Lockport Educational Consortium

Grade Level Mathematics Goals

Kindergarten

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. More learning time in Kindergarten should be devoted to number than to other topics.

Examples of Major Within-Grade Dependencies

Students must begin work with number names and their related counts at or near the very start of the year to allow time for understanding and fluency to develop. Specific skills with how many and how many more through twenty should be easily handled by the end of the year. Note that joining and separating & how many more are needed models are an important part of this process Hence, work on concepts of addition and subtraction should begin early and continue throughout the year.

Counting and Cardinality

1	2	3	4	Student Outcome	DOM	STD
				CC.K.CC.1 **Know number names and the count sequence. Count to 100 by ones and by tens.**	CC	1
				CC.K.CC.2 Know number names and the count sequence. Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	CC	2
				CC.K.CC.3 Know number names and count sequence. Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 showing a count of no objects).	CC	3
				CC.K.CC.4 **Count to tell the number of objects. Understand the relationship between numbers and quantities; connect counting to cardinality.**	CC	4
				CC.K.CC.4a When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.	CC	4a
				CC.K.CC.4b **Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.**	CC	4b
				CC.K.CC.4c Understand that each successive number name refers to a quantity that is one larger.	CC	4c
				CC.K.CC.5 Count to tell the number of objects. Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.	CC	5

Counting and Cardinality Continued

1	2	3	4	Student Outcome	DOM	STD
				CC.K.CC.6 **Compare numbers. 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. (Include groups with up to ten objects.)**	CC	6
				CC.K.CC.7 Compare numbers. Compare two numbers between 1 and 10 presented as written numerals.	CC	7

Operations and Algebraic Thinking

1	2	3	4	Student Outcome	DOM	STD
				CC.K.OA.1 Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. Represent addition and subtraction with objects, fingers, mental images, drawings (drawings need not show details, but should show the mathematics in the problem), sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.	OA	1
				CC.K.OA.2 Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	OA	2
				CC.K.OA.3 Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).	OA	3
				CC.K.OA.4 Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. 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.	OA	4
				CC.K.OA.5 **Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. Fluently add and subtract within 5.**	OA	5

Numbers and Operations in Base 10

1	2	3	4	Student Outcome	DOM	STD
				CC.K.NBT.1 **Work with numbers 11-19 to gain foundations for place value. Compose and**	NBT	1

				decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.		

Measurements and Data

1	2	3	4	Student Outcome	DOM	STD
				CC.K.MD.1 **Describe and compare measurable attributes. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.**	MD	1
				CC.K.MD.2 Describe and compare measurable attributes. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.	MD	2
				CC.K.MD.3 Classify objects and count the number of objects in each category. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (Limit category counts to be less than or equal to 10.)	MD	3

Geometry (State Goal 9)

1	2	3	4	Student Outcome	DOM	STD
				CC.K.G.1 **Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.**	G	1
				CC.K.G.2 Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). Correctly name shapes regardless of their orientations or overall size.	G	2

1	2	3	4	Student Outcome	DOM	STD
				CC.K.G.3 Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").	G	3
				CC.K.G.4 **Analyze, compare, create, and compose shapes. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).**	G	4
				CC.K.G.5 Analyze, compare, create, and compose shapes. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	G	5
				CC.K.G.6 Analyze, compare, create, and compose shapes. Compose simple shapes to form larger shapes. For example, "can you join these two triangles with full sides touching to make a rectangle?"	G	6

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Grade Level Mathematics Goals

First Grade

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 measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

Examples of Key Advances from Kindergarten to Grade 1
Students (1) Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects which remain in a set after some are taken away. (2) Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

Examples of Major Within-Grade Dependencies
Students must begin work with multiplication and division at or near the very start of the year to allow time for understanding and fluency to develop. Note that area models for products are an important part of this process. Hence, work on concepts of area should likely begin at or near the start of the year as well.

Operations and Algebraic Thinking

1	2	3	4	Student Outcome	DOM	STD
				CC.1.OA.1 Represent and solve problems involving addition and subtraction within 20 to solve word problems involving adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with an unknown number to represent the problem.	OA	1
				CC.1.OA.2 Represent and solve problems involving addition and subtraction. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	OA	2

1	2	3	4	Student Outcome	DOM	STD
				CC.1.OA.3 Understand and apply properties of operations and the relationship between addition and subtraction. Apply properties of operations as strategies to add and subtract. Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.) (Students need not use formal terms for these properties.)	OA	3
				CC.1.OA.4 Understand and apply properties of operations and the relationship between addition and subtraction. Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.	OA	4
				CC.1.OA.5 Add and subtract within 20. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).	OA	5
				CC.1.OA.6 **Add and subtract within 20. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).**	OA	6
				CC.1.OA.7 Work with addition and subtraction equations. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.	OA	7
				CC.1.OA.8 Work with addition and subtraction equations. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = __ – 3, 6 + 6 = __.	OA	8

Number and Operations in Base 10

1	2	3	4	Student Outcome	DOM	STD
				CC.1.NBT.1 **Extend the counting sequence. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.**	NBT	1
				CC.1.NBT.2 **Understand place value. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:** **a. 10 can be thought of as a bundle of ten ones — called a "ten."** **b. The numbers from 11 - 19 are composed of a ten & one, two, three, four, five, six, seven, eight, or nine ones.** **c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (& 0 ones).**	NBT	2
				CC.1.NBT.3 Understand place value. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	NBT	3
				CC.1.NBT.4 **Use place value understanding and properties of operations to add and subtract. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens & tens, ones & ones; and sometimes it is necessary to compose a ten.**	NBT	4
				CC.1.NBT.5 Use place value understanding and properties of operations to add and subtract. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.	NBT	5
				CC.1.NBT.6 **Use place value understanding and properties of operations to add and subtract. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used**.	NBT	6

Measurement and Data

1	2	3	4	Student Outcome	DOM	STD
				CC.1.MD.1 **Measure lengths indirectly and by iterating length units. Order three objects by length; compare the lengths of two objects indirectly by using a third object.**	MD	1
				CC.1.MD.2 Measure lengths indirectly and by iterating length units. 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. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.	MD	2

Measurement and Data (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.1.MD.3 **Tell and write time. Tell and write time in hours and half-hours using analog and digital clocks.**	MD	3
				CC.1.MD.4 Represent and interpret data. Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. Represent in tallies and bar graphs.	MD	4

Geometry

1	2	3	4	Student Outcome	DOM	STD
				CC.1.G.1 Reason with shapes and their attributes. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); for a wide variety of shapes; build and draw shapes to possess defining attributes.	G	1
				CC.1.G.2 Reason with shapes and their attributes. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. (Students do not need to learn formal names such as “right rectangular prism.”)	G	2
				CC.1.G.3 Reason with shapes and their attributes. 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.	G	3

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Grade Level Mathematics Goals

Second Grade

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.

Examples of Key Advances from Grade 1 to Grade 2
Students in grade 1 worked on addition and subtraction concepts, skills, and problem solving and developed fluency in addition within 10. Beside this, they also developed considerable understanding of the appropriateness of addition or subtraction for modeling a problem involving joining, how-many more, take away, and other physical operations.

Students in grade 1 also developed considerable skill in identifying basic shapes and counting their sides and corners.

Examples of Major Within-Grade Dependencies
Students must begin work with addition and subtraction at or near the very start of the year to allow time for understanding and fluency to develop. Note that all different models for subtraction should receive emphasis as part of this process. Work on concepts of place value and regrouping should precede using the symbolic processes in addition and subtraction problems.

Operations and Algebraic Thinking

1	2	3	4	Student Outcome	DOM	STD
				CC.2.OA.1 **Represent and solve problems involving addition and subtraction. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem**.	OA	1
				CC.2.OA.2 **Add and subtract within 20. Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.**	OA	2
				CC.2.OA.3 Work with equal groups of objects to gain foundations for multiplication. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	OA	3
				CC.2.OA.4 **Work with equal groups of objects to gain foundations for multiplication. 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.**	OA	4

Number and Operations in Base 10

1	2	3	4	Student Outcome	DOM	STD
				CC.2.NBT.1 Understand place value. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: -- a. 100 can be thought of as a bundle of ten tens — called a "hundred." -- b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	NBT	1
				CC.2.NBT.2 Understand place value. Count within 1000; skip-count by 5s, 10s, and 100s.	NBT	2
				CC.2.NBT.3 Understand place value. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	NBT	3
				CC.2.NBT.4 Understand place value. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	NBT	4
				CC.2.NBT.5 Use place value understanding and properties of operations to add and subtract. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	NBT	5
				CC.2.NBT.6 Use place value understanding and properties of operations to add and subtract. Add up to four two-digit numbers using strategies based on place value and properties of operations.	NBT	6
				CC.2.NBT.7 **Use place value understanding and properties of operations to add and subtract. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.**	NBT	7
				CC.2.NBT.8 Use place value understanding and properties of operations to add and subtract. Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.	NBT	8
				CC.2.NBT.9 **Use place value understanding and properties of operations to add and subtract. Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)**	NBT	9

Measurement and Data

1	2	3	4	Student Outcome	DOM	STD
				CC.2.MD.1 Measure and estimate lengths in standard units. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	MD	1
1	2	3	4	Student Outcome	DOM	STD
				CC.2.MD.2 Measure and estimate lengths in standard units. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two	MD	2

				measurements relate to the size of the unit chosen.		
				CC.2.MD.3 Measure and estimate lengths in standard units. Estimate lengths using units of inches, feet, centimeters, and meters.	MD	3
				CC.2.MD.4 Measure & estimate lengths in standard units. Measure to determine how much longer one object is than another, express the difference in terms of a standard length unit.	MD	4
				CC.2.MD.5 **Relate addition and subtraction to length. Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.**	MD	5
				CC.2.MD.6 Relate addition and subtraction to length. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, … , and represent whole-number sums and differences within 100 on a number line diagram.	MD	6
				CC.2.MD.**7 Work with time, money, and temperature. Tell and write time from analog and digital clocks to the nearest five minutes, use a.m./p.m. Tell temperature from thermometer.**	MD	7
				CC.2.MD.8 **Work with time and money. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ (dollars) and ¢ (cents) symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have? Make change within 50¢.**	MD	8
				CC.2.MD.9 Represent and interpret data. Generate measurement data by measuring lengths of several objects to the nearest whole unit. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	MD	9
				CC.2.MD.10 Represent and interpret data. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve put-together, take-apart, and compare problems using information presented in a bar graph.	MD	10

Geometry (State Goal 9)

1	2	3	4	Student Outcome	DOM	STD
				CC.2.G.1 Reason with shapes and their attributes. 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. (Sizes are compared directly or visually, not compared by measuring.)	G	1
				CC.2.G.2 Reason with shapes and their attributes. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	G	2
				CC.2.G.3 **Reason with shapes and their attributes. 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. Recognize that equal shares of identical wholes need not have the same shape.**	G	3

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Grade Level Mathematics Goals

Third Grade

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.

Examples of Key Advances from Grade 2 to Grade 3
Students in grades K–2 worked on addition and subtraction concepts, skills, and problem solving. Beginning in grade 3, students will learn concepts, skills, and problem solving for multiplication and division. This work will continue in grades 3, 4, and 5, preparing the way for work with ratios and proportional relationships in grades 6 and 7. Students in grade 3 also begin to enlarge their concept of number by developing an understanding of fractions as numbers. This work will continue in grades 3–6, preparing for work with the rational number system in 6 and 7.

Examples of Major Within-Grade Dependencies
Students must begin work with multiplication and division at or near the very start of the year to allow time for understanding and fluency to develop. Note that area models for products are an important part of this process. Hence, work on concepts of area should likely begin at or near the start of the year as well.

Operations and Algebraic Thinking

1	2	3	4	Student Outcome	DOM	STD
				CC.3.OA.1 **Represent and solve problems involving multiplication and division. Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.**	OA	1
				CC.3.OA.2 **Represent and solve problems involving multiplication and division. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.**	OA	2
				CC.3.OA.3 Represent and solve problems involving multiplication and division. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	OA	3
				CC.3.OA.4 Represent and solve problems involving multiplication and division. Determine the unknown whole number in a multiplication or division equation relating 3 whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = __ ÷ 3, 6 × 6 = ?.	OA	4

Operations and Algebraic Thinking (Continued)

1	2	3	4	Student Outcome	DOM	STD
	■			CC.3.OA.5 Understand properties of multiplication and the relationship between multiplication and division. Apply properties of operations as strategies to multiply and divide. Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15 then 15 × 2 = 30, or by 5 × 2 = 10 then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) (Students need not use formal terms for these properties.)	OA	5
	■	■		CC.3.OA.6 Understand properties of multiplication and the relationship between multiplication and division. Understand division as an unknown-factor problem. For example, divide 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.	OA	6
			■	CC.3.OA.7 **Multiply and divide within 100. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of one-digit numbers.**	OA	7
			■	CC.3.OA.8 Solve problems involving the four operations, and identify and explain patterns in arithmetic. 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. (This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).)	OA	8
			■	CC.3.OA.9 **Solve problems involving the four operations, and identify and explain patterns in arithmetic. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.**	OA	9

Number and Operations in Base 10

1	2	3	4	Student Outcome	DOM	STD
■				CC.3.NBT.1 **Use place value understanding and properties of operations to perform multi-digit arithmetic. Use place value understanding to round whole numbers to the nearest 10 or 100.**	NBT	1
■				CC.3.NBT.2 **Use place value understanding and properties of operations to perform multi-digit arithmetic. Fluently add and subtract within 1000 using strategies and algorithms based on place value, operation properties, and/or the relationship between addition and subtraction. (A range of algorithms may be used.)**	NBT	2

1	2	3	4	Student Outcome	DOM	STD
				CC.3.NBT.3 Use place value understanding and properties of operations to perform multi-digit arithmetic. Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. (A range of algorithms may be used.)	NBT	3

Number and Operations-Fractions

1	2	3	4	Student Outcome	DOM	STD
				CC.3.NF.1 **Develop understanding of fractions as numbers. 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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)**	NF	1
				CC.3.NF.2 Develop understanding of fractions as numbers. Understand a fraction as a number on the number line; represent fractions on a number line diagram. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)	NF	2
				CC.3.NF.2a 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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)	NF	2a
				CC.3.NF.2b 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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)	NF	2b
				CC.3.NF.3 Develop understanding of fractions as numbers. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)	NF	3
				CC.3.NF.3a Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)	NF	3a
				CC.3.NF.3b **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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)**	NF	3b
				CC.3.NF.3c Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: 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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)	NF	3c

1	2	3	4	Student Outcome	DOM	STD
				CC.3.NF.3d **Compare two fractions with the same numerator or the same denominator, by reasoning about their size, Recognize that valid comparisons rely on the two fractions referring 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. (Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.)**	NF	3d

Measurement and Data

1	2	3	4	Student Outcome	DOM	STD
				CC.3.MD.1 **Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. Tell and write time to the nearest minute & measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.**	MD	1
				CC.3.MD.2 Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (Excludes compound units such as cm^3 and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Excludes multiplicative comparison problems (problems involving notions of "times as much.")	MD	2
				CC.3.MD.3 **Represent and interpret data. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.**	MD	3
				CC.3.MD.4 **Represent and interpret data. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.**	MD	4
				CC.3.MD.5 Geometric measurement: understand concepts of area and relate area to multiplication and to addition. Recognize area as an attribute of plane figures and understand concepts of area measurement. a. 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. b. 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.	MD	5

1	2	3	4	Student Outcome	DOM	STD
				CC.3.MD.6 **Geometric measurement: understand concepts of area and relate area to multiplication and to addition. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).**	MD	6
				CC.3.MD.7 Geometric measurement: understand concepts of area and relate area to multiplication and to addition. Relate area to the operations of multiplication and addition.	MD	7
				CC.3.MD.7a 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.	MD	7a
				CC.3.MD.7b Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.	MD	7b
				CC.3.MD.7c Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.	MD	7c
				CC.3.MD.7d 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.	MD	7d
				CC.3.MD.8 Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. 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 area or with the same area and different perimeter.	MD	8

Geometry

1	2	3	4	Student Outcome	DOM	STD
				CC.3.G.1 **Reason with shapes and their attributes. 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**.	G	1
				CC.3.G.2 **Reason with shapes and their attributes. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part is 1/4 of the area of the shape.**	G	2

Lockport Educational Consortium

Grade Level Mathematics Goals

Fourth Grade

In Grade 4, instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

Examples of Key Advances from Grade 3 to Grade 4
In grade 3, students studied multiplication in terms of equal groups, arrays, and area. In grade 4, students extend their concept of multiplication to make multiplicative comparisons. Students in grade 4 apply and extend their understanding of the meanings and properties of addition and subtraction to extend addition and subtraction to fractions. Fraction equivalence is an important theme within the standards that begins in grade 3. In grade 4, students extend their understanding of fraction equivalence to the general case, $a/b = (n \times a)/(n \times b)$.They apply this understanding to compare fractions in the general case.

Students in grade 4 apply and extend their understanding of the meanings and properties of multiplication to multiply a fraction by a whole number. Students in grade 4 begin using the four operations to solve word problems involving continuous measurement quantities such as liquid volume, mass, and time. Students combine their understanding of the meanings and properties of multiplication and division with their understanding of base-ten units to begin to multiply and divide multidigit numbers, this builds on work done in grade 3. Students generalize their previous understanding of place value for multidigit whole numbers. This supports their work in multidigit multiplication and division, carrying forward into grade 5, when students will extend place value to decimals.

Examples of Major Within-Grade Dependencies
Students' work with decimals depends to some extent on concepts of fraction equivalence and elements of fraction arithmetic. Standards refer to using the four operations to solve word problems involving continuous measurement quantities such as liquid volume, mass, time, and so on. Some parts of this standard could be met earlier in the year (such as using whole-number multiplication to express measurements given in a larger unit in terms of a smaller unit), while others might be met only by the end of the year (such as word problems involving addition and subtraction of fractions or multiplication of a fraction by a whole number).

Standard MD-7 refers to word problems involving unknown angle measures. Before this standard can be met, students must understand concepts of angle measure and, presumably, gain some experience measuring angles. Before that can happen, students must have some familiarity with the geometric terms that are used to define angles as geometric shapes.

Operations and Algebraic Thinking

1	2	3	4	Student Outcome	DOM	STD
				CC.4.OA.1 Use the four operations with whole numbers to solve problems. Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	OA	1
				CC.4.OA.2 Use the four operations with whole numbers to solve problems. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.	OA	2
				CC.4.OA.3 **Use the four operations with whole numbers to solve problems. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.**	OA	3
				CC.4.OA.4 Gain familiarity with factors and multiples. 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. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number & which numbers in the range 1-100 are prime or composite.	OA	4
				CC.4.OA.5 Generate and analyze patterns. Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.	OA	5

Number and Operations in Base 10

1	2	3	4	Student Outcome	DOM	STD
				CC.4.NBT.1 Generalize place value understanding for multi-digit whole numbers. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.)	NBT	1
				CC.4.NBT.2 **Generalize place value understanding for multi-digit whole numbers. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.)**	NBT	2
				CC.4.NBT.3 **Generalize place value understanding for multi-digit whole numbers. Use place value understanding to round multi-digit whole numbers to any place. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.)**	NBT	3
				CC.4.NBT.4 **Use place value understanding and properties of operations to perform multi-digit arithmetic. Fluently add and subtract multi-digit whole numbers using the standard algorithm. (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000. A range of algorithms may be used.)**	NBT	4
				CC.4.NBT.5 Use place value understanding and properties of operations to perform multi-digit arithmetic. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000. A range of algorithms may be used.)	NBT	5
				CC.4.NBT.6 **Use place value understanding and properties of operations to illustrate, explain, & perform multi-digit arithmetic. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.**	NBT	6

Number and Operations-Fractions

1	2	3	4	Student Outcome	DOM	STD
				CC.4.NF.1 **Extend understanding of fraction equivalence and ordering. Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)**	NF	1
				CC.4.NF.2 Extend understanding of fraction equivalence and ordering. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)	NF	2
				CC.4.NF.3 Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. Understand a fraction a/b with a > 1 as a sum of fractions 1/b. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)	NF	3
				CC.4.NF.3a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	NF	3a
				CC.4.NF.3b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.	NF	3b
				CC.4.NF.3c **Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction**.	NF	3c
				CC.4.NF.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	NF	3d

1	2	3	4	Student Outcome	DOM	STD
				CC.4.NF.4 Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)	NF	4
				CC.4.NF.4a Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).	NF	4a
				CC.4.NF.4b Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)	NF	4b
				CC.4.NF.4c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?	NF	4c
				CC.4.NF.5 **Understand decimal notation for fractions, and compare decimal fractions. Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100 and add 3/10 + 4/100 = 34/100. (Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.) (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)**	NF	5

Data and Probability (State Goal 10)

1	2	3	4	Student Outcome	DOM	STD
				CC.4.NF.6 Understand decimal notation for fractions, and compare decimal fractions. Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100 ; describe a length as 0.62 meters; locate 0.62 on a number line diagram. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)	NF	6
				CC.4.NF.7 **Understand decimal notation for fractions, and compare decimal fractions. Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. (Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.)**	NF	7

Measurement and Data

1	2	3	4	Student Outcome	DOM	STD
				CC.4.MD.1 Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example: Know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Create a conversion table for feet and inches listing the number pairs (1, 12), (2, 24),…	MD	1
				CC.4.MD.2 Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving making change, simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	MD	2

1	2	3	4	Student Outcome	DOM	STD
				CC.4.MD.5 Geometric measurement: understand concepts of angle and measure angles. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: -- a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. -- b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	MD	5
				CC.4.MD.6 Geometric measurement: understand concepts of angle and measure angles. Measure angles in whole-number degrees using a protractor. Sketch angles of given measure.	MD	6
				CC.4.MD.7 Geometric measurement: understand concepts of angle and measure angles. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	MD	7

Geometry

1	2	3	4	Student Outcome	DOM	STD
				CC.4.G.1 **Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.**	G	1
				CC.4.G.2 **Draw and identify lines and angles, and classify shapes by properties of their lines and angles. 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. Recognize right triangles as a category, and identify right triangles.**	G	2
				CC.4.G.3 **Draw and identify lines and angles, and classify shapes by properties of their lines and angles. 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. Identify line-symmetric figures and draw lines of symmetry.**	G	3

Lockport Educational Consortium

Grade Level Mathematics Goals
Fifth Grade

In Grade 5, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

Examples of Key Advances from Grade 4 to Grade 5
In grade 5, students will integrate decimal fractions into the place value system. By thinking about decimals as sums of multiples of base-ten units, students begin to extend algorithms for multidigit operations to decimals. Students use their understanding of fraction equivalence and their skill in generating equivalent fractions as a strategy to add and subtract fractions, including fractions with unlike denominators. Students apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. They also learn the relationship between fractions and division, allowing them to divide any whole number by any nonzero whole number and express the answer in the form of a fraction or mixed number. And, they apply and extend previous understandings of multiplication and division to divide a unit fraction by a whole number or a whole number by a unit fraction. Students extend their grade 4 work in finding whole-number quotients and remainders to the case of two-digit divisors. Students continue their work in geometric measurement by working with volume as an attribute of solid figures and as a measurement quantity. Students build on their previous work with number lines to use two perpendicular number lines to define a coordinate system.

Examples of Major Within-Grade Dependencies
Understanding that in a multidigit number, a digit in one place represents 1/10 of what it represents in the place to its left is an example of multiplying a quantity by a fraction.

Operations and Algebraic Thinking

1	2	3	4	Student Outcome	DOM	STD
				CC.5.OA.1 Write and interpret numerical expressions. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	OA	1
				CC.5.OA.2 **Write and interpret numerical expressions. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.**	OA	2

1	2	3	4	Student Outcome	DOM	STD
				CC.5.OA.3 Analyze patterns and relationships. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.	OA	3

Numeration in Base 10

1	2	3	4	Student Outcome	DOM	STD
				CC.5.NBT.1 **Understand the place value system. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.**	NBT	1
				CC.5.NBT.2 Understand the place value system. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.	NBT	2
				CC.5.NBT.3 **Understand the place value system. Read, write, and compare decimals to thousandths.**	NBT	3
				CC.5.NBT.3a Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.	NBT	3a
				CC.5.NBT.3b Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	NBT	3b
				CC.5.NBT.4 Understand the place value system. Use place value understanding to round decimals to any place.	NBT	4
				CC.5.NBT.5 **Perform operations with multi-digit whole numbers and with decimals to hundredths. Fluently multiply multi-digit whole numbers using the standard algorithm.**	NBT	5

1	2	3	4	Student Outcome	DOM	STD
				CC.5.NBT.6 Perform operations with multi-digit whole numbers and with decimals to hundredths. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	NBT	6
				CC.5.NBT.7 **Perform operations with multi-digit whole numbers and with decimals to hundredths. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.**	NBT	7

Number and Operations-Fractions

1	2	3	4	Student Outcome	DOM	STD
				CC.5.NF.1 **Use equivalent fractions as a strategy to add and subtract fractions. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)**	NF	1
				CC.5.NF.2 Use equivalent fractions to add and subtract fractions. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, use visual fraction models/equations to represent the problem. Use benchmark fractions and fraction number to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7 by observing that 3/7 < 1/2.	NF	2

Number and Operations-Fractions (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.5.NF.3 **Extend previous understandings of multiplication and division to multiply and divide fractions. Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve problems involving division of whole numbers with answers in the form of fractions or mixed numbers, e.g., by using visual fraction models/equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, note that 3/4 multiplied by 4 equals 3 and that 3 wholes shared equally among 4 people, each person has a share of size 3/4. If 9 people want to share a 50-lb. sack of rice equally by weight, how many lbs. of rice should each get? Between what two whole numbers is your answer?**	NF	3
				CC.5.NF.4 Extend previous understandings of multiplication and division to multiply and divide fractions. Extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.	NF	4
				CC.5.NF.4a Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, the result of a sequence of operations $a \times q \div b$. For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)	NF	4a
				CC.5.NF.4b Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	NF	4b
				CC.5.NF.5 **Apply and extend previous understandings of multiplication and division to multiply and divide fractions. Interpret multiplication as scaling (resizing):** **a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.** **b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n×a) / (n×b) to the effect of multiplying a/b by 1.**	NF	5

Number and Operations-Fractions (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.5.NF.6 Apply and extend previous understandings of multiplication and division to multiply and divide fractions. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	NF	6
				CC.5.NF.7 Apply and extend previous understandings of multiplication and division to multiply and divide fractions. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.)	NF	7
				CC.5.NF.7a Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4 and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.	NF	7a
				CC.5.NF.7b Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 ÷ (1/5) and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.	NF	7b
				CC.5.NF.7c Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?	NF	7c

Measurement and Data

1	2	3	4	Student Outcome	DOM	STD
				CC.5.MD.1 **Convert like measurement units within a given measurement system. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions to solve multi-step problems.**	MD	1
				CC.5.MD.2 Represent and interpret data. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. Given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.	MD	2
				CC.5.MD.3 **Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. Recognize volume as an attribute of solid figures & understand concepts of volume measurement.** **a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.** **b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.**	MD	3
				CC.5.MD.4 Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	MD	4
				CC.5.MD.5 Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. Relate volume to the operations of multiplication & addition and solve real world/math problems involving volume.	MD	5
				CC.5.MD.5a **Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths or as height × area of the base.**	MD	5a
				CC.5.MD.5b Apply the formulas V =(l)(w)(h) and V = (b)(h) for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	MD	5b
				CC.5.MD.5c Find volumes of solid figures composed non-overlapping prisms by adding the volumes of the non-overlapping parts, solving real world problems.	MD	5c

Geometry

1	2	3	4	Student Outcome	DOM	STD
				CC.5.G.1 Graph points on the coordinate plane to solve real-world and mathematical problems. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand the roles of how far and what direction the first and second numbers tell (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	G	1
				CC.5.G.2 **Graph points on the coordinate plane to solve real-world and mathematical problems. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.**	G	2
				CC.5.G.3 Classify two-dimensional figures into categories based on their properties. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	G	3
				CC.5.G.4 Classify two-dimensional figures into categories based on their properties. Classify two-dimensional figures in a hierarchy based on properties.	G	4

Lockport Educational Consortium
Grade Level Mathematics Goals
Sixth Grade

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

Examples of Key Advances from Grade 5 to Grade 6
Students' prior understanding of and skill with multiplication, division, and fractions contribute to their study of ratios, proportional relationships, and unit rates.

Students begin using properties of operations systematically to work with variables, variable expressions, and equations.

Students begin working with the system of rational numbers, including using positive and negative numbers to describe quantities, extending the number line and coordinate plane to represent rational numbers and ordered pairs, and understanding ordering and absolute value of rational numbers.

Having worked with measurement data in previous grades, students begin to develop notions of statistical variability, summarizing and describing distributions.

Examples of Major Within-Grade Dependencies
Equations of the form $px = q$ .are unknown-factor problems; the solution is the quotient of a fraction by a fraction.

Solving problems by writing and solving equations involves not only an appreciation of how variables are used and what it means to solve an equation, but also some ability to write, read, and evaluate expressions in which letters stand for numbers.

Students must be able to place rational numbers on a number line before they can place ordered pairs of rational numbers on a coordinate plane. The former standard about ordering rational numbers is much more fundamental.

Ratios and Proportional Relationships

1	2	3	4	Student Outcome	DOM	STD
				CC.6.RP.1 **Understand ratio concepts and use ratio reasoning to solve problems. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "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." "For every vote candidate A received, candidate C received nearly three votes."**	RP	1
				CC.6.RP.2 Understand ratio concepts and use ratio reasoning to solve problems. Understand the concept of a unit rate a/b associated with a ratio a:b with b $\neq$ 0 (b not equal to zero), and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger." (Expectations for unit rates in this grade are limited to non-complex fractions.)	RP	2
				CC.6.RP.3 **Understand ratio concepts and use ratio reasoning to solve problems. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.**	RP	3
				CC.6.RP.3a Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	RP	3a
				CC.6.RP.3b Solve unit rate problems including those involving unit pricing and constant speed. For example, If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?	RP	3b
				CC.6.RP.3c Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole given a part and the percent.	RP	3c
				CC.6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	RP	3d

Number System

1	2	3	4	Student Outcome	DOM	STD
				CC.6.NS.1 **Apply and extend previous understandings of multiplication and division to divide fractions by fractions. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?**	NS	1
				CC.6.NS.2 Compute fluently with multi-digit numbers and find common factors and multiples. Fluently divide multi-digit numbers using the standard algorithm.	NS	2
				CC.6.NS.3 Compute fluently with multi-digit numbers and find common factors and multiples. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	NS	3
				CC.6.NS.4 Compute fluently with multi-digit numbers and find common factors and multiples. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with common factor as a multiple of a sum of two whole numbers with no common factor. E.g. express 36 + 8 as 4 (9 + 2).	NS	4
				CC.6.NS.5 **Apply and extend previous understandings of numbers to the system of integers. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, debits/credits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.**	NS	5
				CC.6.NS.6 Apply and extend previous understandings of numbers to the system of rational numbers. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	NS	6

Number System (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.6.NS.6a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.	NS	6a
				CC.6.NS.6b Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	NS	6b
				CC.6.NS.6c **Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.**	NS	6c
				CC.6.NS.7 Apply and extend previous understandings of numbers to the system of rational numbers. Understand ordering and absolute value of rational numbers.	NS	7
				CC.6.NS.7a Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.	NS	7a
				CC.6.NS.7b **Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.**	NS	7b
				CC.6.NS.7c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.	NS	7c
				CC.6.NS.7d Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.	NS	7d
				CC.6.NS.8 **Apply and extend previous understandings of numbers to the full system of positive and negative rational numbers. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.**	NS	8

Expressions and Equations

1	2	3	4	Student Outcome	DOM	STD
				CC.6.EE.1 Apply and extend previous understandings of	EE	1

				arithmetic to algebraic expressions. Write and evaluate numerical expressions involving whole-number exponents.		
				CC.6.EE.2 **Apply and extend previous understandings of arithmetic to algebraic expressions. Write, read, and evaluate expressions in which letters stand for numbers.**	EE	2
				CC.6.EE.2a Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y.	EE	2a
				CC.6.EE.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.	EE	2b
				CC.6.EE.2c **Evaluate expressions at specific values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s^3 and A = 6 s^2 to find the volume and surface area of a cube with sides of length s = 1/2.**	EE	2c
				CC.6.EE.3 Apply and extend previous understandings of arithmetic to algebraic expressions. Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.	EE	3
				CC.6.EE.4 **Apply and extend previous understandings of arithmetic to algebraic expressions. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.**	EE	4

Expressions and Equations (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.6.EE.5 Reason about and solve one-variable equations and inequalities. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	EE	5
				CC.6.EE.6 Reason about and solve one-variable equations and inequalities. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	EE	6
				CC.6.EE.7 **Reason about and solve one-variable equations and inequalities. Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.**	EE	7
				CC.6.EE.8 Reason about and solve one-variable equations and inequalities. Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	EE	8
				CC.6.EE.9 Represent and analyze quantitative relationships between dependent and independent variables. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.	EE	9

Geometry

1	2	3	4	Student Outcome	DOM	STD
				CC.6.G.1 **Solve real-world and mathematical problems involving area, surface area, and volume. Find area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.**	G	1
				CC.6.G.2 Solve real-world and mathematical problems involving area, surface area, and volume. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	G	2
				CC.6.G.3 Solve real-world and mathematical problems involving area, surface area, and volume. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	G	3
				CC.6.G.4 Solve real-world and mathematical problems involving area, surface area, and volume. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	G	4

Statistics and Probability

1	2	3	4	Student Outcome	DOM	STD
				CC.6.SP.1 Develop understanding of statistical variability. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.	SP	1

1	2	3	4	Student Outcome	DOM	STD
				CC.6.SP.2 **Develop understanding of statistical variability. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.**	SP	2
				CC.6.SP.3 Develop understanding of statistical variability. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	SP	3
				CC.6.SP.4 **Summarize and describe distributions. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.**	SP	4
				CC.6.SP.5 Summarize and describe distributions. Summarize numerical data sets in relation to their context, such as by: -- a. Reporting the number of observations. -- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. -- c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered. -- d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data was gathered.	SP	5

Lockport Educational Consortium

Grade Level Mathematics Goals

Seventh Grade

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

Examples of Key Advances from Grade 6 to Grade 7

In grade 6, students learned about rational numbers and the kinds of quantities they can be used to represent; they also learned about absolute value and ordering of rational numbers, including in real-world contexts. In grade 7, students will add, subtract, multiply, and divide within the system of rational numbers.

Students grow in their ability to analyze proportional relationships. They decide whether two quantities are in a proportional relationship; they work with percents; they analyze proportional relationships and solve problems involving unit rates associated with ratios of fractions (e.g., if a person walks ½ mile in each ¼ hour, the unit rate is the complex fraction ½ / ¼ miles per hour or 2 miles per hour); and they analyze proportional relationships in geometric figures. Students solve a variety of problems involving angle measure, area, surface area, and volume.

Examples of Major Within-Grade Dependencies

Meeting standard EE.3 in its entirety will involve using rational number arithmetic (NS.1–3) and percents (RP.3). Work leading to meeting this standard could be organized as a recurring activity that tracks the students' ongoing acquisition of new skills in rational number arithmetic and percents. Because rational number arithmetic (NS.1–3) underlies the problem solving detailed in EE.3 as well as the solution of linear expressions and equations (EE.1–2, 4), this work should likely begin at or near the start of the year.

The work leading to meeting standards EE.1–4 could be divided into two phases, one centered on addition and subtraction (e.g., solving $x + q = r$) in relation to rational number addition and subtraction (NS.1) and another centered on multiplication and division (e.g., solving $px + q = r$ and $p(x + q) = r$) in relation to rational number multiplication and division (NS.2).

Ratios and Proportional Relationships

1	2	3	4	Student Outcome	DOM	STD
				CC.7.RP.1 Analyze 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. For example, 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.	RP	1
				CC.7.RP.2 Analyze proportional relationships and use them to solve real-world and mathematical problems. Recognize and represent proportional relationships between quantities.	RP	2
				CC.7.RP.2a 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.	RP	2a
				CC.7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	RP	2b
				CC.7.RP.2c **Represent proportional relationships by equations. For example, 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 = pn*.**	RP	2c
				CC.7.RP.2d 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.	RP	2d
				CC.7.RP.3 **Analyze proportional relationships and use them to solve real-world and mathematical problems. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.**	RP	2d

Number System

1	2	3	4	Student Outcome	DOM	STD
				CC.7.NS.1 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 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.	NS	1

Number System (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.7.NS.1a Describe situations in which opposite quantities combine to make 0. For example, a gain of one yard followed by a loss of one yard in football.	NS	1a
				CC.7.NS.1b 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 in contexts.	NS	1b
				CC.7.NS.1c **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.**	NS	1c
				CC.7.NS.1d Apply properties of operations as strategies to add and subtract rational numbers.	NS	1d
				CC.7.NS.2 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	NS	2
				CC.7.NS.2a 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 rules for multiplying signed numbers. Interpret products of rational numbers by contexts.	NS	2a
				CC.7.NS.2b 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 in real-world contexts.	NS	2b
				CC.7.NS.2c Apply properties of operations as strategies to multiply and divide rational numbers.	NS	2c
				CC.7.NS.2d 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.	NS	2d
				CC.7.NS.3 **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide integers and rational numbers. Solve real-world and mathematical problems involving the four operations with the full set of rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)**	NS	3

Expressions and Equations

1	2	3	4	Student Outcome	DOM	STD
				CC.7.EE.1 Use properties of operations to generate equivalent expressions. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	EE	1
				CC.7.EE.2 Use properties of operations to generate equivalent expressions. 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. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."	EE	2
				CC.7.EE.3 **Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 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 as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: 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.**	EE	3
				CC.7.EE.4 Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 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.	EE	4
				CC.7.EE.4a 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. For example, The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?	EE	4a

Expressions and Equations (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.7.EE.4b **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. For example, 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 needed**.	EE	4b

Geometry

1	2	3	4	Student Outcome	DOM	STD
				CC.7.G.1 Draw, construct, and describe geometrical figures and describe the relationships between them. Solve problems involving scale drawings of geometric figures, by computing actual lengths and areas from a scale drawing and reproducing such a drawing at a different scale.	G	1
				CC.7.G.2 Draw, construct, and describe geometrical figures and describe the relationships between them. 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.	G	2
				CC.7.G.3 Draw, construct, and describe geometrical figures and describe the relationships between them. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	G	3
				CC.7.G.4 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. Know and use the formulas for the area and circumference of a circle to solve problems; informally derive the relation-ship between the circumference and area of a circle.	G	4
				CC.7.G.5 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 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.	G	5
				CC.7.G.6 **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 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.**	G	6

Statistics and Probability

1	2	3	4	Student Outcome	DOM	STD
				CC.7.SP.1 Use random sampling to draw inferences about	SP	1

				a population. 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.		
				CC.7.SP.2 **Use random sampling to draw inferences about a population. 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. For example, 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.**	SP	2
				CC.7.SP.3 **Draw informal comparative inferences about two populations. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, has twice the variability (mean absolute deviation) , on a dot plot, the separation is noticeable.**	SP	3
				CC.7.SP.4 Draw informal comparative inferences about two populations. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in grade four science book.	SP	4
				CC.7.SP.5 Investigate chance processes and develop, use, and evaluate probability models. 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.	SP	5

Statistics and Probability (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.7.SP.6 Investigate chance processes and develop, use, and evaluate probability models. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run	SP	6

				relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times.		
				CC.7.SP.7 Investigate chance processes and develop, use, and evaluate probability models. 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 sources of the discrepancy.	SP	7
				CC.7.SP.7a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, 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.	SP	7a
				CC.7.SP.7b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, 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?	SP	7b
				CC.7.SP.8 **Investigate chance processes and develop, use, and evaluate probability models. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation**.	SP	8
				CC.7.SP.8a 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 event occurs.	SP	8a
				CC.7.SP.8b **Represent sample spaces for compound events using 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.**	SP	8b
				CC.7.SP.8c Design and use a simulation to generate frequencies for compound events. For example, 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?	SP	8c

Lockport Educational Consortium
Grade Level Mathematics Goals
Eighth Grade/PreAlgebra

In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Examples of Key Advances from Grade 7 to PreAlgebra
Students build on previous work with proportional relationships, unit rates, and graphing to connect these ideas and understand that the points (x,y) on a nonvertical line are the solutions of the equation $y = mx + b$, where m is the slope of the line as well as the unit rate of a proportional relationship (in the case $b = 0$). Students also formalize their previous work with linear relationships by working with functions — rules that assign to each input exactly one output.

By working with equations such as $x^2 = 2$ and in geometric contexts such as the Pythagorean Theorem, students enlarge their concept of number beyond the system of rationals to include irrational numbers. They represent these numbers with radical expressions and approximate these numbers with rationals.

Examples of Major Within-Grade Dependencies
An important development takes place in grade 8 when students make connections between proportional relationships, lines, and linear equations (8.EE, second cluster). Making these connections depends on prior grades' work, including 7.RP.2 and 6.EE.9. There is also a major dependency within grade 8 itself: The angle-angle criterion for triangle similarity underlies the fact that a nonvertical line in the coordinate plane has equation $y = mx + b$. Therefore, students must do work with congruence and similarity (8.G.1–5) before they are able to justify the connections among proportional relationships, lines, and linear equations. Hence the indicated geometry work should likely begin at or near the very start of the year.

Much of the work of grade 8 involves lines, linear equations, and linear functions (8.EE.5–8; 8.F.3–4; 8.SP.2–3). Irrational numbers, radicals, the Pythagorean Theorem, and volume (8.NS.1–2; 8.EE.2; 8.G.6–9) are nonlinear in nature. Curriculum developers might choose to address linear and nonlinear bodies of content somewhat separately. An exception, however, might be that when addressing functions, pervasively treating linear functions as separate from nonlinear functions might obscure the concept of function *per se*. There should also be sufficient treatment of nonlinear functions to avoid giving students the misleading impression that all functional relationships are linear (see also 7.RP.2a).

Number System

1	2	3	4	Student Outcome	DOM	STD
				CC.8.NS.1.**Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0's or eventually repeat. Know that other numbers are call irrational.**	NS	1
				CC.8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.	NS	2

Expressions and Equations

1	2	3	4	Student Outcome	DOM	STD
				CC.8.EE.1 Work with radicals and integer exponents. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 3^2 × 3^(–5) = 3^(–3) = 1/(3^3) = 1/27.	EE	1
				CC.8.EE.2 **Work with radicals and integer exponents. 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 √2 is irrational.**	EE	2
				CC.8.EE.3 Work with radicals and integer exponents. Use numbers expressed in the form of a single digit times an integer power of 10 (scientific notation) to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger.	EE	3
				CC.8.EE.4 Work with radicals and integer exponents. 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.	EE	4

Expressions and Equations

1	2	3	4	Student Outcome	DOM	STD
				CC.8.EE.5 **Understand the connections between proportional relationships, lines, and linear equations. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.**	EE	5
				CC.8.EE.6 **Understand the connections between proportional relationships, lines, and linear equations. 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*.**	EE	6
				CC.8.EE.7 Analyze & solve linear equations and pairs of simultaneous linear equations. Solve linear equations in one variable.	EE	7
				CC.8.EE.7a 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).	EE	7a
				CC.8.EE.7b **Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.**	EE	7b
				CC.8.EE.8 Analyze and solve linear equations and pairs of simultaneous linear equations. Analyze and solve pairs of simultaneous linear equations.	EE	8
				CC.8.EE.8a **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**.	EE	8a
				CC.8.EE.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.	EE	8b
				CC.8.EE.8c 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.	EE	8c

Functions (Note: function notation is not required in Grade 8.)

1	2	3	4	Student Outcome	DOM	STD

				CC.8.F.1 **Define, evaluate, and compare functions. 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 corresponding inputs & outputs.**	F	1
				CC.8.F.2 Define, evaluate, and compare functions. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, 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.	F	2
				CC.8.F.3 Define, evaluate, and compare functions. 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. For example, 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.	F	3
				CC.8.F.4 **Use functions to model relationships between quantities. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a relational description or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and as its graph or a table of values.**	F	4
				CC.8.F.5 Use functions to model relationships between quantities. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	F	5

Geometry

1	2	3	4	Student Outcome	DOM	STD
				CC.8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software. Verify experimentally the properties of rotations, reflections, and translations: -- a. Lines are taken to lines, and line segments to line segments of the same length. -- b. Angles are taken to angles of the same measure. -- c. Parallel lines are taken to parallel lines.	G	1

Geometry (Continued)

1	2	3	4	Student Outcome	DOM	STD
				CC.8.G.2 Understand congruence and similarity using physical models, transparencies, or geometry software. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a	G	2

				sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.		
				CC.8.G.3 Understand congruence and similarity using physical models, transparencies, or geometry software. Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	G	3
				CC.8.G.4 **Understand congruence and similarity using physical models, transparencies, or geometry software. 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.**	G	4
				CC.8.G.5 Understand congruence and similarity using physical models, transparencies, or geometry software. 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. For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.	G	5
				CC.8.G.6 Understand and apply the Pythagorean Theorem. Explain a proof of the Pythagorean Theorem and its converse.	G	6
				CC.8.G.7 **Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.**	G	7
				CC.8.G.8 Understand and apply the Pythagorean Theorem. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	G	8
				CC.8.G.9 Solve real-world and mathematical problems involving volume of cylinders, cones and spheres. Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	G	9

Statistics and Probability

1	2	3	4	Student Outcome	DOM	STD
				CC.8.SP.1 Investigate patterns of association in bivariate data. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	SP	1
				CC.8.SP.2 **Investigate patterns of association in bivariate data. 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 or trend line, and informally assess the model fit by judging the closeness of the data points to the line.**	SP	2
				CC.8.SP.3 Investigate patterns of association in bivariate data. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, 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.	SP	3
				CC.8.SP.4 **Investigate patterns of association in bivariate data. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?**	SP	4