploration for each lesson then express their reasoning and sense-making in communicate your answer. Students are also asked to explain their understanding of problems or answers during collaborative learning (partner shares, etc.) and journaling. Students are given "Open ended" and "Writing" problems. Explain to themselves the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals • Make conjectures about the form and meaning of the solution attempt. • Plan a solution pathway rather than simply jumping into a solution. • Consider analogous problems and try special cases and simpler forms of the original problen in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Transform algebraic expressions or change the viewing window on their graphing calculator to get information. • Explain correspondences between equations, verbal descriptions, tables, and graphs. • Draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Use concrete objects or pictures to help conceptualize and solve a problem. • Check their answers to problems using a different method. • Ask themselves, "Does this make sense?" • Understand the approaches of others to solving complex problems and identify correspondences between approaches. MP2 – Students are given "Critical Thinking", "Abstract Reasoning", and "Thought Provoking" problems. Students are asked to verbalize their interpretations of a problem (given either in words or symbols) and explain how the words relate to the symbols. Make sense of quantities and their relationships in problem situations. • Bring two complementary abilities to bear on problems involving quantitative relationships: Decontextualize (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents) and Contextualize (pause as needed during the manipulation process in order to probe into the referents for the symbols involved) • Use quantitative reasoning that entails creating a coherent representation of the problem at hand, considering the units involved, and attending to the meaning of quantities, not just how to compute them . • Know and flexibly use different properties of operations and objects. MP3 – Students are given "Error Analysis", "Making an Argument" and "How do you see it" problems. Students are also asked to critique theirs and others work through collaborative learning and journaling. Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical

progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases. • Recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments. • Distinguish correct logic or reasoning from that which is flawed and, if there is a flaw, explain what it is Elementary students construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Later students learn to determine domains to which an argument applies. • Listen or read the arguments of others, decide whether they make sense, and ask useful question to clarify or improve arguments.

MP4 – Students are given multiple real-life examples to connect the mathematical symbolic expressions to real-life and verbal applications. Students are given "Modeling with Mathematics" and "Mathematical Connections" problems. Students are asked to transfer from tables, to graphs, to equations/expressions throughout.

Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation • Map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze those relationships mathematically to draw conclusions. • Interpret their mathematical results in the context of the situation. • Reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MP5 – Students are asked to use graphing calculators and graph paper with tables, graphs, and equations to manipulate and solve problems. Explicit graphing calculator instruction is utilized to help students understand how to manipulate and use the tool.

• Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.

MP6 – Students are asked to use precise language with the "Vocabulary" and "Core Concept" problems. They are also asked to give answers in specific formats (such as to a tenth or hundredth). Students are asked to explain, using precise language, through verbal discourse as well as math journaling.

Try to communicate precisely to others. In the elementary grades, students give carefully formulated explanations to each other. In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.

MP7 – Students complete several problems that require justification and explanations. They are given problems such as "Comparing Methods", "Justifying Steps" , and "Analyzing". Students are asked to identify specifics within equations and then transfer this knowledge to other equations.

Mathematically proficient students: • Look closely to discern a pattern or structure. Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. In the expression x_2 + 9x + 14, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.

MP8 – Students evaluate equations and solutions of their own and others. They are given estimation problems to focus on the regularity to identify errors before they begin and after they complete work. Students are also asked to analyze errors. Students focus on repetition and regularity through math journal work and collaborative discourse.

Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation (y-2)/(x-1)=3. Noticing the regularity in the way terms cancel when expanding (x-1)(x+1), (x-1)(x_2+x+1), and (x-1)(x_3+x_2+x+1) might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.

Additional resources and materials addressing the big ideas and focus for grade level math:

POCS is a school designed to work with students who have experienced academic challenges in a traditional school setting. Students who enroll in our school typically arrive with significant deficiencies in Mathematics skills. Consequently, looking at our historical data has always been a challenge for us because the average level of performance greatly varies with each cohort of students. Each of our students has a different story of struggle and adversity that brought them to our school. Over the years POCS has implemented numerous programs and strategies to enable the students to show growth toward proficiency. Over the years our students have shown significant growth the longer they attend POCS.

In 2011 POCS adapted elements from the Big Picture Learning model including our students to connect learning to real life experiences. We ask our tenth – twelfth grade students to participate in internships, reflect on the experience and connect the activity to their mathematical learning. All students have Response to Intervention (RTI) each day for ELA or Math. The students are leveled to meet the needs of the individual students. During the RTI period, students work on Math 180, Khan Academy, and teacher created materials to meet their individual needs. POCS offers extensive tutoring for all students with the teachers reaching out to parents of students who would benefit from the extra time and work. POCS has small classes averaging 10 - 13 students per class. POCS has developed a Setting B for students in need of smaller class instruction focusing on the individual needs of the student.

Unit / Concept / SAT Category	Estimated Time	CCSS	Topics / Mathematical Practices	Vertical Alignment
Unit 1 Basics of Geometry Additional Topics of Mathematics (10%)	11 days	CO.A.1 CO.D.12 GPE.B.7 MG.A.1	Points, Lines, and Planes / MP3, MP4, MP5 Measuring and Constructing Segments / MP1, MP2, MP5, MP6 Using Midpoint and Distance Formulas / MP1, MP2, MP5 Perimeter and Area in the Coordinate Plane/ MP1, MP3, MP6, MP7 Measuring and Constructing Angles / MP5, MP6 Describing Pairs of Angles / MP2, MP3	Introduced in 7th , continued in 8th Utilizing algebraic expressions from 7th – 9th
Unit 3 Parallel and Perpendicular Lines Additional Topics of Mathematics (10%)	16 days	CO.A.1 CO.C.9C CO.D.12 GPE.B.5 GPE.B.6	Pairs of Lines and Angles / MP3 Parallel Lines and Transversals / MP3, MP6 Proofs with Parallel Lines / MP3 Proofs with Perpendicular Lines / MP3 Equations of Parallel and Perpendicular Lines / MP1, MP4	Introduced in 8th, revisited in 9th Utilizing manipulation (from 7th) and expressions (from 7th)
Unit 4 Transformations Additional Topics of Mathematics (10%)	17 days	CO.A.2 CO.A.3 CO.A.4 CO.A.5 CO.B.6 MG.A.3 SRT.A.1A SRT.A.1B SRT.A.2	Translations / MP5, MP2, MP3 Reflections / MP1, MP5, MP7 Rotations / MP3, MP8 Congruence and Transformations / MP3, MP5 Dilations / MP7, MP5 Similarity and Transformations / MP2, MP3, MP5, MP6	Utilizing proportions from 7th , introduced in 8th

Unit 5 Congruent Triangles Additional Topics of Mathematics (10%)	18 days	CO.B.7 CO.B.8 CO.C.10 CO.D.13 MG.A.1 MG.A.3 SRT.B.5 GPE.B.4	Angles of Triangles / MP3, Congruent Polygons / MP3, MP7 Proving Triangle Congruence by SAS / MP3, MP5 Equilateral and Isosceles Triangles / MP3, MP5, MP6 Proving Triangle Congruence by SSS / MP3, MP5 Proving Triangle Congruence by ASA and AAS / MP3, MP5 Using Congruent Triangles / MP1, MP3 Coordinate Proofs / MP1, MP2, MP3	Introduced in 8^{th}, Utilizing expressions (7^{th} – 9^{th}) and polygon work from 7^{th}
Unit 6 Relationships with Triangles Additional Topics of Mathematics (10%)	14 days	CO.C.9 CO.C.10 CO.D.12 C.A.3 MG.A.1 MG.A.3	Perpendicular and Angle Bisectors / MP3, MP5 Bisectors of Triangles / MP3, MP5, MP7 Medians and Altitudes of Triangles / MP3, MP7 The Triangle Midsegment Theorem / MP3	Introduced in 8^{th}, Utilizing expression work from 7^{th} – 9^{th}
Unit 8 Similarlity Additional Topics of Mathematics (10%)	10 days	SRT.A.2 SRT.A.3 SRT.B.4 SRT.B.5 MG.A.1 MG.A.3 GPE.B.5 GPE.B.6	Similar Polygons / MP7 Proving Triangle Similarity by AA / MP3 Proving Triangle Similarity by SSS and SAS / MP3 Proportionality Theorems / MP3, MP7	Utilizing proportions from 7^{th} Introduced in 8^{th}

Unit 7 Quadrilaterals and other polygons Additional Topics of Mathematics (10%)	11 days	A.REI.B.3 A.SSE.A.1b G.GPE.B.5 G.CO.C.11 G.SRT.B.5 G.MG.A.1 G.MG.A.3	Angles of Polygons / MP3 Properties of Parallelograms / MP1, MP3, MP6, MP8 Proving That a Quadrilateral is a Parallelogram / MP2, MP3, MP8 Properties of Special Parallelograms / MP2, MP3, MP6, MP8 Properties of Trapezoids and Kites / MP1, MP2, MP3	Utilizing work from 7^{th} Introduced in 8^{th}, Expressions from 7^{th} – 9^{th}
Unit 9 Right Triangles and Trigonometry Additional Topics of Mathematics (10%)	18 days	SRT.B.4 SRT.B.5 SRT.C.6 SRT.C.7 SRT.C.8 SRT.D.9 SRT.D.10 SRT.D.11 MG.A.1 MG.A.3	The Pythagorean Theorem / MP2, MP3, MP6 Special Right Triangles / MP2, MP6 Similar Right Triangles / MP3 The Tangent Ratio / MP6 The Sine and Cosine Ratios / MP7 Solving Right Triangles / MP6 Law Sines and Law of Cosines / MP3, MP5	Reviewed again in Algebra 2 and Prob/Stats
	115 total days			

Unit - Concept - SAT Category	Total days	Breakdown of days	Marking period
Unit 1 Basics of Geometry Additional Topics of Mathematics (10%)	11 days	1.1 - 2 days 1.2 - 2 days 1.3 - 2 days Review/Quiz - 1 day 1.4 - 2 days 1.5 - 2 days 1.6 - 2 days Review/Test - 1 day	MP 1

Unit 3 Parallel and Perpendicular Lines Additional Topics of Mathematics (10%)	16 days	3.1 - 2 days 3.2 - 2 days 3.3 - 2 days Review/Quiz - 2 days 3.4 - 2 days 3.5 - 4 days Review - 1 day Test - 1 day	MP 1
Unit 4 Transformations Additional Topics of Mathematics (10%)	17 days	4.1 - 2 days 4.2 - 2 days 4.3 - 2 days Review/Quiz - 2 days 4.4 - 2 days 4.5 - 3 days 4.6 - 2 days Review - 1 day Test - 1 day	MP 2
Unit 5 Congruent Triangles Additional Topics of Mathematics (10%)	18 days	5.1 - 1 day 5.2 - 1 day 5.3 - 2 days 5.4 - 1 day Review/ Quiz - 1 day 5.5 - 2 days 5.6 - 1 day 5.7 - 1 day 5.8 - Skip Review - 1 day Test - 1 day	MP 2

Unit 6 Relationships with Triangles Additional Topics of Mathematics (10%)	14 days	6.1 - 2 days 6.2 - skip 6.3 - 2 days Review/Quiz - 2 days 6.4 - 2 days 6.5 - 2 days 6.6 - 2 days Review / Test - 2 days	MP 3
Unit 8 Similarlity Additional Topics of Mathematics (10%)	10 days	8.1 - 2 days 8.2 - 2 days 8.3 - 2 days 8.4 - 2 days Review/Test - 2 days	MP 3
Unit 7 Quadrilaterals and other polygons Additional Topics of Mathematics (10%)	11 days	7.1 - 2 days 7.2 - 2 days Review/Quiz - 1 day 7.3 - Skip 7.4 - 2 days 7.5 - 2 days Review/Test - 2 days	MP 4
Unit 9 Right Triangles and Trigonometry Additional Topics of Mathematics (10%)	18 days	9.1 - 2 days 9.2 - 2 days 9.3 - 2 days 9.4 - 2 days Review/Quiz - 2 days 9.5 - 2 days 9.6 - 2 days 9.7 - 2 days Review / Test - 2 days	MP 4
	115 days		

Algebra II

Algebra 2 - 11th
Ways in which students demonstrate the standards of Mathematical Practices: Positive Outcomes Charter School (POCS) utilizes multiple formative and summative methods for assessing and allowing students to demonstrate successful application of the Standards of mathematical Practice. Beyond the Big Ideas curriculum, POCS uses data collected from Khan Academy, Benchmarking from Scholastic Math Inventory (SMI), and Progress Monitoring (Khan Academy, Smarter Balance Interim testing, and Big Ideas Extension and differentiation materials for each chapter) Formative assessments include: Monitoring progress questions/quizzes every two weeks, Lesson mini assessments, Exit tickets, and class journal work. Summative assessments include: Benchmark assessments (SMI assessments) each marking period and unit assessments and/or performance assessments at the end of the unit. Math practices addressed with: MP 1 – MP 1 – Students investigate with the exploration for each lesson then express their reasoning and sense-making in communicate your answer. Students are also asked to explain their understanding of problems or answers during collaborative learning (partner shares, etc.) and journaling. Students are given "Open ended" and "Writing" problems. Explain to themselves the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals • Make conjectures about the form and meaning of the solution attempt. • Plan a solution pathway rather than simply jumping into a solution. • Consider analogous problems and try special cases and simpler forms of the original problen in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Transform algebraic expressions or change the viewing window on their graphing calculator to get information. • Explain correspondences between equations, verbal descriptions, tables, and graphs. • Draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Use concrete objects or pictures to help conceptualize and solve a problem. • Check their answers to problems using a different method. • Ask themselves, "Does this make sense?" • Understand the approaches of others to solving complex problems and identify correspondences between approaches. MP2 – Students are given "Critical Thinking", "Abstract Reasoning", and "Thought Provoking" problems. Students are asked to verbalize their interpretations of a problem (given either in words or symbols) and explain how the words relate to the symbols. Make sense of quantities and their relationships in problem situations. • Bring two complementary abilities to bear on problems involving quantitative

relationships: Decontextualize (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents) and Contextualize (pause as needed during the manipulation process in order to probe into the referents for the symbols involved) • Use quantitative reasoning that entails creating a coherent representation of the problem at hand, considering the units involved, and attending to the meaning of quantities, not just how to compute them . • Know and flexibly use different properties of operations and objects.

MP3 – Students are given "Error Analysis", "Making an Argument" and "How do you see it" problems. Students are also asked to critique theirs and others work through collaborative learning and journaling.

Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases. • Recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments. • Distinguish correct logic or reasoning from that which is flawed and, if there is a flaw, explain what it is Elementary students construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Later students learn to determine domains to which an argument applies. • Listen or read the arguments of others, decide whether they make sense, and ask useful question to clarify or improve arguments.

MP4 – Students are given multiple real-life examples to connect the mathematical symbolic expressions to real-life and verbal applications. Students are given "Modeling with Mathematics" and "Mathematical Connections" problems. Students are asked to transfer from tables, to graphs, to equations/expressions throughout.

Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation • Map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze those relationships mathematically to draw conclusions. • Interpret their mathematical results in the context of the situation. • Reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MP5 – Students are asked to use graphing calculators and graph paper with tables, graphs, and equations to manipulate and solve problems. Explicit graphing calculator instruction is utilized to help students understand how to manipulate and use the tool.

• Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.

MP6 – Students are asked to use precise language with the "Vocabulary" and "Core Concept" problems. They are also asked to give answers

in specific formats (such as to a tenth or hundredth). Students are asked to explain, using precise language, through verbal discourse as well as math journaling.

Try to communicate precisely to others. In the elementary grades, students give carefully formulated explanations to each other. In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.

MP7 – Students complete several problems that require justification and explanations. They are given problems such as "Comparing Methods", "Justifying Steps" , and "Analyzing". Students are asked to identify specifics within equations and then transfer this knowledge to other equations.

Mathematically proficient students: • Look closely to discern a pattern or structure. Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.

MP8 – Students evaluate equations and solutions of their own and others. They are given estimation problems to focus on the regularity to identify errors before they begin and after they complete work. Students are also asked to analyze errors. Students focus on repetition and regularity through math journal work and collaborative discourse.

Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation $(y-2)/(x-1)=3$. Noticing the regularity in the way terms cancel when expanding $(x-1)(x+1)$, $(x-1)(x^2+x+1)$, and $(x-1)(x^3+x^2+x+1)$ might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.

Additional resources and materials addressing the big ideas and focus for grade level math:

POCS is a school designed to work with students who have experienced academic challenges in a traditional school setting. Students who enroll in our school typically arrive with significant deficiencies in Mathematics skills. Consequently, looking at our historical data has always been a challenge for us because the average level of performance greatly varies with each cohort of students. Each of our students has a different story of struggle and adversity that brought them to our school. Over the years POCS has implemented numerous programs and strategies to enable the students to show growth toward proficiency. Over the years our students have shown significant growth the longer they attend POCS.

In 2011 POCS adapted elements from the Big Picture Learning model including our students to connect learning to real life experiences. We

ask our tenth – twelfth grade students to participate in internships, reflect on the experience and connect the activity to their mathematical learning. All students have Response to Intervention (RTI) each day for ELA or Math. The students are leveled to meet the needs of the individual students. During the RTI period, students work on Math 180, Khan Academy, and teacher created materials to meet their individual needs. POCS offers extensive tutoring for all students with the teachers reaching out to parents of students who would benefit from the extra time and work. POCS has small classes averaging 10 - 13 students per class. POCS has developed a Setting B for students in need of smaller class instruction focusing on the individual needs of the student.

Unit / Concept / SAT Category	Estimated Time	CCSS	Topics	Vertical Alignment
Unit 1 Linear Functions Heart of Algebra (30%)	12 days	F.IF.9 F.BF.1a F.BF.3 F.LE.2 A.CED.2 A.CED.3 A.REI.6 S.ID.6a N.Q.A.2	Parent Functions and Transformations / MP2, MP3, MP6 Transformations of Linear and Absolute Value Functions / MP2, MP3, MP5 Modeling with Linear Functions / MP1, MP3, MP4, MP6 Solving Liner Systems / MP1, MP3	Introduced in 8^{th} and 9^{th} grade, utilizing equation knowledge from 7^{th} – 10^{th} Utilizing transformation knowledge from 10^{th}
Unit 2 Quadratic Functions Passport to Advanced Mathematics (30%)	7 days	F.IF.4 F.IF.6 F.IF.7c F.IF.9 F.BF.1a F.BF.3 A.CED.2 A.APR.3 G.GPE.2 S.ID.6a N.Q.A.2	Transformations of Quadratic Functions / MP3, MP7 Characteristics of Quadratic Functions / MP2, MP6 Focus of a Parabola /MP3 Modeling with Quadratic Equations / MP2, MP4, MP5, MP6	Introduced in 9^{th} grade, utilizing equation knowledge from 7^{th} – 10^{th}, utilizing transformation knowledge from 10^{th}, utilizing knowledge from earlier 11^{th} grade

Unit 3 Quadratic Equations and Comlex Numbers Passport to Advanced Mathematics (30%)	11 days	N.CN.1 N.CN.2 N.CN.7 F.IF.8A A.SSE.2 A.REI.4B A.REI.7 AREI.11 A.CED.1 A.CED.3 N.Q.A.2	Solving Quadratic Equations / MP6 Complex Numbers / MP7 Completing the Square / MP2, MP6, MP7 Using Quadratic Formula / MP2, MP6, MP7 Solving Nonlinear Systems / MP1, MP3, MP5 Quadratic Inequalities / MP2, MP5	Introduced in 9th grade, utilizing equation knowledge from 7th – 10th, utilizing knowledge from prior 11th grade
Unit 4 Polynomial Functions Passport to Advanced Mathematics (30%)	18 days	N.CN.8 N.CN.9 F.IF.4 F.IF.7c F.BF.1a F.BF.3 A.APR.2 A.APR.3 A.APR.4 A.APR.5 A.APR.6 A.SSE.2 A.CED.2 N.Q.A.2	Graphing Polynomial Functions / MP2, MP4, MP5 Adding, Subtracting, and Multiplying Polynomials / MP7, MP8 Dividing Polynomials / MP2 Factoring Polynomials / MP1, MP2, MP3, MP5 Solving Polynomial Equations / MP3, MP5 The Fundamental Theorem of Algebra / MP1 Transformations of Polynomial Functions / MP5, MP7 Analyzing Graphs of Polynomial Functions / MP2, MP3, MP6 Modeling with Polynomial Functions / MP5	Introduced in 9th grade Utilizing knowledge of equations and transformations and graphing from 7th – 10th Utilizing distribution and integer knowledge from 7th grade Utilizing function transformation knowledge from earlier in 11th grade

Unit 10 Probability Problem Solving and Data Analysis (30%)	8 days	S.CP.1 S.CP.2 S.CP.3 S.CP.4 S.CP.5 S.CP.6 S.CP.7 S.CP.8 S.CP.9	Sample Spaces and Probability / MP5, MP7 Independent and Dependent Events / MP2, MP5, MP6 Two-Way Tables and Probability / MP4 Probability of Disjoint and Overlapping Events / MP3, MP4 Permutations and Combinations / MP3, MP6 Binomial Distributions / MP7, MP5	Introduced in 7th grade, utilized again in 8th and Prob/Stats
Unit 11 Data Analysis and Statistics Problem Solving and Statistics (30%)	15 days	S.ID.4 S.IC.1 S.IC.2 S.IC.3 S.IC.4 S.IC.5 S.IC.6	Using Normal Distributions / MP3, MP4 Populations, Samples, and Hypotheses / MP2, MP3, MP5 Collecting Data / MP3, MP4 Experimental Design / MP2, MP3, MP5 Making Inferences from Sample Surveys / MP3, MP4 Making Inferences from Experiments / MP4	Introduced in 9th grade, utilized again in Prob/Stats
Unit 6 Exponential and Logarithmic Functions Passport to Advanced Mathematics (30%)	3 days	A.SSE.B.3cF.IF.7e F.IF.C.8b F.LE.A.2 F.LE.B.5	Exponential Growth and Decay Functions / MP2, MP3, MP6	Introduced in 8th and 9th grade Utilized in later units
Unit 5 Rational Exponents and Radical Functions Passport to Advanced Mathematics (30%)	16 days	N.RN.1 N.RN.2 F.IF.7b F.BF.1a F.BF.3 F.BF.4a A.ED.4 A.REI.1 A.REI.2	nth Roots and Rational Exponents / MP3, MP6 Properties of Rational Exponents and Radicals / MP5, MP6, MP7 Graphing Radical Functions / MP3, MP6, MP7 Solving Radical Equations and Inequalities / MP7 Performing Function Operations / MP1, MP5, MP6 Inverse of a Function / MP3	Introduced in 9th grade (rational numbers in 7th), utilizing knowledge from prior 11th grade

Unit 7 Rational Functions Passport to Advanced Mathematics (30%)	11 days	F.BF.3 A.REI.1 A.REI.2 A.CED.1 A.CED.2 A.CED.3 A.CED.4 A.APR.6 A.APR.7	Inverse Variation / MP2, Mp4, MP6 Graphing Rational Functions / MP2, MP7 Multiplying and Dividing Rational Expressions / MP2, MP6 Adding and Subtracting Rational Expressions / MP2, MP3 Solving Rational Equations / MP1	Utilizing rational number information (from 7th – 10th grade) and prior knowledge from 11th grade
Unit 9 Trigonometric Ratios and Functions Additional Topics of Mathematics (10%)	9 days	F.IF.7e F.TF.1 F.TF.2 F.TF.5 F.TF.8 F.TF.9 F.BF.1a F.BF.3 A.CED.2 N.Q.A.2	Right Triangle Trigonometry / MP4 Angles and Radian Measure / MP2, MP6 Trigonometric Functions of Any Angle / MP3 Graphing Sine and Cosine Functions / MP7 Graphing Other Trigonometric Functions / MP1 Modeling with Trigonometric Identities / MP5, MP1, MP4 Using Trigonometric Identities / MP2, MP7 Using Sum and Difference Formulas / MP1, MP2, MP3, Mp5	Introduced in 8th and 9th grade, and reviewed in 10th grade
Total	110 days			

Unit - Concept - SAT Category	Total days	Breakdown of days	Marking period

Unit 1 Linear Functions Heart of Algebra (30%)	12 days	1.1 - 2 days 1.2 - 2 days Quiz - 1 day 1.3 - 2 days 1.4 - 2 days Review/Test - 2 days	MP1
Unit 2 Quadratic Functions Passport to Advanced Mathematics (30%)	7 days	2.1 - 2 days 2.2 - 3 days Review - 1 day Quiz - 1 day	MP1
Unit 3 Quadratic Equations and Comlex Numbers Passport to Advanced Mathematics (30%)	11 days	3.1 - 2 days 3.2 - 2 days 3.3 - 2 days 3.4 - 3 days Review/Quiz - 2 days	MP 1
Unit 4 Polynomial Functions Passport to Advanced Mathematics (30%)	18 days	4.1 - 2 days 4.2 - 2 days 4.3 - 3 days 4.4 - 2 days Review/Quiz - 1 4.5 - (ex 1 & 2 only) - 2 days 4.6 - skip 4.7 - 2 days 4.8 - 2 days Review / Test - 2 days	MP 2

Unit 10 Probability Problem Solving and Data Analysis (30%)	8 days	10.1 - 2 days 10.2 - 2 days 10.3 - 2 days 10.4 - skip 10.5 - skip 10.6 - skip Review/Test - 2 days	MP 2
Unit 11 Data Analysis and Statistics Problem Solving and Statistics (30%)	15 days	11.1 - 2 days 11.2 - 3 days 11.3 - 3 days 11.4 - 3 days 11.5 - 1 day 11.6 - skip Review/Test - 2 days	MP 2/3
Unit 6 Exponential and Logarithmic Functions Passport to Advanced Mathematics (30%)	3 days	6.1 - 2 days Quiz - 1 day	MP 3
Unit 5 Rational Exponents and Radical Functions Passport to Advanced Mathematics (30%)	16 days	5.1 - 2 days 5.2 - 3 days 5.3 - 4 days Quiz - 1 day 5.4 (skip inequal) - 2 days 5.5 - 2 days Review/Quiz - 2 days	MP 3/4
Unit 7 Rational Functions Passport to Advanced Mathematics (30%)	11 days	7.2 - 1 day 7.3 - 3 days Review/Quiz - 1 days 7.4 - 2 days 7.5 - 2 days Review/Test - 2 days	MP 4

Unit 9 Trigonometric Ratios and Functions Additional Topics of Mathematics (10%)	9 days	9.1 - 3 days 9.2 - 2 days 9.3 - 4 days Continue as you can.	MP 4

Probability & Statistics

Probability & Statistics - 12th
Ways in which students demonstrate the standards of Mathematical Practices: Positive Outcomes Charter School (POCS) utilizes multiple formative and summative methods for assessing and allowing students to demonstrate successful application of the Standards of mathematical Practice. Beyond the Big Ideas curriculum, POCS uses data collected from Khan Academy, Benchmarking from Scholastic Math Inventory (SMI), and Progress Monitoring (Khan Academy, Smarter Balance Interim testing, and Big Ideas Extension and differentiation materials for each chapter) Formative assessments include: Monitoring progress questions/quizzes every two weeks, Lesson mini assessments, Exit tickets, and class journal work. Summative assessments include: Benchmark assessments (SMI assessments) each marking period and unit assessments and/or performance assessments at the end of the unit. Math practices addressed with: MP 1 – Students investigate with the exploration for each lesson then express their reasoning and sense-making in communicate your answer. Students are also asked to explain their understanding of problems or answers during collaborative learning (partner shares, etc.) and journaling. Students are given "Open ended" and "Writing" problems. MP2 – Students are given "Critical Thinking", "Abstract Reasoning", and "Thought Provoking" problems. Students are asked to verbalize their interpretations of a problem (given either in words or symbols) and explain how the words relate to the symbols. MP3 – Students are given "Error Analysis", "Making an Argument" and "How do you see it" problems. Students are also asked to critique theirs and others work through collaborative learning and journaling. MP4 – Students are given multiple real-life examples to connect the mathematical symbolic expressions to real-life and verbal applications. Students are given "Modeling with Mathematics" and "Mathematical Connections" problems. Students are asked to transfer from tables, to graphs, to equations/expressions throughout. MP5 – Students are asked to use graphing calculators and graph paper with tables, graphs, and equations to manipulate and solve problems. Explicit graphing calculator instruction is utilized to help students understand how to manipulate and use the tool. MP6 – Students are asked to use precise language with the "Vocabulary" and "Core Concept" problems. They are also asked to give answers in specific formats (such as to a tenth or hundredth). Students are asked to explain, using precise language, through verbal discourse as well as math journaling. MP7 – Students complete several problems that require justification and explanations. They are given problems such as "Comparing Methods", "Justifying Steps" , and "Analyzing". Students are asked to identify specifics within equations and then transfer this knowledge to other equations. MP8 – Students evaluate equations and solutions of their own and others. They are given estimation problems to focus on the regularity to identify errors before they begin and after they complete work. Students are also asked to analyze errors. Students focus on repetition and regularity through math journal work and collaborative discourse.

Additional resources and materials addressing the big ideas and focus for grade level math:
POCS is a school designed to work with students who have experienced academic challenges in a traditional school setting. Students who enroll in our school typically arrive with significant deficiencies in Mathematics skills. Consequently, looking at our historical data has always been a challenge for us because the average level of performance greatly varies with each cohort of students. Each of our students has a different story of struggle and adversity that brought them to our school. Over the years POCS has implemented numerous programs and strategies to enable the students to show growth toward proficiency. Over the years our students have shown significant growth the longer they attend POCS.
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Unit / Concept / SAT Category	Estimated Time	CCSS	Topics	Vertical Alignment
Unit 11 Data Analysis and Displays Problem Solving and Data Analysis (30%)	20 days	S.ID.A.3 S.ID.A.1 S.ID.A.2 S.ID.B.5	Measures of Center and Variation Box-and_Whisker Plots Shapes of Distribution Two-Way Tables Choosing a Data Set	Introduced in 8^{th}, revisted in 9^{th}, utilizing work from 11^{th} as well.
Unit 10 Probability Problem Solving and Data Analysis (30%)	20 days	S.CP.A.1 S.CP.A.2 S.CP.A.3 S.CP.A.5 S.CP.B.6 S.CP.A.4 S.CP.B.7 S.CP.B.8 S.CP.B.9	Sample Spaces and Probability Independent and Depenendent Events Two-Way Tables and Probability Probability of Disjoint and Overlapping Events Permutations and Combinations Binomial Distributions	Introduced in 7^{th}, visited in 8^{th}, 9^{th}, and 11^{th} throughout

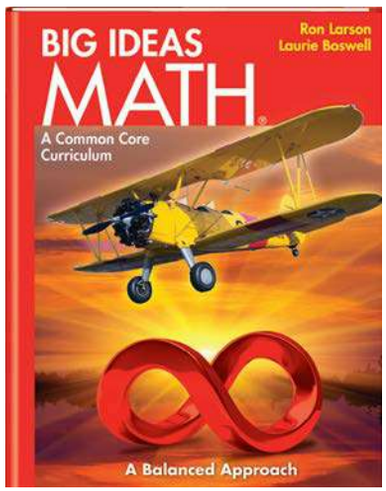
Unit 11 - Data Analysis & Statistics Problem Solving and Data Analysis (30%)	25 days	S.ID.A.4 S.IC.A.2 S.IC.A.1 S.IC.B.3 S.IC.B.6 S.IC.B.4 S.IC.B.5	Using Normal Distributions Populations and Samples Collecting Data Experimental Design Making Inferences from Sample Surveys Making Inferences from Experiments	Building upon prior Probability and statistical knowledge from 7th, 8th, 9th, and 11th grade.
Unit 9 Right Triangles and Trigonometry Additional Topics of Mathematics (10%)	18 days	SRT.B.4 SRT.B.5 SRT.C.6 SRT.C.7 SRT.C.8 SRT.D.9 SRT.D.10 SRT.D.11 MG.A.1 MG.A.3	The Pythagorean Theorem Special Right Triangles Similar Right Triangles The Tangent Ratio The Sine and Cosine Ratios Solving Right Triangles Law Sines and Law of Cosines	Introduced in 8th (Pythag) and revisited in 9th and 11th
Unit 9 Trigonometric Ratios and Functions Additional Topics of Mathematics (10%)	14 days	F.IF.7e F.TF.1 F.TF.2 F.TF.5 F.TF.8 F.TF.9 F.BF.1a F.BF.3 A.CED.2 N.Q.A.2	Right Triangle Trigonometry Angles and Radian Measure Trigonometric Functions of Any Angle Graphing Sine and Cosine Functions Graphing Other Trigonometric Functions Modeling with Trigonometric Identities Using Trigonometric Identities Using Sum and Difference Formulas	Building upon t\prior triangle and trig knowledge from 8th, 9th, and 11th grade

Unit 8 - Sequences & Series Problem Solving & Data Analysis (30%)	13 days	F.IF.A.1 A.CED.A.1 F.IF.A.3 F.BF.A.2 F.LE.A.2 A.SSE.B.4 F.BF.A.1a	Defining and Using Sequences and Series Analyzing Arithmetic Sequences and Series Analyzing Geometric Sequences and Series Finding Sums of Infinite Geometric Series Using Recursive Rules with Sequences	Building upon knowledge from 7th and 8th through HS.
	110 days			

Unit - Concept - SAT Category	Total days	Breakdown of days	Marking period
Unit 11 Data Analysis and Displays Problem Solving and Data Analysis (30%)	20 days	11.1 - 3 days 11.2 - 2 days 11.3 - 2 days Project - 2 days 11.4 - 3 days 11.5 - 3 days Project - 5 days	MP 1
Unit 10 Probability Problem Solving and Data Analysis (30%)	20 days	10.1 - 2 days 10.2 - 3 days 10.3 - 3 days 10.4 - 3 days 10.5 - 3 days 10.6 - 3 days Project - 5 days	MP 1/2

Unit 11 - Data Analysis & Statistics Problem Solving and Data Analysis (30%)	25 days	11.1 - 2 days 11.2 - 2 days 11.3 - 3 days Survey project (begin) - 2 days 11.4 - 3 days 11.5 - 2 days 11.6 -3 days Survey project (end) - 2 days	MP 2
Unit 9 Right Triangles and Trigonometry Additional Topics of Mathematics (10%)	18 days	9.1 - 2 days 9.2 - 2 days 9.3 - 2 days 9.4 - 2 days Project - 2 days 9.5 - 2 days 9.6 - 2 days 9.7 - 2 days Project - 2 days	MP 2/3
Unit 9 Trigonometric Ratios and Functions Additional Topics of Mathematics (10%)	14 days	9.1 - 3 days 9.2 - 2 days 9.3 - 4 days Project - 5 days	MP 3

Unit 8 - Sequences & Series Problem Solving & Data Analysis (30%)	13 days	8.1 - 2 days 8.2 - 2 days 8.3 - 2 days Review/Quiz - 1 day 8.4 - 2 days 8.5 - 2 days Review/Test - 2 days	MP 4



Big Ideas Math (Red)
Correlation to the Common Core State Standards
Regular Pathway - Grade 7

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Correlated to
Common Core State Standards for Mathematics Grade 7

Standard		Pages or Locations Where Standard is Addressed
Domain: Ratios and Proportional Relationships		
7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.	*Primary SE/TE:* 162-169 (5.1)
7.RP.2	Recognize and represent proportional relationships between quantities.	
	a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	*Primary SE/TE:* 170-175 (5.2), 176-177 (Ext. 5.2), 198-203 (5.6)
	b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	*Primary SE/TE:* 176-177 (Ext. 5.2), 192-197 (5.5), 198-203 (5.6) *Supporting SE/TE:* 186-191 (5.4)
	c. Represent proportional relationships by equations.	*Primary SE/TE:* 178-183 (5.3), 186-191 (5.4), 198-203 (5.6)
	d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	*Primary SE/TE:* 176-177 (Ext. 5.2), 198-203 (5.6)
7.RP.3	Use proportional relationships to solve multistep ratio and percent problems.	*Primary SE/TE:* 162-169 (5.1), 178-183 (5.3), 226-231 (6.3), 232-237 (6.4), 240-245 (6.5), 246-251 (6.6), 252-257 (6.7)
Domain: The Number System		
7.NS.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.	
	a. Describe situations in which opposite quantities combine to make 0.	*Primary SE/TE:* 8-13 (1.2) *Supporting SE/TE:* 2-7 (1.1), 50-55 (2.2)
	b. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.	*Primary SE/TE:* 8-13 (1.2), 50-55 (2.2) *Supporting SE/TE:* 2-7 (1.1)
	c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	*Primary SE/TE:* 14-19 (1.3), 58-63 (2.3) *Supporting SE/TE:* 2-7 (1.1)
	d. Apply properties of operations as strategies to add and subtract rational numbers.	*Primary SE/TE:* 8-13 (1.2), 14-19 (1.3), 50-55 (2.2), 58-63 (2.3) *Supporting SE/TE:* 2-7 (1.1)

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Standard		Pages or Locations Where Standard is Addressed
7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	
	a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.	*Primary SE/TE:* 22-27 (1.4), 64-69 (2.4) *Supporting SE/TE:* 2-7 (1.1)
	b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $–(p/q) = (–p)/q = p/(–q)$. Interpret quotients of rational numbers by describing real-world contexts.	*Primary SE/TE:* 28-33 (1.5), 44-49 (2.1), 64-69 (2.4) *Supporting SE/TE:* 2-7 (1.1)
	c. Apply properties of operations as strategies to multiply and divide rational numbers.	*Primary SE/TE:* 22-27 (1.4), 64-69 (2.4) *Supporting SE/TE:* 2-7 (1.1)
	d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	*Primary SE/TE:* 44-49 (2.1) *Supporting SE/TE:* 2-7 (1.1)
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.	*Primary SE/TE:* 8-13 (1.2), 14-19 (1.3), 22-27 (1.4), 28-33 (1.5), 50-55 (2.2), 58-63 (2.3), 64-69 (2.4) *Supporting SE/TE:* 2-7 (1.1), 79
Domain: Expressions and Equations		
7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	*Primary SE/TE:* 80-85 (3.1), 86-91 (3.2), 92-93 (Ext. 3.2)
7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.	*Primary SE/TE:* 80-85 (3.1), 86-91 (3.2)
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	*Primary SE/TE:* 214-219 (6.1), 220-225 (6.2), 232-237 (6.4)

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Standard		Pages or Locations Where Standard is Addressed
7.EE.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	
	a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.	*Primary SE/TE:* 96-101 (3.3), 102-107 (3.4), 108-113 (3.5)
	b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.	*Primary SE/TE:* 124-129 (4.1), 130-135 (4.2), 138-145 (4.3), 146-151 (4.4)
Domain: Geometry		
7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	*Primary SE/TE:* 298-305 (7.5)
7.G.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	*Primary SE/TE:* 282-287 (7.3), 292-297 (7.4)
7.G.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	*Primary SE/TE:* 388-389 (Ext. 9.5)
7.G.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	*Primary SE/TE:* 316-323 (8.1), 332-337 (8.3) *Supporting SE/TE:* 324-329 (8.2), 368-373 (9.3)
7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	*Primary SE/TE:* 270-275 (7.1), 276-281 (7.2), 288-289 (Ext. 7.3)
7.G.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	*Primary SE/TE:* 338-343 (8.4), 354-361 (9.1), 362-367 (9.2), 376-381 (9.4), 382-387 (9.5)
Domain: Statistics and Probability		
7.SP.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	*Primary SE/TE:* 440-445 (10.6)

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Standard		Pages or Locations Where Standard is Addressed
7.SP.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.	*Primary SE/TE:* 440-445 (10.6), 446-447 (Ext. 10.6)
7.SP.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	*Primary SE/TE:* 448-453 (10.7)
7.SP.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	*Primary SE/TE:* 448-453 (10.7)
7.SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	*Primary SE/TE:* 406-411 (10.2) *Supporting SE/TE:* 400-405 (10.1), 412-419 (10.3)
7.SP.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	*Primary SE/TE:* 412-419 (10.3)
7.SP.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	
	a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.	*Primary SE/TE:* 406-411 (10.2), 412-419 (10.3)
	b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	*Primary SE/TE:* 412-419 (10.3)
7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	
	a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.	*Primary SE/TE:* 420-427 (10.4), 428-435 (10.5)
	b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.	*Primary SE/TE:* 420-427 (10.4), 428-435 (10.5)
	c. Design and use a simulation to generate frequencies for compound events.	*Primary SE/TE:* 436-437 (Ext. 10.5)

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Common Core State Standards for Mathematics Grade 7

	Standard	Pages or Locations Where Standard is Addressed
Mathematical Practices		
		Big Ideas Math is a research-based program, systematically developed using the Common Core State Standards for Mathematical Practice as the underlying structure. The Standards for Mathematical Practice are seamlessly connected to the Common Core State Content Standards resulting in a program that maximizes both teacher effectiveness and student understanding. Every section has additional Mathematical Practice support in the Dynamic Classroom and in the online Lesson Plans at *BigIdeasMath.com* .
1	Make sense of problems and persevere in solving them. Mathematically proficient students: • Explain to themselves the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals • Make conjectures about the form and meaning of the solution attempt. • Plan a solution pathway rather than simply jumping into a solution. • Consider analogous problems and try special cases and simpler forms of the original problen in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Transform algebraic expressions or change the viewing window on their graphing calculator to get information. • Explain correspondences between equations, verbal descriptions, tables, and graphs. • Draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Use concrete objects or pictures to help conceptualize and solve a problem. • Check their answers to problems using a different method. • Ask themselves, “Does this make sense?” • Understand the approaches of others to solving complex problems and identify correspondences between approaches.	Each section begins with an Essential Question. Students look for entry points using guides such as In Your Own Words. Clear step-by-step examples encourage students to plan a solution pathway rather than jumping into a solution attempt. Guided questions and instructional scaffolding support students’ perseverance. ***Sample references:*** Chapter 2, pages 44-49 Chapter 3, pages 102-107 Chapter 4, pages 124-129 Chapter 6, pages 240-245 Chapter 7, pages 288-289 Chapter 8, pages 332-337 Chapter 8, pages 338-343 Chapter 9, pages 388-389 Chapter 10, pages 400-405

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Correlated to
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	Standard	Pages or Locations Where Standard is Addressed
2	Reason abstractly and quantitively. Mathematically proficient students: • Make sense of quantities and their relationships in problem situations. • Bring two complementary abilities to bear on problems involving quantitative relationships: - Decontextualize (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents) and - Contextualize (pause as needed during the manipulation process in order to probe into the referents for the symbols involved) • Use quantitative reasoning that entails creating a coherent representation of the problem at hand, considering the units involved, and attending to the meaning of quantities, not just how to compute them . • Know and flexibly use different properties of operations and objects.	Students learn to represent problems by consistently using a verbal model, paying close attention to units and employing mathematical properties. This helps students represent problems symbolically and manipulate the representative symbols. They are taught to contextualize by thinking about the referents and symbols involved. ***Sample references:*** Chapter 1, pages 14-19 Chapter 2, pages 50-55 Chapter 3, pages 86-91 Chapter 5, pages 186-191 Chapter 6, pages 220-225 Chapter 6, pages 246-251 Chapter 10, pages 440-445

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	Standard	Pages or Locations Where Standard is Addressed
3	Construct viable arguments and critique the reasoning of others. Mathematically proficient students: • Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases. • Recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments. • Distinguish correct logic or reasoning from that which is flawed and, if there is a flaw, explain what it is - Elementary students construct arguments using concrete referents such as objects, drawings, diagrams, and actions. - Later students learn to determine domains to which an argument applies. • Listen or read the arguments of others, decide whether they make sense, and ask useful question to clarify or improve arguments.	Throughout the series students are expected to develop models, formulate deductions, and make conjectures. Essential Questions, Error Analysis exercises, and Reasoning exercises provide opportunities for students to make assumptions, examine results, and explain their reasoning. What Is Your Answer, In Your Own Words, You Be The Teacher, and Which One Doesn't Belong encourage debate and sensemaking. ***Sample references:*** Chapter 1, pages 8-13 Chapter 4, pages 138-145 Chapter 5, pages 170-175 Chapter 6, pages 232-237 Chapter 7, pages 270-275 Chapter 7, pages 276-281 Chapter 8, pages 316-323 Chapter 9, pages 354-361 Chapter 10, pages 406-411 Chapter 10, pages 428-435

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	Standard	Pages or Locations Where Standard is Addressed
4	Model with mathematics. Mathematically proficient students: • Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. - In early grades, this might be as simple as writing an addition equation to describe a situation. - In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. - By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation • Map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze those relationships mathematically to draw conclusions. • Interpret their mathematical results in the context of the situation. • Reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	In each section, students work with the mathematics of everyday life. Students use graphs, tables, charts, number lines, diagrams, flowcharts, and formulas to organize, make sense of, and identify realistic solutions to real-life situations. Students write stories involving math, on topics such as using percents to help them improve their grades. Visual representations, such as integer tiles and fraction models, help students make sense of numeric operations. ***Sample references:*** Chapter 2, pages 58-63 Chapter 3, pages 96-101 Chapter 4, pages 130-135 Chapter 5, pages 192-197 Chapter 6, pages 226-231 Chapter 9, pages 376-381 Chapter 10, pages 412-419

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	Standard	Pages or Locations Where Standard is Addressed
5	Use appropriate tools strategically. Mathematically proficient students: • Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.	Opportunities for students to select and use appropriate tools such as graphing calculators, protractors, measuring devices, websites, and other external resources are provided for students throughout the series. ***Sample references:*** Chapter 6, pages 252-257 Chapter 7, pages 282-287 Chapter 7, pages 292-297 Chapter 10, pages 448-453

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Common Core State Standards for Mathematics Grade 7

	Standard	Pages or Locations Where Standard is Addressed
6	Attend to Precision. Mathematically proficient students: • Try to communicate precisely to others. - In the elementary grades, students give carefully formulated explanations to each other. - In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.	Through the balanced approach to instruction, students have daily opportunities to communicate mathematically. Students work through activities, examples, and exercises to understand and use the language of mathematics, paying careful attention to the importance of units, labeling, and quantities. ***Sample references:*** Chapter 1, pages 2-7 Chapter 2, pages 64-69 Chapter 3, pages 80-85 Chapter 4, pages 146-151 Chapter 5, pages 198-203 Chapter 6, pages 214-219 Chapter 7, pages 298-305 Chapter 8, pages 324-329 Chapter 9, pages 362-367

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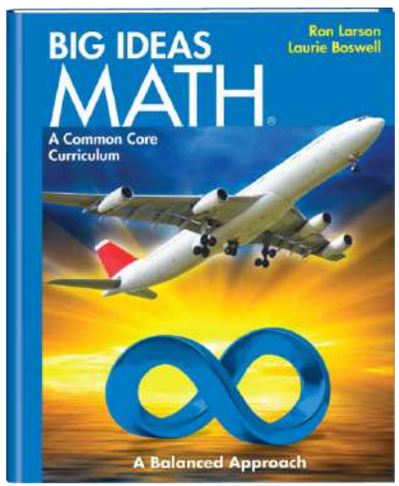
	Standard	Pages or Locations Where Standard is Addressed
7	Look for and make use of structure. Mathematically proficient students: • Look closely to discern a pattern or structure. - Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. - Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. - In the expression x^2 + 9x + 14, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.	Real and relevant word problems encourage students to "see" that these problems are composed of several components. Students find that some mathematical representations share common mathematical structures and learn to look for these relationships discerning inherent patterns and structures. ***Sample references:*** Chapter 1, pages 22-27 Chapter 3, pages 92-93 Chapter 5, pages 162-169 Chapter 9, pages 368-373 Chapter 9, pages 382-387 Chapter 10, pages 420-427
8	Look for and express regularity in repeated reasoning. Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. - Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. - Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation (y-2)/(x-1)=3. - Noticing the regularity in the way terms cancel when expanding (x-1)(x+1), $(x-1)(x^2+x+1)$, and $(x-1)(x^3+x^2+x+1)$ might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.	The series helps students see that mathematics is well structured and predictable. Students work through a problem, not through the numbers. They consider factors such as an appropriate answer to the question, reasonable intermediate steps, and a realistic solution. ***Sample references:*** Chapter 1, pages 28-33 Chapter 3, pages 108-113 Chapter 5, pages 178-183



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Correlation to the Common Core State Standards
Regular Pathway - Grade 8

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Correlated to
Common Core State Standards for Mathematics Grade 8

Standard		Pages or Locations Where Standard is Addressed
Domain: The Number System		
8.NS.1	Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.	*Primary SE/TE:* 308-315 (7.4), 316-317 (Ext. 7.4)
8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).	*Primary SE/TE:* 308-315 (7.4)
Domain: Expressions and Equations		
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.	*Primary SE/TE:* 410-415 (10.1), 416-421 (10.2), 422-427 (10.3), 428-433 (10.4)
8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	*Primary SE/TE:* 288-293 (7.1), 294-299 (7.2), 300-305 (7.3), 318-323 (7.5) *Supporting SE/TE:* 308-315 (7.4)
8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.	*Primary SE/TE:* 436-441 (10.5), 442-447 (10.6), 448-453 (10.7)
8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	*Primary SE/TE:* 436-441 (10.5), 442-447 (10.6), 448-453 (10.7)
8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.	*Primary SE/TE:* 158-163 (4.3) *Supporting SE/TE:* 142-147 (4.1)
8.EE.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	*Primary SE/TE:* 148-155 (4.2), 158-163 (4.3), 166-171 (4.4) *Supporting SE/TE:* 156-157 (Ext. 4.2), 172-177 (4.5)

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Correlated to
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Standard		Pages or Locations Where Standard is Addressed
8.EE.7	Solve linear equations in one variable.	
	a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).	*Primary SE/TE:* 2-9 (1.1), 10-15 (1.2), 18-25 (1.3) *Supporting SE/TE:* 26-31 (1.4), 230-231 (Ext. 5.4)
	b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	*Primary SE/TE:* 2-9 (1.1), 10-15 (1.2), 18-25 (1.3) *Supporting SE/TE:* 26-31 (1.4), 201, 230-231 (Ext. 5.4)
8.EE.8	Analyze and solve pairs of simultaneous linear equations.	
	a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	*Primary SE/TE:* 202-207 (5.1), 224-229 (5.4) *Supporting SE/TE:* 230-231 (Ext. 5.4)
	b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.	*Primary SE/TE:* 202-207 (5.1), 208-213 (5.2), 216-223 (5.3), 224-229 (5.4) *Supporting SE/TE:* 230-231 (Ext. 5.4)
	c. Solve real-world and mathematical problems leading to two linear equations in two variables.	*Primary SE/TE:* 202-207 (5.1), 208-213 (5.2), 216-223 (5.3), 224-229 (5.4) *Supporting SE/TE:* 230-231 (Ext. 5.4)
Domain: Functions		
8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	*Primary SE/TE:* 242-247 (6.1), 248-255 (6.2)
8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	*Primary SE/TE:* 256-263 (6.3)
8.F.3	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.	*Primary SE/TE:* 256-263 (6.3), 266-271 (6.4)
8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	*Primary SE/TE:* 256-263 (6.3) *Supporting SE/TE:* 178-183 (4.6), 184-189 (4.7), 371

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Standard		Pages or Locations Where Standard is Addressed
8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	*Primary SE/TE:* 272-277 (6.5)
Domain: Geometry		
8.G.1	Verify experimentally the properties of rotations, reflections, and translations:	
	a. Lines are taken to lines, and line segments to line segments of the same length.	*Primary SE/TE:* 48-53 (2.2), 54-59 (2.3), 60-67 (2.4)
	b. Angles are taken to angles of the same measure.	*Primary SE/TE:* 48-53 (2.2), 54-59 (2.3), 60-67 (2.4)
	c. Parallel lines are taken to parallel lines.	*Primary SE/TE:* 48-53 (2.2), 54-59 (2.3), 60-67 (2.4)
8.G.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	*Primary SE/TE:* 48-53 (2.2), 54-59 (2.3), 60-67 (2.4) *Supporting SE/TE:* 42-47 (2.1)
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	*Primary SE/TE:* 48-53 (2.2), 54-59 (2.3), 60-67 (2.4), 82-89 (2.7)
8.G.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	*Primary SE/TE:* 82-89 (2.7) *Supporting SE/TE:* 70-75 (2.5), 76-81 (2.6)
8.G.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	*Primary SE/TE:* 102-109 (3.1), 110-115 (3.2), 126-131 (3.4) *Supporting SE/TE:* 118-125 (3.3)
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.	*Primary SE/TE:* 300-305 (7.3), 318-323 (7.5)
8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	*Primary SE/TE:* 300-305 (7.3), 318-323 (7.5)
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	*Primary SE/TE:* 300-305 (7.3), 318-323 (7.5)
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	*Primary SE/TE:* 334-339 (8.1), 340-345 (8.2), 348-353 (8.3) *Supporting SE/TE:* 354-361 (8.4)
Domain: Statistics and Probability		
8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	*Primary SE/TE:* 372-377 (9.1), 378-383 (9.2) *Supporting SE/TE:* 392-399 (9.4)

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Standard		Pages or Locations Where Standard is Addressed
8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	*Primary SE/TE:* 378-383 (9.2)
8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	*Primary SE/TE:* 378-383 (9.2)
8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.	*Primary SE/TE:* 386-391 (9.3)

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	Standard	Pages or Locations Where Standard is Addressed
Mathematical Practices		
		Big Ideas Math is a research-based program, systematically developed using the Common Core State Standards for Mathematical Practice as the underlying structure. The Standards for Mathematical Practice are seamlessly connected to the Common Core State Content Standards resulting in a program that maximizes both teacher effectiveness and student understanding. Every section has additional Mathematical Practice support in the Dynamic Classroom and in the online Lesson Plans at *BigIdeasMath.com* .
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	Standard	Pages or Locations Where Standard is Addressed
5	Use appropriate tools strategically. Mathematically proficient students: • Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.	Opportunities for students to select and use appropriate tools such as graphing calculators, protractors, measuring devices, websites, and other external resources are provided for students throughout the series. ***Sample references:*** Chapter 2, pages 42-47 Chapter 4, pages 142-147 Chapter 5, pages 202-207 Chapter 7, pages 308-315 Chapter 9, pages 372-377
6	Attend to Precision. Mathematically proficient students: • Try to communicate precisely to others. - In the elementary grades, students give carefully formulated explanations to each other. - In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.	Through the balanced approach to instruction, students have daily opportunities to communicate mathematically. Students work through activities, examples, and exercises to understand and use the language of mathematics, paying careful attention to the importance of units, labeling, and quantities. ***Sample references:*** Chapter 2, pages 60-67 Chapter 3, pages 102-109 Chapter 6, pages 256-263 Chapter 7, pages 288-293 Chapter 7, pages 318-323 Chapter 10, pages 442-447

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	Standard	Pages or Locations Where Standard is Addressed
7	Look for and make use of structure. Mathematically proficient students: • Look closely to discern a pattern or structure. - Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. - Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. - In the expression x^2 + 9x + 14, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.	Real and relevant word problems encourage students to "see" that these problems are composed of several components. Students find that some mathematical representations share common mathematical structures and learn to look for these relationships discerning inherent patterns and structures. ***Sample references:*** Chapter 2, pages 54-59 Chapter 4, pages 158-163 Chapter 6, pages 242-247 Chapter 7, pages 294-299 Chapter 10, pages 416-421
8	Look for and express regularity in repeated reasoning. Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. - Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. - Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation (y-2)/(x-1)=3. - Noticing the regularity in the way terms cancel when expanding (x-1)(x+1), $(x-1)(x^2+x+1)$, and $(x-1)(x^3+x^2+x+1)$ might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.	The series helps students see that mathematics is well structured and predictable. Students work through a problem, not through the numbers. They consider factors such as an appropriate answer to the question, reasonable intermediate steps, and a realistic solution. ***Sample references:*** Chapter 1, pages 26-31 Chapter 3, pages 110-115 Chapter 8, pages 354-361 Chapter 10, pages 422-427

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Standard		Pages or Locations Where Standard is Addressed
Conceptual Category: Number and Quantity		
Domain: The Number System		
N.RN.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*	*Primary SE/TE:* 237-242 (5.1)
N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	*Primary SE/TE:* 237-242 (5.1), 243-250 (5.2) *Supporting SE/TE:* 253 (5.3), 261-268 (5.4), 271-274 (5.5), 299 (6.1), 304, 305 (6.2), 334 (6.6), 344 (6.7)
Domain: Quantities		
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.	*Supporting SE/TE:* 23, 26 (1.3), 60, 63 (2.2), 77, 79, 81, 82 (2.4), 97, 98, 100-102 (3.1), 115, 117 (3.3), 126, 128, 129 (3.4), 183, 185 (4.4), 505-512 (9.6)
Domain: The Complex Number System		
N.CN.1	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.	*Primary SE/TE:* 103-110 (3.2)
N.CN.2	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	*Primary SE/TE:* 105-110 (3.2) *Supporting SE/TE:* 123 (3.4), 200 (4.6)
N.CN.7	Solve quadratic equations with real coefficients that have complex solutions.	*Primary SE/TE:* 103, 107, 109 (3.2), 114, 116 (3.3), 121, 123, 127, 128 (3.4) *Supporting SE/TE:* 199 (4.6)
N.CN.8	Extend polynomial identities to the complex numbers. *For example, rewrite* $x^2 + 4$ *as* $(x + 2i)(x - 2i)$.	*Primary SE/TE:* 199 (4.6) *Supporting SE/TE:* 107 (3.2)
N.CN.9	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	*Primary SE/TE:* 198-204 (4.6)
Conceptual Category: Algebra		
Domain: Seeing Structure in Expressions		
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.	
	a. Interpret parts of an expression, such as terms, factors, and coefficients.	*Supporting SE/TE:* 23, 26 (1.3), 60, 63 (2.2), 77, 79, 81, 82 (2.4), 97, 98, 100-102 (3.1), 115, 117 (3.3), 126, 128, 129 (3.4), 183, 185 (4.4), 505-512 (9.6)
	b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)^n$ *as the product of P and a factor not depending on P.*	*Supporting SE/TE:* 97 (3.1), 180-186 (4.4), 190-196 (4.5), 296-302 (6.1), 305-308 (6.2)
A.SSE.2	Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$.	*Primary SE/TE:* 96, 100, 102 (3.1), 179-186 (4.4), 327, 329-332 (6.5) *Supporting SE/TE:* 111-118 (3.3), 121, 123 (3.4), 133, 134 (3.5), 142 (3.6), 190-192 (4.5), 199 (4.6), 263-265 (5.4), 299, 301 (6.1), 305, 307 (6.2), 312 (6.3), 334, 336 (6.6), 344 (6.7), 368, 371 (7.2), 376-382 (7.3), 385-390 (7.4), 393, 394 (7.5), 515, 517 (9.7), 521-524 (9.8)

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Standard		Pages or Locations Where Standard is Addressed
A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	
	c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^{t} *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	*Primary SE/TE:* 299, 301 (6.1) *Supporting SE/TE:* 305, 307 (6.2), 344, 347 (6.7)
A.SSE.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*	*Primary SE/TE:* 425, 428, 429, 431, 432 (8.3), 435-440 (8.4)
Domain: Arithmetic with Polynomials and Rational Expressions		
A.APR.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	*Primary SE/TE:* 165-172 (4.2) *Supporting SE/TE:* 174 (4.3), 193, 195 (4.5), 200, 202 (4.6), 377-382 (7.3), 385-390 (7.4), 393, 394, 396, 397 (7.5)
A.APR.2	Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.	*Primary SE/TE:* 176, 178 (4.3), 182-186 (4.4) *Supporting SE/TE:* 191, 192 (4.5)
A.APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	*Primary SE/TE:* 59, 60, 63, 64 (2.2), 183, 185 (4.4), 190, 192, 194, 195 (4.5), 199, 202 (4.6), 212, 213, 216, 217 (4.8) *Supporting SE/TE:* 96, 97, 100 (3.1), 142, 145 (3.6)
A.APR.4	Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity* $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ *can be used to generate Pythagorean triples.*	*Primary SE/TE:* 168, 171, 172 (4.2)
A.APR.5	Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.	*Primary SE/TE:* 165, 169, 171, 172 (4.2), 574, 577 (10.5)
A.APR.6	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	*Primary SE/TE:* 174, 175, 177, 178 (4.3), 368, 371 (7.2), 376, 380, 381 (7.3), 386, 389, 390 (7.4)
A.APR.7	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	*Primary SE/TE:* 375, 377-382 (7.3), 383-390 (7.4)

Items in brackets are required in Algebra 1.

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Standard		Pages or Locations Where Standard is Addressed
Domain: Creating Equations		
A.CED.1	Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	*Primary SE/TE:* 143, 145, 146 (3.6), 362, 364 (7.1) *Supporting SE/TE:* 22-24, 26-28 (1.3), 76-78, 81, 82 (2.4), 97, 98, 100-102 (3.1), 115, 117, 118 (3.3), 126, 128-130 (3.4), 195, 196 (4.5), 240-242 (5.1), 254, 257, 258 (5.3), 298-302 (6.1), 306, 308 (6.2), 330, 332 (6.5), 335, 338-340 (6.6), 345, 347, 348 (6.7), 379, 381, 382 (7.3), 392, 395-398 (7.5), 465, 467, 468 (9.1)
A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	*Primary SE/TE:* 21-28 (1.3), 75-82 (2.4), 219-224 (4.9), 341, 343-348 (6.7), 359, 361-364 (7.1), 505-512 (9.6) *Supporting SE/TE:* 12-18 (1.2), 33-36 (1.4), 48-54 (2.1), 68-74 (2.3), 97, 98, 100-102 (3.1), 126, 128-130 (3.4), 205-210 (4.7), 252-258 (5.3), 275-284 (5.6), 297, 298, 300-302 (6.1), 318-324 (6.4), 366-372 (7.2), 379, 381, 382 (7.3), 395, 397 (7.5)
A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*.	*Primary SE/TE:* 33-36 (1.4), 137, 138 (3.5), 141, 143-146 (3.6), 362, 364 (7.1) *Supporting SE/TE:* 21-28 (1.3), 97, 98, 100, 101 (3.1), 126, 128, 129 (3.4), 201, 203 (4.6), 267 (5.4), 335, 338-340 (6.6), 369, 371, 372 (7.2)
A.CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R*.	*Primary SE/TE:* 280, 282-284 (5.6), 395, 397 (7.5) *Supporting SE/TE:* 26 (1.3), 268 (5.4), 340 (6.6)
Domain: Reasoning with Equations and Inequalities		
A.REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	*Primary SE/TE:* 262-268 (5.4), 334-336, 338-340 (6.6), 392-398 (7.5) *Supporting SE/TE:* 240, 242 (5.1), 419, 420, 422, 423 (8.2), 427, 428, 430 (8.3), 464, 465, 467, 468 (9.1)
A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	*Primary SE/TE:* 261-268 (5.4), 391-398 (7.5)
A.REI.4	Solve quadratic equations in one variable.	
	b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	*Primary SE/TE:* 93-102 (3.1), 107, 109 (3.2), 112-118 (3.3), 121-130 (3.4) *Supporting SE/TE:* 133, 134, 136, 137 (3.5), 142, 143, 145, 146 (3.6), 190, 192 (4.5), 199 (4.6), 263-265 (5.4), 336 (6.6), 393, 394 (7.5)
A.REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	*Primary SE/TE:* 29-36 (1.4) *Supporting SE/TE:* 78, 81 (2.4), 420, 423 (8.2), 428, 430 (8.3)
A.REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.*	*Primary SE/TE:* 131-138 (3.5) *Supporting SE/TE:* 267 (5.4)
A.REI.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	*Primary SE/TE:* 135, 137 (3.5) *Supporting SE/TE:* 196 (4.5), 264, 268 (5.4), 333, 334, 339 (6.6), 391, 394, 398 (7.5)
Conceptual Category: Functions		

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Standard		Pages or Locations Where Standard is Addressed
Domain: Interpreting Functions		
F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1* .	*Primary SE/TE:* 409-411, 414, 415 (8.1), 417-424 (8.2), 425-428, 430-432 (8.3), 441-450 (8.5)
F.IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity* .	*Primary SE/TE:* 55-64 (2.2), 67-74 (2.3), 157-164 (4.1), 211-218 (4.8) *Supporting SE/TE:* 21-23, 26-28 (1.3), 183, 185 (4.4), 295-302 (6.1), 303-308 (6.2), 309, 313, 315, 316 (6.3), 365-372 (7.2), 436, 437, 439 (8.4), 445 (8.5), 485-494 (9.4), 497-504 (9.5)
F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*	*Supporting SE/TE:* 4, 9 (1.1), 28 (1.3), 58, 62, 64 (2.2), 77, 81 (2.4), 141, 145, 146 (3.6), 161, 163 (4.1), 201 (4.6), 251, 252, 256-258 (5.3), 270, 271, 273 (5.5), 277-284 (5.6), 295, 296, 302 (6.1), 309, 313, 315, 316 (6.3), 365-372 (7.2), 486 (9.4), 498, 500 (9.5)
F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	*Primary SE/TE:* 77, 80, 82 (2.4) *Supporting SE/TE:* 21-28 (1.3), 161, 163 (4.1), 258 (5.3), 302 (6.1), 306 (6.2), 315 (6.3), 371 (7.2), 493 (9.4), 503 (9.5)
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	
	b. Graph square root, cube root, [and piecewise-defined] functions, [including step functions and absolute value functions].	*Primary SE/TE:* 251-258 (5.3) *Supporting SE/TE:* 261, 264, 265, 268 (5.4), 270 (5.5), 275, 278, 279, 282 (5.6)
	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	*Primary SE/TE:* 47-54 (2.1), 55-64 (2.2), 69, 72 (2.3), 157-164 (4.1), 205-210 (4.7), 211-218 (4.8) *Supporting SE/TE:* 93, 94, 96, 98, 99, 101, 102 (3.1), 139-146 (3.6), 190, 192, 194, 196 (4.5), 222 (4.9)
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	*Primary SE/TE:* 295, 297, 298, 300, 302 (6.1), 303, 305, 307 (6.2), 309, 312, 313, 315, 316 (6.3), 317-324 (6.4), 485-494 (9.4), 497-504 (9.5)

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Standard		Pages or Locations Where Standard is Addressed
F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	
	a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	*Primary SE/TE:* 96, 97, 100 (3.1), 114, 115, 117, 118 (3.3)
	b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, *and classify them as representing exponential growth or decay.*	*Primary SE/TE:* 298-302 (6.1) *Supporting SE/TE:* 305, 307 (6.2), 344, 347 (6.7)
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum* .	*Primary SE/TE:* 23, 26 (1.3), 60, 63 (2.2) *Supporting SE/TE:* 224 (4.9), 258 (5.3), 302 (6.1), 306, 308 (6.2), 315 (6.3), 372 (7.2), 503 (9.5), 511 (9.6)
Domain: Building Functions		
F.BF.1	Write a function that describes a relationship between two quantities.	
	a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	*Primary SE/TE:* 21-28 (1.3), 75-82 (2.4), 219, 222-224 (4.9), 343-348 (6.7), 445, 446, 448-450 (8.5), 505, 506, 508-512 (9.6) *Supporting SE/TE:* 97, 98, 100-102 (3.1), 126, 128-130 (3.4), 298-302 (6.1), 359, 362, 364 (7.1), 379, 381, 382 (7.3)
	b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model* .	*Primary SE/TE:* 269-274 (5.5) *Supporting SE/TE:* 335, 338 (6.6), 379, 381 (7.3)
F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	*Primary SE/TE:* 417-424 (8.2), 425-432 (8.3), 441-450 (8.5)
F.BF.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\ f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	*Primary SE/TE:* 4-10 (1.1), 11-18 (1.2), 47-54 (2.1), 205-210 (4.7), 215, 217, 218 (4.8), 251, 253, 254, 256, 257 (5.3), 317-324 (6.4), 365-368, 370-371 (7.2), 487-494 (9.4), 497, 499-503 (9.5) *Supporting SE/TE:* 386, 389 (7.4), 517 (9.7)
F.BF.4	Find inverse functions.	
	a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$.	*Primary SE/TE:* 276-284 (5.6), 312, 315 (6.3) *Supporting SE/TE:* 395, 397, 398 (7.5)
Domain: Linear, Quadratic, and Exponential Models		
F.LE.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	*Primary SE/TE:* 21-28 (1.3), 298, 300-302 (6.1), 343-348 (6.7), 417-424 (8.2), 425-432 (8.3)
F.LE.4	For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	*Primary SE/TE:* 311, 314 (6.3), 330, 332 (6.5), 333-335, 338 (6.6)
F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.	*Primary SE/TE:* 298-302 (6.1), 306, 308 (6.2)
Domain: Trigonometric Functions		

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Standard		Pages or Locations Where Standard is Addressed
F.TF.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	*Primary SE/TE:* 469, 471-476 (9.2) *Supporting SE/TE:* 461-468 (9.1), 480-484 (9.3)
F.TF.2	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	*Primary SE/TE:* 477-484 (9.3) *Supporting SE/TE:* 461-468 (9.1), 485-494 (9.4), 497-504 (9.5)
F.TF.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	*Primary SE/TE:* 505-512 (9.6) Supporting SE/TE: 461-468 (9.1)
F.TF.8	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.	*Primary SE/TE:* 513-515, 517 (9.7) Supporting SE/TE: 461-468 (9.1)
F.TF.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	*Primary SE/TE:* 519-524 (9.8)
Conceptual Category: Geometry		
Domain: Expressing Geometric Properties with Equations		
G.GPE.2	Derive the equation of a parabola given a focus and directrix.	*Primary SE/TE:* 68, 69, 72-74 (2.3)
Conceptual Category: Statistics and Probability		
Domain: Interpreting Categorical and Quantitative Data		
S.ID.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	*Primary SE/TE:* 595-602 (11.1)
S.ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	
	a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.*	*Primary SE/TE:* 21-28 (1.3), 75-82 (2.4) *Supporting SE/TE:* 219-224 (4.9), 341-348 (6.7), 505-512 (9.6)
Domain: Making Inferences and Justifying Conclusions		
S.IC.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	*Primary SE/TE:* 603-608 (11.2), 609-616 (11.3), 619-624 (11.4)
S.IC.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*	*Primary SE/TE:* 625-632 (11.5), 633-638 (11.6) Supporting SE/TE: 603-608 (11.2)
S.IC.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	*Primary SE/TE:* 609-616 (11.3), 619-624 (11.4)
S.IC.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	*Primary SE/TE:* 625-632 (11.5)
S.IC.5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	*Primary SE/TE:* 633-638 (11.6)
S.IC.6	Evaluate reports based on data.	*Primary SE/TE:* 619-624 (11.4) *Supporting SE/TE:* 625-632 (11.5), 633-638 (11.6)
Domain: Conditional Probability and the Rules of Probability		

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Standard		Pages or Locations Where Standard is Addressed
S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	*Primary SE/TE:* 537-544 (10.1), 545-552 (10.2), 563-568 (10.4)
S.CP.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	*Primary SE/TE:* 545-552 (10.2)
S.CP.3	Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.	*Primary SE/TE:* 547-552 (10.2) *Supporting SE/TE:* 566, 568 (10.4)
S.CP.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*	*Primary SE/TE:* 553-560 (10.3)
S.CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	*Primary SE/TE:* 545-552 (10.2), 556-557, 559-560 (10.3)
S.CP.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.	*Primary SE/TE:* 547-549, 551-552 (10.2)
S.CP.7	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.	*Primary SE/TE:* 563-568 (10.4) *Supporting SE/TE:* 579-584 (10.6)
S.CP.8	Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B \mid A) = P(B)P(A \mid B)$, and interpret the answer in terms of the model.	*Primary SE/TE:* 545-552 (10.2)
S.CP.9	Use permutations and combinations to compute probabilities of compound events and solve problems.	*Primary SE/TE:* 569-578 (10.5), 579, 582-584 (10.6)
Domain: Using Probability to Make Decisions		
S.MD.6	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	*Supporting SE/TE:* 552 (10.2), 557, 559-560 (10.3), 566, 568 (10.4)
S.MD.7	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	*Supporting SE/TE:* 552 (10.2), 557, 559-560 (10.3), 566, 568 (10.4)

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	Standard	Pages or Locations Where Standard is Addressed
Mathematical Practices		
Big Ideas Math is a research-based program, systematically developed using the Common Core State Standards for Mathematical Practice as the underlying structure. The Standards for Mathematical Practice are seamlessly connected to the Common Core State Content Standards resulting in a program that maximizes both teacher effectiveness and student understanding. Every section has additional Mathematical Practice support in the Dynamic Classroom and in the online Lesson Plans at *BigIdeasMath.com* .		
1	Make sense of problems and persevere in solving them. Mathematically proficient students: • Explain to themselves the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals • Make conjectures about the form and meaning of the solution attempt. • Plan a solution pathway rather than simply jumping into a solution. • Consider analogous problems and try special cases and simpler forms of the original problen in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Transform algebraic expressions or change the viewing window on their graphing calculator to get information. • Explain correspondences between equations, verbal descriptions, tables, and graphs. • Draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Use concrete objects or pictures to help conceptualize and solve a problem. • Check their answers to problems using a different method. • Ask themselves, “Does this make sense?” • Understand the approaches of others to solving complex problems and identify	Each section begins with an Essential Question. Clear step-by-step examples encourage students to plan a solution pathway rather than jumping into a solution attempt. Guided questions and instructional scaffolding support students’ perseverance. ***Sample references:*** Chapter 1, pages 7, 10, 17, 19, 23, 25-29, 36 Chapter 2, pages 51, 52, 54, 55, 60-62, 67, 72, 81-83 Chapter 3, pages 92, 102, 107, 110, 119, 124, 127, 129-131, 138, 143, 144 Chapter 4, pages 161, 163, 164, 179, 183, 186, 187, 190, 202, 209, 224 Chapter 5, pages 258, 269, 274, 283 Chapter 6, pages 306, 315, 316, 323, 333, 339, 348 Chapter 7, pages 362, 369, 373, 381, 388, 391, 399 Chapter 8, pages 419, 427, 431, 446, 449, 450 Chapter 9, pages 465, 466, 473, 484, 493, 497, 502, 503, 511, 517 Chapter 10, pages 544, 551, 563 Chapter 11, pages 635, 638
2	Reason abstractly and quantitively. Mathematically proficient students: • Make sense of quantities and their relationships in problem situations. • Bring two complementary abilities to bear on problems involving quantitative relationships: - Decontextualize (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents) and - Contextualize (pause as needed during the manipulation process in order to probe into the referents for the symbols involved) • Use quantitative reasoning that entails creating a coherent representation of the problem at hand, considering the units involved, and attending to the meaning of quantities, not just how to compute them . • Know and flexibly use different properties of operations and objects.	Students learn to represent problems by consistently using a verbal model, paying close attention to units and employing mathematical properties. This helps students represent problems symbolically and manipulate the representative symbols. They are taught to contextualize by thinking about the referents and symbols involved. ***Sample references:*** Chapter 1, pages 6, 10, 17, 18, 21, 27, 28, 35, 36 Chapter 2, pages 52, 61, 64, 72, 74 Chapter 3, pages 100-102, 110, 117, 127-130, 137, 145, 146 Chapter 4, pages 161, 164, 171, 172, 185, 196, 224 Chapter 5, pages 242, 258, 281, 283, 284 Chapter 6, pages 298, 316, 317, 323, 324 Chapter 7, pages 358, 359, 372, 382, 390, 398 Chapter 8, pages 417, 424, 431, 432, 450 Chapter 9, pages 460, 468, 469, 476, 483, 493, 503, 504, 512, 517 Chapter 10, pages 543, 545, 552, 560, 576 Chapter 11, pages 602, 603, 605, 607, 609, 615, 616, 625, 632

	Standard	Pages or Locations Where Standard is Addressed
3	Construct viable arguments and critique the reasoning of others. Mathematically proficient students: • Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases. • Recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments. • Distinguish correct logic or reasoning from that which is flawed and, if there is a flaw, explain what it is - Elementary students construct arguments using concrete referents such as objects, drawings, diagrams, and actions. - Later students learn to determine domains to which an argument applies. • Listen or read the arguments of others, decide whether they make sense, and ask useful question to clarify or improve arguments.	Throughout the series students are expected to develop models, formulate deductions, and make conjectures. Essential Questions, Error Analysis exercises, and Reasoning exercises provide opportunities for students to make assumptions, examine results, and explain their reasoning. Which One Doesn't Belong and Making an Argument encourage debate and sensemaking. ***Sample references:*** Chapter 1, pages 3, 9, 10, 17, 23, 27, 28, 35, 36 Chapter 2, pages 46, 52-54, 63, 64, 67, 81 Chapter 3, pages 101-103, 109, 110, 117, 118, 129, 130, 138, 145, 146 Chapter 4, pages 157, 162, 164, 171, 172, 178, 183, 184, 186, 194-197, 203, 210, 211, 218, 223, 224 Chapter 5, pages 237, 242, 249, 250, 267, 273-275, 283 Chapter 6, pages 295, 301-303, 308, 309, 315, 317, 323, 324, 327, 331, 332, 339, 346, 348, 349 Chapter 7, pages 363, 364, 372, 373, 375, 382, 383, 389, 390, 397-399 Chapter 8, pages 409, 414-416, 422-424, 432, 435, 439, 440, 448-451 Chapter 9, pages 461, 466-469, 474-476, 483, 484, 494, 504, 511, 512, 517, 518, 524 Chapter 10, pages 542, 544, 552, 560, 561, 563, 567-569, 584, 585 Chapter 11, pages 602, 607, 608, 614, 616, 619, 624, 632, 638

	Standard	Pages or Locations Where Standard is Addressed
4	Model with mathematics. Mathematically proficient students: • Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. - In early grades, this might be as simple as writing an addition equation to describe a situation. - In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. - By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation • Map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze those relationships mathematically to draw conclusions. • Interpret their mathematical results in the context of the situation. • Reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	In each section, students work with the mathematics of everyday life. Throughout this series, students use graphs, tables, charts, number lines, diagrams, and formulas to organize, make sense of, and identify realistic solutions to real-life situations. ***Sample references:*** Chapter 1, pages 7-10, 15, 18, 21-23, 26, 27, 34 Chapter 2, pages 51, 53, 60, 62-65, 74, 81, 82 Chapter 3, pages 100-102, 118, 129, 137, 144, 146 Chapter 4, pages 163, 170, 171, 195, 196, 201, 203, 224 Chapter 5, pages 242, 249, 254, 267, 273, 283 Chapter 6, pages 300, 301, 308, 314, 316, 339, 348 Chapter 7, pages 362, 364, 369, 371, 381, 390 Chapter 8, pages 415, 423, 431, 439, 440, 446, 449-451 Chapter 9, pages 465, 467, 473, 475, 483, 484, 491-495, 504, 508, 509, 511 Chapter 10, pages 543, 544, 549, 552-560, 566, 568, 583, 584 Chapter 11, pages 594, 598, 601, 602, 616, 620, 622, 623, 626, 627, 630, 631
5	Use appropriate tools strategically. Mathematically proficient students: • Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.	Opportunities for students to select and use appropriate tools such as paper and pencil, rulers, protractors, graphing calculators, spreadsheets, dynamic geometry software, websites, and other external resources are provided for students throughout the series. ***Sample references:*** Chapter 1, pages 2, 9, 11, 25, 27 Chapter 2, pages 63, 75, 79, 81 Chapter 3, pages 92, 129, 135, 139, 143, 145 Chapter 4, pages 156, 164, 172, 189, 197, 204, 214, 217, 219, 221, 222 Chapter 5, pages 243, 257, 267, 272, 282, 283 Chapter 6, pages 303, 307, 315, 316, 339, 341, 345, 347, 348 Chapter 7, pages 369, 371, 390, 398 Chapter 8, pages 408, 417, 425, 435, 441, 445 Chapter 9, pages 484, 493, 503, 504, 509, 512 Chapter 10, pages 544, 578 Chapter 11, pages 603, 606, 608, 619, 628, 635, 636, 638

	Standard	Pages or Locations Where Standard is Addressed
6	Attend to Precision. Mathematically proficient students: • Try to communicate precisely to others. - In the elementary grades, students give carefully formulated explanations to each other. - In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.	Through the balanced approach to instruction, students have daily opportunities to communicate mathematically. Students work through explorations, examples, and exercises to understand and use the language of mathematics, paying careful attention to the importance of units, labeling, and quantities. ***Sample references:*** Chapter 1, pages 10, 17, 35, 36 Chapter 2, pages 52, 56, 74, 81 Chapter 3, pages 97, 103, 128, 130, 143 Chapter 4, pages 161, 183, 196, 203, 211 Chapter 5, pages 236, 238, 244, 263, 280 Chapter 6, pages 306, 308, 315, 323 Chapter 7, pages 358, 364, 382, 398, 399 Chapter 8, pages 411, 432, 441, 446, 450, 451 Chapter 9, pages 460, 461, 502, 512, 519, 520, 523 Chapter 10, pages 539, 542, 546, 582, 584 Chapter 11, pages 600, 625, 626, 629-632
7	Look for and make use of structure. Mathematically proficient students: • Look closely to discern a pattern or structure. - Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. - Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. - In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.	Real and relevant word problems encourage students to “see” that these problems are composed of several components. Students find that some mathematical representations share common mathematical structures and learn to look for these relationships discerning inherent patterns and structures. ***Sample references:*** Chapter 1, pages 3-18, 31 Chapter 2, pages 47-54, 62, 63, 69 Chapter 3, pages 95, 107, 108, 111-118, 128, 140 Chapter 4, pages 163, 165-172, 179-186, 205-210 Chapter 5, pages 251-258, 261 Chapter 6, pages 305, 317-324, 335, 344 Chapter 7, pages 362, 365-372 Chapter 8, pages 416, 448 Chapter 9, pages 485-494, 497-504, 516-518 Chapter 10, pages 537, 558, 579

Standard		Pages or Locations Where Standard is Addressed
8	Look for and express regularity in repeated reasoning. Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. - Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. - Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation (y-2)/(x-1)=3. - Noticing the regularity in the way terms cancel when expanding (x-1)(x+1), $(x-1)(x^2+x+1)$, and $(x-1)(x^3+x^2+x+1)$ might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.	The series helps students see that mathematics is well structured and predictable. Students work through a problem, not through the numbers. They consider factors such as an appropriate answer to the question, reasonable intermediate steps, and a realistic solution using the four-step problem solving plan. ***Sample references:*** Chapter 1, pages 15, 23, 35 Chapter 2, pages 55, 60, 74, 82, 83 Chapter 3, pages 115, 143 Chapter 4, pages 175, 187, 191, 198 Chapter 5, pages 242, 340 Chapter 6, pages 294, 306 Chapter 7, pages 362, 369 Chapter 8, pages 425, 432, 440, 446 Chapter 9, page 473 Chapter 10, page 568

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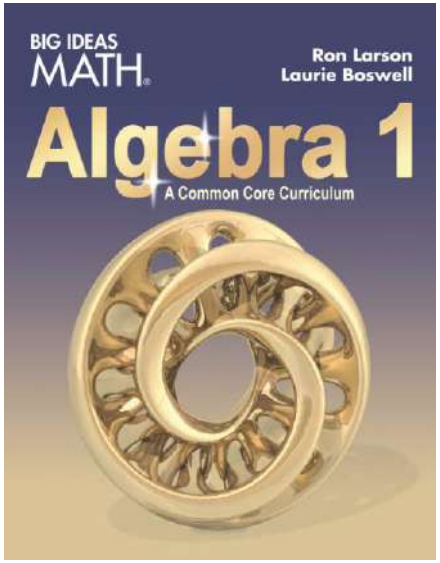

Correlations to the Common Core State Standards

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Common Core State Standards for High School Algebra 1

Standard		Pages or Locations Where Standard is Addressed
Conceptual Category: Number and Quantity		
Domain: ˙The Real Number System		
N.RN.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*	*Primary SE/TE* : 299-304 (6.2)
N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	*Primary SE/TE* : 291-298 (6.1), 299-304 (6.2), 479-488 (9.1) *Supporting SE/TE* : 559-566 (10.3)
N.RN.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	*Primary SE/TE* : 479-488 (9.1)
Domain: Quantities		
N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	*Primary SE/TE* : 15 (1.2) *Supporting SE/TE* : 37 (1.5), 129, 132-134 (3.4)
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.	*Supporting SE/TE:* 124 (3.3), 178 (4.1), 238 (5.1), 244 (5.2), 250 (5.3), 264 (5.5), 335 (6.6), 400 (7.7), 428 (8.2), 435 (8.3), 464 (8.6), 493 (9.2), 509 (9.4), 517 (9.5), 554 (10.2), 563 (10.3)
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	*Supporting SE/TE:* 204, 207, 208 (4.5), 299 (6.2), 313, 314, 316, 318, 321 (6.4), 463 (8.6), 497 (9.3), 546 (10.1), 554 (10.2)
Conceptual Category: Algebra		
Domain: Seeing Structure in Expressions		
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.	
	a. Interpret parts of an expression, such as terms, factors, and coefficients.	*Supporting SE/TE* : 112, 113, 115, 118, 119 (3.2), 122, 124-126 (3.3), 135, 138-144 (3.5), 359, 361-364 (7.1)
	b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)^n$ *as the product of P and a factor not depending on P.*	*Supporting SE/TE* : 13, 16-18 (1.2), 313-322 (6.4), 377-382 (7.4)
A.SSE.2	Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$.	*Primary SE/TE* : 385-390 (7.5), 391-396 (7.6), 397-402 (7.7), 403-408 (7.8)
A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	
	a. Factor a quadratic expression to reveal the zeros of the function it defines.	*Primary SE/TE* : 388, 390 (7.5), 394, 396 (7.6), 400, 402 (7.7), 406-408 (7.8), 449-458 (8.5)
	b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	*Primary SE/TE* : 508, 509, 511-514 (9.4)

Items in brackets are not required until Algebra 2.

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Standard		Pages or Locations Where Standard is Addressed
	c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^{t} *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	*Primary SE/TE* : 316, 320, 322 (6.4)
Domain: Arithmetic with Polynomials and Rational Expressions		
A.APR.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	*Primary SE/TE* : 357-364 (7.1), 365-370 (7.2), 371-376 (7.3)
A.APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	*Primary SE/TE* : 377-382 (7.4), 449-458 (8.5) *Supporting SE/TE* : 385-390 (7.5), 391-396 (7.6), 397-402 (7.7), 403-408 (7.8), 489-496 (9.2)
Domain: Creating Equations		
A.CED.1	Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	*Primary SE/TE* : 3-10 (1.1), 11-18 (1.2), 19-24 (1.3), 27-34 (1.4), 53-60 (2.1), 61-66 (2.2), 67-72 (2.3), 73-78 (2.4), 81-86 (2.5), 87-92 (2.6), 325-330 (6.5), 497-502 (9.3), 505-514 (9.4), 515-524 (9.5), 559-566 (10.3) *Supporting SE/TE* : 385-390 (7.5), 391-396 (7.6), 397-402 (7.7), 403-408 (7.8), 525-532 (9.6)
A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	*Primary SE/TE* : 111-120 (3.2), 121-126 (3.3), 129-134 (3.4), 135-144 (3.5), 155-162 (3.7), 175-180 (4.1), 181-186 (4.2), 187-192 (4.3), 217-224 (4.7), 305-312 (6.3), 313-322 (6.4), 419-424 (8.1), 425-430 (8.2), 431-438 (8.3), 441-448 (8.4), 449-458 (8.5), 543-550 (10.1), 551-556 (10.2) *Supporting SE/TE* : 235-240 (5.1), 241-246 (5.2), 247-252 (5.3), 253-258 (5.4), 459-468 (8.6), 567-574 (10.4)
A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	*Primary SE/TE* : 235-240 (5.1), 241-246 (5.2), 247-252 (5.3), 253-258 (5.4), 261-266 (5.5), 267-272 (5.6), 273-280 (5.7)
A.CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	*Primary SE/TE* : 35-42 (1.5), 497-502 (9.3)
Domain: Reasoning with Equations and Inequalities		
A.REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	*Primary SE/TE* : 3-10 (1.1), 325-330 (6.5) *Supporting SE/TE* : 11-18 (1.2), 19-24 (1.3), 27-34 (1.4), 497-502 (9.3), 505-514 (9.4), 515-524 (9.5), 559-566 (10.3)
A.REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	*Primary SE/TE* : 3-10 (1.1), 11-18 (1.2), 19-24 (1.3), 27-34 (1.4), 61-66 (2.2), 67-72 (2.3), 73-78 (2.4), 81-86 (2.5), 87-92 (2.6)

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Standard		Pages or Locations Where Standard is Addressed
A.REI.4	Solve quadratic equations in one variable.	
	a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.	*Primary SE/TE* : 505-514 (9.4), 515-524 (9.5)
	b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	*Primary SE/TE* : 377-382 (7.4), 497-502 (9.3), 505-514 (9.4), 515-524 (9.5) *Supporting SE/TE* : 388-390 (7.5), 394-396 (7.6), 399-402 (7.7), 405-408 (7.8)
A.REI.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	*Primary SE/TE* : 247-252 (5.3)
A.REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	*Primary SE/TE* : 235-240 (5.1), 241-246 (5.2), 247-252 (5.3), 253-258 (5.4)
A.REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.	*Primary SE/TE* : 525-532 (9.6)
A.REI.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	*Primary SE/TE* : 111-120 (3.2), 155-162 (3.7), 217-224 (4.7) *Supporting SE/TE* : 305-312 (6.3), 419-424 (8.1), 431-438 (8.3), 543-550 (10.1), 551-556 (10.2)
A.REI.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	*Primary SE/TE* : 261-266 (5.5), 325, 328-330 (6.5), 491, 494-496 (9.2), 527-532 (9.6) *Supporting SE/TE* : 464 (8.6), 561, 564-566 (10.3)
A.REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	*Primary SE/TE* : 267-272 (5.6), 273-280 (5.7)
Conceptual Category: Functions		
Domain: Interpreting Functions		
F.IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.	*Primary SE/TE* : 103-110 (3.1), 121-126 (3.3)
F.IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	*Primary SE/TE* : 121-126 (3.3)
F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*	*Primary SE/TE* : 209-216 (4.6), 331-338 (6.6), 339-346 (6.7)

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Standard		Pages or Locations Where Standard is Addressed
F.IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.**	*Primary SE/TE* : 135-144 (3.5), 305-312 (6.3), 441-448 (8.4), 449-458 (8.5), 543-550 (10.1), 551-556 (10.2) *Supporting SE/TE* : 121-126 (3.3), 489-496 (9.2)
F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**	*Primary SE/TE* : 111-120 (3.2) *Supporting SE/TE* : 132-134 (3.4)
F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*	*Primary SE/TE* : 462-468 (8.6), 546, 547, 549, 550 (10.1), 554, 556 (10.2) *Supporting SE/TE* : 316, 320 (6.4)
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	*Primary SE/TE* : 111-120 (3.2), 121-126 (3.3), 129-134 (3.4), 135-144 (3.5), 145-154 (3.6), 419-424 (8.1), 425-430 (8.2), 431-438 (8.3), 489-496 (9.2)
	b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	*Primary SE/TE* : 155-162 (3.7), 217-224 (4.7), 543-550 (10.1), 551-556 (10.2)
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	*Primary SE/TE* : 305-312 (6.3), 317, 318, 321 (6.4)
F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	
	a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	*Primary SE/TE* : 449-458 (8.5), 505-514 (9.4)
	b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.	*Primary SE/TE* : 316, 318, 320-322 (6.4)
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	*Primary SE/TE* : 124, 126 (3.3), 305-312 (6.3), 435, 437, 438 (8.3), 543-550 (10.1), 551-556 (10.2) *Supporting SE/TE* : 186 (4.2)

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Standard		Pages or Locations Where Standard is Addressed
Domain: Building Functions		
F.BF.1	Write a function that describes a relationship between two quantities.	
	a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	*Primary SE/TE* : 175, 178, 180 (4.1), 181, 184, 186 (4.2), 209, 213, 215-216 (4.6), 309, 311-312 (6.3), 314, 317-322 (6.4), 341, 343-346 (6.7), 445, 448 (8.4), 453, 454, 456-458 (8.5), 459-468 (8.6) *Supporting SE/TE* : 198, 200 (4.4)
	b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	*Supporting SE/TE* : 322 (6.4), 430 (8.2)
F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*	*Primary SE/TE* : 209-216 (4.6), 331-338 (6.6), 339-346 (6.7)
F.BF.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	*Primary SE/TE* : 145-154 (3.6), 155-162 (3.7), 305-312 (6.3), 419-424 (8.1), 425-430 (8.2), 441-448 (8.4)
F.BF.4	Find inverse functions.	
	a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. *For example, f(x) =2 x3 or f(x) = (x+1)/(x-1) for x ≠ 1.*	*Primary SE/TE* : 567-574 (10.4)
Domain: Linear, Quadratic, and Exponential Models		
F.LE.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.	
	a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	*Primary SE/TE* : 305-312 (6.3) *Supporting SE/TE* : 135-144 (3.5)
	b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	*Primary SE/TE* : 111-120 (3.2), 175-180 (4.1), 181-186 (4.2) *Supporting SE/TE* : 459-468 (8.6)
	c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	*Primary SE/TE* : 315, 316, 320-322 (6.4) *Supporting SE/TE* : 305-312 (6.3), 459-468 (8.6)
F.LE.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	*Primary SE/TE* : 175-180 (4.1), 181-186 (4.2), 187-192 (4.3), 209-216 (4.6), 305-312 (6.3), 313-322 (6.4), 331-338 (6.6), 339-346 (6.7)
F.LE.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	*Primary SE/TE* : 459-468 (8.6)
F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.	*Primary SE/TE* : 140, 142-144 (3.5), 198, 200 (4.4), 201-208 (4.5) *Supporting SE/TE* : 313-322 (6.4)

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Standard		Pages or Locations Where Standard is Addressed
Conceptual Category: Statistics and Probability		
Domain: Interpreting Categorical and Quantitative Data		
S.ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).	*Primary SE/TE* : 593-598 (11.2), 599-606 (11.3), 617-622 (11.5)
S.ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	*Primary SE/TE* : 599-606 (11.3)
S.ID.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	*Primary SE/TE* : 585-592 (11.1), 593-598 (11.2), 599-606 (11.3)
S.ID.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	*Primary SE/TE* : 609-616 (11.4)
S.ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	
	a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	*Primary SE/TE* : 195, 198, 200 (4.4), 201-208 (4.5)
	b. Informally assess the fit of a function by plotting and analyzing residuals.	*Primary SE/TE* : 202, 203, 206-208 (4.5)
	c. Fit a linear function for a scatter plot that suggests a linear association.	*Primary SE/TE* : 195, 198, 200 (4.4), 201-208 (4.5)
S.ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	*Primary SE/TE* : 198, 200 (4.4), 204, 207, 208 (4.5)
S.ID.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.	*Primary SE/TE* : 203, 204, 206-208 (4.5)
S.ID.9	Distinguish between correlation and causation.	*Primary SE/TE* : 205, 207, 208 (4.5)

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	Standard	Pages or Locations Where Standard is Addressed
Mathematical Practices		
Big Ideas Math is a research-based program, systematically developed using the Common Core State Standards for Mathematical Practice as the underlying structure. The Standards for Mathematical Practice are seamlessly connected to the Common Core State Content Standards resulting in a program that maximizes both teacher effectiveness and student understanding. Every section has additional Mathematical Practice support in the Dynamic Classroom and in the online Lesson Plans at *BigIdeasMath.com* .		
1	Make sense of problems and persevere in solving them. Mathematically proficient students: • Explain to themselves the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals • Make conjectures about the form and meaning of the solution attempt. • Plan a solution pathway rather than simply jumping into a solution. • Consider analogous problems and try special cases and simpler forms of the original problen in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Transform algebraic expressions or change the viewing window on their graphing calculator to get information. • Explain correspondences between equations, verbal descriptions, tables, and graphs. • Draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Use concrete objects or pictures to help conceptualize and solve a problem. • Check their answers to problems using a different method. • Ask themselves, “Does this make sense?” • Understand the approaches of others to solving complex problems and identify correspondences between approaches.	Each section begins with an Essential Question. Clear step-by-step examples encourage students to plan a solution pathway rather than jumping into a solution attempt. Guided questions and instructional scaffolding support students’ perseverance. ***Sample references:*** Chapter 1, page 27 Chapter 2, page 87 Chapter 3, pages 103-110, 129 Chapter 4, page 147 Chapter 5, page 247, 273 Chapter 8, page 418 Chapter 9, pages 478, 489, 505, 525
2	Reason abstractly and quantitively. Mathematically proficient students: • Make sense of quantities and their relationships in problem situations. • Bring two complementary abilities to bear on problems involving quantitative relationships: - Decontextualize (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents) and - Contextualize (pause as needed during the manipulation process in order to probe into the referents for the symbols involved) • Use quantitative reasoning that entails creating a coherent representation of the problem at hand, considering the units involved, and attending to the meaning of quantities, not just how to compute them . • Know and flexibly use different properties of operations and objects.	Students learn to represent problems by consistently using a verbal model, paying close attention to units and employing mathematical properties. This helps students represent problems symbolically and manipulate the representative symbols. They are taught to contextualize by thinking about the referents and symbols involved. ***Sample references:*** Chapter 1, page 35 Chapter 2, page 81 Chapter 4, page 195 Chapter 7, pages 357, 365, 385, 403 Chapter 8, page 419 Chapter 9, 479

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	Standard	Pages or Locations Where Standard is Addressed
3	Construct viable arguments and critique the reasoning of others. Mathematically proficient students: • Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases. • Recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments. • Distinguish correct logic or reasoning from that which is flawed and, if there is a flaw, explain what it is - Elementary students construct arguments using concrete referents such as objects, drawings, diagrams, and actions. - Later students learn to determine domains to which an argument applies. • Listen or read the arguments of others, decide whether they make sense, and ask useful question to clarify or improve arguments.	Throughout the series students are expected to develop models, formulate deductions, and make conjectures. Essential Questions, Error Analysis exercises, and Reasoning exercises provide opportunities for students to make assumptions, examine results, and explain their reasoning. Which One Doesn't Belong and Making an Argument encourage debate and sensemaking. ***Sample references:*** Chapter 1, page 11 Chapter 3, page 111, 135 Chapter 4, pages 201, 217 Chapter 5, page 247 Chapter 6, pages 299, 305 Chapter 8, pages 431, 449 Chapter 10, page 542 Chapter 11, page 585
4	Model with mathematics. Mathematically proficient students: • Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. - In early grades, this might be as simple as writing an addition equation to describe a situation. - In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. - By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation • Map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze those relationships mathematically to draw conclusions. • Interpret their mathematical results in the context of the situation. • Reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	In each section, students work with the mathematics of everyday life. Throughout this series, students use graphs, tables, charts, number lines, diagrams, and formulas to organize, make sense of, and identify realistic solutions to real-life situations. ***Sample references:*** Chapter 1, pages 6, 7, 14, 16, 22, 23 Chapter 2, pages 70, 71, 76, 77, 84 Chapter 3, pages 124, 125, 140 Chapter 4, pages 175, 178, 180, 184, 186, 192 Chapter 5, pages 238, 240 Chapter 6, pages 309, 311, 313-322 Chapter 7, pages 374-376, 380, 382 Chapter 8, pages 435, 437, 438, 445 Chapter 9, pages 483, 486, 496, 500, 510, 517, 522 Chapter 10, pages 559, 563-566 Chapter 11, pages 584, 593, 609

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	Standard	Pages or Locations Where Standard is Addressed
5	Use appropriate tools strategically. Mathematically proficient students: • Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.	Opportunities for students to select and use appropriate tools such as paper and pencil, rulers, protractors, graphing calculators, spreadsheets, dynamic geometry software, websites, and other external resources are provided for students throughout the series. ***Sample references:*** Chapter 1, pages 8, 16 Chapter 2, page 52 Chapter 3, pages 102, 111, 145 Chapter 4, pages 181, 187, 200 Chapter 5, pages 234, 240, 261, 264, 266, 267 Chapter 6, pages 325, 335, 346 Chapter 7, pages 356, 377, 391 Chapter 8, page 425, 437, 438, 441, 468 Chapter 9, page 515 Chapter 11, page 592, 605, 617
6	Attend to Precision. Mathematically proficient students: • Try to communicate precisely to others. - In the elementary grades, students give carefully formulated explanations to each other. - In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.	Through the balanced approach to instruction, students have daily opportunities to communicate mathematically. Students work through explorations, examples, and exercises to understand and use the language of mathematics, paying careful attention to the importance of units, labeling, and quantities. ***Sample references:*** Chapter 1, page 2 Chapter 2, pages 53-60 Chapter 3, pages 121-126 Chapter 5, page 241 Chapter 8, page 452 Chapter 9, pages 497, 499, 500 Chapter 10, page 567 Chapter 11, page 599

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	Standard	Pages or Locations Where Standard is Addressed
7	Look for and make use of structure. Mathematically proficient students: • Look closely to discern a pattern or structure. - Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. - Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. - In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.	Real and relevant word problems encourage students to “see” that these problems are composed of several components. Students find that some mathematical representations share common mathematical structures and learn to look for these relationships discerning inherent patterns and structures. ***Sample references:*** Chapter 1, pages 13, 19 Chapter 2, page 67, 75, 83 Chapter 3, page 146, 155 Chapter 4, pages 209-216 Chapter 6, pages 290, 331-338, 339-346 Chapter 7, pages 371-376, 397-402 Chapter 8, page 452 Chapter 9, page 482 Chapter 10, pages, 543, 552, 561, 569
8	Look for and express regularity in repeated reasoning. Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. - Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. - Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation (y-2)/(x-1)=3. - Noticing the regularity in the way terms cancel when expanding (x-1)(x+1), $(x-1)(x^2+x+1)$, and $(x-1)(x^3+x^2+x+1)$ might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.	The series helps students see that mathematics is well structured and predictable. Students work through a problem, not through the numbers. They consider factors such as an appropriate answer to the question, reasonable intermediate steps, and a realistic solution using the four-step problem solving plan. ***Sample references:*** Chapter 1, pages 6, 7, 14, 15, 22, 29 Chapter 2, pages 64, 70, 76, 84, 90 Chapter 3, pages 124, 132, 140 Chapter 4, page 178, 184, 190, 215, 216 Chapter 5, page 238, 244, 246, 250, 256, 264, 270, 277 Chapter 6, pages 302, 309, 318, 335 Chapter 7, page 376, 388, 400, 406 Chapter 8, pages 428, 435, 445 Chapter 9, page 483, 510, 517, 523 Chapter 10, page 547, 551, 563

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Standard		Pages or Locations Where Standard is Addressed
Conceptual Category: Geometry		
Domain: The Number System		
G.CO.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	*Primary SE/TE:* 3-10 (1.1), 11-18 (1.2), 37-46 (1.5), 47-54 (1.6), 125-130 (3.1), 529-536 (10.1), 593-600 (11.1) *Supporting SE/TE:* 19-26 (1.3), 99-104 (2.5), 105-114 (2.6)
G.CO.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	*Primary SE/TE:* 173-180 (4.1), 181-188 (4.2), 189-196 (4.3), 207-214 (4.5)
G.CO.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	*Primary SE/TE:* 181-188 (4.2), 189-196 (4.3)
G.CO.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	*Primary SE/TE:* 173-180 (4.1), 181-188 (4.2), 189-196 (4.3)
G.CO.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	*Primary SE/TE:* 173-180 (4.1), 181-188 (4.2), 189-196 (4.3), 199-206 (4.4), 215-220 (4.6) *Supporting SE/TE:* 246 (5.3), 262 (5.5), 270 (5.6)
G.CO.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	*Primary SE/TE:* 173-180 (4.1), 181-188 (4.2), 189-196 (4.3), 199-206 (4.4)
G.CO.7	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	*Primary SE/TE:* 239-244 (5.2)
G.CO.8	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	*Primary SE/TE:* 245-250 (5.3), 261-268 (5.5), 269-276 (5.6)
G.CO.9	Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints*.	*Primary SE/TE:* 99-104 (2.5), 105-114 (2.6), 131-136 (3.2), 137-144 (3.3), 148-154 (3.4), 180 (4.1), 301-308 (6.1) *Supporting SE/TE:* 65-74 (2.1), 75-82 (2.2), 83-88 (2.3), 91-98 (2.4)
G.CO.10	Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point*.	*Primary SE/TE:* 231-238 (5.1), 251-258 (5.4), 309-318 (6.2), 319-326 (6.3), 329-334 (6.4), 335-342 (6.5), 343-348 (6.6) *Supporting SE/TE:* 65-74 (2.1), 75-82 (2.2), 83-88 (2.3), 91-98 (2.4)
G.CO.11	Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals*.	*Primary SE/TE:* 367-374 (7.2), 375-384 (7.3), 387-396 (7.4) *Supporting SE/TE:* 65-74 (2.1), 75-82 (2.2), 83-88 (2.3), 91-98 (2.4), 359-366 (7.1)
G.CO.12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line*.	*Primary SE/TE:* 11-18 (1.2), 19-26 (1.3), 37-46 (1.5), 137-144 (3.3), 147-154 (3.4), 181 (4.4), 309-318 (6.2), 529 (10.1)

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Standard		Pages or Locations Where Standard is Addressed
G.CO.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	*Primary SE/TE:* 37 (1.5), 154 (3.4), 254 (5.4), 553-560 (10.4)
Domain: Similarity, Right Triangles, & Trigonometry		
G.SRT.1	Verify experimentally the properties of dilations given by a center and a scale factor:	
	a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.	*Primary SE/TE:* 207-214 (4.5)
	b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	*Primary SE/TE:* 207-214 (4.5)
G.SRT.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	*Primary SE/TE:* 215-220 (4.6), 417-426 (8.1)
G.SRT.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	*Primary SE/TE:* 427-432 (8.2)
G.SRT.4	Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*	*Primary SE/TE:* 435-444 (8.3), 445-452 (8.4), 463-470 (9.1) *Supporting SE/TE:* 65-74 (2.1), 75-82 (2.2), 83-88 (2.3), 91-98 (2.4)
G.SRT.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	*Primary SE/TE:* 277-282 (5.7), 367-374 (7.2), 375-384 (7.3), 387-396 (7.4), 397-406 (7.5), 427-432 (8.2), 435-444 (8.3), 477-484 (9.3) *Supporting SE/TE:* 301-308 (6.1), 319-326 (6.3)
G.SRT.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	*Primary SE/TE:* 487-492 (9.4), 493-500 (9.5)
G.SRT.7	Explain and use the relationship between the sine and cosine of complementary angles.	*Primary SE/TE:* 493-500 (9.5)
G.SRT.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★	*Primary SE/TE:* 463-470 (9.1), 487-492 (9.4), 493-500 (9.5), 501-506 (9.6) *Supporting SE/TE:* 471-476 (9.2)
G.SRT.9	(+) Derive the formula $A = 1/2\ ab\ \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	*Primary SE/TE:* 507-516 (9.7)
G.SRT.10	(+) Prove the Laws of Sines and Cosines and use them to solve problems.	*Primary SE/TE:* 507-516 (9.7)
G.SRT.11	(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	*Primary SE/TE:* 507-516 (9.7)

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Standard		Pages or Locations Where Standard is Addressed
Domain: Circles		
G.C.1	Prove that all circles are similar.	*Primary SE/TE:* 537-544 (10.2)
G.C.2	Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*	*Primary SE/TE:* 529-536 (10.1), 537-544 (10.2), 545-548 (10.3), 553-560 (10.4), 561-568 (10.5), 569-574 (10.6)
G.C.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	*Primary SE/TE:* 309-318 (6.2), 553-560 (10.4)
G.C.4	(+) Construct a tangent line from a point outside a given circle to the circle.	*Primary SE/TE:* 529-536 (10.1)
G.C.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	*Primary SE/TE:* 593-600 (11.1), 601-608 (11.2)
Domain: Expressing Geometric Properties with Equations		
G.GPE.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	*Primary SE/TE:* 575-580 (10.7)
G.GPE.4	Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).*	*Primary SE/TE:* 283-288 (5.8), 575-580 (10.7) *Supporting SE/TE:* 329-334 (6.4)
G.GPE.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	*Primary SE/TE:* 155-162 (3.5), 435-444 (8.3)
G.GPE.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	*Primary SE/TE:* 155-162 (3.5), 445-452 (8.4)
G.GPE.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★	*Primary SE/TE:* 29-36 (1.4) *Supporting SE/TE:* 19-26 (1.3)
Domain: Geomteric Measurement and Dimension		
G.MD.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments*.	*Primary SE/TE:* 593-600 (11.1), 601-608 (11.2), 625-634 (11.5), 635-640 (11.6), 641-646 (11.7)
G.MD.2	(+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	*Primary SE/TE:* 625-634 (11.5), 647-654 (11.8)
G.MD.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★	*Primary SE/TE:* 625-634 (11.5), 635-640 (11.6), 641-646 (11.7), 647-654 (11.8) *Supporting SE/TE:* 609-616 (11.3)
G.MD.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	*Primary SE/TE:* 617-622 (11.4)

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Standard		Pages or Locations Where Standard is Addressed
Domain: Modeling with Geometry		
G.MG.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★	*Primary SE/TE:* 29-36 (1.4), 231-238 (5.1), 245-250 (5.3), 251-258 (5.4), 261-268 (5.5), 301-308 (6.1), 309-318 (6.2), 329-334 (6.4), 375-384 (7.3), 387-396 (7.4), 397-406 (7.5), 435-444 (8.3), 471-476 (9.2), 501-506 (9.6), 569-574 (10.6), 625-634 (11.5), 635-640 (11.6), 647-654 (11.8)
G.MG.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★	*Primary SE/TE:* 601-608 (11.2), 625-634 (11.5)
G.MG.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).★	*Primary SE/TE:* 181-188 (4.2), 261-268 (5.5), 309-318 (6.2), 387-396 (7.4), 417-426 (8.1), 501-506 (9.6), 507-516 (9.7), 545-548 (10.3), 625-634 (11.5)

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Standard		Pages or Locations Where Standard is Addressed
Mathematical Practices		
Big Ideas Math is a research-based program, systematically developed using the Common Core State Standards for Mathematical Practice as the underlying structure. The Standards for Mathematical Practice are seamlessly connected to the Common Core State Content Standards resulting in a program that maximizes both teacher effectiveness and student understanding. Every section has additional Mathematical Practice support in the Dynamic Classroom and in the online Lesson Plans at *BigIdeasMath.com* .		
1	Make sense of problems and persevere in solving them. Mathematically proficient students: • Explain to themselves the meaning of a problem and looking for entry points to its solution. • Analyze givens, constraints, relationships, and goals • Make conjectures about the form and meaning of the solution attempt. • Plan a solution pathway rather than simply jumping into a solution. • Consider analogous problems and try special cases and simpler forms of the original problen in order to gain insight into its solution. • Monitor and evaluate their progress and change course if necessary. • Transform algebraic expressions or change the viewing window on their graphing calculator to get information. • Explain correspondences between equations, verbal descriptions, tables, and graphs. • Draw diagrams of important features and relationships, graph data, and search for regularity or trends. • Use concrete objects or pictures to help conceptualize and solve a problem. • Check their answers to problems using a different method. • Ask themselves, “Does this make sense?” • Understand the approaches of others to solving complex problems and identify correspondences between approaches.	Each section begins with an Essential Question. Clear step-by-step examples encourage students to plan a solution pathway rather than jumping into a solution attempt. Guided questions and instructional scaffolding support students’ perseverance. ***Sample references:*** Chapter 1, pages 29-36 Chapter 4, pages 173-180 Chapter 5, pages 231-238 Chapter 6, pages 329-334 Chapter 8, pages 417-432 Chapter 9, pages 478-484, 487-500 Chapter 10, pages 528, 561-568 Chapter 11, pages 625-634
2	Reason abstractly and quantitively. Mathematically proficient students: • Make sense of quantities and their relationships in problem situations. • Bring two complementary abilities to bear on problems involving quantitative relationships: - Decontextualize (abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents) and - Contextualize (pause as needed during the manipulation process in order to probe into the referents for the symbols involved) • Use quantitative reasoning that entails creating a coherent representation of the problem at hand, considering the units involved, and attending to the meaning of quantities, not just how to compute them . • Know and flexibly use different properties of operations and objects.	Students learn to represent problems by consistently using a verbal model, paying close attention to units and employing mathematical properties. This helps students represent problems symbolically and manipulate the representative symbols. They are taught to contextualize by thinking about the referents and symbols involved. ***Sample references:*** Chapter 2, pages 91-104 Chapter 7, pages 375-384 Chapter 9, pages 463-470 Chapter 10, pages 529-536, 569-574 Chapter 11, pages 592, 601-616

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Standard		Pages or Locations Where Standard is Addressed
3	Construct viable arguments and critique the reasoning of others. Mathematically proficient students: • Understand and use stated assumptions, definitions, and previously established results in constructing arguments. • Make conjectures and build a logical progression of statements to explore the truth of their conjectures. • Analyze situations by breaking them into cases. • Recognize and use counterexamples. • Justify their conclusions, communicate them to others, and respond to the arguments of others. • Reason inductively about data, making plausible arguments that take into account the context from which the data arose. • Compare the effectiveness of two plausible arguments. • Distinguish correct logic or reasoning from that which is flawed and, if there is a flaw, explain what it is - Elementary students construct arguments using concrete referents such as objects, drawings, diagrams, and actions. - Later students learn to determine domains to which an argument applies. • Listen or read the arguments of others, decide whether they make sense, and ask useful question to clarify or improve arguments.	Throughout the series students are expected to develop models, formulate deductions, and make conjectures. Essential Questions, Error Analysis exercises, and Reasoning exercises provide opportunities for students to make assumptions, examine results, and explain their reasoning. Which One Doesn't Belong and Making an Argument encourage debate and sensemaking. ***Sample references:*** Chapter 2, pages 65-82 Chapter 3, pages 125-130, 137-144, 147-154 Chapter 5, pages 230-238, 251-258, 269-279 Chapter 6, pages 329-334 Chapter 7, pages 359-366, 387-396 Chapter 8, pages 427-432, 435-444 Chapter 9, pages 477-484 Chapter 11, pages 641-646
4	Model with mathematics. Mathematically proficient students: • Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. - In early grades, this might be as simple as writing an addition equation to describe a situation. - In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. - By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. • Make assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. • Identify important quantities in a practical situation • Map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. • Analyze those relationships mathematically to draw conclusions. • Interpret their mathematical results in the context of the situation. • Reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	In each section, students work with the mathematics of everyday life. Throughout this series, students use graphs, tables, charts, number lines, diagrams, and formulas to organize, make sense of, and identify realistic solutions to real-life situations. ***Sample references:*** Chapter 1, pages 3-10, 29-36 Chapter 5, pages 231-238 Chapter 6, pages 329-334 Chapter 7, page 358 Chapter 8, pages 427-432 Chapter 9, pages 471-484, 487-500

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Standard		Pages or Locations Where Standard is Addressed
5	Use appropriate tools strategically. Mathematically proficient students: • Consider available tools when solving a mathematical problem. (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software) • Are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • Detect possible errors by strategically using estimation and other mathematical knowledge. • Know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. • Identify relevant external mathematical resources and use them to pose or solve problems. • Use technological tools to explore and deepen their understanding of concepts.	Opportunities for students to select and use appropriate tools such as paper and pencil, rulers, protractors, graphing calculators, spreadsheets, dynamic geometry software, websites, and other external resources are provided for students throughout the series. ***Sample references:*** Chapter 1, pages 11-18, 37-46 Chapter 3, page 124 Chapter 4, pages 172, 173, 181, 189, 199, 207, 215 Chapter 5, pages 231, 239, 245, 251, 261, 269, 283 Chapter 6, pages 300, 301, 309, 319, 329, 335, 343 Chapter 7, pages 359, 367, 375, 387, 397 Chapter 8, pages 417, 427, 435, 445 Chapter 9, pages 471, 477, 487, 493, 501, 507 Chapter 10, page 529
6	Attend to Precision. Mathematically proficient students: • Try to communicate precisely to others. - In the elementary grades, students give carefully formulated explanations to each other. - In high school, students have learned to examine claims and make explicit use of definitions. • Try to use clear definitions in discussion with others and in their own reasoning. • State the meaning of the symbols they choose, including using the equal sign consistently and appropriately. • Specify units of measure and label axes to clarify the correspondence with quantities in a problem. • Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.	Through the balanced approach to instruction, students have daily opportunities to communicate mathematically. Students work through explorations, examples, and exercises to understand and use the language of mathematics, paying careful attention to the importance of units, labeling, and quantities. ***Sample references:*** Chapter 1, pages 2, 47-54 Chapter 2, pages 83-88 Chapter 3, pages 131-136 Chapter 4, pages 215-220 Chapter 6, pages 335-342 Chapter 9, pages 462, 471-476, 487-492, 501-506 Chapter 11, pages 593-600

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Standard		Pages or Locations Where Standard is Addressed
7	Look for and make use of structure. Mathematically proficient students: • Look closely to discern a pattern or structure. - Young students might notice that three and seven more is the same amount as seven and three more or they may sort a collection of shapes according to how many sides the shapes have. - Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. - In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • Step back for an overview and can shift perspective. • See complicated things, such as some algebraic expressions, as single objects or composed of several objects.	Real and relevant word problems encourage students to "see" that these problems are composed of several components. Students find that some mathematical representations share common mathematical structures and learn to look for these relationships discerning inherent patterns and structures. ***Sample references:*** Chapter 2, pages 91-98 Chapter 4, pages 181-188, 207-214 Chapter 6, pages 309-326 Chapter 8, pages 416-426, 445-452 Chapter 9, pages 493-500 Chapter 10, pages 545-550 Chapter 11, pages 635-640
8	Look for and express regularity in repeated reasoning. Mathematically proficient students: • Notice if calculations are repeated. • Look both for general methods and for shortcuts. - Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeated decimal. - Paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1,2) with a slope 3, middle school students might abstract the equation (y-2)/(x-1)=3. - Noticing the regularity in the way terms cancel when expanding (x-1)(x+1), $(x-1)(x^2+x+1)$, and $(x-1)(x^3+x^2+x+1)$ might lead high school students to the general formula for the sum of a geometric series. • Maintain oversight of the process of solving a problem, while attending to the details. • Continually evaluate the reasonableness of intermediate results.	The series helps students see that mathematics is well structured and predictable. Students work through a problem, not through the numbers. They consider factors such as an appropriate answer to the question, reasonable intermediate steps, and a realistic solution using the four-step problem solving plan. ***Sample references:*** Chapter 1, pages 7, 15, 33 Chapter 2, page 95 Chapter 4, pages 177, 189-196 Chapter 5, pages 235, 261-268 Chapter 6, pages 332, 346 Chapter 7, pages 375-384, 392, 397-406 Chapter 8, pages 420, 430 Chapter 9, pages 479, 490, 497 Chapter 10, page 565 Chapter 11, pages 593-600, 629

Positive Outcomes Charter School Sample Lesson Plans

After extensive research Positive Outcome Charter School choose and utilizes the Big Ideas Advanced Math series for the seventh through 12th grade math curriculum. Positive Outcomes Charter School choose this curriculum with the belief that using the Big Ideas Math advanced series enable students to address all the Common Core Standards and have opportunities for conceptual understanding, procedural confidence and application of the concepts in their everyday life. The Big Ideas Math Advance series stresses student focus, reasoning, and rigor. Positive Outcomes Charter School also utilizes Khan Academy, Math 180 and extensive tutoring to have our students reach their potential.

Lesson plans at Positive Outcomes Charter School utilize the elements of LFS. Theses include:

- **LEQ: Lesson Essential Question -** What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?
- **Entrance Activity: Warm Up, Do Now -** Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information
- **Teaching Strategy: Activity -** What will you do, how will you do it and what will the students be doing?
- **Accommodations for students -** How will you adjust for students with identified needs?
- **Accelerations for Students -** How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?
- **Para Strategy -** What will the support staff do in the room to assist in the lesson?
- **CFU: Check for Understanding -** How will you check throughout the lesson and activity that the students understand and are following along with your lesson?
- **Exit Activity: Exit Ticket, Ticket of the door, 3-2-1, summarizing, answering the LEQ -** The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.

As part of the lesson plan process, the Dean of Instruction and Academics along with the Special Education Coordinator review each set of plans to ensure there are opportunities for students to demonstrate the standards of mathematical practice and share resources and strategies as needed. The Dean of Academics and Special Education Coordinator are checking for:

- **Activating Activity** - The Activating Activity is checked to ensure there is a connection from the last lesson and the lesson being taught. Examples of Activating Activity may include reviewing the exit ticket from the previous lesson, a check for prior knowledge for the lesson being taught, and completing activities from the previous class.
- **Objective for the cl**ass – What does the teachers want the students to be able to answer or understand when they leave the class?
- The **standards** being taught
- **Teaching strategies** - Checking to see if the strategies challenging the students, is the rigor there to make sure the students are building stamina and perseverance. The Dean of Academics and Special Education Coordinator check make sure the teaching strategies allow the students to demonstrate the standards of mathematical practice.
- **Check–for-Understanding** – How the teacher is gathering evidence of student understanding and determining the formative assessment of student understanding is at appropriate opportunities.

- **Para-Professional strategies** – Checking how the teachers have determined what will the support staff do in the room to assist in the lesson
- **Accommodations for Students –** Determining if the teacher has made adjustments for students with identified needs. The Dean of Instruction and Academics along with the Special Education Coordinator will share resources and strategies as needed.
- **Accelerations -** The Dean of Instruction and Academics along with the Special Education Coordinator review the lesson for adjustments and offer strategies and resources for students needing to be challenged.
- **Exit Activity -** The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day

Positive Outcomes Charter School utilizes the Teacher Excellence Framework (TEF) as the teacher evaluation system. The Teaching Excellence Framework defines excellent instruction and is the basis for teacher development and feedback. The Teaching Excellence Framework is organized around five components with subcomponents describing the specific, observable student and teacher behaviors associated with each. TEF has Positive Outcomes Charter School Dean of Academics conducting at least 8 observations per year, all observations are 15-20 minutes and unannounced. Feedback meetings are within one week with the observer and teacher working together to develop one or two action steps that will have the greatest impact on student achievement. Feedback utilizes research based teaching strategies from programs such as Uncommon School's Get Better Faster and Teach like A Champion (Positive Outcomes Charter School used this book to drive training for teachers in PLC during the (2017-2018 school year)

MATH 7
UEQ: How do you use integers in real life situations? (Ch.1)

Monday

LEQ(s):	**Red Activity 1.3: Subtracting Integers** **Essential Question: How are adding integers and subtracting integers related?** CC State Standards 7.NS.1c, 7.NS.1d, 7.NS.3
Entrance Activity:	DO NOW: Complete Warm Up on the Smartboard. Subtracting Positive Integers
Teaching Strategies:	We will complete graphic organizer on subtracting integers while going over the activities. ACTIVITY 1 **Subtracting Integers** This activity illustrates subtracting two integers. Students should use counters even if they say they know the answer. ACTIVITY 2 **Adding Integers** This activity illustrates adding integers with different signs with a positive sum. Students should use counters even if they say they know the answer. ACTIVITY 3 **Subtracting Integers** This activity illustrates subtracting a positive integer from a negative integer. Students should use a number line. ACTIVITY 4 **Adding Integers** This activity illustrates writing an addition expression from a number line to find the sum. • Look at the related addition problem −3 + (−1). Draw an arrow from 0 to −3 to represent −3. Now move to the left one because you are adding 1 in the negative direction (−1). Draw the arrow and write, “Add −1.” • Have students work with partners to write an addition expression. **Inductive Reasoning** • Students should work with partners to find the sums. Note that Questions 5–8 are the problems completed in Activities 1–4.

	• The goal is to develop some understanding about subtraction and the related addition problem.
Para Strategies:	The paraprofessional will assist all students with understanding the concepts that are reviewed during the lesson. The paraprofessional will also model any examples to ensure student understanding. The para may work with struggle students directly. The para will assist the students with the manipulatives.
CFU's:	Check-ins during activities 1-4. Review after each activity.
Exit Activity:	Have students explain how to use integer counters to model 4 − 6.This will verify that the students can use counters to subtract integers.
Accommodations for students:	Students will have the use of the manipulatives and adding integers graphic organizer at all times. The students will also have the direct instruction of the paraprofessional to ensure understanding.
Accelerations for Students:	**What is Your Answer?** (In student workbook) • In Questions 17 and 18, subtraction is the same as adding the opposite. • **Extension:** "Use the integer counters or a number line to model (8 − 4) − 2 and 8 − (4 − 2). Are the results the same?"

Tuesday

LEQ(s):	**Subtracting Integers** **Essential Question: How do you subtract integers?** CC State Standards 7.NS.1c, 7.NS.1d, 7.NS.3
Entrance Activity:	DO NOW: Subtracting integers on SMARTS. REVIEW EXIT TICKET FROM PREVIOUS DAY
Teaching Strategies:	**Subtracting Integers** This Key Idea introduces subtracting an integer by adding the opposite. • Write the Key Idea. Work through the examples EXAMPLE 1 **Subtracting Integers** This example illustrates how to subtract an integer by adding the opposite. • Work through the example with the students. Pointing to a classroom number line may be helpful. • Have students use Think-Pair-Share to answer On Your Own Questions 1-6. • Review the answers together, with students presenting their work to the class. EXAMPLE 2 **Subtracting Integers** This example illustrates subtracting more than two numbers. • Work through the example with the students. Caution students to work slowly. • Have students work independently to answer On Your Own Questions 7-12. Review the answers together, with students presenting their work to the class. EXAMPLE 3 **Real-Life Application** This example illustrates subtracting the lowest elevation from the highest elevation. • Work through the example with the students. • You may need to review the meanings of *elevation* and *range*. • **Fun Fact:** The highest point in Hawaii is Mauna Kea at 4208 meters above sea level. The lowest points in Hawaii are at sea level, where the coast of Hawaii meets the Pacific Ocean. • Have students work in pairs to answer On Your Own Question 13. • Review the answer together, with students presenting their work to the class.

Para Strategies:	The paraprofessional will assist students who need direct instruction/accommodations with CFU problems. The para will also identify struggle students and group them and provide direct instruction.
CFU's:	1. OYO #1-6 on Smarts after Example 1 2. OYO # 7-12 on Smarts after Example 2 3. OYO #13on Smarts after Example 3 (accelerated)
Exit Activity:	**Exit Ticket: ON LAST PAGE ON SMARTS** HOMEWORK: PRACTICE 1.3 in student workbook page 14
Accommodations for students:	Example 3 Modeled through Whole Group Instruction; Assistance with CFU #13 Use of graphic organizer and manipulatives at all times.
Accelerations for Students:	EXAMPLE 3 AND OYO #13: STUDENT CAN COMPLETE THIS PROBLEM AFTER COMPLETING #1-12

Thursday

LEQ(s):	**Red Activity 1.3: Subtracting Integers** **Essential Question: How are adding integers and subtracting integers related?** CC State Standards 7.NS.1c, 7.NS.1d, 7.NS.3
Entrance Activity:	DO NOW: Complete Warm Up on the Smartboard. Subtracting Positive Integers REVIEW HOMEWORK FROM PREVIOUS DAY REVIEW EXIT TICKET FROM PREVIOUS DAY
Teaching Strategies:	Adding and Subtracting Integers Practice Day Kuta Software Adding and Subtracting Integers Practice Worksheet. Students will be paired by selecting a card. Students will work together to assist each other with solving the problems.
Para Strategies:	The paraprofessional will assist all students with understanding the concepts that are reviewed during the lesson. The paraprofessional will also model any examples to ensure student understanding. The para may work with struggle students directly. The para will assist the students with the manipulatives.
CFU's:	Check-ins and help upon request. Whole group questions every 10 minutes.
Exit Activity:	Quizizz to collect data to see where students are struggling.
Accommodations for students:	Students will have the use of the manipulatives and adding integers graphic organizer at all times. The students will also have the direct instruction of the paraprofessional to ensure understanding.
Accelerations for Students:	The students will move on to complete the Quizizz for advanced problems.

Friday

LEQ(s):	**Red Activity 1.4: Multiplying Integers** **Essential Question: Is the product of two integers *positive, negative,* or *zero*? How can you tell?** **CC State Standards** 7.NS.2a, 7.NS.2c, 7.NS.3
Entrance Activity:	DO NOW: Adding and subtracting integers review sheet
Teaching Strategies:	MINI QUIZ- ADDING AND SUBTRACTING INTEGERS After students complete the mini quiz, they will be prompted to complete the warm up on the new notes packet. MULTIPLYING INTEGERS We will complete the graphic organizer on multiplying integers as we complete each activity ACTIVITY 1 **Multiplying Integers with the Same Sign** This activity illustrates using repeated addition to find the product. Have students draw a number line to represent 3 groups of 2. ACTIVITY 2 **Multiplying Integers with Different Signs** This activity illustrates using repeated addition to find the product. • Make sure students understand why the arrows are moving to the left, instead of moving to the right. Ask a student to read the last result, namely that 3 ● (−2) = −6. So, a positive number times a negative number is a negative product ACTIVITY 3 **Multiplying Integers with Different Signs** This activity illustrates using a table to find the product. • Make sure that students recognize the pattern—the first factor is decreasing by 1, the second factor is constant, and the product is decreasing by 2. Ask a student to read the last result, namely that –3 ● 2 = –6. So, a negative number times a positive number is a negative product. ACTIVITY 4

	Multiplying Integers with the Same Sign This activity illustrates using a table to find the product. • **Connection:** Activity 1 showed that the product of two positive integers is positive. Activity 2 and Activity 3 showed that the product of a positive and a negative (or a negative and a positive) is negative. • Ask the question "Are there any other combinations to consider?" • Tell students: "Let's look at the product of two negatives." Students should recognize the patterns: the first factor is constant, the second factor is decreasing by 1, and the product is increasing by 3. • **Extension:** Use the patterns developed to find the product of three numbers, such as 3(−2)(−4). **Inductive Reasoning** • Students should work with partners to find the products. The goal is for the students to recognize the bigger pattern. When the factors have the same signs, the product is positive. When the factors have different signs, the product is negative. • Note that Questions 5–8 are the problems completed in Activities 1–4.
Para Strategies:	The paraprofessional will assist all students with understanding the concepts that are reviewed during the lesson. The paraprofessional will also model any examples to ensure student understanding. The para may work with struggle students directly. The para will assist the students with the manipulatives.
CFU's:	Check-ins during activities 1-4. Review after each activity
Exit Activity:	Multiplication with positive x positive, negative x negative, positive x negative and negative x positive exit ticket.
Accommodations for students:	The paraprofessional will assist all students with understanding the concepts that are reviewed during the lesson. The paraprofessional will also model any examples to ensure student understanding. The para may work with struggle students directly. The para will assist the students with the manipulatives.
Accelerations for Students:	Students will assist struggle students with understanding the concept of multiplying negative integers.

MATH 8
UEQ: How do you use linear equations to solve real life problems? (Ch.1)

Monday

LEQ(s):	**1.2: How can you solve a multi-step equation? How can you check the reasonableness of your solution?** 8.EE.7a, 8.EE.7b
Entrance Activity:	DO NOW: Simplify Expressions On Smarts
Teaching Strategies:	**Solving Multi-Step Equations** This Key Idea introduces the process of solving multi-step equations. • Write the Key Idea. Tell students that when you evaluate an expression, you follow the order of operations. Solving an equation undoes the evaluating, in reverse order. The goal is to isolate the variable term and then solve for the variable **Solving a Two-Step Equation** This example illustrates how to solve a problem about the height of a tree by solving a two-step equation. • Explain to students how the equation represents the growth of the tree: think of the tree as being 15 feet tall when being planted and then growing at a rate of 1.5 feet each year. • Work through the example as shown. • Have students work independently to complete On Your Own Questions 1 and 2. Then have neighbors check each other's work. Review the answers together, with students presenting their work to the class **Combining Like Terms to Solve an Equation** This example illustrates how to combine like terms before solving an equation. • Work through the example as shown. • Be sure to discuss how the Distributive Property can be used to subtract the terms. • Have students work independently to answer On Your Own Question 3. Then have neighbors check each other's work. Review the answer together, with students presenting their work to the class. **Using the Distributive Property to Solve an Equation** This example illustrates how to use the Distributive Property as part of solving a multi-step equation.

	• Ask students to identify the operations involved in this equation. • Work through the example as shown. • Take time to work through the Study Tip and discuss the steps. Use the Words of Wisdom in the Teaching Edition. • Have students work in pairs to answer On Your Own Questions 4 and 5. Students need to be careful with multi-step equations, and it is helpful to have a partner check each step. • Review the answers together, with students presenting their work to the class. **Real-Life Application** This example illustrates how to write and solve an equation to find a missing data value. • Review *mean* with students if necessary. • Discuss the information displayed in the table and write the equation. • Work through the example as shown. • Show students that the third step could be written without parentheses. • Discuss the question with students. • Have students work in pairs to answer On Your Own Question 6. • Review the answer together, with students presenting their work to the class.
Para Strategies:	The paraprofessional will assist all students with understanding the concepts that are reviewed during the lesson. The paraprofessional will also model any examples to ensure student understanding. The paraprofessional will work directly with struggle students and students who need accommodations
CFU's:	OYO #1-3 after Example 2 OYO #4-5 After Example 4
Exit Activity:	EXIT TICKET:. Solve $8x + 9 - 4x = 25$. Check your solution. HW: 1.2 Practice in Workbook pg 10
Accommodations for students:	Students will receive assistance/direct instruction from para or teacher with OYO problems. Students will have access to graphic organizers, calculators and direct instruction from the teacher or paraprofessional.
Accelerations for Students:	Students will practice Multi-Step Equations on Quizzizz

Tuesday

LEQ(s):	**1.2: How can you solve a multi-step equation? How can you check the reasonableness of your solution?** 8.EE.7a, 8.EE.7b
Entrance Activity:	DO NOW: 1-4 Warm Up on SMARTS. Find the angle measures of the polygon algebraicly. REVIEW DO NOW REVIEW EXIT TICKET FROM PREVIOUS DAY REWIEW HOMEWORK
Teaching Strategies:	***MULTI STEP EQUATIONS PRACTICE DAY*** Quizizz: Students will log into google classroom and take the online quizizz on multi-step equations. Their results will determine if the receive a Basic or Advanced Practice Card. Textbook Practice: **BASIC: Homework Assignment:** 1, 2, 6 – 14 **ADVANCED: Homework Assignment:** 1, 2, 6 – 14 even, 15 – 18 Students will receive an index card with the problems that they will be completing (Basic or Advanced)
Para Strategies:	The paraprofessional will assist students who are identified as struggle students, and students who require direct instruction and accommodations. The paraprofessional will also assist with identifying students who need direct instruction to ensure understanding
CFU's:	Each question will show the student's understanding of mastering the LEQ. Once students are finished with their problems, they will check their answers on the answer key. They will then identify the problems they struggled with and ask for teacher assistance. Each student will then write down the problems they would like to be reviewed as a whole group.
Exit Activity:	There will be no exit ticket since the students will be completing practice problems HOMEWORK: Finish Practice Problems for homework.
Accommodations for students:	Students will naturally gravitate towards the basic or intermediate problems assistance from para and teacher. All students with IEPs/504s will receive accommodations per their IEP. **BASIC:** 1, 2, 6 – 14

Accelerations for Students:	**ADVANCED:** 1, 2, 6 – 14 even, 15 – 18 Once finished, students will go to Khan Academy to practice Multi-Step Equations

Thursday

LEQ(s):	**1.2: How can you solve a multi-step equation? How can you check the reasonableness of your solution?** 8.EE.7a, 8.EE.7b
Entrance Activity:	DO NOW: Multi-Step Equations #2 Quizizz. REVIEW EXIT TICKET FROM PREVIOUS DAY REVIEW HOMEWORK FROM LAST NIGHT
Teaching Strategies:	***MULTI STEP EQUATIONS PRACTICE DAY*** 1. MULTI-STEP EQUATIONS QUIZ-QUIZ GAME Students will be put in to teams of two or three (at least one accelerated student per team). They will be given a whiteboard, dry erase marker, piece of paper, pencil and eraser. The teacher will post a problem on the smartboard. The teams will be given three minutes to solve the problem. Music will play as the students try to solve. Students can use the whiteboard or the piece of paper to solve the problems, but the answer must be displayed on the whiteboard. Once the music stops, all teams must have their answers on the whiteboard, and the whiteboards raised in the air. Each team will receive one point for having the right answer. Repeat. Students must rotate their role in the team (recording, solving, computing, etc). If a team does not work together, they will have one point taken away for each round. The team with the most points will win.
Para Strategies:	The paraprofessional will assist students who are identified as struggle students, and students who require direct instruction and accommodations. The paraprofessional will also assist with identifying students who need direct instruction to ensure understanding.

CFU's:	Each question will show the student's understanding of mastering the LEQ.
Exit Activity:	There will be no exit ticket since the students will be playing a review game for the assessment on Friday. HOMEWORK: Review for Assessment on Monday.
Accommodations for students:	Student will be placed on a team with an accelerated student. The accelerated student will assist the students who need accommodations.
Accelerations for Students:	Teams will receive advance problems where the accelerated and struggle students can collaborate.

Friday

LEQ(s):	**1.2: How can you solve a multi-step equation? How can you check the reasonableness of your solution?** 8.EE.7a, 8.EE.7b
Entrance Activity:	DO NOW: QUIZ REVIEW
Teaching Strategies:	1.1 Choice Board Assessment (10 points) 1. Students will have the opportunity to select their problems for assessment. 2. Problems will be on index cards. 3. There will be three levels of index cards: Basic (1 point). Intermediate (2 points) Advanced(3 points) 4. Students will be required to complete a total of 10 points worth of problems. When finished, students are to work on enrichment color by numbers.
Para Strategies:	Provide assistance for students who need accommodations. All students with IEPs/504s will receive accommodations.

CFU's:	NONE
Exit Activity:	Turn in enrichment worksheet.
Accommodations for students:	Students will naturally gravitate towards the basic or intermediate problems. Students can use notes and assistance from para and teacher. All students with IEPs/504s will receive accommodations per their IEP.

Algebra 1
UEQ: How do you use linear equations to solve real life problems? (Ch.1)
Monday

LEQ(s):	**Algebra 1 Lesson 1.2: Essential Question: How can you use multi-step equations to solve real-life problems?** HSN-Q.A.1 HSA-CED.A.1 HSA-REI.B.3
Entrance Activity:	DO NOW: Distribution problems (6) REVIEW DO NOW REVIEW EXIT TICKET FROM PREVIOUS DAY REWIEW HOMEWORK
Teaching Strategies:	***MULTI STEP EQUATIONS PRACTICE DAY*** Textbook Practice: **Suggestions for Leveling** Basic: 1, 2, 17 – 25 odd, 35, 37, 41, 47, 50, 57 – 65 Advanced: 1, 2, 18 – 34 even, 35 – 41, 44, 47, 48 – 56 even, 57 – 65 Students will receive an index card with the problems that they will be completing (Basic or Advanced) (Quizizz from previous day will provide data to show which students should receive basic or advanced)
Para Strategies:	The paraprofessional will assist students who are identified as struggle students, and students who require direct instruction and accommodations. The paraprofessional will also assist with identifying students who need direct instruction to ensure understanding
CFU's:	Each question will show the student's understanding of mastering the LEQ. Once students are finished with their problems, they will check their answers on the answer key. They will then identify the problems they struggled with and ask for teacher assistance. Each student will then write down the problems they would like to be reviewed as a whole group.
Exit Activity:	There will be no exit ticket since the students will be playing a review game for the assessment on Friday. HOMEWORK: Finish Practice Problems for homework.

Accommodations for students:	Students will naturally gravitate towards the basic or intermediate problems. Students can use notes and assistance from para and teacher. All students with IEPs/504s will receive accommodations per their IEP. Basic: 1, 2, 17 – 25 odd, 35, 37, 41, 47, 50, 57 – 65
Accelerations for Students:	Advanced: 1, 2, 18 – 34 even, 35 – 41, 44, 47, 48 – 56 even, 57 – 65

Tuesday

LEQ(s):	**Algebra 1 Lesson 1.2: Essential Question: How can you use multi-step equations to solve real-life problems?** HSN-Q.A.1 HSA-CED.A.1 HSA-REI.B.3
Entrance Activity:	DO NOW: Complete Order of Operations Problems (6) REVIEW PRACTICE PROBLEMS FROM PREVIOUS DAY
Teaching Strategies:	MULTI-STEP EQUATIONS QUIZ-QUIZ GAME Students will be put in to teams of two or three (at least one accelerated student per team). They will be given a whiteboard, dry erase marker, piece of paper, pencil and eraser. The teacher will post a problem on the smartboard. The teams will be given three minutes to solve the problem. Music will play as the students try to solve. Students can use the whiteboard or the piece of paper to solve the problems, but the answer must be displayed on the whiteboard. Once the music stops, all teams must have their answers on the whiteboard, and the whiteboards raised in the air. Each team will receive one point for having the right answer. Repeat. Students must rotate their role in the team (recording, solving, computing, etc). If a team does not work together, they will have one point taken away for each round. The team with the most points will win

Para Strategies:	The paraprofessional will assist students who are identified as struggle students, and students who require direct instruction and accommodations. The paraprofessional will also assist with identifying students who need direct instruction to ensure understanding.
CFU's:	Each question will show the student's understanding of mastering the LEQ.
Exit Activity:	There will be no exit ticket since the students will be playing a review game for the assessment on Friday. Homework: Study for Assessment on Monday!
Accommodations for students:	Student will be placed on a team with an accelerated student. The accelerated student will assist the students who need accommodations.
Accelerations for Students:	Teams will receive advance problems where the accelerated and struggle students can collaborate.

Thursday

LEQ(s):	**Algebra 1 Lesson 1.2: Essential Question: How can you use multi-step equations to solve real-life problems?** HSN-Q.A.1 HSA-CED.A.1 HSA-REI.B.3
Entrance Activity:	DO NOW: QUIZ REVIEW
Teaching Strategies:	1.2 Choice Board Assessment (10 points) 5. Students will have the opportunity to select their problems for assessment. 6. Problems will be on index cards. 7. There will be three levels of index cards: Basic (1 point). Intermediate (2 points) Advanced (3 points) Expert (4 points) 8. Students will be required to complete a total of 10 points worth of problems. When finished, students are to work on enrichment color by numbers.
Para Strategies:	Provide assistance for students who need accommodations. All students with IEPs/504s will receive accommodations.
CFU's:	NONE
Exit Activity:	Turn in enrichment worksheet.
Accommodations for students:	Students will naturally gravitate towards the basic or intermediate problems. Students can use notes and assistance from para and teacher. All students with IEPs/504s will receive accommodations per their IEP.

Friday

LEQ(s):	**Algebra 1 Lesson 1.3: Solving Equations with Variables on Both Sides** **Essential Question: How can you solve an equation that has variables on both sides?** HSA-CED.A.1 HSA-REI.B.3
Entrance Activity:	Do Now: Simplify the expression using distribution
Teaching Strategies:	**EXPLORATION 1** **Perimeter** In this exploration, students write and solve an equation with variables on both sides. • Discuss with students how the perimeter of a polygon is found. • Have students work in pairs to complete the exploration. • Not all of the sides in the second polygon are labeled, and students may ignore this issue. Sufficient information is given so that students can determine the missing measures. Circulate the room, and help students who do not see what these missing values are. • As you circulate, note how students are solving equations with variables on both sides of the equation. EXAMPLE 1 (IF TIME ALLOWS) **Core Concept – Solving Equations with Variables on Both Sides** In this Core Concept, students learn how to solve an equation with variables on both sides. • Write the Core Concept and then ask students to Turn and Talk. Partner A explains his/her understanding of the Core Concept. After one minute, select a partner B to explain the Core Concept to the class. **Solving an Equation with Variables on Both Sides** In this example, students solve an equation with variables on both sides. • Ask students to use Think-Pair-Share to discuss what the first step is in solving the equation. Students may want to add 9*x* to each side so that the variable term is on the left side of the equation. Explain that you can solve for the variable on either side of the equation. Have students work with a partner to finish the example. Then review the answer as a class.
Para Strategies:	The paraprofessional will assist all students with understanding the concepts that are reviewed during the lesson. The paraprofessional will also assist to identify struggle students and group them accordingly. The paraprofessional will provide direct instruction to the struggle students and students who need accommodations.
CFU's:	All students will have frequent check-ins by teacher and para to ensure understanding of concepts and conjectures. Each problem will be modeled and reviewed as a whole class.

Exit Activity:	Exit Ticket: There will be no exit ticket for this activity.
Accommodations for students:	These students will receive direct instruction from the para or teacher to ensure understanding of the concepts. Students with IEP/504 will receive all accommodations and modifications per IEP/504. These students will receive instruction with Exploration 1a-c
Accelerations for Students:	These students will continue to Exploration 2 where they will perform the same steps to set up equations with equal areas and perimeter.

Grade and Subject: **Geometry 10th, 2nd & 3rd periods**

- HSG-CO.A.2 - Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
- HSG-CO.A.4 - Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- HSG-CO.A.5 - Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
- HSG-CO.B.6- Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

Monday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students can perform geometric transformations and compositions.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	What happens when you reflect something? Like a selfie or in a mirror?
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Mini lesson/review as needed. Students will complete the refresher and independent activities about transformations.

Para Strategies: What will the support staff do in the room to assist in the lesson?	Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students). Pd 3: Ms. G will be working with J & D on ?? need to check to see where they are on perpendicular/parallel.
CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	4.1 journal 4.1 practice 4.2 exploration 4.2 practice 4.3 exploration 4.3 practice
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the	As necessary review based on Big Ideas

following day.	
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?	Students can work ahead when passed current practice set.

Tuesday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students can perform geometric transformations and compositions.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Reflect a shape over the y axis. Reflect the same point over the x-axis.
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Mini lesson/review as needed. Students will complete the refresher and independent activities about transformations.
Para Strategies: What will the support staff do in the room to assist in the lesson?	Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students). Pd 3: Ms. G will be working with J & D on parallel & perpendicular lines on maps.

CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	4.1 journal 4.1 practice 4.2 exploration 4.2 practice 4.3 exploration 4.3 practice
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	Reflect a given shape.
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for	Students can work ahead when passed current practice set.

students how will work faster than the majority of other students in order to keep them engaged?	

Thursday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students can perform geometric transformations and compositions.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Rotate a point about the origin.
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Mini lesson/review as needed. Students will complete the refresher and independent activities about transformations.
Para Strategies: What will the support staff do in the room to assist in the lesson?	Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students). Pd 3: Ms. G will be working with J & D on parallel & perpendicular lines on maps.

CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	4.1 journal 4.1 practice 4.2 exploration 4.2 practice 4.3 exploration 4.3 practice
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	As necessary review based on Big Ideas
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for	Students can work ahead when passed current practice set.

students how will work faster than the majority of other students in order to keep them engaged?	

Friday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students can perform geometric transformations and compositions.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Rotate a shape about the origin.
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Mini lesson/review as needed. Students will complete the refresher and independent activities about transformations.
Para Strategies: What will the support staff do in the room to assist in the lesson?	Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students). Pd 3: Ms. G will be working with J & D on parallel & perpendicular lines on maps.

CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	4.1 journal 4.1 practice 4.2 exploration 4.2 practice 4.3 exploration 4.3 practice
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	As necessary review based on Big Ideas
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for	Students can work ahead when passed current practice set.

students how will work faster than the majority of other students in order to keep them engaged?	

Grade and Subject: Algebra 2, 11th, period 5 &

Common Core Standard:

- HSF-IF.C.7c - Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* - Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- HSF-BF.B.3 - Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
- HSA-SSE.A.2 - Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
- HSA-REI.B.4b - Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
- HSF-IF.C.8a - Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Monday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify solutions of quadratics.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Refresher / Review

Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Lesson - Review factoring, taking square roots, intro to completing square. Then students will move to Big Ideas when they are ready. Lesson on quadratic formula when ready. (self paced) When finished, journal pages 76 - 80 (next unit)
Para Strategies: What will the support staff do in the room to assist in the lesson?	Pd 6: 1 - 1 for student: assist as necessary with make up work. When student not there & para for 7: Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students).
CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	Big Ideas practice for 3.1, 3.3, & 3.4 when ready.
Exit Activity: The purpose of the exit activity is to assess the amount of	Questions or issues that came up today.

information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?	Students can work at their pace. They can move to the next section when they are ready.

Tuesday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify solutions of quadratics.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Quadratic formula intro/practice
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Lesson - Review as necessary. Data from Big Ideas and observations will drive reteaching as necessary. When finished, journal pages 76 - 80 (next unit)
Para Strategies: What will the support staff do in the room to assist in the lesson?	Pd 6: 1 - 1 for student: assist as necessary with make up work. When student not there & para for 7: Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same

	problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students).
CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	Big Ideas 3.1, 3.3, 3.4
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	Quadratic formula practice
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students	Students can work at their pace. They can move to the next section when they are ready.

how will work faster than the majority of other students in order to keep them engaged?	

Thursday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify solutions of quadratics.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Answer questions that have risen during the week, Refresher as needed.
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Lesson - Review factoring (as needed), taking square roots, intro to completing square (when ready), quadratic formula, data from Big Ideas to complete re-teaching or review as necessary. When finished, journal pages 76 - 80 (next unit)
Para Strategies: What will the support staff do in the room to assist in the lesson?	Pd 6: 1 - 1 for student: assist as necessary with make up work. When student not there & para for 7: Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students).

CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	Big Ideas 3.1, 3.3, 3.4
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	Quadratic review as needed (Based on data, what techniques do they need help with
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?	Students can work at their pace. They can move to the next section when they are ready.

Friday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify solutions of quadratics.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Quick introduction to other polynomials. & how it relates to quadratics.
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Lesson - Review factoring (as needed), taking square roots, intro to completing square (when ready), quadratic formula, Ideally, students should be finishing quadratics and moving onto other polynomials.
Para Strategies: What will the support staff do in the room to assist in the lesson?	Pd 6: 1 - 1 for student: assist as necessary with make up work. When student not there & para for 7: Assist students in gathering materials as necessary. Provide positive reinforcement for those beginning tasks. Gather work for absent students. Encourage students for participation/behavior. Assist students with work when possible. Let teacher know if you recognize a student is having difficulty (or ask a question for a student). Assist teacher to hand out materials as needed. Understand/enforce policies & procedures. Read questions/directions. Ensure students understand questions/directions. Seek teacher assistance as necessary for behavior/problems/etc. Let teacher know if multiple students are struggling on same problems. Let teacher know if directions are confusing/questions are confusing. (Model asking appropriately to assist students).

CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	Big Ideas, 3.1, 3.3, 3.4. When finished, journal pages 76 - 80 (next unit) 4.1 when ready.
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	similarities & differences of cubics & quartics.
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in	Students can work at their pace. They can move to the next section when they are ready.

order to keep them engaged?	

Grade and Subject: Probability & Statistics, 12th, period 4

Common Core Standard:

- HSS-CP.A.1 - Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
- HSS-CP.A.2 - Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
- HSS-CP.A.3 - Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.
- HSS-CP.A.5 - Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
- HSS-CP.B.6 - Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.

Do you have anything going on this week that I can assist you with? Assessments/quizzes/graphic organizers/simplified notes?

Monday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify the frequency of an event.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Questions from Friday to be used for everyone to answer, then find statistics of.

Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Review as necessary, select problems for 10.6. Performance task when ready.
Para Strategies: What will the support staff do in the room to assist in the lesson?	There is no para in the class at this time.
CFU's: How will you check throughout the lesson and activity that the students understand and are following along with your lesson?	Select questions from 10.6 & performance task (trees & dogs)
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the	Based on data from Big Ideas

following day.	
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?	Students can move onto the next unit when they have passed assessment

Tuesday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify the frequency of an event.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Discussion of Performance assessment
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Review as necessary. Students will do independent practice.
Para Strategies: What will the support staff do in the room to assist in the lesson?	There is no para in the class at this time.
CFU's: How will you check throughout the lesson and activity that the students understand and are following	Select questions from 10.6 & performance assessment

along with your lesson?	
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	Based on data from Big Ideas
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?	Students can move onto the next unit when they have passed assessment

Thursday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify the frequency of an event.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Based on data from Big Ideas
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Review as necessary. Students will do independent practice.
Para Strategies: What will the support staff do in the room to assist in the lesson?	There is no para in the class at this time.
CFU's: How will you check	Select questions from 10.6 & performance assessment

throughout the lesson and activity that the students understand and are following along with your lesson?	
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	Based on data from Big Ideas
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?	Students can move onto the next unit when they have passed assessment

Friday

LEQ(s): What do you want the students to be able to answer at the end of this class and what CCSS is it tied to?	Students will identify the frequency of an event.
Entrance Activity: Review the exit tickets from previous lesson, scaffold from prior knowledge, and intro to new information	Based on data from Big Ideas
Teaching Strategies: What will you do, how will you do it and what will the students be doing?	Review as necessary. Students will do independent practice.
Para Strategies: What will the support staff do in the room to assist in the lesson?	There is no para in the class at this time.
CFU's: How will you check throughout the lesson and activity that the students understand and are following	Select questions from 10.6 & performance assessment

along with your lesson?	
Exit Activity: The purpose of the exit activity is to assess the amount of information the students understood from class today. This should be tied back to the LEQ and will determine what lesson and instruction you will do the following day. It can also determine what your LEQ may need to be for the following day.	Based on data from Big Ideas
Accommodations for students: How will you adjust for students with identified needs?	Students can work at their pace. Video tutorials or teacher/para assistance in 1-1 or small group as needed. Graphic organizers available for all concepts. Calculators available for all work. Formulas provided as necessary. Questions given 1 at a time on computer/smart board. Textbook/alternative assignments available as necessary. Multiple attempts available. Teacher/para modeling given. Questions read/broken down as necessary. Concrete models used when possible. Manipulatives/visuals used. Teacher notes available when given. Access to vocabulary terms/definitions.
Accelerations for Students: How will you adjust for students how will work faster than the majority of other students in order to keep them engaged?	Students can move onto the next unit when they have passed assessment