MATHEMATICS CURRICULUM

2012

Thank you to all the members of the Diocesan Mathematics Curriculum Committee for all their valuable work in formulating this document.

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Purpose

The following Mathematics Curriculum has been developed to assist teachers and administrators in the Diocese of Spokane. It is the expectation that this curriculum be localized by each school. The standards are aligned with the Common Core State Standards (CC) and Washington State Learning Standards in Mathematics (S) and are individually referenced.

Philosophy

The Diocese of Spokane believes the study of mathematics leads the student to understand more fully the patterns, order and intricacies evident in God's creation.

Mathematical literacy is developed through a formative process of instruction, exploration and practice. Through these experiences students develop conceptual understanding and procedural fluency. Students are enabled to transfer and apply concepts, developing connections to everyday life. Students acquire the confidence to communicate mathematical reasoning and use problem solving strategies in an ever-changing world.

Goals

In accordance with the above philosophy, a mathematically proficient student will:

- Analyze problems and persevere in solving them, utilizing appropriate strategies.
- Transfer and apply the concepts and procedures of mathematics.
- Demonstrate procedural fluency and precision.
- Use appropriate tools strategically and efficiently.
- Reason abstractly and quantitatively.
- Construct viable arguments, critique reasoning and validate results.
- Recognize and make use of patterns and structures.
- Communicate precisely using mathematical language.

Standards for Mathematical Practice

Mathematical Practices

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

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

1. Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2. Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to 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 the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

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. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

4. Model with mathematics.

Mathematically proficient students can 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. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5. Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students 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. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6. Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7. Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, 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 7×8 equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 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. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

8. Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and 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 repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with 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 $(x - 1)(x^3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Connecting the Standards for Mathematical Practice to the Standards for Mathematical Content

The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years. Designers of curricula, assessments, and professional development should all attend to the need to connect the mathematical practices to mathematical content in mathematics instruction.

The Standards for Mathematical Content are a balanced combination of procedure and understanding. Expectations that begin with the word "understand" are often especially good opportunities to connect the practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices.

In this respect, those content standards which set an expectation of understanding are potential "points of intersection" between the Standards for Mathematical Content and the Standards for Mathematical Practice. These points of intersection are intended to be weighted toward central and generative concepts in the school mathematics curriculum that most merit the time, resources, innovative energies, and focus necessary to qualitatively improve the curriculum, instruction, assessment, professional development, and student achievement in mathematics.

Kindergarten

Kindergarten

Mathematical Practices

1. Make sense of problems and persevere in solving them.
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***Complete description of practices found on p.5-8*

Domains: Counting and Cardinality, Operations and Algebraic Reasoning, Number and Operations Base Ten, Measurement and Data, Geometry

Summary Statement: In Kindergarten, instructional time should focus on two critical areas: (1) representing, relating, and operating on whole numbers, initially with sets of objects; (2) describing shapes and space.

Standards & Expectations	Common Core & State Standards	SLE
1. Develop problem solving skills and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information • Identify what's missing • Identify, select, and apply possible strategies and tools • Analyze, evaluate, and explain if a solution is reasonable and answer the question	S K.5.A	
2. Understand and use mathematical vocabulary appropriately.		
Counting and Cardinality		
Know number names and the count sequence.		
1. Count forward to 100 by ones and tens.	CC K.CC.1 S K.1.A	
2. Count (forward and backward) beginning from a given number within the known sequence (instead of beginning at 1).	CC K.CC.2 S K.1.A	

3. Recognize, write, and represent numbers from 0 – 20.	CC K.CC.3	
4. Read aloud and locate numerals from 0 to 31 (e.g. on a calendar or number line).	CC K.1.B,G	
5. Order numerals from 1 to 10.	S K.1.D	
6. Order objects or events using ordinal numbers or words (first through tenth).	S 1.1.D	
Understand the relationship between number and quantity.		
1. When counting objects, say the number names in the standard order, counting with one to one correspondence.	CC K.CC.4a	
2. Understand that the last number named tells the number of objects counted.	CC K.CC.4b	
3. Understand that each successive number name refers to a quantity that is one larger.	CC K.CC.4c, S K.1.D	
4. Count as many as 20 items arranged in a line, a rectangular array, or a circle.	CC K.CC.5 S K.1.E	
5. Count as many as 10 items in a scattered configuration.	CC K.CC.5 S K.1.E	
6. Given a number from 1-20, count out that many objects.	CC K.CC.5 S K.1.E	
7. Understand that the number of objects is the same regardless of their arrangement or the order in which they were counted (Conservation of number).	S K.1.E	
Compare numbers.		
1. Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group (e.g. by using matching and counting strategies).	CC K.CC.6 S K.1.F	
2. Compare two written numbers between 1 and 20.	CC K.CC.7	
3. Use <, >, = to order numbers or groups of objects.		
Operations, Algebraic Thinking, and Patterns,		
Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.		
1. Identify, copy, extend, describe, and create simple repetitive patterns.	S K.2.A	
2. Represent a pattern when given a rule (ABAB, ABB).		
3. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g. claps), acting out situations, verbal explanations, expressions, or equations (using +, -, =).	CC K.OA.1 CC K.2.C, S K.2.D	
4. Solve addition and subtraction word problems, add and subtract within 10 (e.g. by using objects or drawing to represent the problem).	CC K.OA.2 S K.2.C, S K.2.D	
5. Decompose numbers less than or equal to 10 into pairs in more	CC K.OA. 3	

than one way by using objects or drawing, and record each decomposition by a drawing or equation (e.g. 5=2 +3 and 5= 4+ 1).	S K.2.C	
6. For any number from 1 to 9, find the number that makes 10 when added to the given number (e.g. by using objects or drawings, and record the answer with a drawing or equation).	CC K.OA. 4 S K.1.H	
7. Fluently compose and decompose numbers 1- 5.	CC K.OA. 5 S K.1. C, H	
Number and Operations in Base Ten (Place Value)		
1. Compose and decompose (put together and take apart) numbers from 11 to 19 into tens and some additional ones by using objects or drawings and record each composition or decomposition by a drawing or equations (e.g. 18 = 10 + 8).	CC K.NBT	
Measurement and Data		
1. Compare and describe attributes of an object or objects.	CC K.MD.1&2	
2. Classify objects into given categories (sort).	CC K.MD.3	
3. Record data from sorted groups (e.g. graphs).		
4. Collect, organize and represent data on graphs to answer questions about everyday situations using symbolic graphs (e.g. pictographs, bar graphs, tally marks, line graph, pie graph, table and chart).		
5. Interpret data.		
6. Identify and name values of pennies, nickels, dimes, and quarters.		
7. Make direct comparisons using measurable attributes such as length, weight or capacity.	S K. 4.A	
8. Measure objects using standard and nonstandard units.		
9. Tell time to the hour using digital and analog clocks.	CC 1.M.D.3	
10. Use a calendar to identify day, date, month and year.		
Geometry		
Identify and describe shapes.		
1. Identify, name and describe circles, triangles, rectangles, squares, and their 3-D components.	CC K.G.3,4 S K.3.A	
2. Describe the relative positions of geometric shapes using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.	CC K.G.1	
3. Identify the attributes of shapes as two-dimensional (lying in a plane, "flat") or three dimensional.	CC K.G.3	
4. Use concrete and pictorial models to identify ½,⅓, ¼.	CC 1.G.3	
5. Recognize parts of a whole and whether those parts are equal or not equal.		
Analyze, compare, create, and compose shapes.		

1. Describe and represent objects in the environment using names of shapes (regardless of orientation or size).	S K.3.C CC K.G.1,5	
2. Compose larger shapes from simple shapes.	CC K.G.6	

GRADE 1

GRADE 1

Mathematical Practices

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6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Complete description of practices found on p.5-8*

Domains: Operations and Algebraic Reasoning, Number and Operations Base Ten, Measurement and Data, Geometry

Summary Statement: In Grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

Standards & Expectations	**Common Core & State Standards**	**SLE**
1. Solve problems and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information • Identify what's missing • Identify, select, and apply possible strategies and tools • Analyze, evaluate, and explain if a solution is reasonable and answers the question	S K.5.A	
2. Understand and use mathematical vocabulary appropriately.		
Operations, and Algebraic Thinking		
1. Use addition and subtraction from 1 to 20 to solve a variety of word problems.	CC 1.OA.1	
2. Solve and create addition and subtraction equations using =, -, +.	S 1.2.H	
3. Add 2 or more one-digit numbers using commutative and associative properties of addition, and zero identity. • 3+5+5=3+10- associativity allows us to add the last two	CC 1.OA.1 S 1.2.E	

addends first. • (5+3) +5= 5+(5+3) = (5+5) +3=13 – commutativity and associativity allow us to reorder addends. • 4+0= 4		
4. Demonstrate the inverse relationship between addition and subtraction (fact families).	CC 1.OA.1 S 1.2.D	
5. Represent and compute addition facts and subtraction facts for sums to 20 using a variety of strategies. (e.g. counting on; making ten; decomposing a number leading to a ten; using the relationship between addition and subtraction; and creating equivalent but easier or known sums).	CC 1.0A.6 S 1.2 A,E, F,	
6. Use the = sign and the word "equals" to indicate that two expressions are equivalent.	S 1.2.B	
7. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers (8 + ? = 11, 5 = _?-3,).	CC 1.OA.8	
8. Fluently compose and decompose numbers 1-10.	CC 1.0 A6 S 1.2.G	
9. Demonstrate addition and subtraction using words, pictures, and numbers.		
10. Recognize, extend, and create number patterns.	S 1.2.I	
Number and Operations in Base Ten (Place Value)		
Comprehend Number		
1. Count (backward and forward) to 120, starting at any number less than 120. In this range, read, write and represent a number of objects with a written numeral.	CC NBT. 1, S 1.1.A, B, E	
2. Read aloud numerals from 0 to 1,000.	S 1.1.C	
3. Order objects or events using ordinal numbers (first through 31st).	S 1.1.D	
4. Classify a number as odd or even and demonstrate that it is odd or even.	S-1.1.I	
Understand Place Value		
1. Understand that the two digits of a two-digit number represent amounts of tens and ones (e.g. 10 can be a bundle of ten ones, 19 is a ten and nine ones).	CC 1.NBT.2	
2. Compare several two-digit numbers based on value of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	CC 1.NBT.3	
3. Add within 100, using models, drawings, and strategies based on place value (understanding that in adding two-digit numbers, ones and ones and tens and tens are added; and sometimes it is necessary to compose a ten).	CC 1.NBT.4 S 1.2.A	
4. Given a two-digit number, mentally find 10 more or 10 less than	CC 1.NBT.5	

the number, without having to count; explain the reasoning used.		
5. Subtract multiples of 10 in the range 10-90 using concrete models or drawings and strategies based on place value.	CC 1.NBT.6	
6. Group and count objects by tens, fives, and twos.	S 1.1.H	
Measurement and Data		
1. Order objects by length.	CC 1.MD.1	
2. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps	CC 1.MD.2 S 1.4.A-D	
3. Measure objects using standard and nonstandard units.	S 1.2.3	
4. Tell and write time in hours and half-hours using analog and digital clocks.	CC 1.MD.3 S 1.2.3	
5. Define relative units of time (seconds, minutes, hours).	S 1.2.3	
6. Name the days of the week and the months of the year, and use a calendar to determine a day or month.	S.1.4.F	
7. Collect, organize, represent, and answer questions about data using real, pictorial, and symbolic graphs (tallies, bar, pie).	CC 1.MD.4 S 1.5.A,B	
8. Identify coin and coin value (pennies, nickels, dimes, and quarters).	S 1.2.3	
9. Counts coin combinations to determine value (pennies, nickels, dimes).	S 1.2.3	
Geometry		
1. Distinguish between defining attributes (e.g. triangles are closed and three-sided) versus non-defining attributes (e.g. color, orientation, overall size); build and draw shapes that possess defining attributes.	CC 1.G.1 S 1.3.A	
2. Identify and describe two-dimensional and three-dimensional figures, including those in real-world contexts, regardless of size or orientation.	S 1.3.B	
3. Combine known shapes to create new shapes and divide known shapes into other shapes.	CC 1.G.2 S 1.3.C	
4. Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. • Understand for these examples that decomposing into more equal shares creates smaller shares.	CC 1.G.3	

GRADE 2

GRADE 2

Mathematical Practices

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

***Complete description of practices found on p.5-8*

Domains: Operations and Algebraic Thinking, Number and Operations Base Ten, Measurement and Data, Geometry

Summary Statement: In Grade 2, instructional time should focus on four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

Standards & Expectations	**Common Core & State Standards**	**SLE**
1. Solve problems and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present or missing • Identify, select, and apply strategies and tools • Analyze, evaluate, and explain if a solution is reasonable and answers the question	S K.5.A	
2. Understand and use mathematical vocabulary appropriately.		
Operations and Algebraic Thinking		
1. Use addition and subtraction within 100 to solve one- and two-step word problems with unknowns in all positions (x+20=80, 20=X+80, 60 +20=X).	CC 2.OA.1 S 2.2.B, G	

2. Fluently compose and decompose within 20 using mental strategies (e.g. counting on; making ten; decomposing a number leading to a ten; using the relationship between addition and subtraction; and creating equivalent but easier or known sums). 3. Know from memory all sums of two one-digit numbers (by end of grade 2).	CC 2.OA.2 S 2.2.A	
4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	CC 2.OA.4 S 2.4.C	
Number and Operations in Base Ten		
1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones (e.g. 706 equal 7 hundreds, 0 tens, and 6 ones).	CC 2.NBT.1 S 2.1.C	
2. Count forward and backward within 1000; skip-count by 2s, 5s, 10s, and 100s.	CC 2.NBT.2 S 2.1.A	
3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	CC 2.NBT.3 S 2.1.B, D	
4. Compare three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	CC 2.NBT.4 S 2.1.E, F	
5. Fluently compose and decompose within 100 using strategies based on place value, properties of operations (identity, commutative, associative, zero), and/or the relationship between addition and subtraction.	CC 2.NBT.5 S 2.2.C, D	
6. Add up to four two-digit numbers using strategies based on place value and properties of operations.	CC 2.NBT.6	
7. Compose and decompose within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	CC 2.NBT.7 S 2.2.C	
8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.	CC 2.NBT.8 S 2.2.D	
9. Explain addition and subtraction strategies using place value and the properties of operations.	CC 2.NBT.9 S 2.2.C	
10. Create and state a rule for generating and extending patterns.	S 2.2.F	
Measurement and Data		
1. Measure the length of an object using standard units by selecting and using appropriate tools (e.g. rulers, yardsticks, etc.).	CC 2.MD.1 S 2.3.C	

2. Estimate lengths using units of inches, feet, centimeters, and meters.	CC 2.MD.3 S 2.3.B	
3. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	CC 2.MD.4	
4. Measure and compare length using addition and subtraction.	CC 2.MD.5, 6 S 2.2.C	
5. Measure and compare weight of various objects.	S 3.5.C	
6. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	CC 2.MD.7 S 2.3.E	
7. Describe the relative length among minutes, hours, days, weeks, months, and years.	S 2.3.D	
8. Name each standard U.S. coin, write its value using the dollar and decimal sign and create combinations of given values.	S 2.2.H	
9. Solve problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately (e.g. If you have 2 dimes and 3 pennies, how many cents do you have?).	CC 2.MD.8 S 2.2H, I	
10. Collect, organize, represent, and answer questions about data using a variety of graph types.	CC 2.MD.9, 10 S 2.3.C, 2.4.B	
Geometry		
1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	CC 2.G.1	
2. Partition a rectangle into rows and columns of same-size squares to determine area using concept of repeated addition.	CC 2.G.2	
3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths.	CC 2.G.3	
4. Interpret a fraction as a number of equal parts of a whole or a set.	S 2.4.E	

GRADE 3

GRADE 3

Mathematical Practices

1. Make sense of problems and persevere in solving them.
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6. Attend to precision.
7. Look for and make use of structure.
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***Complete description of practices found on p.5-8*

Domains: Operations and Algebraic Thinking, Number and Operations Base Ten, Measurement and Data, Geometry

Summary Statement: In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes.

Standards & Expectations	**Common Core & State Standards**	**SLE**
1. Develop problem solving skills and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present and missing • Identify, select, and apply possible strategies • Analyze and evaluate if a solution is reasonable and answers the question	CC 3.MD.8 S 4.5 A-H	
2. Understand and use mathematical vocabulary appropriately		
Operations and Algebraic Thinking		
1. Determine whether two expressions are equal and use "=" to denote equality (e.g. 3+5=10-2).	SS 3.5A	
2. Represent and interpret multiplication as repeated addition, arrays, counting by multiples, and equal jumps on the number line, and connect each representation to the related equation.	CC 3.OA.1 S 3.2.A	

3. Represent and interpret division as equal sharing, repeated subtraction, equal jumps on the number line, and formation of equal groups of objects, and connect each representation to the related equation.	CC 3.OA.2 S 3.2.B	
4. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.	CC 3.OA.3 S 3.2.C	
5. Apply various strategies to determine the unknown whole number in a multiplication or division equation For example, determine the unknown number that makes the equation true in each of the equations $8 \times X = 48$, $5 = X \div 3$, $6 \times 6 = X$.	CC 3.OA.4	
6. Apply properties of operations to multiply and divide (e.g. If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.).	CC 3.OA.5 S 3.2.D	
7. Understand division as an unknown-factor problem (e.g. find $32 \div 8$ by finding the number that makes 32 when multiplied by 8).	CC 3.OA.6 S 3.2.C	
8. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g. knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	CC 3.OA.7 S 3.2.E	
9. Solve two-step word problems using the four operations. • Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	CC 3.OA.8 S 3.1.E S 3.2.F, H	
10. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations (e.g. observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends).	CC 3.OA.9	
Number and Operations in Base Ten		
1. Read, write, compare, order, and represent numbers to 10,000 using numbers, words, symbols, and expanded form.	S 3.1.A	
2. Use place value understanding to round whole numbers to the nearest 10, 100, or 1000.	CC 3.NBT.1 S 3.1.B	

3. Fluently compose and decompose within 1000 using strategies including estimation and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	CC 3.NBT.2 S 3.1.C, D	
4. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g. 9 × 80, 5 × 60) using place value and properties of operations.	CC 3.NBT.3	
Number and Operations – Fractions		
1. Understand a fraction 1/*b* as the quantity formed by 1 part when *a* whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by a parts of size 1/*b*.	CC 3.NF.1	
2. Understand a fraction as a number on the number line; represent fractions on a number line diagram. • Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line. • Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.	CC 3.NF.2 S 3.3.A, B	
3. Explain equivalence of fractions and compare fractions by reasoning about their size. • Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. • Recognize and generate simple equivalent fractions (e.g. 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent (e.g. by using a visual fraction model). • Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers (e.g. Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram). • Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	CC 3.NF.3 S 3.3.C,D	
4. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole (e.g. partition a shape into 4 parts with equal area, and describe the area of each part and ¼ of the area of the shape).	CC 3.G.	

Measurement and Data		
1. Tell and write time to the nearest minute and measure time intervals in minutes. • Solve word problems involving addition and subtraction of time intervals in minutes.	CC 3.MD.1	
2. Name each standard U.S. coin, write its value using the dollar and decimal sign and create combinations of given values.	S 2.2.H	
3. Solve problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately (e.g. If you have 2 dimes and 3 pennies, how many cents do you have?).	CC 2.MD.8 S 2.2H, I	
4. Measure and estimate volume (liquid and capacity) and masses of objects using standard units. • Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.	CC 3.MD.2 S 3.5.C, D	
5. Create and interpret a picture graph and a bar graph to represent a data set with several categories. • Solve one- and two-step "how many more" and "how manyless" problems using information presented in scaled bar graphs (e.g. draw a bar graph in which each square in the bar graph might represent 5 pets).	CC 3.MD.3 S 3.5.E	
6. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a graph (line plot, pictograph, frequency tables, and bar graphs) where the scale is marked off in appropriate units— whole numbers, halves, or quarters.	CC 3.MD.4 S 3.5.E	
7. Measure temperature in degrees Fahrenheit and degrees Celsius using a thermometer.	S 3.5.B	
Geometric measurement: understand concepts of area and relate area to multiplication and to addition.		
1. Recognize area as an attribute of plane figures and understand concepts of area measurement. • A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. • A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.	CC 3.MD.5	
2. Measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units).	CC 3.MD.6	

3. Relate area to the operations of multiplication and addition. • Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. • Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems. • Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	CC 3.MD.7 S 3.2.A, B	
Geometric measurement: recognize perimeters as an attribute of plane figures and distinguish between linear and area measures.		
4. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	CC 3.MD.8 S 3.4.D, E	
Reason with shapes and their attributes		
5. Understand that shapes in different categories (e.g. rhombuses, rectangles, and others) may share attributes (e.g. having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). • Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	CC 3.G S 3.4.C	
Geometry		
1. Identify and represent parallel, intersecting, and perpendicular lines and line segments.	S 3.4.A	
2. Identify and represent right angles.	S 3.4.B	
3. Identify attributes (corners, faces, vertices, and edges) to classify two and three dimensional figures.		

GRADE 4

GRADE 4

Mathematical Practices

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

***Complete description of practices found on p.5-8*

Domains: Number and Operations in Base Ten, Operations and Algebraic Thinking, Number and Operations: Fractions, Decimals, Mixed Numbers, Measurement, Data, and Geometry, Reasoning, Problem Solving and Communication

Summary Statement: Students generalize their understanding of place value to 1,000,000. They will gain understanding of the relative size of numbers in each place. Students will use place value understanding and properties of operations to perform multi-digit arithmetic.

Standards & Expectations	Common Core & State Standards	SLE
Number and Operations in Base Ten		
1. Recognize the place and value of an individual number through the millions.	CC 4 NBT	
2. Read and write multi-digit numbers using base-ten numerals (standard form), number names (word form), and expanded form.	CC 4 NBT 2	
3. Compare multi-digit numbers using less than, greater than, and equal to (<, >, =).	CC 4 NBT 2 CC 4.1 E	
4. Use place value understanding to round multi-digit whole numbers to appropriate place.	CC 4 NBT 3	
5. Fluently compose and decompose multi-digit whole numbers using an algorithm.	CC NBT 5	
6. Multiply whole numbers. • Recall with fluency multiplication facts to 12 • One-digit number by four digits • Two-digit numbers by two-digit numbers	CC NBT 5 4.1 A,C,F	
7. Mentally multiply by 10, 100, 1000.	S 4.1.D	
8. Divide a four digit by a one digit number with and without remainders.	CC NBT 6	
9. Estimate to determine if an answer is reasonable.	CC 4.1.H	

Summary Statement: Students will use the four operations with whole numbers to solve problems. They will gain familiarity with factors and multiples. Students will generate and analyze patterns.

Standards & Expectations	State Standards & Common Core	SLE
Operation and Algebraic Thinking		
1. Use the four operations to solve problems with whole numbers.	CC 4.0A	
2. Solve multi-step word problems with whole numbers using the four operations, including problems in which remainders must be interpreted. • Assess the reasonableness of answers using mental math computation and estimation strategies including rounding.	CC 4.0A3 S 4.1H,I,J	
3. Represent multi-step problems using an equation with a letter standing for the unknown quantity.	CC 4.0A.3	
4. Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors.	CC 4.0A4 S 4.1B	
5. Determine whether a given whole number in the range 1-100 is prime or composite.	CC 4.0A4	
6. Identify and extend a pattern of shapes, objects, and numbers with a single operation.	CC 4.0A5	

Summary Statement: Students develop understanding of fraction equivalence and operations with fractions. Students recognize the relationship between fractions and decimals.

Standards & Expectations	State Standards & Common Core	SLE
Number and Operations: Fractions, Decimals, Mixed Numbers		
1. Use concrete and pictorial models to represent fractions and to generate equivalent fractions.	CC 4.NF1 S 4.2D	
2. Given two fractions with unlike denominators rewrite the fractions with common denominators.	S 5.2 C	
3. Compare two fractions with different numerators and denominators using symbols <,>, = by creating common denominators.	CC 4.N2 S 4.2E,F	
4. Round fractions to the nearest whole number.	S 4.2H	
5. Simplify fractions using common factors.	S 4.2G	
6. Convert a mixed number to a fraction (improper fraction) and a fraction to a mixed number.	S 4.2C	
7. Add and subtract fractions and mixed numbers with like	CC 4.NF3a,c	

denominators.		
8. Solve word problems involving addition and subtraction of fractions and mixed numbers with like denominators.	CC 4.NFd S 4.2I	
9. Multiply fractions by whole numbers.	CC 4.NF4	
10. Solve word problems involving multiplication of a fraction by a whole number.	CC 4.NF4c	
11. Represent decimals through the hundredths with place value models, fraction equivalence, and a number line.	S 4.2A	
12. Read, write, compare, and order decimals through the hundredths.	S 4.2B	
13. Understand decimal notation for fractions, and compare decimal to fractions with denominators of 10 and 100.	CC 4.NF6	
14. Round decimals to the nearest whole number and tenths.	S 4.2H	
15. Compare two decimals to hundredths by reasoning about their size using symbols <,>, =.	CC 4.NF7	

Summary Statement: Students solve problems involving measurement. Students will draw, identify lines and angles, and classify shapes by properties of their lines and angles. They collect, represent, and interpret data. Students will determine the probability of an event.

Standards & Expectations	**State Standards & Common Core**	**SLE**
Measurement, Data, and Geometry		
1. Understand and use standard and metric units of measurement, converting from smaller to larger units and larger to smaller. (length, mass, volume, time)	CC 4.MD	
2. Use the four operations to solve word problems involving: • Distance • Intervals of time (elapsed time) • Volume • Masses of objects • Money	CC 4.2 S 4.4B,C	
3. Determine congruence of two-dimensional figures and transformations such as flips, turns, and slides.	S 4.3A	
4. Apply the formulas for area and perimeter to two-dimensional shapes.	CC 4.MD3 S 4.3c,d	
5. Demonstrate that rectangles with the same area can have different perimeters and that rectangles with the same perimeter can have different areas.	S 4.3E	
6. Solve single and multi-step word problems involving perimeter and area.	S 4.3F	
7. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint.	CC 4.MD5a	

8. Draw and identify lines and angles and classify shapes by the properties of their lines and angles (right, acute, obtuse).	CC 4.G	
9. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size.	CC 4.G2	
10. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Draw lines of symmetry for a two-dimensional figure.	CC 4.G3	
11. Represent and interpret data. • Line plot • Coordinate plane using ordered pairs • Bar and line graphs • Pie chart • Tallies • Pictograph	CC 4.MD S 4.4D,H	
12. Determine the median, mode, and range of a set of data and describe what each measure indicates about the data.	S 4.4E	
13. Determine simple probability using the terms certain, impossible, likely, or unlikely.	S 4.4FG	

Summary Statement: Students solve problems that extend their understanding of core mathematical concepts. These critical reasoning, problem-solving, and communication skills represent the kind of mathematical thinking that equips students to solve problems and to make decisions based on quantitative information.

Standards & Expectations	**State Standards & Common Core**	**SLE**
Reasoning, problem solving, and communication		
1. Develop problem solving skills and make generalizations about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present and missing • Identify, select, and apply possible strategies • Apply estimation strategies to predict results • Analyze and evaluate if a solution is reasonable and answers the question	S4.5A-H	

GRADE 5

GRADE 5

Mathematical Practices

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

***Complete description of practices found on p.5-8*

Domains: Number and Operations in Base Ten, Operations and Algebraic Thinking, Number and Operations: Fractions, Measurement and Data, Geometry, Reasoning, Problem Solving and Communication

Summary Statement: Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations

Standards & Expectations	State Standards & Common Core	SLE
Numbers and Operations in Base Ten		
1. Use knowledge of place value to explain patterns in the numbers of zeros of the product of 10.	CC 5. NBT 2	
2. Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.	CC 5. NBT 2	
3. Read, write (standard and expanded form), and compare decimals to the thousandths (>, <, =).	CC 5. NBT 3	
4. Use place value understanding to round decimals.	CC 5. NBT 4	
5. Quickly recall multiplication facts and the related division facts.	S. 4.1 A	
6. Perform operations (+,-, x, ÷) with multi-digit whole numbers with decimals to the hundredths using an algorithm.	CC 5. NBT 5 S 5.2 F	
7. Using divisibility rules, find quotients with up to four-digit dividends and two-digit divisors.	CC 5. NBT 6 S 5.1C	
8. Estimate sums, differences, products, and quotients of decimals to determine reasonableness of answers.	S 5.2G	
9. Solve single and multi-step word problems involving multi-digit division (four-digit dividends and two-digit divisors).	S 5.1 F	

Summary Statement: Students write and interpret numerical expressions and analyze patterns and relationships.

Standards & Expectations	State Standards & Common Core	SLE
Operations and Algebraic thinking		
1. Write algebraic expressions that represent simple situations and evaluate the expressions using substitution when variables are involved.	S 5.4C	
2. Understand order of operations using parentheses, brackets, or braces in numerical expression and evaluate expressions with these symbols.	CC 5.0A 1	
3. Analyze patterns and relationships by identifying and using given rules.	CC 5.0 A 3 S 5.4A	

Summary Statement: Students apply their understanding of fractions and fraction models to represent the addition, subtraction, and multiplication of fractions with like and unlike denominators.

Standards & Expectations	State Standards & Common Core	SLE
Number and Operations: Fractions		
1. Determine the greatest common factor and least common multiple of two or more whole numbers.	S 5.2 D	
2. Factor a number into its prime factorization.		
3. Given two fractions with unlike denominators rewrite the fractions with common denominators.	S 5.2C	
4. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions.	CC 5. NF 1 S 5.2 B	
5. Estimate sums and differences of fractions to determine reasonableness of answers.	S 5.2G	
6. Solve word problems involving addition and subtraction of fractions and mixed numbers.	CC 5. NF 2	
7. Multiply a fraction or whole number by a fraction.	CC 5NF 4	
8. Recognize that multiplying a given number by a fraction greater than 1 results in a product greater than the number, and that multiplying a number by a fraction less than 1 results in a product smaller than the number.	CC 5NF 5b	
9. Solve problems involving multiplication of fractions and mixed numbers.	CC 5NF 6	
10. Divide unit fractions by whole numbers and whole numbers by unit fractions.	CC 5NF 7	
11. Solve problems involving division of unit fractions by whole numbers.	CC 5NF 7c	

Summary Statement: Students will convert like measurement units within a given system and represent and interpret data. Students will understand concepts of volume and relate volume of multiplication and addition.

Standards & Expectations	State Standards & Common Core	SLE
Measurement and Data		
1. Convert among different-sized standard measurement units within a given measurement system.	CC 5 MD 1	
2. Use conversions of different-sized standard measurement units in solving multi-step problems.	CC 5 MD 1	
3. Find the area of a rectangle with fractional side lengths (A=l w).	CC 5 NF 4b S 5.3D	
4. Recognize volume as an attribute of a solid figure and understand concepts of volume measurement.	CC 5 NF 3	
5. Find the volume by applying the formula V= l w h and V= b h for rectangular prisms.	CC 5 NF 5b	
6. Represent and interpret data. • Line plot • Coordinate plane using ordered pairs • Bar and line graphs • Pie chart • Tallies	CC 5.G S 5.4D S 5.5C	
7. Determine the mean, median, mode, and range of a set of data and describe what each measure indicates about the data.	S 5.5B	
8. Use the four operations to solve problems involving: • Distance • Intervals of time (elapsed time) • Liquid volume • Masses of objects • Money	CC 4.2 S 5.3I	

Summary Statement: Students will classify two-dimensional figures based on properties and measurement.

Standards & Expectations	State Standards & Common Core	SLE
Geometry		
1. Classify two-dimensional figures into categories based on their properties.	CC 5G S 5.3A	
2. Use a protractor to measure and identify angles and triangles. (Isosceles, scalene, right, equilateral).	S 5.3B	

Summary Statement: Students solve problems that extend their understanding of core mathematical concepts. These critical reasoning, problem-solving, and communication skills represent the kind of mathematical thinking that equips students to solve problems and to make decisions based on quantitative information.

Standards & Expectations	State Standards & Common Core	SLE
Reasoning, problem solving, and communication		
1. Develop problem solving skills and make generalizations about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present and missing • Identify, select, and apply possible strategies • Apply estimation strategies to predict results • Analyze and evaluate if a solution is reasonable and answers the question	S 5.6A-J	

GRADE 6

GRADE 6

Mathematical Practices

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

***Complete description of practices found on p.5-8*

Summary Statement: Students will apply and extend previous understanding of multiplication and division to divide fractions. They fluently compute with multi-digit numbers and find common factors and multiples. Students apply understanding of numbers to the system of rational numbers (positive and negative integers).

Standards & Expectations	State Standards & Common Core	SLE
Number System		
1. Fluently divide multi-digit numbers using an algorithm.	CC 6NS 2 S 6.1 F	
2. Fluently add, subtract, multiply, and divide multi-digit decimals using an algorithm.	CC 6NS 3	
3. Multiply and divide fractions and explain the inverse relationship between multiplication and division with fractions.	S6.1 D	
4. Solve single and multi-step word problems involving operations with fractions and decimals and verify the solutions.	S 6.1 H	
5. Factor a number into its prime factorization.		
6. Determine the greatest common factor and least common multiple of two or more whole numbers.	CC 6.NS	
7. Compare and order fractions and decimals using symbols <,>, =.	S 6.1 A	
8. Understand that positive and negative numbers are used together to describe quantities or values (e.g. temperature, credit/debits, etc.).	CC 6.NS 5	
9. Compare and order positive and negative integers using number lines, list, and symbol (<,>, =).	S 6.5C	
10. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	CC 6NS 6b	
11. Understand the absolute value of a rational number as its distance	CC 6NS 7c	

from 0 on the number line.		

Summary Statement: Understand ratio concepts and ratio reasoning to solve problems.

Standards & Expectations	State Standards & Common Core	SLE
Ratios and Proportional Relationships		
1. Understand the concept of a ratio and use ratio language to describe a relationship between two quantities (e.g. "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak".	CC 6.RP	
2. Identify and write ratios as comparisons of part-to-part and part-to-whole relationships.	S6.3 A	
3. Represent percent visually and numerically, and convert between the fractional, decimal, and percent representations of a number (e.g. represent 75/100 as a percent using numbers, picture, circle graph, represent 40% as a fraction and as a decimal, write 13/16 as a decimal and percent).	S 6.3 C	
4. Use ratio and rate reasoning to solve problems. • Make tables of equivalent ratios relating quantities with measurements • Solve unit rate problems involving unit pricing and contend speed (e.g. "It took 7 hours to mow 4 lawns, at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?).	CC 6. RP 3ab S 6.3 D	

Summary Statement: Students understand the use of variables in mathematical expressions and ratios, through writing, using, and evaluating expressions. Students use properties of operation and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations.

Standards & Expectations	State Standards & Common Core	SLE
Expressions and Equations		
1. Write and evaluate numerical expressions involving whole-number exponents.	CC 6. EE 1	
2. Evaluate mathematical expressions when the value for each variable is given.	CC 6 EE 2c S 6.2 C	
3. Write, read, and evaluate expressions in which letters stand for numbers.	CC 6. EE 2 S 6.2 A	
4. Evaluate expressions using order of operations with parentheses, brackets, or braces.	CC 5.0A 1	

5. Apply the properties of operations to generate equivalent expressions (e.g. commutative, associative, distributive properties).	CC 6. EE 4 S 6.2 D	
6. Solve word problems using mathematical expressions and equations and verify solutions.	S. 6.2 F	
7. Understand solving an equation or inequality as a process of answering a question (e.g. Which values from a specified set, if any, make the equation or inequality true?)	CC 6.EE 5	
8. Represent and analyze quantitative relationships between dependent and independent variables (e.g. In a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d=65t to represent the relationship between distance and time.).	CC 6.EE 9	

Summary Statement: Students will solve mathematical problems involving area, surface area, and volume.

Standards & Expectations	**State Standards & Common Core**	**SLE**
Geometry		
1. Find the area of right triangles, special (irregular) quadrilaterals, and irregular polygons by composing into rectangles or decomposing into triangles and other shapes (e.g. composite figures).	CC 6.G 1 S 6.4 B	
2. Use a protractor to measure and identify angles and triangles (isosceles, scalene, right, and equilateral).	S 5.3B	
3. Given coordinates for the vertices, draw polygons in the coordinate plane.	CC 6.G 3	
4. Find the volume of a right rectangular prism with whole number and fractional edge length (V=l w h and V= b h).	CC 6G 2	
5. Determine the surface area of rectangular prisms.	S 6.4 E, F,G	
6. Describe and sort polyhedra by their attributes: parallel faces, types of faces, number of faces, edges, and vertices.	S 6.4 G	
7. Identify the ratio of the circumference to the diameter of a circle as the constant π and recognize 22/7 and 3.14 as common approximations of π.	S 6.3 E	
8. Determine the circumference and area of circles. (C= πd)	S. 6.4 A	
9. Apply formulas for solving problems involving area, surface area, and volume.	CC 6.G 1-4	

Summary Statement: Students will develop understanding statistical variability and summarize and describe distributions.

Standards & Expectations	State Standards & Common Core	SLE
Statistics and Probability		
1. Understand a statistical question requires data that has more than one answer (variability) (e.g. "How old am I" is not a statistical question, but "How old are the students in my school" is a statistical question because it shows variability in ages).	CC 6.SP 1	
2. Determine the experimental probability of a simple event using data collected in an experiment.	S 6.3 F	
3. Determine the theoretical probability of an event and its complement, and represent the probability as a fraction or decimal.	S 6.3. G	
4. Summarize and display numerical data in plots on a number line, including dot plots, histograms, stem and leaf plot, and box plot, etc.	CC 6 SP	
5. Identify and analyze trends in data.		
6. Solve problems by analyzing data collected to answer a statistical question which has distribution that can be described by its center (mean, median, mode), spread (range, variance, standard deviation), overall shape.	CC 6 SP 2	

Summary Statement: Students solve problems that extend their understanding of core mathematical concepts. These critical reasoning, problem-solving, and communication skills represent the kind of mathematical thinking that equips students to solve problems and to make decisions based on quantitative information.

Standards & Expectations	State Standards & Common Core	SLE
Reasoning, problem solving, and communication		
1. Develop problem solving skills and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present and missing • Identify, select, and apply possible strategies • Apply estimation strategies to predict results • Analyze and evaluate if a solution is reasonable and answers the question	S 6.6A-H	

GRADE 7 & 8
Course Options

Introduction to Pre-Algebra

(Grade 7- course option I)

Introduction to Pre-Algebra

Mathematical Practices

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

***Complete description of practices found on p.5-8*

Summary Statement: Students will solidify foundational skills for a successful transition into Pre-Algebra. A deeper understanding of number systems, ratio and proportional relationships, expression and equations, geometric relationships, and statistics and probabilities are critical focus area.

Standards & Expectations	Common Core & State Standards	SLE
Ratio and Proportional Relationships		
1. Analyze and solve single and multi-step proportional relationships and use them to solve real-world and mathematical problems. • Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units (e.g. if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour). • Recognize and represent proportional relationships between quantities using graphs, tables, and equations. • Decide whether two quantities are in a proportional relationship (e.g. slope of a line in a triangle). • Understand what a point (x, y) on a graph of a proportional relationship means. • Graph ordered pairs of rational numbers and determine the coordinates of a given point in the coordinate grid.	CC 7.RP S 7.2 B. E-H S 7.5 A	
Number Systems		
1. Identify and use rational and irrational numbers. • Know the relationship between real numbers and the number line and compare and order real numbers with and without the number line.	S 8.4 D	

• Apply and extend previous understandings of operations with fractions to add, subtract, multiply, divide and compare rational numbers. 2. 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. 3. Apply properties of operations as strategies to multiply and divide rational numbers. 4. Describe situations in which opposite quantities combine to make 0 (e.g. a hydrogen atom has 0 charge because its two constituents are oppositely charged). 5. 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. 6. Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between their differences, and apply this principle in real-world contexts. 7. Apply properties of operations as strategies to add and subtract rational numbers. 8. Write the prime factorization of whole numbers using exponents. 9. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 10. 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. 11. 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.	CC7.NS S 7.1.A,B S. 7.5 B S A 1.2 A	

12. Represent numbers in scientific notation and translate numbers written in scientific notation into standard form. 13. 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. 14. Solve real-world and mathematical problems involving the four operations with rational numbers. Computations with rational numbers extend the rules for manipulating fractions to complex fractions.		
Expression and Equations		
Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 1. 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 (e.g. If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation). 2. Use variables to represent quantities in a real-world or mathematical problem, and construct and write simple equations and inequalities to solve problems by reasoning about the quantities. • 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 (e.g. the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?).	CC 7EE S7.1.F S 8.4 A S A1.2 B	
Geometry		
Draw, construct, and describe geometrical figures and describe their relationships between them.	CC 7.G	

1. Solve problems involving scale drawings of geometric figures (triangles, rectangles, etc.), including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	S 7. 2 C, D S 7.3 C	
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 1. 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. 2. Determine the volume and surface area of rectangular and triangular prisms, cylinders and cones using the appropriate formulas.	CC 7.G S 7.3 A,B,D	
Statistics and Probability		
Investigate chance processes and develop, use, and evaluate probability models. 1. 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. 2. 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. • Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events (e.g. if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected). • Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process (e.g. find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?).	CC 7.SP	

3. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. • 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. • Represent sample spaces for compound events using methods such as organized lists, tables, circle graph, 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. • Design and use a simulation to generate frequencies for compound events (e.g. use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?). 4. Describe a data set using measures of center (median, mean, and mode) and variability (maximum, minimum, and range) and evaluate the suitability and limitations of using each measure of different situations.	S 7. 4 C	
Reasoning, problem solving, and communication		
1. Develop problem solving skills and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present and missing • Identify, select, and apply possible strategies • Apply estimation strategies to predict results • Analyze and evaluate if a solution is reasonable and answers the question	S 7.6A-H	

Pre-Algebra

(Grade 7-course option II
or
Grade 8- course option I)

Pre-Algebra

Mathematical Practices

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

***Complete description of practices found on p.5-8*

Summary Statement: Students will solidify foundational skills for a successful transition into Algebra. Students will understand and apply operations with rational numbers; formulate, reason and simplify/solve expressions and equations; grasp the concept of a function; use functions to describe quantitative relationships; analyze two and three-dimensional space and figures; and investigate and analyze data and probability models.

Standards & Expectations	**Common Core & State Standards**	**SLE**
Number System		
Identify rational and irrational numbers.	S 8.4 D	
Know that there are irrational numbers. 1. Know that numbers that are not rational are called irrational. • Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	CC 8.NS	
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 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. 2. Describe situations in which opposite quantities combine to make 0 (e.g. a hydrogen atom has 0 charge because its two constituents are oppositely charged).	CC 7.NS S 8.4 A,B	

3. 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. 4. 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. 5. Apply properties of operations as strategies to add and subtract rational numbers. 6. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 7. 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. 8. 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. 9. Apply properties of operations as strategies to multiply and divide rational numbers. 10. 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. 11. Represent numbers in scientific notation and translate numbers written in scientific notation into standard form. 12. Solve problems involving operations with numbers and scientific notation and verify solutions. 13. Solve real-world and mathematical problems involving the four operations with rational numbers.		

Expressions and Equations		
Analyze and solve linear equations 1. Solve linear equations in one variable. • Give examples of linear equations in one variable with one solution • Solve linear equations with integer coefficients. 2. Solve one and two step linear inequalities and graph the solution on the number line.	CC 8.EE S 8.1 A,B	
Use properties of operations to generate equivalent expressions. 3. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 4. 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 (e.g. $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05.").	CC 7.EE	
Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 5. 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 (e.g. If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation). 6. Use variables to represent quantities in a real-world or mathematical problem, and construct and write simple equations and inequalities to solve problems by reasoning about the quantities. • 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	CC 7.EE S 7.1.F S A 1.2 B	

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 (e.g. the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?). • 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 (e.g. As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make and describe the solutions).		
Functions		
Define, evaluate, and compare functions. 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. 2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions) (e.g. given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change).	CC 8.F S 8.1.G	
Geometry		
Understand congruence and similarity using physical models, transparencies, or geometry software. 1. Verify experimentally the properties of rotations, reflections, and translations: • Lines are taken to lines, and line segments to line segments of the same length. • Angles are taken to angles of the same measure. • Parallel lines are taken to parallel lines. 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. 3. Describe the effect of dilations, translations, rotations, and	CC 8.G S 8.2 A,B,C,D	

reflections on two-dimensional figures using coordinates. 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. 5. Identify and use the relationship pairs of angles such as complementary supplementary, adjacent, and vertical. 6. 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 (e.g. Arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so).		
Draw, construct, and describe geometrical figures and describe the relationships between them. 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. 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. 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.	CC 7.G S 7.2 C,D,E	
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 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. 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.	CC 7G	

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.		
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. 1. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	CC 8.G	
Ratios and Proportional Relationships		
Analyze proportional relationships and use them to solve real-world and mathematical problems. 1. Recognize and represent proportional relationships between quantities. • 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). • Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. • Represent proportional relationships by equations (e.g. if total cost *t* is proportional to the number *n* of items purchased at a constant price *p*, the relationship between the total cost and the number of items can be expressed as $t = p$). • 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. • Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways (e.g. Compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed). 2. Use proportional relationships to solve multistep ratio and percent problems (e.g. simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error).	CC 7.RP	
Statistics and Probability		
Use random sampling to draw inferences about a population.		

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. 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 (e.g. Estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be).	CC 7.SP S 8.3A-D	
Draw informal comparative inferences about two populations. 3. Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability (e.g. The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable). 4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations (e.g. Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book). 5. Describe how linear transformations affect the center and spread of univariate data (e.g. A company decides to double each of its employees' salaries. What happens to the mean and standard deviation of the salaries as result?).	CC 7.SP S A1.6 A,B	
Investigate chance processes and develop, use, and evaluate probability models. 6. Determine probabilities of stall exclusive dependent and independent events for small sample spaces. 7. 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	CC 7.SP S 8.3 F	

given the probability (e.g. When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times). 8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. • 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. • 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. • Design and use a simulation to generate frequencies for compound events (e.g. Use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?).		
Reasoning, problem solving, and communication		
1. Develop problem solving skills and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present and missing • Identify, select, and apply possible strategies • Apply estimation strategies to predict results • Analyze and evaluate if a solution is reasonable and answers the question	S 8.5 A-H	

Algebra I

(Grade 8- course option II)

Algebra I

Mathematical Practices

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

***Complete description of practices found on p.5-8*

Summary Statement: Students will solidify foundational pre-algebraic skills and understand and apply algebraic concepts to build a foundation for all higher math classes. Students will understand and use mathematical properties, algebraic expressions and functions, rational and irrational numbers, linear and quadratic equations/inequalities, graphing, and data analysis. These concepts will be used in solving real world situations.

Standards & Expectations	**Common Core & State Standards**	**SLE**
Number and Quantity		
Reason quantitatively and use units to solve problems. 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. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	CC N.RN	
4. Know that irrational numbers can be approximated by rational numbers. 5. 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) (e.g. By truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$	CC 8.NS Diocesan	

is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better Approximations. Simply irrational expressions and perform operations.		
Expressions and Equations		
Interpret the structure of expressions. 1. Interpret expressions that represent a quantity in terms of its context. • Interpret parts of an expression, such as terms, factors, and coefficients. • Interpret complicated expressions by viewing one or more of their parts as a single entity. 2. Use the structure of an expression to identify ways to rewrite it (e.g. see $x4 – y4$ *as* $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$).	CC A.SSE	
Perform arithmetic operations on polynomials. 3. 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. 4. Use algebraic properties to factor and combine like terms in polynomials.	CC A.APR S A1.2 E,F	
Write expressions in equivalent forms to solve problems. 5. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. • Factor a quadratic expression to reveal the zeros of the function it defines. • Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	CC A.SSE	
Understand the relationship between zeros and factors of Polynomials. 6. 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.	CC A.APR	
Create equations and inequalities that describe numbers or relationships.		

7. 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. 8. Create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. 9. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations (e.g. rearrange Ohm's law $V = IR$ to highlight resistance R). 10. 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. 11. 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 (e.g. As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least\ \$100. Write an inequality for the number of sales you need to make, and describe the solutions).	CC A-CED S A 1.2 B	
Understand solving equations as a process of reasoning and explain the reasoning. 12. Explain each step in solving a linear equation. Construct a viable argument to justify a solution method.	CC A.REI	
Represent and solve equations and inequalities graphically. 13. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane. 14. Graph the solutions to a linear inequality in two variables.	CC A.REI	
Solve equations and inequalities in one variable. 15. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. 16. Solve absolute value equation in one variable.	CC A.REI S A1.4 A	
Solve systems of equations. 17. Solve systems of linear equations by graphing, substitution and elimination.	CC A.REI S A1.1 C S A1.4 D	

Analyze and solve linear equations and pairs of simultaneous linear equations. 18. Write and solve linear equations in one variable. • 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). • Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. 19. Analyze and solve pairs of simultaneous linear equations. • 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. • Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. • Solve simple cases by inspection (e.g. $3x + 2y = 5$ *and* $3x +$ • $2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6. • Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.	CC 8.EE S A1.4 D	
20. Solve a quadratic equation in one variable by factoring, using square roots, completing the square, and applying the quadratic formula. 21. Solve quadratic equations in one variable. • 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.	CC A.REI S A1.5 C,D	

• 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.		
Work with radicals and integer exponents. 22. Know and apply the properties of integer exponents to generate equivalent numerical expressions using the law of exponents and the order of operations. 23. Quickly recall the square roots of the perfect squares from 1 through 225 and estimate square roots of other positive numbers. 24. 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. 25. 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 (e.g. estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger). 26. 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. 27. Calculate the distant between two points on a coordinate plane. (Distance Formula) 28. Use the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	S 8.4 C S A 1.2 C CC 8.EE S 8.2 E, F,G S 8.2 F,G	
Understand the connections between proportional relationships, lines, and linear equations. 29. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways (e.g. Compare a	CC 8.EE S 8.1 C	

distance-time graph to a distance-time equation to determine which of two moving objects has greater speed). 30. 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*.		

Functions		
Understand the concept of a function and use function notation. 1. Understand a function is a relationship between two quantities. 2. Understand and define 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 $y = f(x)$. 3. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. 4. 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 (e.g. the function $A = S^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points *(1,1), (2,4)* and *(3,9)*, which are not on a straight line 0.	CC F.IF S A1.3 A,C S 8.1 G CC 8.F	
Interpret functions that arise in applications in terms of the context. 5. Interpret key features of graphs and tables in terms of the quantities of a function. 6. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.	CC F-IF S A1.3 B	
Use functions to model relationships between quantities. 7. 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.	CC 8.F	

8. 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.	S 8.1.G S A1.4E	
9. Describe qualitatively the functional relationship between two quantities by analyzing a table/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.	CC-8.SP	
10. 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.	CC-8.SP	
11. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept (e.g. In a linear model for a biology experiment, interpret a slope of 1.5 *cm/hr* as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height		
Analyze functions using different representations 12. Graph functions expressed symbolically and show key features of the graph. • Write and graph an equation for a line given the slope and the y intercept, the slope and point on the line, or two points on the line, and translate between forms of linear equations. • Identify and interpret the slope of a linear function, including equations for parallel and perpendicular lines. • Graph linear equations using the slope and y intercept. • Graph linear and quadratic functions and show x and y intercepts, maximum, and minimum. • Graph square root and absolute value functions. • Graph polynomial and rational functions, identifying x and y intercepts. • Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	S A1.4 C S A 1.4.B A 1.5 A,B CC F.1F S 8.1D	
13. Write a function defined by an expression in different but		

equivalent forms to reveal and explain different properties of the function. • Use the process of factoring and completing the square in a quadratic function to show zeros.		
Construct and compare linear, quadratic, and exponential models and solve problems. 14. Distinguish between situations that can be modeled with linear functions and with exponential functions. • Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. • Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. • Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. 15. Construct linear and exponential functions, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). 16. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically.	CC F.LE	
Interpret expression for functions in terms of the situation they model. 1. Interpret the parameters in a linear or exponential function in terms of a context.	CC F.LE	
Reasoning, problem solving, and communication		
1. Develop problem solving skills and make generalization about the processes used and apply these generalizations to similar problems. • Determine the question to be answered • Identify the information present and missing • Identify, select, and apply possible strategies • Apply estimation strategies to predict results • Analyze and evaluate if a solution is reasonable and answers the question	S 8.5-H	