Mississippi College and Career Readiness Standards for Mathematics Scaffolding Document

Grade 4

GRADE 4

Operations and Algebraic Thinking (OA)

Use the four operations with whole numbers to solve problems

4.OA.1
Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to fluently multiply and divide within 100. • How to fluently recall basic multiplication facts. • The answer to a multiplication problem is called the product. • The two numbers that are being multiplied in a multiplication equation are called factors. • How to compare numbers in an additive sense (what amount would be added to a quantity in order to result in another). • How to explain patterns in arithmetic. • How to interpret products of whole numbers. • Interpretation means to communicate symbolically, numerically, abstractly, and/or with a model.	• A multiplicative comparison compares two quantities by showing that one quantity is a specific number "times less than" or "greater than" the other quantity. • Determine the factor by which to multiply one quantity in order to result in another. • The meaning of "times as many." • The difference in the situations in which you would multiply to find the unknown or divide to find the unknown. • Reasoning abstractly and quantitatively. • Modeling with mathematics.	• Use a tape diagram model to make and illustrate multiplicative comparisons. • Write an equation to represent a multiplicative comparison. • Identify unknown quantities in multiplicative comparison equations. • Use a symbol for an unknown number • Identify which number is being multiplied and which number tells "how many times as much."

GRADE 4

Operations and Algebraic Thinking (OA)

Use the four operations with whole numbers to solve problems

4.OA.2 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.[1]	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to fluently multiply and divide within 100. • How to fluently recall basic multiplication facts. • The answer to a multiplication problem is called the product. • The two numbers that are being multiplied in a multiplication equation are called factors. • The answer to a division problem is called the quotient. • The number being divided is called the dividend and the number being divided into the dividend is called the divisor. • How to compare numbers in an additive sense (what amount would be added to a quantity in order to result in another). • How to interpret products and quotients of whole numbers. • Interpretation means to communicate symbolically,	• An additive comparison is the difference between two quantities. • A multiplicative comparison compares two quantities by showing that one quantity is a specific number "times less than" or "greater than" the other quantity. • Determining the factor by which to multiply one quantity in order to result in another. • The meaning of "times as many." • The difference in the situations in which you would multiply to find the unknown or divide to find the unknown. • Reason abstractly and quantitatively. • Modeling with mathematics. • Looking for and making use of structure.	• Solve multiplication and division problems that involve the following comparison situations: unknown product, group size unknown, number of groups unknown. • Use a tape diagram model to make and illustrate multiplicative comparisons. • Write an equation to represent a multiplicative comparison using a symbol to represent the unknown. • Determine if a word problem is additive comparison or multiplicative comparison. • Identify differences among additive comparison and multiplicative comparison word problems.

	numerically, abstractly, and/or with a model.		

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Operations and Algebraic Thinking (OA)

Use the four operations with whole numbers to solve problems

	Desired Student Performance		
4.OA.3 Solve multistep (two or more operational steps) 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.	**A student should know** • A variable represents an unknown quantity. • How to write one-step equations using variables. • How to write two-step equations using addition and subtraction (easy to medium difficulty level). • How to explain the difference between an expression and an equation. • Equal sign means "is the same as." • How to add, subtract, divide, and multiply with multi-digit whole numbers. • How to define multiplication and division. • How to describe the inverse relationship between multiplication and division and addition and subtraction. • How to fluently multiply and divide within 100.	**A student should understand** • Use of parenthesis in an equation**.** • Reading an expression or equation that has more than one step. • Rounding whole numbers to find an estimate that can be used to assess the reasonableness of the answer. • Remainders can be interpreted as: o a leftover. o fractions or decimals. o discards, leaving only the whole number quotient. o increasing the whole number quotient by one. o rounding to the nearest whole number for an approximate result. • Substitute * or • for the "x" in a multiplication equation. • Making sense of problems	**A student should be able to do** • Identify the differences among addition, subtraction, multiplication, and division word problems. • Perform addition, subtraction, division, and multiplication with whole numbers. • Interpret remainders and how they affect the whole number answer in a division problem. • Write equations using variables to represent the unknown for multi-step word problems. • Evaluate the reasonableness of an answer by using estimation strategies or mental math strategies. • Write an equation consisting of multiple operations to reflect the situation(s) in a word problem. • Select a word problem that matches a specific equation.

	• How to fluently recall basic multiplication facts. • How to fluently add and subtract numbers up to 1,000.	and persevering in solving them. • Attending to precision. • Modeling with mathematics. • Reasoning abstractly and quantitatively.	• Solve addition and subtraction word problems that include the following situations: result unknown, total unknown, both addends unknown, change unknown, difference unknown, greater unknown, and lesser unknown (refer to table in Progressions document). • Solve multiplication and division word problems that include the following situations: equal groups, arrays of objects, and comparison (refer to table in Progressions Document).

GRADE 4

Operations and Algebraic Thinking (OA)

Gain familiarity with factors and multiples

4.OA.4
Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to fluently multiply and divide within 100. • Describe the inverse relationship between multiplication and division. • A factor is a number that is multiplied with another number to get a product. • A product is the answer to a multiplication problem when two factors are multiplied. • The words multiple and product are interchangeable. • Division can be used to find an unknown factor.	• Any whole number is a multiple of each of its factors. • A prime number only has two factors, one and itself. • A composite number has two or more factor pairs. • A factor pair is two factors that create a specific product. • A multiple is divisible by its factors. • Divisibility means that a multiple can be divided evenly by its factor with no remainder.	• List factors for a given whole number. • Classify numbers as prime or composite. • List multiples of a given single digit number. • Decide if a number is a multiple of a given one-digit number.

GRADE 4

Operations and Algebraic Thinking (OA)

Generate and analyze patterns

	Desired Student Performance		
4.OA.5 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.*	**A student should know** • A pattern is a set of numbers or objects which relate to each other according to a specific rule. • How to identify patterns in a multiplication table. • How to identify patterns in an addition table. • How to fluently add and subtract single digit numbers. • How to fluently multiply and divide within 100.	**A student should understand** • Patterns can grow or repeat. • Division can be used to help identify properties of repeating patterns when finding the "nth" figure in a pattern (*for example: find the 100th figure in the pattern circle, square, triangle, triangle–since there are four figures in the pattern before the pattern repeats, divide 100 by 4. This tells you that there will be 25 full repeats so the 100th figure would be the last shape in the pattern.)* • Reasoning abstractly and quantitatively. • Attending to precision. • Looking for and expressing regularity in repeated reasoning.	**A student should be able to do** • Construct shape patterns that express a given rule. • Construct number patterns that express a given rule. • Connect a rule for a given pattern with its sequence of numbers or shapes. • Extend a given pattern after determining the rule that the pattern follows. • Make generalizations about patterns that are not apparent within the given rule. • Determine the rule for a given pattern that can be used to find the "n^{th}" number or object in the pattern. • Look for and make use of structure.

GRADE 4

Number and Operations in Base Ten ^{2} (NBT)

Generalize place value understanding for multi-digit whole numbers

	Desired Student Performance		
4.NBT.1 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.*	**A student should know**	**A student should understand**	**A student should be able to do**
	• The place name and value of each digit in a number**.** • How to multiply one-digit whole numbers by multiples of 10 using strategies of place value and properties of operations (ex: skip-counting and decomposing)**.** • Ten like units make one unit of the next greater place (ten ones make one ten) • How to fluently multiply and divide within 100. • How to multiply single digits from memory. • How to decompose and compose numbers in the base-ten system. • When moving to the right across the places in a number, the digits represent lesser values and when moving to the left the places have a greater value.	• In the base-ten system, the value of each place is 10 times the value of the place to the immediate right**.** • The meaning of "times as many." • Multiplying and dividing by multiples of 10 creates a pattern. (ex: Multiplying by 10 creates a product where each digit has been shifted 1 place to the left and dividing by 10 creates a quotient where each digit has been shifted 1 place to the right). • Reasoning abstractly and quantitatively. • Attending to precision. • Looking for and making use of structure.	• Multiply and divide by multiples of 10**.** • Show understanding of the relationship between place values by decomposing equations. • Model place value relationships using base-ten blocks in the place value frame (ex: *10 x 50 represented as 5 tens each taken 10 times*). • Justify understandings by writing statements using "times as many**.**"

GRADE 4

Number and Operations in Base Ten [2] (NBT)

Generalize place value understanding for multi-digit whole numbers

4.NBT.2 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.	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to use standard form, number names, and expanded form to read and write numbers to 1000. • How to use place value to compare two three-digit numbers and use >, =, and < symbols to record the comparisons. • How to identify the values of the digits represented by the place in the base-ten system up to the thousands. • When moving to the right across the places in a number, the digits represent lesser values and when moving to the left, the places have a greater value. • Ten like units make one unit of the next greater place (each bundle of 10 makes 1 of the place to the left). • That to compare numbers you use the greatest place value.	• The role of the comma: 3-digit sequences of hundreds, tens, and ones are separated by commas and are followed by the appropriate period name (thousand, million, billion, etc.) • The values of the digits represented by the place in the base-ten system extended beyond the thousands up to one million. • Patterns when multiplying single digit numbers by 10; 100; 1,000; 10,000; 100,000; 1,000,000. • Place value to the one million place. • How to use place value to write numbers in expanded notation. • When comparing numbers, the number with the greatest place is the greatest number.	• Say multi-digit whole numbers (up to 1,000,000). • Write multi-digit whole numbers in expanded form (ex: 2,436 = 2,000 + 400 + 30 + 6 and 2,436 = (1,000 x 2) + (100 x 4) + (10 x 3) + (1 x 6). • Write the whole number that is being represented by expanded notation. • Write multi-digit whole numbers from place names of digits (ex: 2 thousands + 4 hundreds + 3 tens + 6 ones = 2,436). • Write whole numbers from word form to standard form and standard form to word form. • Compare two multi-digit numbers by using place value understanding. • Use symbols such as >, =, and < to record comparisons of two multi-digit numbers.

	• How to express numbers in expanded form, word form or number names, and number form.	• When comparing numbers that have digits in the same place, the number that has the greatest digit in the greatest place is the greatest number. • Looking for and making use to structure.	

GRADE 4

Number and Operations in Base Ten [2] (NBT)

Generalize place value understanding for multi-digit whole numbers

4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to round numbers to the nearest 10 and 100. • Rounding generates numbers that a number is closest to that has no ones; no tens or ones; no hundreds, tens or ones, etc. • How to identify the values of the digits represented by the place in the base-ten system up to thousands. • When moving to the right across the places in a number, the digits represent lesser values and when moving to the left the places have a greater value.	• In standard notation, a comma separates 3-digit sequences of hundreds, tens, and ones and is followed by the appropriate base period name (thousand, million, billion, etc.) • The values of the digits represented by a place in the base-ten system extended beyond the thousands up to one million. • Use a number line to round whole numbers. • Patterns are associated with rounding. • The digits in a place that would make a number round down or make the number round up and the patterns and reasoning associated with it.	• Round multi-digit whole numbers up to the millions place. • Use an open number line to show reasoning and understanding of rounding up to the millions place. • Identify the greatest and least number that rounds to a specified number. • Create numbers that would round to a specified number *(ex: List 2 numbers that would round to 100,000. 96,789 would round to 100,000 and 104,999 would round to 100,000)* and be able to explain the reasoning for your answer.

GRADE 4

Number and Operations in Base Ten [2] (NBT)

Use place value understanding and properties of operations to perform multi-digit arithmetic

	Desired Student Performance		
4.NBT.4 ***Fluently*** add and subtract (including subtracting across zeros) multi-digit whole numbers using the standard algorithm.	**A student should know**	**A student should understand**	**A student should be able to do**
	• The relationship between addition and subtraction is an inverse relationship. • How to fluently add and subtract numbers up to 10,000. • How to model addition and subtraction by using an open number line and base ten blocks. • How to use the properties of operations to add and subtract. • The values of the digits represented by a place in the base-ten system extend beyond the thousands up to one million. • When moving to the right across the places in a number, the digits represent lesser values and when	• Like base-ten units are to be added together or subtracted from each other. • Compose or decompose base-ten units as needed in order to add or subtract multi-digit whole numbers. • Digits that are in the same place should be lined up together when adding or subtracting. • The steps and understanding behind the standard algorithm for addition. • The standard algorithm for addition is a step-wise process that relies on base-ten place value. • The standard algorithm for subtraction is a step-wise process that relies on base-ten place value.	• Add numbers up to 1,000,000 using the standard algorithm for addition. • Subtract numbers up to 1,000,000 using the standard algorithm for subtraction. • Regroup in order to add or subtract. • Explain the steps of the addition standard algorithm and the subtraction standard algorithm.

	moving to the left the places have a greater value. • Ten like units make one unit of the next greater place (each bundle of 10 makes 1 of the place to the left).	• Looking for and making use of structure. • Looking for and expressing regularity in repeated reasoning. • Reasoning abstractly and quantitatively.	

GRADE 4

Number and Operations in Base Ten [2] (NBT)

Use place value understanding and properties of operations to perform multi-digit arithmetic

4.NBT.5
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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Multiplication is repeated addition. • How to fluently multiply and divide within 100. • How to multiply single digits from memory. • The answer to a multiplication problem is called the product. • The two numbers that are being multiplied in a multiplication equation are called factors. • Multiplying single digit numbers by 10; 100; 1,000; 10,000; 100,000; and 1,000,000 creates a pattern. • There is an inverse relationship between multiplication and division. • How to compose and decompose numbers based on place value. • How to use and draw a rectangular array.	• The properties of multiplication. • Use of the distributive property to find the product of up to a four-digit by one-digit or of a two-digit by two-digit number. • Use and draw an area model for multiplication. • Recognize the patterns that occur when multiplying multiples of 10 by other multiples of 10 (ex: 30 x 20, 3 x 2 equals 6, and you use the zero from each factor in the product). • Modeling with mathematics. • Looking for and making use of structure. • Constructing viable arguments and critiquing the reasoning of others. • Reasoning abstractly and quantitatively.	• Model multiplication by using base-ten blocks, area model, and rectangular arrays. • Find the product of up to a four-digit by a one-digit number. • Explain how to find the product of up to a four-digit number by a one-digit number and a two—digit number by a two—digit number. • Find the product of a two-digit number by two-digit number and explain the strategy that was used.

GRADE 4

Number and Operations in Base Ten [2] (NBT)

Use place value understanding and properties of operations to perform multi-digit arithmetic

4.NBT.6
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. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Desired Student Performance

A student should know	A student should understand	A student should be able to do

• Division is repeated subtraction.
• Division can be used for three purposes: equal sharing, measurement, and finding unknown factors.
• The answer to a division problem is called the quotient.
• The number being divided is called the dividend and the number being divided into the dividend is called the divisor.
• The relationship between division and multiplication is an inverse relationship.
• In the base-ten system, the value of the place to the immediate left of any place is 10 times the value of that place.
• How to name and identify the value of each place in the base-ten system up to millions.
	• Compose and decompose whole numbers based on place value.
	• Patterns are created when dividing multiples of 10 by single digit numbers that divide evenly (ex: 8,000 ÷ 4 = 2,000).
	• Remainders can be interpreted as:
	  o a leftover.
	  o fractions or decimals.
	  o discards, leaving only the whole number answer.
	  o increasing the whole number quotient by one.
	  o rounding to the nearest whole number for an approximate result.
	• Model with mathematics.
		• Decompose numbers based on place value to find the quotient of a greater number divided by a one-digit number.
		• Divide up to four-digit numbers that will result in whole numbers and remainders.
		• Interpret remainders and how they affect the quotient.
		• Model division by using the area model, rectangular arrays, and writing equations.
		• Write an explanation describing how the quotient was found.

		• Reason abstractly and quantitatively. • Looking for and making use of structure. • Constructing viable arguments and critiquing the reasoning of others.	

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Extend understanding of fraction equivalence and ordering

4.NF.1
Recognizing that the value of "n" cannot be 0, 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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to recognize fractions as equivalent based on size or location on a number line. • How to recognize and generate simple equivalent fractions and explain why the fractions are equivalent. • How to write whole numbers as fractions and identify fractions that are equivalent to whole numbers. • Equivalent fractions represent the same area, interval or amount. • Fractions should be seen and treated as regular numbers. • The denominator represents the number of parts that comprise the whole and the numerator represents the number of parts that are being identified.	• Two different fractions can be equivalent. • Equivalent fractions are based on the same whole. • Multiplying the numerator and the denominator by the same number, n, partitions each unit fraction piece into smaller equal pieces. • Dividing the numerator and denominator by the same number, n, groups the unit fractions together to make larger equal pieces. • Working with fractions with denominators of 2, 3, 4, 6, 8, 10, 12, and 100. • Modeling with mathematics.	• Plot, label, and identify fractions on a number line. • Use a variety of visual fraction models (tape diagram, number line diagram, or area model). • Write 1 and other whole numbers as a fraction. • Partition a whole into smaller parts to model a fraction that is equivalent to the fraction that is already being represented. • Create an equivalent fraction for a given fraction by partitioning a whole into smaller parts or by combining parts to make larger parts. • Use writing to justify why two fractions are or are not equivalent.

	• A fraction is created by combining a sufficient number of unit fractions. • Equal parts are made up of parts with equivalent measurements.		

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Extend understanding of fraction equivalence and ordering

4.NF.2
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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Fractions with the same denominator (based on the same whole) are made up of the same size unit fractions. • The sign > is the "greater than" sign, the sign < is the "less than" sign, and the sign = is the "equal to" sign. • When placing two fractions on a number line, the one to the left is lesser and the one to the right is greater. • How to generate equivalent fractions for ½ and 1. • Equivalent fractions represent the same area, interval, or amount. • Numbers 0, ½, and 1 are benchmark numbers. • Decompose means to break into parts.	• In order to compare fractions, the fractions must be referring to the same whole. • The greater the denominator, the less the value of the unit fraction. • When fractions have the same denominator, the fraction with the greatest numerator has the greatest value. • A fraction the with a numerator greater than the denominator has a value greater than 1. • Working with fractions with denominators of 2, 3, 4, 6, 8, 10, 12, and 100. • Modeling with mathematics.	• Make comparisons of fractions by using a variety of visual fraction models (tape diagram, number line diagram, or area model). • Create equivalent fractions by finding common denominators. • Decompose fractions with the same denominator to justify comparisons. • Draw a model to justify conclusions when comparing two fractions. • Evaluate the reasonableness of a conclusion based on the benchmark fractions of 0, ½, and 1.

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers

	Desired Student Performance		
4.NF.3a Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	**A student should know** • Fractions that have the same denominator are made up of different quantities of the same size unit fraction. • Addition means joining together and subtraction means separating. • Definitions of the words "sum" and "difference." • Decompose means to break into parts and compose means to put together. • Addition and subtraction are inverse operations. • How to write a whole number as a fraction. • How to represent a whole number as an equivalent fraction. • How to find quotients of whole numbers with and without remainders.	**A student should understand** • A fraction is a sum of its unit fractions. • When adding and subtracting fractions, the fractions must be referring to the same whole. • Joining the same size unit fractions creates a fraction of greater value. • Adding and subtracting fractions with denominators of 2, 3, 4, 6, 8, 10, 12, and 100. • A mixed number is a whole number plus a fraction less than 1. • Modeling with mathematics • Attending to precision.	**A student should be able to do** • Plot and label a fraction on a number line. • Decompose a fraction into its sufficient number of unit fractions. • Compose a fraction by combining unit fractions. • Add and subtract fractions with like denominators. • Convert a mixed number to a fraction by representing the whole number as an equivalent fraction and finding their sum. • Decompose a fraction into a sum of a whole number and a number less than 1 in order to convert to a mixed number.

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers

	Desired Student Performance		
4.NF.3b Understand a fraction a/b with a > 1 as a sum of fractions 1/b. *b.* 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 (including but not limited to: concrete models, illustrations, tape diagram, number line, area model, etc.). *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.*	**A student should know** • Decompose means to break apart. • How to represent one as a fraction in more than one way. • Definitions of the terms "sum" and "difference". • How to represent a whole number as a fraction.	**A student should understand** • Adding fractions with the same denominator. • Fraction a/b, where a is greater than 1, is the sum of a significant amount of unit fractions. • Decomposing a fraction in different ways. • The sum of the decomposed parts of a fraction is equal to that fraction. • Working with fractions with denominators of 2, 3, 4, 6, 8, 10, 12, and 100. • Attending to precision. • Looking for and making use of structure. • Looking for and expressing regularity in repeated reasoning.	**A student should be able to do** • Decompose a fraction into parts. • Write an equation that represents a specific fraction with its decomposed parts that equal that fraction. • Determine if the sum of a set of fractions equals a given fraction. • Use a variety of visual fraction models (tape diagram, number line diagram, or area model) to justify decompositions. • Model with mathematics

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers

4.NF.3c

Understand a fraction a/b with a > 1 as a sum of fractions 1/b.

c. 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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to create equivalent fractions. • How to write a whole number as a fraction. • A fraction a/b is made up of a sufficient number of unit fractions. • Addition means joining together and subtraction means taking away. • Subtraction and addition are inverse operations. • How to find quotients of whole numbers with and without remainders.	• A mixed number is a number that is made up of a whole number and a fraction that is less than 1. • A fraction with the numerator greater than the denominator has a value greater than 1. • Converting a mixed number to a fraction by representing the whole number as an equivalent fraction and finding their sum. • Decomposing a fraction into a sum of a whole number and a number less than 1 in order to convert to a mixed number. • Adding and subtracting fractions with like denominators of 2, 3, 4, 6, 8, 10, 12, and 100.	• Use a variety of visual fraction models (tape diagram, number line diagram, or area model). • Create an equivalent fraction for a mixed number (write it as an improper fraction) in order to add or subtract. • Represent the sum as a mixed number by joining a sufficient number of unit fractions together to make as many wholes as possible, and create the fraction by joining together the left over unit fractions. • Model with mathematics. • Reason abstractly and quantitatively. • Look for and make use of structure.

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers

	Desired Student Performance		
4.NF.3d Understand a fraction a/b with a > 1 as a sum of fractions 1/b. d. 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.	**A student should know** • Addition means joining together and subtraction means taking away. • Subtraction and addition are the inverse operations. • Fraction a/b is made up of a sufficient number of unit fractions. • How to create equivalent fractions. • How to write a whole number as a fraction. • A mixed number is a number that is made up of a whole number and a fraction that is less than 1.	**A student should understand** • Adding fractions with like denominators of 2, 3, 4, 6, 8, 10, and 12. • Writing an equation using fractions. • A fraction with a numerator greater than the denominator has a value greater than 1. • Converting a mixed number to a fraction by representing the whole number as an equivalent fraction and finding their sum. • Decomposing a fraction into a sum of a whole number and a number less than 1 in order to convert to a mixed number. • Attending to precision.	**A student should be able to do** • Use a variety of visual fraction models (tape diagram, number line diagram, or area model) to solve word problems. • Solve word problems that include the following situations: result unknown, total unknown, both addends unknown, change unknown, difference unknown, greater unknown, and lesser unknown. • Write an equation that represents a word problem. • Model with mathematics. • Make sense of problems and persevere in solving them. • Look for and make use of structure.

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers

	Desired Student Performance		
4.NF.4a Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. 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).*	**A student should know** • Definitions of the terms "multiplication" and "multiple". • How to fluently recall basic multiplication facts. • How to multiply whole numbers. • The denominator represents the number of parts that comprise the whole and the numerator represents the number of parts that are being identified. • Fraction a/b is made up of a sufficient number of unit fractions.	**A student should understand** • A fraction a/b is a multiple of the unit fraction 1/b. • When multiplying a whole number by a fraction, the whole number is only multiplied by the numerator. • Decomposing a fraction to show how many groups of the unit fraction it takes to represent that fraction. • A fraction with a numerator greater than the denominator has a value greater than 1. • Decomposing a mixed number to create a whole as a fraction plus the fraction**.** • When multiplying a fraction by a whole number, you are multiplying the number of unit fractions by the whole number. • Attending to precision. • Looking for and making use of structure.	**A student should be able to do** • Use a variety of visual fraction models (tape diagram, number line diagram, or area model) to multiply a fraction by a whole number. • Express a multiple of a/b as a multiple of 1/b. • Use multiplication to write an equation that represents how many groups of a unit fraction it takes to represent a fraction. • Represent the product as a mixed number by joining a sufficient number of unit fractions together to make as many wholes as possible, and join the remaining unit fractions together to create a fraction. • Model with mathematics.

		• Looking for and expressing regularity in repeated reasoning.	

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers

	Desired Student Performance		
4.NF.4b Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. b. 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.*	**A student should know** • Definitions of the terms "multiplication" and "multiple". • How to fluently recall basic multiplication facts. • How to multiply whole numbers. • The denominator represents the number of parts that comprise the whole and the numerator represents the number of parts that are being identified. • That a fraction a/b is made up of a sufficient number of unit fractions.	**A student should understand** • A fraction a/b is a multiple of the unit fraction 1/b. • When multiplying a whole number by a fraction, the whole number is only multiplied by the numerator. • Decomposing a fraction to show how many groups of the unit fraction it takes to represent that fraction. • A fraction with a numerator greater than the denominator has a value greater than 1. • Decomposing a mixed number to create a whole as a fraction plus the fraction. • Modeling with mathematics. • Looking for and making use of structure. • Looking for and expressing regularity in repeated reasoning.	**A student should be able to do** • Use a variety of visual fraction models (tape diagram, number line diagram, or area model) to multiply a fraction by a whole number. • Use multiplication to write an equation that represents how many groups of a unit fraction it takes to represent a fraction. • Express a multiple of a/b as a multiple of 1/b. • Represent the product as a mixed number by joining a sufficient number of unit fractions together to make as many wholes as possible, and join the remaining unit fractions together to make the fraction.

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers

4.NF.4c
Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

c. 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?*

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Definitions of the terms "multiplication" and "multiple". • How to fluently recall basic multiplication facts. • How to multiply whole numbers. • The denominator represents the number of parts that comprise the whole and the numerator represents the number of parts that are being identified. • A fraction a/b is made up of a sufficient number of unit fractions.	• A multiple of 1/b equals a/b. • A fraction a/b is a multiple of the unit fraction 1/b. • Decomposing a mixed number to create a whole as a fraction plus the fraction. • A fraction that has a numerator greater than the denominator has a value greater than 1. • When multiplying a whole number by a fraction, the whole number is only multiplied by the numerator. • Looking for and making use of structure. • Looking for and expressing regularity in repeated reasoning.	• Use a variety of visual fraction models (tape diagram, number line diagram, or area model) to multiply a fraction by a whole number. • Write an equation that represents the word problem. • Solve word problems which include situations where the product is unknown and situations that include a whole number of fractional quantities—not a fraction of a whole-number quantity. • Represent the product as a mixed number by joining a sufficient number of unit fractions together to make as many wholes as possible, and create the fraction by joining together the left over unit fractions. • Make sense of problems and persevere in solving them. • Model with mathematics.

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Understand decimal notation for fractions, and compare decimal fractions

	Desired Student Performance		
4.NF.5 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.[4] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*	**A student should know** • Equivalent fractions represent the same area, interval, or amount. • Fractions should be seen and treated as regular numbers. • The denominator represents the number of parts that comprise the whole and the numerator represents the number of parts that are being identified. • How to create equivalent fractions. • How to fluently recall basic multiplication facts.	**A student should understand** • Adding fractions with like denominators. • When adding fractions with like denominators, you only add the numerators. • Multiplying the numerator and denominator by the same number, n, partitions each unit fraction piece into smaller equal pieces. • Reasoning abstractly and quantitatively. • Looking for and making use of structure.	**A student should be able to do** • Use a variety of visual models (number line and base ten blocks) to represent a decimal. • Create an equivalent fraction with 100 as the denominator for a fraction that has a denominator of 10. • Add fractions with like denominators. • Write a fraction with a denominator of 10 or 100 as a decimal. • Model with mathematics.

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Understand decimal notation for fractions, and compare decimal fractions

4.NF.6
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.*

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• The place value chart does not just extend to the left of the ones place but also to the right. • The denominator represents the number of parts that comprise the whole and the numerator represents the number of parts that are being identified. • A fraction with a denominator of 10 represents "tenths" and a fraction with a denominator of 100 represents "hundredths". • When the numerator and denominator are equal, the fraction represents 1. • A fraction with numerator greater than the denominator has a value greater than 1.	• A decimal fraction is a fraction with 10 or 100 as the denominator. • A whole number contains an "understood" decimal point after it (to the right). • Decimals can be written as fractions. • The number of digits to the right of the decimal point indicates the number in the denominator of the fraction: 10, 100, 1000, etc. • The first place after the decimal point represents the "tenths" place and the second place represents the "hundredths" place. • Fractions with denominators equal to 10 and 100 can be written using a decimal point. • The value of the ones place is 10 times the value of the tenths place and the value of	• Write a decimal number as a fraction with a denominator of 10 or 100. • Write a fraction with a denominator of 10 or 100 as a decimal number. • Create an equivalent fraction with 100 in the denominator for a fraction with 10 in the denominator. • Locate and label a decimal number on a number line. • Look for and make use of structure.

		the tenths place is 10 times the value of the hundredths place. • Correctly pronounce a decimal number. • Attending to precision. • Looking for and expressing regularity in repeated reasoning.	

GRADE 4

Numbers and Operations – Fractions [3] (NF)

Understand decimal notation for fractions, and compare decimal fractions

4.NF.7
Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the 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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• The sign > is the "greater than" sign, the sign < is the "less than" sign, and the sign = is the "equal to" sign. • When placing two decimals on a number line, the one to the left has a lesser value and the one to the right has a greater value. • Decimals can be written as fractions. • A decimal represents part of a whole. • How to correctly pronounce a decimal number.	• The value of the ones place is 10 times the value of the tenths place and the value of the tenths place is 10 times the value of the hundredths place. • You can only compare decimals that refer to the same whole. • 0.1 is equivalent to 0.10, 0.2 is equivalent to 0.20, etc. • Modeling with mathematics. • Attending to precision. • Reasoning abstractly and quantitatively.	• Represent a decimal with a visual model (number line or base-ten blocks). • Make comparisons of decimals by using a variety of visual models (number line or base ten blocks). • Justify comparisons with a visual model.

GRADE 4

Measurement and Data (MD)

Solve problems using measurement and conversions of measurements from a larger unit to a smaller unit

	Desired Student Performance		
4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g, mg; 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. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),...*	**A student should know** • How to identify unit measurements related to length/distance, volume/capacity, and weight/mass. • Equivalent means "equal to." • How to tell and write time to the nearest minute. • How to measure time intervals in minutes. • How to directly or indirectly compare two units of measurement. • How to use and read a ruler.	**A student should understand** • Units belong to either the metric system or the U.S. customary system. • Units in the metric and U.S. customary systems are used to measure length, capacity, weight, and time. • The metric system is based on base ten place value. • Prefixes and their meanings are added to the basic unit in the metric system. • Multiplicatively comparing two different units in the same system. • Multiplication is used to convert greater units of measurement to lesser units of measurement in a single system.	**A student should be able to do** • Recognize and identify units of measurements used to measure length, capacity, weight, and time. • Relate the size of a unit to a benchmark or mental image. • Convert greater units of measurement to lesser units of measurement within a single system. • Create a two-column table of measurement equivalents. • Write an equation to represent a multiplication comparison of two different units. • Look for and make use of structure. • Look for and express regularity in repeated reasoning.

GRADE 4

Measurement and Data (MD)

Solve problems using measurement and conversions of measurements from a larger unit to a smaller unit

4.MD.2	**Desired Student Performance**		
Use the four operations to solve word problems involving • intervals of time • money • distances • liquid volumes • masses of objects including problems *involving 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.	**A student should know** • How to add, subtract, multiply, and divide whole numbers. • How to add and subtract fractions or mixed numbers with the denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100. • How to write a fraction with a denominator of 10 or 100 as a decimal and how to write a decimal as a fraction with 10 or 100 as the denominator. • How to identify unit measurements related to length/distance, volume/capacity, and weight/mass. • Equivalent means “equal to.” • How to tell and write time to the nearest minute. • How to measure time intervals in minutes. • How to directly or indirectly compare two units of measurement. • How to use and read a ruler.	**A student should understand** • (Grade level appropriate) Word problems will be situations that involve two whole number measurements or one whole number measurement and a non-whole number measurement. • Units belong to either the metric system or the U.S. customary system. • Units and their size in the metric and U.S. customary systems are used to measure length, capacity, weight, and time. • The metric system is based on base ten place value. • Prefixes and their meanings can be added to the basic unit in the metric system. • Multiplication is used to convert greater units of measurement to lesser units of measurement within a single system.	**A student should be able to do** • Convert larger units of measurement to smaller units of measurement within a single system. • Recognize and identify units of measurements used to measure length, capacity, weight, and time. • Relate the size of a unit to a benchmark or mental image. • Construct a number line diagram, marked in whole numbers and fractions or decimals, to represent a measurement scale. • Read a measurement scale. • Solve word problems related to measurement that include the following situations: result unknown, total unknown, both addends unknown, change unknown, difference unknown, greater unknown, lesser unknown, unknown product,

	• How to measure to the nearest cm or mm. • How to find area and perimeter in unit squares.	• Making sense of problems and persevere in solving them. • Reason abstractly and quantitatively. • Modeling with mathematics. • Attending to precision.	group size unknown, and number of groups unknown. • Determine how many times larger a specific unit is than another specific lesser unit. • Calculate area and perimeter using a given unit.

GRADE 4

Measurement and Data (MD)

Solve problems using measurement and conversions of measurements from a larger unit to a smaller unit

4.MD.3
Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to recall basic multiplication facts. • How to multiply whole numbers. • Area is the amount of two-dimensional space that is contained within a boundary. • Area is measured in square units. • How to find the area of quadrilaterals by tiling and by using the formula *A = l x w*. • How to find the area of figures that are decomposable into rectangles. • Perimeter is the boundary of a two-dimensional shape**.** • Perimeter is measured in units of length. • How to find the perimeter of figures by adding all side lengths together. • Opposite sides of a rectangle are equal.	• The multiplicative relationship between the number of square units in the row and the number of square units in the column in a rectangular figure. • The unknown length of a rectangular figure is the unknown factor of the product of the length and width. • By using the inverse operation of multiplication, division, you can find the missing length of one side of a rectangular figure when you know the area and one side of the rectangular figure. • All the possible lengths and widths of a rectangle can be found by dividing the perimeter in half and finding all of the numbers with a sum of this number. • Modeling with mathematics. • Using appropriate tools strategically.	• Find the area and perimeter of rectangular figures in real world situations. • Find the unknown length of a rectangular figure when one side length and the area of the rectangle are known **or** when one side length and the perimeter are known. • Find the length and width of a rectangle that has a specific perimeter **or** a specific area **or** a specific perimeter and area together. • Write a “situation equation” that can be used to find the missing length of a rectangle when the length of one side and area of the rectangle is known or the length of one side and perimeter of the rectangle is known. *(The Progression Document states that a “situation equation” refers to the idea that the*

		• Attending to precision. • Looking for and making use of structure.	*student constructs an equation as a representation of a situation rather than identifying the situation as an example of a familiar equation.)*

GRADE 4

Measurement and Data (MD)

Represent and Interpret Data

	Desired Student Performance		
4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*	**A student should know** • Data is not just a set of numbers, it is a set of numbers with a context. • How to read and write in fraction notation. • Fractions should be seen and treated as regular numbers. • That the denominator represents the number of parts that comprise the whole and the numerator represents the number of parts that are being identified. • Difference is the answer to a subtraction problem. • How to identify unit measurements related to length/distance, volume/capacity, and weight/mass.	**A student should understand** • When adding and subtracting fractions, the fractions must be referring to the same whole. • Adding and subtracting fractions with denominators of 2, 3, 4, 5,6, 8, 10, 12, and 100. • A line plot is a type of display that positions the data along the appropriate scale drawn as a number line diagram. • Reasoning abstractly and quantitatively. • Modeling with mathematics. • Using appropriate tools strategically. • Attending to precision. • Looking for and making use of structure.	**A student should be able to do** • Use a ruler to gather measurement data (halves, fourths, eighths) and construct a line plot using the data. • Construct a line plot from a given data set and mark off the appropriate units (denominators limited to 2, 4, and 8). • Analyze and read a line plot. • Add and subtract fractions and/or mixed numbers with like denominators to solve problems involving data on a line plot. • Compare fractions by reasoning about their size. • Use the data in the line plot to answer questions about the data.

GRADE 4

Measurement and Data (MD)

Geometric measurement: understand concepts of angle and measure angles

4.MD.5a
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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• A ray is a part of a line with one end point and extends without end in one direction. • An angle is formed wherever two rays have a common endpoint. This endpoint is called the vertex of the angle. • The size of an angle is the amount of rotation between two rays forming the angle. • A right angle has a measurement of 90°, an acute angle has a measurement of less than 90°, an obtuse angle has a measurement of more than 90° and less than 180°, a straight angle has a measurement of exactly 180°, and a reflex angle has a measurement of more than 180° and less than 360°. • A fraction represents a part of a whole.	• Degrees are the units used to measure angles. • Angles are measured within degrees of a circle. • Angles are a fraction of a circle. • A circle has 360°. • An angle is named using three points in which the middle point labels the vertex. • Using appropriate tools strategically. • Attending to precision. • Looking for and making use of structure.	• Identify an angle. • Identify benchmark angles (90°, 180°, 270°, 360°). • Recognize that angles are measured within degrees of a circle. • Write an angle's measurement as a fraction. • Explain that an angle measurement is a fraction of a circle. • Categorize angles based on their measurement (acute, obtuse, right, straight, reflex). • Construct examples of an angle with a specific measurement using a protractor. • Measure a given angle using a protractor.

GRADE 4

Measurement and Data (MD)

Geometric measurement: understand concepts of angle and measure angles

4.MD.5b
Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• A ray is a part of a line with one end point and extends without end in one direction. • An angle is formed wherever two rays have a common endpoint. • The size of an angle is the amount of rotation between the two rays that form the angle. • A right angle has a measurement of 90°, an acute angle has a measurement of less than 90°, an obtuse angle has a measurement of more than 90° and less than 180°, a straight angle has a measurement of exactly 180°, and a reflex angle has a measurement of more than 180° and less than 360°.	• Degrees are the units used to measure angles. • Angles are measured within degrees of a circle. • Angles are a fraction of a circle. • A circle has 360°. • A protractor is used to measure angles. • An angle is named using 3 points in which the middle point labels the vertex. • Using appropriate tools strategically. • Attending to precision. • Looking for and making use of structure.	• Identify an angle. • Recognize that angles are measured within degrees of a circle. • Recognize benchmark angles (90°, 180°, 270°, 360°). • Explain that an angle measurement is a fraction of a circle. • Categorize angles based on their measurement (acute, obtuse, right, straight, reflex). • Construct examples of an angle with a specific measurement using a protractor. • Measure a given angle using a protractor.

GRADE 4

Measurement and Data (MD)

Geometric measurement: understand concepts of angle and measure angles

4.MD.6
Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

Desired Student Performance

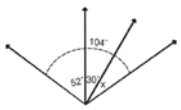
A student should know	A student should understand	A student should be able to do
• A ray is a part of a line with one end point and extends without end in one direction. • An angle is formed wherever two rays have a common endpoint. • The size of an angle is the amount of rotation between the two rays that form the angle. • A right angle has a measurement of 90°, an acute angle has a measurement of less than 90°, an obtuse angle has a measurement of more than 90° and less than 180°, a straight angle has a measurement of exactly 180°, and a reflex angle has a measurement of more than 180° and less than 360°.	• Degrees are the units used to measure angles. • Angles are measured within degrees of a circle. • Angles are a fraction of a circle. • A circle has 360°. • A protractor is used to measure angles. • An angle is named using 3 points in which the middle point labels the vertex. • Using appropriate tools strategically. • Attending to precision.	• Name and identify angles. • Identify benchmark angles (90°, 180°, 270°, 360°). • Categorize angles based on their measurement (acute, obtuse, right, straight, reflex). • Use a protractor to construct examples of an angle with a specific measurement. • Measure a given angle using a protractor.

GRADE 4

Measurement and Data (MD)

Geometric measurement: understand concepts of angle and measure angles

4.MD.7
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.
Example: Find the missing angle using an equation:



Desired Student Performance

A student should know	A student should understand	A student should be able to do
• An angle is formed wherever two rays have a common endpoint. • A ray is a part of a line with one end point and extends without end in one direction. • The size of an angle is the amount of rotation between the two rays that form the angle. • A right angle has a measurement of 90°, an acute angle has a measurement of less than 90°, an obtuse angle has a measurement of more than 90° and less than 180°, a straight angle has a measurement of exactly 180°, and a reflex angle has a measurement of more than 180° and less than 360°. • How to write an equation using a variable to represent the unknown.	• Degrees are the units used to measure angles. • Angles are measured within degrees of a circle. • Angles are a fraction of a circle. • A circle has 360°. • An angle is named using 3 points in which the middle point labels the vertex. • Two angles that have the same vertex and share a side are called adjacent angles. • Two angles are complimentary if their measurements have the sum of 90°. • Two angles are supplementary if their measurements have the sum of 180°. • Opposite angles created by intersecting lines have the same angle measurement. • Making sense of problems and persevering in solving them. • Modeling with mathematics.	• Find the measurement of an angle in a diagram when given the angle's complimentary or supplementary measurement. • Find the measurement of the other three angles formed by intersecting lines when given the measurement of one angle. • Write an equation to find the missing measurement of one angle when given the measurement of the second angle for complimentary and supplementary angles and find the measurement of it. • Write an equation to find the missing measurement of an angle inside a larger angle when the larger angle measurement and one measurement part of the larger angle is known and find the measurement of it.

GRADE 4

Geometry (G)

Draw and identify lines and angles, and classify shapes by properties of their lines and angles

4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• A two-dimensional figure is a figure that lies in a plane or is "flat." • Polygons have attributes. • Polygons with equal sides are regular polygons. • Two-dimensional shapes are closed figures. A shape is closed if exactly two sides meet at every vertex, every side meets exactly two other sides, and no sides cross each other. • Two-dimensional figures are made up of points, lines, and line segments.	• The meaning of the words point, line, line segment, ray, angle, obtuse angle, acute angle, right angle, parallel, and perpendicular. • Lines are infinite in extent, and points have location but no dimension. • The size of an angle is the amount of rotation between the two rays that form the angle. • A right angle has a measurement of 90°, an acute angle has a measurement of less than 90°, and an obtuse angle has a measurement of more than 90° and less than 180°. • An angle is formed wherever two rays have a common endpoint. This endpoint is called the vertex of the angle.	• Define and recognize examples of the following: point, line, line segment, ray, angle, acute angle, right angle, obtuse angle, perpendicular, and parallel lines. • Construct examples of angles and triangles that are acute, right, or obtuse. • Construct examples of points, lines, line segments, and parallel and perpendicular lines. • Recognize and identify points, lines, line segments, types of angles, and parallel and perpendicular lines in two-dimensional figures. • Attend to precision.

GRADE 4

Geometry (G)

Draw and identify lines and angles, and classify shapes by properties of their lines and angles

4.G.2
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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• A two-dimensional figure is a figure that lies in a plane or is "flat". • Two-dimensional shapes are closed figures. A shape is closed if exactly two sides meet at every vertex, every side meets exactly two other sides, and no sides cross each other. • How to identify defining attributes of two-dimensional figures. • Defining attributes are geometrical characteristics, such as number of vertices, angles, angle size, etc. Examples of non-defining attributes are color, overall size, or orientation of the figure. • How to classify shapes based on attributes, such as number of sides or angles.	• The meaning of the words parallel and perpendicular (and distinguish how they are different). • A right angle is an angle with a measurement of 90°, an acute angle is an angle with a measurement of less than 90°, and an obtuse angle is an angle with a measurement of more than 90°. • The size of an angle is the amount of rotation between the two rays that form the angle. • A right triangle is a triangle that contains a right angle; any triangle that has a right angle can be categorized as a right triangle. • An angle is named using three points in which the middle point labels the vertex.	• Identify shapes that have parallel or perpendicular lines. • Use parallel lines and perpendicular lines to categorize two-dimensional shapes. • Categorize shapes based on similar attributes. • Identify two-dimensional shapes that contain angles with a specific measurement. • Identify and recognize right triangles. • Measure a given angle. • Attend to precision. • Use appropriate tools strategically.

	• How to categorize and classify quadrilaterals based on similar attributes. • Shapes in different categories can share attributes, and the shared attributes can define a larger category (quadrilaterals). • An angle is formed wherever two rays have a common endpoint. This endpoint is called the vertex of the angle.		

GRADE 4

Geometry (G)

Draw and identify lines and angles, and classify shapes by properties of their lines and angles

4.G.3
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.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• A two-dimensional figure is a figure that lies in a plane or is "flat." • Two-dimensional shapes are closed figures. A shape is closed if exactly two sides meet at every vertex, every side meets exactly two other sides, and no sides cross each other. • A line is straight.	• A figure is symmetrical if a line can be drawn and one side is the mirror image of the other. • When a figure is folded on a line and the areas match up exactly, the fold creates a line of symmetry. • A figure can have more than one line of symmetry. • A figure can have no line of symmetry. • Modeling with mathematics. • Attending to precision. • Looking for and making use of structure.	• Create a symmetrical figure by drawing in the missing half of the figure. • Draw in all the lines of symmetry in a figure. • Identify symmetrical figures.

[1] See Glossary, Table 2.
[2] Grade 4 expectations in this domain are limited to whole numbers less than or equal l to 1,000,000.
[3] Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.
[4] 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.