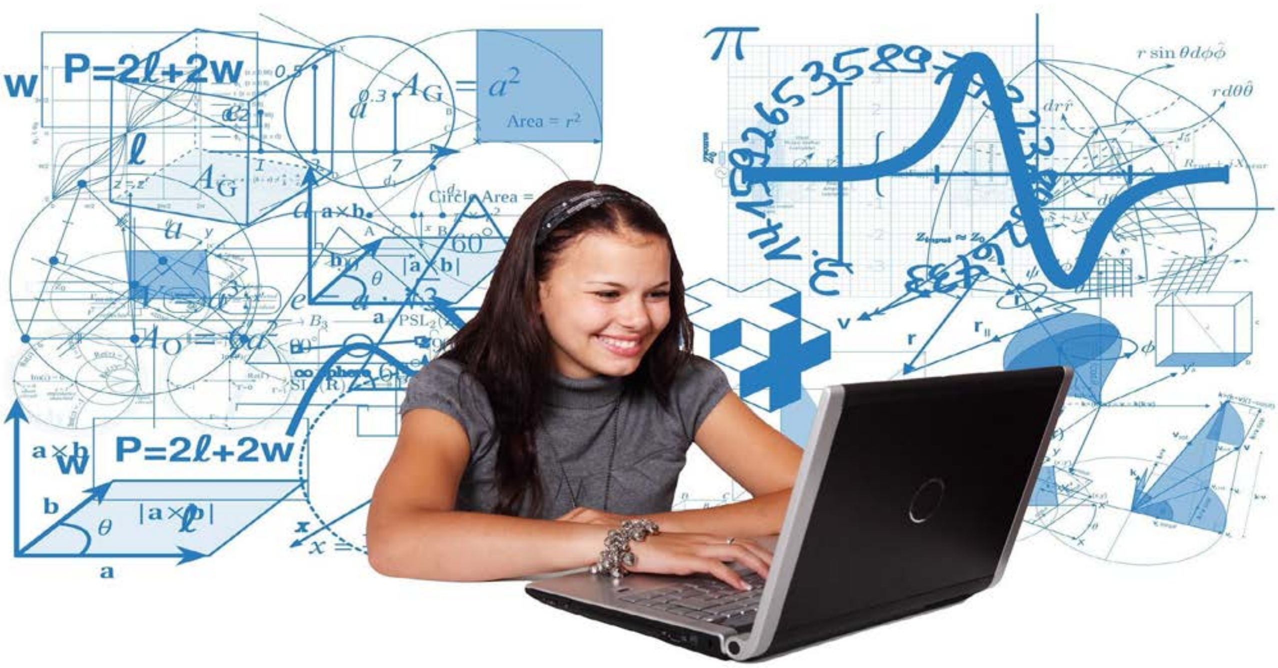
Mathematics Standards Clarification for Grade 4



The Nevada Ready! Network

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2019

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Standards-Based Instruction for
ALL Nevada Students

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Operations & Algebraic Thinking

Cluster

Use the four operations with whole numbers to solve problems.

NVACS 4.OA.A.1 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense of a problem in order to be able to compare equations. • MP 2 Students will need to make sense of a problem and determine how quantities are related and what operation to use when solving a problem. • MP 4 Students may use models such as bar diagrams to compare equations. • MP 5 Students may use a bar diagram as a tool for representing relationships between quantities. • MP 6 Students will attend to precision by calculating accurately.
Instructional Strategies	• Write, identify and model multiplicative comparison situations (3 x 4; Denise has $4. Kathy has three times as much. How much money does Kathy have?). • Have students explore and discuss the context and meaning of the problem before solving. • Solve problems using tools, pictures, words and numbers.
Prerequisite Skills	• Relate multiplication to repeated addition. • Write a multiplication sentence to represent an equal-groups situation. • Know the parts of a multiplication equation. • Draw a model to represent an equal-groups multiplication problem. • Describe a context of equal groups for a multiplication sentence. • Use multiplication 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. • Solve word problems involving multiplication within 100.
Connections Within and Beyond Grade Level	Within: • Students work on this standard in conjunction with 4.OA.A.2. • Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawing and equations with a symbol of the unknown number to represent the problem. For example, given 3 x 4 distinguishing multiplicative (rate context, 3x) from additive comparison (4 + 4 + 4). • Solve multistep word problems posed with whole numbers having whole-number answers using the four operations.

Element	Exemplars
	• Represent problems using equations with a letter standing for the unknown quantity. • Assess the reasonableness of answers using mental computation and estimations strategies including rounding. • 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 model. • Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including expressing measurements. Beyond: In 5th grade students will: • Use multiplication to 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 x (8+7). • Interpret multiplication as scaling (resizing). • Use knowledge of multiplication to begin working on multiplication of fractions.
Instructional Examples/Lessons/Tasks	• Measuring Mammals • 3 Act Task: Dill’er Up (Graham Fletcher) • Thousands and Millions of Fourth Graders (Illustrative Mathematics) • Threatened and Endangered (Illustrative Mathematics)
Assessment Examples	Provide students a variety of questions that require students to interpret and write a mathematical model to correspond. Deja has seven marbles. Braelen has 3 times as many. Braelen has 3 times as many marbles as Deja. • Sample Smarter Balanced Item

Operations & Algebraic Thinking

Cluster

Use the four operations with whole numbers to solve problems.

NVACS 4.OA.A.2 (Major Work)

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]

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students may need help questioning to ask themselves what do we know? What do we need to find? • MP 2 Students need to understand that when finding an unknown number there are multiple ways to solve one specific problem, such as repeated addition is the same as multiplication. • MP 4 Students may model when finding an unknown number. • MP 5 Students may use drawings or bar diagrams to solve word problems to find an unknown quantity. • MP 7 Students identify the hidden question and then look for relationships and patterns to solve.
Instructional Strategies	• Make connections between models (e.g., rectangular arrays, equal groups, and bar diagrams) and written equations using multiplication and division. • Provide many opportunities for a discussion around the information in the problem and use that information to represent the situation using models. • Compare additive and multiplicative comparison situations.
Prerequisite Skills	• Represent and solve problems involving multiplication. • Use multiplication & 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. • Determine the unknown whole number in a multiplication or division equation.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: • Solve multistep word problems posed with whole numbers having whole-number answers using the four operations including those where a remainder needs to be interpreted. • Represent problems using equations with a letter standing for the unknown quantity. • Assess the reasonableness of answers using mental computation and estimations strategies. • Illustrate and explain the calculation by using equations, rectangular arrays, and/or area model. • Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including expressing measurements. Beyond: • 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. • Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. • Interpret multiplication as scaling (resizing). • Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Instructional Examples/Lessons/Tasks	• Comparing Money Raised (Illustrative Mathematics) • Bikes and Trikes (Inside Mathematics)
Assessment Examples	Look for evidence of students solving contextual problems involving multiplicative comparison using drawings or equations with an unknown number. • Howard County Public Schools • Sample Smarter Balanced Item

Operations & Algebraic Thinking

Cluster

Use the four operations with whole numbers to solve problems.

NVACS 4.OA.A.3 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will identify the hidden questions and then make sure their work and answers make sense. Students may be given information that is not needed to solve a problem. • MP 4 Students may use bar diagrams and equations to represent the unknown number. • MP 6 Students must be precise in drawings when finding the unknown number.

Instructional Strategies	• Provide multiple opportunities with problems, including two- and three-step problems with all four operations for students to solve using models or pictures and numbers.
	• Attend to the context, action or situation in the problem. Ask:
	    ○ “What is happening?”
	    ○ “How do you know?”
	    ○ “What do we know?”
	    ○ “What are we figuring out?”
	• **Avoid** teaching key word strategies; as depending upon the context words may indicate several operations.
	• Build on previous division problems experiences by including division problems situations that include remainders.
	• Lead whole class discussions on what to do with remainders by focusing on the context of the problem.
	• Students ask themselves, “Does this makes sense?”
	• Assess the reasonableness of answers using mental computation and estimations strategies including rounding.

Prerequisite Skills	• 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. (*The 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*)

Element	Exemplars
Connections Within and Beyond Grade Level	Within: • Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including expressing measurements. • Represent problems using equations with a letter standing for the unknown quantity. Beyond: • 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. • Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. • Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Instructional Examples/Lessons/Tasks	• Squirreling it Away (Inside Math, Level B, Level C, Level D, starting on p. 4) • Carnival Tickets (Illustrative Mathematics)
Assessment Examples	Look for evidence of students solving straight-forward contextual problems using all four operations. Some division problems may involve interpretation of remainder. • Howard County Public Schools

Operations & Algebraic Thinking

Cluster

Gain familiarity with factors and multiples.

NVACS 4.OA.B.4 (Supporting Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 6 Students attend to precision by working to find all of the possible solutions and use the terms dimensions and factors in relationship to their models. • MP 7 Students use physical models to see the structure of multiplication and in a later lesson connect their findings to identifying prime and composite numbers. • MP 8 Students look for regularity and repeated reasoning in numbers to determine factors (e.g. understanding of divisibility rules to help find factors).
Instructional Strategies	• Discuss patterns as students make lists of factors. • Identify prime numbers (numbers with exactly two factors) and composite numbers (numbers with more than two factors). The multiples of a prime number are all composite numbers. • Develop mathematical vocabulary including factor, factor pair, multiples, odd, even, prime and composite. • List multiples of a given number using skip counting.
Prerequisite Skills	• Interpret products of whole numbers, e.g. interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each. *Thus, in 3rd grade students work with the idea of 'multiples' and understand multiplication as repeated addition or the number of equal groups (multiples) of a number.* • Represent and solve problems involving multiplication. • Fluently multiply and divide within 100 using strategies. • Use multiplication 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. • Determine the unknown whole number in multiplication.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: • Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawing and equations with a symbol of the unknown number to represent the problem, distinguishing multiplicative from additive comparison. • Solve multistep word problems posed with whole numbers having whole-number answers using the four operations including those where a remainder needs to be interpreted. • Represent problems using equations with a letter standing for the unknown quantity. • Assess the reasonableness of answers using mental computation and estimation strategies. • 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 model. • Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including expressing measurements. Beyond: • Fluently multiply multi-digit numbers. • 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; the late the strategy to a written method and explain the reasoning used. • Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. • Interpret multiplication as scaling (resizing). • Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Instructional Examples/Lessons/Tasks	• Factors and Multiples Illustrative Mathematics Exploring Factors & Multiples • 3 Act Task: Dill'er Up (Graham Fletcher) • Number Trains (Inside Mathematics)
Assessment Examples	Look for evidence of student understanding of the distinction between factors and multiples. Students need to able to identify factors and multiples of a given number between 1–100. Look for evidence of student recognition that a whole number is a multiple of each of its factors. • Howard County Public Schools • Sample Smarter Balanced Item • Sample Smarter Balanced Item

Operations & Algebraic Thinking

Cluster

Generate and analyze patterns.

NVACS 4.OA.C.5 (Additional Work)

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*.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students make sense of the problem to determine what needs to be solved. • MP 2 Students reason quantitatively by asking themselves how are the numbers in the problem related? What do I need to find? • MP 3 Students may be given a picture to establish the "Rule". Construct an argument by looking at the picture to establish the pattern shown. • MP 7 Students look for relationships using multiple the same rule. Example, add 4 to each pattern, but start on an even number and start on an odd number. • MP 8 Students use rules to make and test generalizations involving patterns.
Instructional Strategies	• Misconception: Some students may think that all patterns must increase. • Provide a variety of problems and models to give students opportunities to recognize, extend and describe patterns. • Help students to use a variety of strategies to organize their work so that patterns are more apparent. For example, making a list, extending and describing shapes, making a model. • Make generalizations about patterns, when appropriate. • Facilitate student discussions about patterns they find so that students become comfortable describing and writing their ideas using words and numbers.
Prerequisite Skills	• 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
Connections Within and Beyond Grade Level	Beyond: • Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. From ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.

Element	Exemplars
Instructional Examples/Lessons/Tasks	• Piles of Oranges (Inside Math) • Numerical Patterns following a given rule (Illustrative Mathematics)
Assessment Examples	Look for evidence of students being able to generate a number or shape pattern. Students should show an understanding of the pattern rule and features of the pattern. • Sample Assessment Item

Number & Operations in Base Ten

Cluster

Generalize place value understanding for multi-digit whole numbers.

NVACS 4.NBT.A.1 (Major Work)

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.*

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense of problems and persevere in solving problems by applying the concepts of place value, multiplication, and division. • MP 2 Students will use quantitative reasoning to understand the relationship between the places as the value of a digit moves to the left or to the right. • MP 7 Students will recognize the structure of the number system.
Instructional Strategies	*The expectations in this domain are limited to whole numbers less than or equal to 1,000,000.* • Provide students with a variety of experiences to compare the value of digits as they appear in different places to explain the relationship describing the value to the left as 10 times that of the place to the right. • Give students an opportunity to explore and describe patterns based on place value of a given digit. • Identify the relationship among places by multiplying by 10 (moving one place to the left) and dividing by 10 (moving one place to the right).
Prerequisite Skills	• 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. • Multiply one-digit whole numbers by multiples of 10 in the range of 10-90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● 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. ● Use place value understanding to round multi-digit whole numbers to any place. ● Use place value understanding as a strategy when performing operations. Beyond: ● 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. ● Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain pattern 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.
Instructional Examples/Lessons/Tasks	Consider using tools to explore the relationship between places by discussing the values. For example, when exploring the relationship between the 4 in 14 and the 4 in 40, have students build both numbers using a proportional model. Guide conversations to have students generalize the rule that the 4 in the tens place is ten times the 4 in the ones place. Explore with various numbers. • Expand That Number
Assessment Examples	• Howard County Public Schools

Number & Operations in Base Ten

Cluster

Generalize place value understanding for multi-digit whole numbers.

NVACS 4.NBT.A.2 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense of problems and persevere in solving problems by applying the concept of place value to compare multi-digit numbers. • MP 2 Students will use quantitative reasoning to understand the relationship between the digits in within the number system. • MP 3 Students will construct viable arguments about value of multi-digit numbers. • MP 7 Students will recognize the structure of the number system.
Instructional Strategies	*The expectations in this domain are limited to whole numbers less than or equal to 1,000,000.* • Provide opportunities for students to read and write numbers up to 1,000,000 (students may be exposed to numbers over 1,000,000) • Write numbers in expanded notation using place value and words • Compare whole numbers using <, > and = with the same place value and different place values; connect symbols with language • Accurately read and write numbers 1 through 1,000,000.
Prerequisite Skills	• 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. • Read and write numbers to 1000 using standard form, word form, and expanded form. • Compare two three digit numbers based on the hundreds, tens, and ones digits, using <,>,= symbols. • Multiply one-digit whole numbers by multiples of 10 in the range of 10-90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● 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.* ● Use place value understanding to round multi-digit whole numbers to any place. Beyond: ● 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. ● Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain pattern 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. ● Read, write, and compare decimals to thousandths. ○ Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 x (1/10) + 9 x (1/100) + 2 (1/1000). ○ Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. ● Use place value understanding to round decimals to any place.
Instructional Examples/Lessons/Tasks	• Multi-digit Number activities (See page 17, Relative Value of Places)
Assessment Examples	• Sample Smarter Balanced Item

Number & Operations in Base Ten

Cluster

Generalize place value understanding for multi-digit whole numbers.

NVACS 4.NBT.A.3 (Major Work)

Use place value understanding to round multi-digit whole numbers to any place.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense of problems and persevere in solving problems by applying the concept of rounding to multi-digit numbers. • MP 2 Students will use quantitative reasoning to round multi-digit numbers to a given place. • MP 3 Students will construct viable arguments about value of rounded multi-digit numbers. • MP 7 Students will recognize the structure of the number system to round numbers.
Instructional Strategies	*The expectations in this domain are limited to whole numbers less than or equal to 1,000,000* • Provide problem situations that call for estimation and rounding. • Round numbers to a given place value using models including number lines. • Identify the two numbers between which the given number falls. • Students will explain their reasoning and determine if their answers make sense. • Students will make generalizations that will help them to round without using models. • Continue having students justify their reasoning and the reasoning of their classmates.
Prerequisite Skills	• Use place value understanding to round whole numbers to the nearest 10 or 100. • Students use place value strategies through multi-digit computation. • Multiply one-digit whole numbers by multiples of 10 in the range of 10-90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.
Connections Within and Beyond Grade Level	Within: • After solving a word problem using any of the four operations, assess reasonableness of answers using mental computation and estimation strategies. • Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. Beyond: • Use place value understanding to round decimals to any place.

Element	Exemplars
Instructional Examples/Lessons/Tasks	Consider having students use tools, like a number line to round whole numbers to a given place value. The number line will guide students to check for reasonableness of their estimate. • Achieve the Core/Illustrative Mathematics Task
Assessment Examples	• From Smarter Balanced Website: click *Item and Task Specification, Math Item Specification*, Claim 1, Target D

Number & Operations in Base Ten

Cluster

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

NVACS 4.NBT.B.4 (Major Work)

Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense and persevere in solving multi-digit addition and subtraction problems using the standard algorithm. • MP 6 Students will attend to precision while solving multi-digit addition and subtraction problems using the standard algorithm.
Instructional Strategies	*The expectations in this domain are limited to whole numbers less than or equal to 1,000,000.* • Provide problem situations and practice examples involving multi-digit addition and subtraction. • Make connections to concrete tools, models, representations and number lines. • Provide students with opportunities to use efficient mental strategies to compute when appropriate (counting up, adding tens, then adding ones; open number lines). • Students make connections between previous work with addition and subtraction from using models and other representations to more efficient algorithms. • Have students explain their thinking as they add and subtract using place value understanding and the property of operations. This may include when they compose and decompose place values (regrouping) or some students may choose an alternate algorithm where regrouping is not necessary.
Prerequisite Skills	• Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
Connections Within and Beyond Grade Level	Within: • Use the four operations with whole numbers to solve problems. Including multistep word problems posed with whole numbers and having whole-number answers, including problems in which remainders must be interpreted. • Represent these problems using equations with a letter standing for the unknown quantity. • Assess reasonableness of answers using mental computation and estimation strategies. Beyond: • Extend previous understandings of addition and subtraction to working with decimals and whole numbers in all operations.

Element	Exemplars
Instructional Examples/Lessons/Tasks	• Making Sense of the Algorithm (p. 5865) • Mental Math Computational Strategies **For purchase, with NCTM membership** • Chip Trading
Assessment Examples	• Howard County Public Schools

Number & Operations in Base Ten

Cluster

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

NVACS 4.NBT.B.5 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense and persevere in solving multiplication problems using strategies based on place value. • MP 2 Students will use their knowledge of multiplication and place value to estimate products using strategies that make sense to them. • MP 3 Students will construct viable arguments and explain their thinking to partners and/or the class. • MP 4 Students will model multiplication equations in multiple ways. • MP 6 Students will attend to precision while solving multi-digit addition and subtraction problems using the standard algorithm.
Instructional Strategies	*The expectations in this domain are limited to factors that are (a) up to four-digit by one-digit whole numbers or (b) two-digit by two-digit whole numbers.* • Use properties of operation (distributive, associative and commutative), place value and models (arrays and area model) to multiply whole numbers. • Students explain their reasoning using models, numbers, and words. • Facilitate whole class discussions based on patterns and why they work.
Prerequisite Skills	• Represent and solve equations and word problems involving multiplication. • 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. • Apply properties of operations (commutative, associative, distributive) as strategies to multiply. • Relate area to the operations of multiplication and addition. • Use multiplication within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations for the unknown number to represent the problem. • Determine the unknown whole number in multiplication.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: • Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol of the unknown number to represent the problem, distinguishing multiplicative from additive comparison. • Solve multistep word problems posed with whole numbers having whole-number answers using the four operations including those where a remainder needs to be interpreted. • Represent problems using equations with a letter standing for the unknown quantity. • Assess the reasonableness of answers using mental computation and estimations strategies. • Illustrate and explain the calculation by using equations, rectangular arrays, and/or area model. • Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including expressing measurements. Beyond: • Fluently multiply multi-digit numbers using a standard algorithm. • 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. • Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. • Interpret multiplication as scaling (resizing). • Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Instructional Examples/Lessons/Tasks	• Use Partial Products for Multiplication **For purchase, with NCTM membership** • Multiply and Conquer
Assessment Examples	Look for evidence of student strategies based on place value and properties of operations. • Sample Smarter Balanced Item

Number & Operations in Base Ten

Cluster

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

NVACS 4.NBT.B.6 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense and persevere in solving division problems using strategies based on place value. • MP 2 Students will use their knowledge of division and place value to estimate quotients using strategies that make sense to them. • MP 3 Students will construct viable arguments and explain their thinking to partners and/or the class. • MP 4 Students will model division equations in multiple ways. • MP 6 Students will attend to precision while solving multi-digit division problems using a variety of strategies.
Instructional Strategies	*The expectations in this domain are limited to one-digit whole number divisors and up to four-digit whole number dividends.* • Select division problems to scaffold student learning by building on division facts with compatible numbers to support student thinking. • Use models that make sense to represent division situations. • Students explain their reasoning as they solve division problems and develop their conceptual understanding of division.
Prerequisite Skills	• Interpret whole-number quotients of whole numbers. • Apply properties of operations (commutative, associative, distributive) as strategies to division. • Relate area to the operations of multiplication and addition. • Use division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. • Determine the unknown whole number in a multiplication or division equation relating three whole numbers. • Solve two-step word problems using the four operations. Represent these problems using equations for a letter standing for the unknown quantity. • Assess the reasonableness of answers using mental computation and estimation strategies.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Divide to solve word problems involving multiplicative comparison, by using drawing and equations with a symbol of the unknown number to represent the problem. ● Solve multistep word problems posed with whole numbers having whole-number answers using the four operations including those where a remainder needs to be interpreted. ● Represent problems using equations with a letter standing for the unknown quantity. ● Assess the reasonableness of answers using mental computation and estimations strategies. ● Illustrate and explain the calculation by using equations, rectangular arrays, and/or area model. ● Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including expressing measurements. Beyond: ● Extend multi-digit division to a 2-digit divisor. ● 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. ● Apply and extend previous understandings of division to divide a fraction or whole number by a fraction. ● Solve real world problems involving division of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Instructional Examples/Lessons/Tasks	Consider exploring and displaying the different ways students might divide: ● Connections between multiplication & division ● Using a variety of tools, models & strategies **For purchase (Free with NCTM membership):** ● Conceptualizing Division with Large Numbers ● The Quotient Cafe ● Conceptualizing Division with Large Numbers
Assessment Examples	Look for evidence that student understanding is grounded in strategies using place value, the properties of operations and/or the relationship between multiplication and division. ● Howard County Public Schools ● Sample Smarter Balanced Item

Number & Operations—Fractions

Cluster

Extend Understanding Of Fraction Equivalence and Ordering.

NVACS 4.NF.A.1 (Major Work)

Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ 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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students determine other fractions that mean the same as a given fraction. Example, ½- show 12 circles and have students determine how many in each group if split in half. • MP 2 Students may think there is only a set amount of fractions that are equivalent to one fraction, but there are an infinite number of fractions. • MP 3 Students explain the relationship between using multiplication to find equivalent fractions and the Identity Property of Multiplication. • MP 4 Students will use a variety of models to represent equivalent fractions (e.g., tape diagrams, number lines and area models).
Instructional Strategies	• Misconception: Students wonder why they can multiply the numerator and denominator of a fraction without changing its value. Explain that multiplying both the numerator and denominator of a fraction by the same number is the same as multiplying the fraction by 1 because 4/4 is equal to 1. *The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100* • Provide students with different tools, models or visual representations to build sets of equivalent fractions and write the fractions as numerals. • Facilitate discussions about patterns they see in sets of fractions. • Facilitate discussions about the number and size of fractional parts when finding equivalent fractions. Students need to understand that equivalent fractions represent the same amount of one whole, but the number and size of the pieces is changing.
Prerequisite Skills	• Use area models and number line diagrams to reason about equivalence. • Connect fractions as whole numbers to division. • Recognize equivalent fractions numerically and justify their equivalence. • Understand that comparing fractions is only valid when referring to the same whole. • Recognize and generate equivalent fractions and whole numbers using area, length, and number line models.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Connect visual representations to equivalent fractions. ● Connect numerical representations to equivalent fractions. ● Compare two fractions by finding a common denominator. ● Compare two fractions by finding a common numerator. ● Explain equivalent fractions using pictures, words and numbers. Beyond: ● Add and subtract fractions with unlike denominators (including mixed numbers). ● Interpret multiplication as scaling (resizing).
Instructional Examples/Lessons/Tasks	Students will recognize and connect visual representations of equivalent fractions to numerical representations. Provide experiences with the three models for fractions - linear (number line), area/region model, or set model. Please note that the set model is new for 4th grade. • Fractions and Rectangles (Illustrative Mathematics) • Explaining Fraction Equivalence with Pictures (Illustrative Mathematics) • Picking Fractions (Inside Mathematics)
Assessment Examples	• Assessment on Fraction Concepts • Sample Smarter Balanced Item • Sample Smarter Balanced Item

Number & Operations—Fractions

Cluster

Extend Understanding Of Fraction Equivalence and Ordering.

NVACS 4.NF.A.2 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 3 Students construct arguments when comparing two fractions to deepen their understanding on how to compare fractions. • MP 4 Students may use a variety of models to show a comparison of two fractions. • MP 8 Students start to use markers like ½ when comparing if a fractions is larger or smaller than a given fraction.
Instructional Strategies	• Students may have difficulty understanding why a fraction is larger or smaller than another, so you may want to use manipulatives. *The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Provide a variety of concrete tools (i.e., fraction bars) for students to use when comparing fractions. Have students verbalize or discuss why the models are equivalent. Make explicit the connection that fractions can only be compared if referencing the same size whole. • Compare using 0, ½ and 1 as benchmarks. • Find common denominators or numerators to compare fractions. • Students justify their thinking when determining which method makes the most sense for a given situation.
Prerequisite Skills	• Recognize and generate equivalent fractions and whole numbers using area, length, and number line models. • Compare fractions with like numerators or like denominators. • Understand that comparing fractions is only valid when referring to the same whole. • Understand the distance from 0 to 1 represents one whole. • Understand the concept that fractions equal to 1 have the same numerator and denominator, while fractions greater than 1 have a numerator that will be greater than the denominator.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Use a variety of representations to compare fractions; concrete models, benchmark fractions, common denominators and common numerators. ● Relate multiplying and repartitioning models to explain equivalence between two fractions. ● Use decimal notation for fractions with denominators of 10 and 100. Compare two decimals to hundredths by reasoning about size using models. Beyond: ● Use visual models or equations to represent word problems involving addition and subtraction of fractions using equivalent fractions.
Instructional Examples/Lessons/Tasks	• Fraction Comparison (Marilyn Burns) • Fraction Strips (Marilyn Burns) • Comparing Pizzas (Illustrative Mathematics) • Comparing Fractions Using Benchmarks Game: (Achieve the Core)
Assessment Examples	Look for evidence that the student understands how to compare fractions with a method that makes sense. Example: Juan and Chris went to the movies. Each bought a small popcorn. Linda ate ⅚ of her popcorn and Louisa ate 5/12 of her popcorn. Who ate more? • Fraction Concepts • Sample Smarter Balanced Item • Sample Smarter Balanced Item

Number & Operations—Fractions

Cluster

Build Fractions From Unit Fractions By Applying And Extending Previous Understandings of Operations On Whole Numbers.

NVACS 4.NF.B.3.a (Major Work)

Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students model with mathematics. Students can represent the situation with a picture or fraction strips. • MP 5 Students use appropriate tools strategically. Students can represent addition and subtraction of fractions with varied strategies and models (including the number line). • MP 7 Students look for and make use of structure. Students can represent addition and subtraction of mixed numbers with varied strategies and models. • MP 8 Students look for and express regularity in repeated reasoning. Students can describe how adding and/or subtracting fractions must refer to the same size whole and have like denominators.
Instructional Strategies	*The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Relate adding and subtracting of whole numbers to adding and subtracting of fractions with like denominators. • Use a variety of materials to model and describe the situation when adding and subtracting fractions. • Provide a variety of experiences for students to compose and decompose fractions, including fractions greater than 1 and mixed numbers, into unit fractions using concrete and pictorial representations, words and numbers. • Emphasize the connection between representations and the number line.
Prerequisite Skills	• Demonstrate that a whole is partitioned into fractional parts called unit fractions and locate unit fractions on a number line. • Explain that multiple copies of a unit fraction make up a composite fraction and locate composite fractions on a number line. • The denominator indicates the number of equal-size pieces of the whole. • Addition and subtraction of whole numbers.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Understanding that addition and subtraction for fractions has the same meaning as addition and subtraction of whole numbers. ● Interpret and solve word problems that involve adding and subtracting fractions. ● Explain that subtracting fractions is equivalent to separating parts of the same whole. ● Identify and apply multiple strategies to add mixed numbers. ● Explain that adding fractions is equivalent to joining parts of the same whole. ● Decompose fractions into sums of fractions with like denominators. ● Identify and apply multiple strategies to subtract mixed numbers. Beyond: ● Interpret a fraction as a division of the numerator by the denominator. ● Solve division problems interpreting the remainder as a fraction. ● Model problems in which the divisor is greater than the dividend. ● Add and subtract fractions with unlike denominators by using equivalent fractions with like denominators.
Instructional Examples/Lessons/Tasks	● Ensure that students have identical "wholes" when adding and subtracting fractions. Consider cutting identical shapes to enable students to fold, cut and compare- for joining (or addition) have them combine the pieces. For separating (or subtraction) have them decompose and remove pieces. ● Move toward working with number lines. Consider helping students connect fractions on the number line through the use of a double number line with mixed number notation on top and fraction notation (including fractions greater than 1) below. ● When using a number line, emphasize that a fraction is named as a position on the number line; yet reflects a distance from 0 to 1. ● How Far Apart are the Freeway Exits (Robert Kaplinsky) ● Comparing Sums of Unit Fractions (Illustrative Mathematics)
Assessment Examples	● Fractions Concepts Mini-assessment (Achieve the Core)

Number & Operations—Fractions

Cluster

Build Fractions From Unit Fractions By Applying and Extending Previous Understandings Of Operations On Whole Numbers.

NVACS 4.NF.B.3.b (Major Work)

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.*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students need to understand that 4/6 + 1/6 means the same as 2/6 + 2/6 + 1/6. • MP 5 Students use models, fraction strips, and numbers lines to connect the visual model to the written equation.
Instructional Strategies	*The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Provide a variety of activities in which students must decompose a fraction into a sum of fractions with the same denominator. • Begin decomposition into unit fractions. i.e. 3/12 = 1/12 + 1/12 + 1/12. • Ask students to combine unit fractions to show other addends that compose the fraction. • Facilitate discussions in which students use visual models, including area models and the number line, to justify their thinking. • Ask students to demonstrate understanding with fractions less than one and extend these to fractions greater than 1. • Ask students to find many ways to decomposing fractions and explain their reasoning.
Prerequisite Skills	• Numerator indicates it is one part of the whole. • The denominator indicates the number of equal-size pieces of the whole. • Demonstrate that a whole is partitioned into fractional parts called unit fractions. • Explain that multiple copies of a unit fraction make up a composite fraction.
Connections Within and Beyond Grade Level	Within: • Understand decimal notation for fractions and compare decimal fractions (tenths and hundredths only). Beyond: • Solve word problems by multiplying a whole number by a fraction. • Explore multiplication of a fraction by a fraction.
Instructional Examples/Lessons/Tasks	• Making 22 Seventeenths in Different Ways (Illustrative Mathematics)

Element	Exemplars
Assessment Examples	• Fraction Concepts • Sample Smarter Balanced Item • Sample Smarter Balanced Item

Number & Operations—Fractions

Cluster

Build fractions from unit fractions.

NVACS 4.NF.B.3.c (Major Supporting Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 7 Students make use of structure to add and subtract mixed numbers by thinking about equivalent fractions and/or how to decompose fractions and use properties of operations to add or subtract.
Instructional Strategies	*The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Relate adding and subtracting of whole numbers to adding and subtracting of fractions with like denominators. • Use number bonds to compose or decompose fractions. • Explain that subtracting fractions is equivalent to separating parts of the same whole. • Identify and apply multiple strategies to add mixed numbers. • Explain that adding fractions is equivalent to joining parts of the same whole. • Decompose fractions into sums of fractions with like denominators. • Identify and apply multiple strategies to subtract mixed numbers.
Prerequisite Skills	• Addition and subtraction of whole numbers. • Demonstrate that a whole is partitioned into fractional parts called unit fractions. • Explain that multiple copies of a unit fraction make up a composite fraction. • The denominator indicates the number of equal-size pieces of the whole.
Connections Within and Beyond Grade Level	Within: • Interpret and solve word problems that involve adding and subtracting fractions. • Interpret data involving addition and subtraction of fractions represented on a line plot. Beyond: • Interpret a fraction as a division of the numerator by the denominator. • Solve division problems interpreting the remainder as a fraction. • Model problems in which the divisor is greater than the dividend. • Add and subtract fractions with unlike denominators by using equivalent fractions with like denominators.

Element	Exemplars
Instructional Examples/Lessons/Tasks	• Cynthia's Perfect Punch (Illustrative Mathematics) • Plastic Building Blocks (Illustrative Mathematics)
Assessment Examples	• Fraction Concepts

Number & Operations—Fractions

Cluster

Build Fractions From Unit Fractions By Applying and Extending Previous Understandings of Operations On Whole Numbers.

NVACS 4.NF.B.3.d (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students must use reasoning to make sense of addition and subtraction word problems. • MP 2 Students reason abstractly and quantitatively as they work with numbers and put them back into the context of the problems. • MP 4 Students use models to represent their thinking and solve problems.
Instructional Strategies	*The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Provide students with fractional models (area/region, linear/number line, fraction bars) as they solve problems. • Use a variety of materials to model and describe the situation when adding and subtracting fractions. • Begin with adding and subtracting fractions less than 1, move to those greater than 1, then begin work with mixed numbers. • Expect students to solve problems using visual representations. Have students justify the connections between the visual representation and the numerical representations. • Facilitate whole class discussions. Focus on having students connect their thinking using materials, pictures, words and numbers.
Prerequisite Skills	• Develop an understanding of the meaning of fractions and how to make fractional models.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Interpret data and solve problems involving addition and subtraction of fractions using data presented in line plots. ● Create line plots to represent fractional data. ● Apply understanding of operations with fractions, decimals, and whole numbers to solve word problems. ● Apply understanding of measurement units to solve word problems. ● Solve problems that require expressing larger measurement units in terms of smaller measurement units. Beyond: ● Explain that when multiplying a whole number greater than 1 by a fraction, the size of the product will be less than the whole number and greater than the fraction. ● Subtract fractions with unlike denominators by using equivalent fractions with like denominators. ● Add fractions with unlike denominators by using equivalent fractions with like denominators.
Instructional Examples/Lessons/Tasks	● Peaches (Illustrative Mathematics)
Assessment Examples	● Sample Smarter Balanced Item

Number & Operations—Fractions

Cluster

Build Fractions From Unit Fractions By Applying and Extending Previous Understandings Of Operations On Whole Numbers

NVACS 4.NF.B.4.a (Major Work)

Apply and extend previous understandings of multiplication to multiply a fraction by a whole number:

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).*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students will reason about fractions as numbers (quantitatively) and understand that relationship between fractions and whole numbers. • MP 4 Students will use models including number lines and fraction strips, and connect those visual models to the written equations. • MP 6 Students will attend to precision building on their previous understandings of the meaning of the numerator and denominator. • MP 7 Students will recognize the structure of multiplying a fraction by a whole number and explain the relationship between multiplication and repeated addition.
Instructional Strategies	*The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Use prior knowledge of whole number multiplication to multiply a fraction by a whole number. • Decompose fractions into unit fractions and connect this understanding to multiplication: 7/4 = ¼ + ¼ + ¼ + ¼ + ¼ + ¼ + ¼ or 7 groups of ¼ , which can also be written as 7 x ¼.
Prerequisite Skills	• Understand multiplying with whole numbers. • Decomposing fractions into unit fractions. • Relate multiplication to repeated addition.
Connections Within and Beyond Grade Level	Within: • Solve problems involving measurement and conversion of measurement from a larger unit into a smaller unit. Beyond: • Apply the standard algorithm to find products involving fractions. • Use visual models to show that a/b x c/d = ac/bd.
Instructional Examples/Lessons/Tasks	• Skip count by unit fractions to various whole numbers, mixed numbers, and fractions greater than one.
Assessment Examples	• Sample Smarter Balance Test Item

Number & Operations–Fractions

Cluster

Build Fractions From Unit Fractions By Applying and Extending Previous Understandings Of Operations On Whole Numbers

NVACS 4.NF.B.4.b (Major Work)

Apply and extend previous understandings of multiplication to multiply a fraction by a whole number:

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.)*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students will reason about fractions as numbers (quantitatively) and understand that relationship between fractions and whole numbers. • MP 4 Students will use models including area models, number lines, fraction strips, and connect those visual models to the written equations. • MP 6 Students will attend to precision building on their previous understandings of the meaning of the numerator and denominator. • MP 7 Students will recognize the structure of multiplying a fraction by a whole number and explain the relationship between multiplication and repeated addition.
Instructional Strategies	*The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Use prior knowledge of whole number multiplication to multiply a fraction by a whole number. • Use models to develop conceptual understanding of a fraction multiplied by a whole number.
Prerequisite Skills	• Understand multiplying with whole numbers. • Multiply a whole number times a unit fraction.
Connections Within and Beyond Grade Level	Within: • Solve a variety of problems involving multiplication of a fraction by a whole number. • Explain reasoning using pictures, words, and numbers. Beyond: • Solve problems involving division of a whole number by a unit fraction or a unit fraction divided by a whole number. • Explain work using pictures, words, and numbers.
Instructional Examples/Lessons/Tasks	• Extending Multiplication From Whole Numbers to Fractions (Illustrative Mathematics) • 3 Act Task: Do the Dew (Graham Fletcher)
Assessment Examples	• Sample Smarter Balanced Item

Number & Operations–Fractions

Cluster

Build Fractions From Unit Fractions By Applying and Extending Previous Understandings Of Operations On Whole Numbers.

NVACS 4.NF.B.4.c (Major Work)

Apply and extend previous understandings of multiplication to multiply a fraction by a whole number:

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?*

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students must make sense of the problem in order to represent the information using visual fraction models and in order to solve the problem. • MP 2 Students will reason about fractions as numbers (quantitatively) and understand the relationship between fractions and whole numbers. • MP 4 Students will use models including area models, number lines, fraction strips, and connect those visual models to the written equations. • MP 6 Students will attend to precision building on their previous understandings of the meaning of the numerator and denominator. • MP 7 Students will recognize the structure of multiplying a fraction by a whole number and explain the relationship between multiplication and repeated addition.
Instructional Strategies	*The expectations in this domain are limited to fraction denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • Use models to solve a variety of problem situations involving multiplying a whole number times a fraction or mixed number. • Discuss any patterns or connections between whole number multiplication to multiplication of fractions based on the number of groups as well as the relationship between the numerator and denominator.
Prerequisite Skills	• Multiply a whole number times a unit fraction.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Use models to solve a variety of problem situations involving multiplying a whole number times a fraction or mixed number. ● Recognize patterns. ● Solve problems involving measurement including volume, masses, money, and simple fractions and decimals. Beyond: ● Solve problems involving division of a whole number by a unit fraction or a unit fraction divided by a whole number. ● Explain work using pictures, words, and numbers.
Instructional Examples/Lessons/Tasks	● Sugar in Six Cans of Soda (Illustrative Mathematics) ● 3 Act Task: Drip Drop Graham Fletcher)
Assessment Examples	● Sample Smarter Balanced Item ● Sample Smarter Balanced Item

Number & Operations—Fractions

Cluster

Understand decimal notation for fractions, and compare decimal fractions.

NVACS 4.NF.C.5 (Major Supporting Work)

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.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students use appropriate models to understand the equivalence of tenths and hundredths. • MP 6 Student attend to precision by recognizing that they need to generate equivalent fractions to add tenths and hundredths.
Instructional Strategies	*The expectations in this cluster are limited to fraction denominators 10 and 100.* • Provide opportunities for students to find equivalent fractions for tenths. • Find equivalent fractions with a denominator of 100 by using place value blocks as models to provide visual models of equivalence. • Explore adding tenths and hundredths as fractions using models, pictures, words and numbers. Be aware this is the first time students have experienced adding fractions with unlike denominators.
Prerequisite Skills	• Find equivalent fractions.
Connections Within and Beyond Grade Level	Within: • Compare two decimals to hundredths by reasoning about their size. Beyond: • Understand that a digit in one place represents 10 times less than the same digit one place to the left. • Understand that a digit in one place represents 10 times more than the same digit one place to the right. • Understand that a digit in one place represents 1/10 the value of the same digit one place to the left.
Instructional Examples/Lessons/Tasks	• Fraction Equivalence (Illustrative Mathematics)
Assessment Examples	• Howard County Public Schools

Number & Operations—Fractions

Cluster

Understand decimal notation for fractions, and compare decimal fractions.

NVACS 4.NF.C.6 (Major Work)

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.*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students use reasoning to understand the relationship between tenths and hundredths. • MP 3 Students explain their thinking as they describe the value of decimal models and find similarities and differences among their thinking and that of their classmates. • MP 4 Students use base-ten blocks to model decimal numbers in order to relate decimal place value to whole number place value and to determine the value of a decimal number. • MP 6 Students model, read, and write decimal numbers accurately. • MP 7 Students extend the structure of the place value system with whole numbers to decimal numbers. • MP 8 Concrete models provide students with beginning ideas around the relationship among places. Moving a place to the left increased the value of a digit ten times. Moving a place to the right decreased the value of the number by one tenth.
Instructional Strategies	*The expectations in this cluster are limited to fraction denominators 10 and 100.* • Connect whole number place value to the introduction of decimal notation; as we move one place to the right of 1, the place value is 1/10 of a whole. • Write a number as a fraction and decimal in the tenths and hundredths place. • Model fractions with denominators of 10 using place-value blocks, grid paper, place-value charts and number lines. • Give ample opportunities for students to work with decimal numbers in the tenths using models, pictures, words and numbers. • Emphasize the meaning of tenth as one part of ten equal parts in the whole and that 1/10 and 0.1 are different ways to represent the same number.
Prerequisite Skills	• This is the first formal experience with decimals.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Compare two decimals to the hundredths place using symbols. ● Justify the comparison of two decimals by using visual models. Beyond: ● Understand that a digit in one place represents 10 times less than the same digit one place to the left. ● Understand that a digit in one place represents 10 times more than the same digit one place to the right. ● Understand that a digit in one place represents 1/10 the value of the same digit one place to the left.
Instructional Examples/Lessons/Tasks	● Dimes and Pennies (Illustrative Math)
Assessment Examples	● Howard County Public Schools (Howard County Public Schools)

Number & Operations—Fractions

Cluster

Understand decimal notation for fractions, and compare decimal fractions.

NVACS 4.NF.C.7 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students use reasoning to understand the relationship between tenths and hundredths. • MP 3 Students will describe the value of the decimal models and listen and explain their thinking to point out similarities and differences among the reasoning of their classmates. • MP 4 Students will use manipulatives to model decimal numbers in order to relate decimal place value to whole number place value and to determine the value of a decimal number. • MP 7 Students will extend the place value system to decimal numbers. • MP 8 Students will use models to develop relationships among positions in the number system. Moving a position to the left increases the value of the digit ten times. Moving a position to the right decreases the value of the number by one tenth.
Instructional Strategies	*The expectations in this cluster are limited to fraction denominators 10 and 100.* • Compare tenths and hundredths written as fractions and decimals to show there are different ways to write the same number. • Compare two decimals in the tenths and hundredths place using place-value blocks, grid models, number lines and fraction representations.
Prerequisite Skills	• Understand that comparing fractions is only valid when referring to the same whole • Recognize equivalent fractions numerically and justify their equivalence. • Recognize and generate equivalent fractions and whole numbers using area, length, and number line models. • Compare fractions with like numerators or like denominators.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Compare two fractions by using benchmark fractions. ● Compare two fractions by finding a common denominator. ● Explain whether fraction comparisons are valid, i.e., when fractions refer to the same whole. ● Compare two fractions by finding a common numerator. ● Write decimals using place value. ● Write fractions as decimals and decimals as fractions (tenths and hundredths). ● Explain that fractions and decimals are different representations of the same value. ● Represent decimals using different models. Beyond: ● Read and write decimals to thousandths using word form. ● Read and write decimals to thousandths in expanded form. ● Read and write decimals to thousandths using base-ten numerals. ● Compare two decimals to thousandths when they have a different number of places after the decimal. ● Compare two decimals to thousandths when they have the same number of places after the decimal. ● Refer to orders of magnitude when describing relationships between decimals.
Instructional Examples/Lessons/Tasks	● Using Place Value (Illustrative Mathematics) ● RPDP
Assessment Examples	● Sample Smarter Balanced Item

Measurement & Data

Cluster

Solve problems involving measurement and conversion of measurements.

NVACS 4.MD.A.1 (Supporting Work)

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. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense of problems involving measurement and persevere in the conversion of measurements from a larger unit to a smaller unit. • MP 2 Students will use reasoning to justify the relative sizes of measurement units within one system of units. • MP 3 Students will construct and critique arguments based on the reasoning of others relating to the size of measurement units. • MP 6 Students will state the meaning of the symbols and specify units of measure.
Instructional Strategies	• Ensure that students understand the relative size of measurement units. Consider connecting relevant sizes to personal reference frames. For example, a centimeter is about the width of a pinky finger. • Provide experiences with various measurement attributes to connect previous work with measurement to systems of measure. • Plan experiences for students to discover hands-on measurement relationships before they create tables to express measurement relationships. • Provide activities for students to create tables to show measurement equivalents with larger units expressed as smaller units within the metric system. • Model and promote usage of terminology including: measure, metric, customary, convert/conversion, relative size, liquid volume, mass, length, distance, kilometer (km), meter (m), centimeter (cm), kilogram (kg), gram (g), liter (L), milliliter (mL), inch (in), foot (ft.), yard (yd.), mile (mi), ounce (oz.), pound (lb.), cup (c), pint (pt.), quart (qt.), gallon (gal), time, hour, minute, second, and equivalent. • Ensure opportunities for students to talk, process, and write about what they are noticing and finding.

Element	Exemplars
Prerequisite Skills	• Measure the length of an object by selecting the appropriate tools in both customary and metric units. • Measure using two units, describe how the two measurements relate to the size of the unit chosen. • Estimate using units of inches, feet, centimeters, and meters. • Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. • Fluently add, subtract, multiply, and divide within 100 • Tell and write time to the nearest minute and measure time intervals in minutes. • Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). 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 to represent the problem.
Connections Within and Beyond Grade Level	Within: • Students use their understanding of relative size to use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money • 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. • Fluently add, subtract, multiply, and divide Beyond: • 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 in solving multi-step, real world problems.
Instructional Examples/Lessons/Tasks	• Who is the Tallest? • Exploring an Ounce, Measuring Mass, More Punch Please
Assessment Examples	• Dinner at the Zoo

Measurement & Data

Cluster

Solve problems involving measurement and conversion of measurements.

NVACS 4.MD.A.2 (Supporting Work)

Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, 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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will make sense of problems involving measurement and persevere in the conversion of measurements from a larger unit to a smaller unit. • MP 2 Students will use reasoning to justify the relative sizes of measurement units within one system of units. • MP 3 Students will construct and critique arguments based on the reasoning of others relating to the size of measurement units. • MP 6 Students will state the meaning of the symbols and specify units of measure.
Instructional Strategies	• Provide numerous word problems for students to experience and solve. Have students discuss the context of the problems to build schema. • Encourage students to explain their thinking and demonstrate how they solved the problems. • Have students connect and represent measurement quantities using diagrams such as number lines that feature a measurement scale.
Prerequisite Skills	• Tell and write time to the nearest minute and measure time intervals in minutes. • Measure liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). • Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units. • Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. • 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.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Explore relative sizes of measurement units within one system of units. ● Convert large units to smaller unit by multiplying. ● Represent quantities using diagrams such as number line diagrams that feature a measurement scale. ● Use the four operations with whole numbers to solve word problems. Including multistep word problems posed with whole numbers and having whole-number answers, including problems in which remainders must be interpreted. ● 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*. Beyond: ● 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 in solving multi-step, real world problems.
Instructional Examples/Lessons/Tasks	● Simple money context (making change) ● Common Multiplication and Division Situations. (Compare row) for samples of continuous quantity problems using measurement context
Assessment Examples	● Dinner at the Zoo

Measurement & Data

Cluster

Solve problems involving measurement and conversion of measurements.

NVACS 4.MD.A.3 (Supporting Work)

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*.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will persevere and solve problems involving area and perimeter. • MP 2 Students will reason abstractly and quantitatively about the area formula. • MP 6 Students will state the meaning of the symbols and specify units of measure. • MP 8 Students will make generalizations and discover the shortcut of the formulas for area and perimeter.
Instructional Strategies	• Provide a few examples for students to explore simple area and perimeter problems. • Provide area problems when the problem has an unknown factor. Have students generalize their understanding to developing a connection between area models and the area formula. • Encourage students to share their thinking by connecting the context of the problem to their solution. Does their solution make sense when they connect it back to the context of the problem? • Remind students that units must be included on diagrams and in the solution.
Prerequisite Skills	• Recognize area as an attribute of plane figures and understand concepts of area measurement. • Connect multiplication with area. • Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. • Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. • Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. • Recognize area as additive and find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Students solve area and perimeter problems using strategies and models such as the area model. ● Apply the area and perimeter formulas with mathematical problems and real-world situations. Beyond: ● Take knowledge of area and extend it to the concept of volume
Instructional Examples/Lessons/Tasks	● Karl's Garden ● Marilyn Burns (area)
Assessment Examples	● Dinner at the Zoo

Measurement & Data

Cluster

Represent and interpret data.

NVACS 4.MD.B.4 (Supporting Work)

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.*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students will attend to the meaning of the measured objects and plot them on the number line. • MP 4 Students will construct and display data of the objects on the line plot. • MP 5 Students will select the appropriate tools like rulers, to measure objects to the nearest half, fourth, and eight of an inch. • MP 6 Students will attend to precision to describe and analyze data of the objects measured and displayed on line plots.
Instructional Strategies	*The expectations in this domain are limited to ½, ¼, and ⅛.* • Have students discuss how they have previously represented fractions on a number line, measured objects and displayed the data on a line plot . • Provide opportunities for students to create and display data on line plots with fractional units including halves, fourths, and eights. • Ask students to analyze and interpret data. • Have students solve problems that involve addition and subtraction of fractions from the data on the line plot. • Use appropriate vocabulary; data, line plot, length, and fractions, while working with line plots.
Prerequisite Skills	• 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.

Element	Exemplars
Connections Within and Beyond Grade Level	Within: ● Students are solving 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. ● Students will 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. ● Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. ● Recognize and generate equivalent fractions. ● Compare and order fractions and mixed numbers. Beyond: ● 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.
Instructional Examples/Lessons/Tasks	● Button Diameters
Assessment Examples	● Instructure Assessments

Measurement & Data

Cluster

Geometric measurement: understand concepts of angle and measure angles.

NVACS 4.MD.C.5 (Additional Work)

Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will persevere and solve problems involving measurement of angles. • MP 2 Students will identify angle measurements as additive in relation to the reference to a circle. • MP 6 Students will attend to precision when describing the measurement of angles.
Instructional Strategies	• Have conversations about angles being geometric shapes that are made of two rays that are infinite in length. • Discuss that rays that are less than the measure of a right angle is referred to as an acute angle. • Discuss that rays that are more than a measure of a right angle is referred to as an obtuse angle. • Provide opportunities for students to draw and explain the three types of angles. • Allow students to explore and compare angles of various measures to determine whether the angles is acute, right, or obtuse. • Explore the connection between the measurement of rotation and the circular movement in regards to 360 degrees. Discuss how an angle is measured with reference to a circle. • Explain that an angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. • Make a connection with a protractor and the rotation of 80 degrees. • Use the correct terminology for this standard; measure, point, end point, geometric shapes, ray, angle, circle, degree, and protractor.
Prerequisite Skills	• Identify two dimensional shapes.
Connections Within and Beyond Grade Level	Within: • Recognize angle measure as being additive. When an angle is decomposed into non-overlapping parts, the measure of the angle is the sum of the angle measures of the parts. • Using an equation with a symbol for the unknown angle measure, solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems. • Measure angles in whole-number degrees using a protractor. • Sketch angles of specified measure. Beyond: • Builds foundational skills for later geometry work.

Element	Exemplars
Instructional Examples/Lessons/Tasks	• Which Wedge is Right, .Turn, Turn, Turn
Assessment Examples	• Angles of Set Squares

Measurement & Data

Cluster

Geometric measurement: understand concepts of angle and measure angles.

NVACS 4.MD.C.6 (Additional Work)

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

Element	Exemplars
Standards for Mathematical Practice	• MP 5 Students will use protractors to measure angles and select appropriate tools to sketch angles of specified measures. • MP 6 Students will attend to precision when describing the measurement of angles.
Instructional Strategies	• Introduce the protractor using the knowledge that students have about the differences of an acute and obtuse angle. • Demonstrate how to use a protractor based on the placement of the origin of the protractor on the vertex of the angle and alignment of the bottom line. • Direct students to sketch angles of a specified measure. Be sure to take them through the steps based on the ray that is the line of reference.
Prerequisite Skills	• Identify angles in two-dimensional shapes. • Articulate and show the difference between an acute and obtuse angles. • Understand that there are two different angle types.
Connections Within and Beyond Grade Level	Within: • Students will recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and develop an understanding of the concepts of angle measurement. Beyond: • 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.
Instructional Examples/Lessons/Tasks	• Measuring Angles • Guess my Angle
Assessment Examples	• Instructure Assessment

Measurement & Data

Cluster

Geometric measurement: understand concepts of angle and measure angles.

NVACS 4.MD.C.7 (Additional Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students will solve word problems involving measurement of angles. • MP 2 Students will recognize angle measurements as additive in relation to the reference of a circle. • MP 6 Students will attend to precision when describing the measurement of angles.
Instructional Strategies	• Begin by explaining that when an angle is decomposed into non-overlapping parts, the angle measure of the whole is equal to the sum of the angle measures of the parts. When adding the two angle measures together, students should recognize angle measures as additive. • Provide word problems for students to experience that provide opportunities to solve addition and subtraction problems to find the unknown angles. • Promote and use the appropriate vocabulary including additive, decompose, and unknown angle.
Prerequisite Skills	• 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. • Use equations with a letter standing for the unknown quantity.
Connections Within and Beyond Grade Level	Within: • Identify angles • Measure and sketch angles • Add and subtract using a variable for the missing value Beyond: • Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
Instructional Examples/Lessons/Tasks	• Find the Unknown Angle • Summing it Up
Assessment Examples	• Angles of Set Squares • Instructure Assessment

Geometry

Cluster

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

NVACS 4.G.A.1 (Additional Work)

Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students will use two-shapes and spatial reasoning to solve problems involving symmetry. • MP 5 Students will use technology and hands on tools (paper, pencils, rulers,etc.) to draw lines, points, segments, angles, parallel and perpendicular lines. • MP 6 Students will describe and analyze lines, angles, and symmetrical shapes through discussion.
Instructional Strategies	• Identify and create points, lines, line segments, rays, angles, perpendicular and parallel lines in two dimensional shapes. • Build and draw points, lines, lines segments, rays, angles, perpendicular and parallel lines. • Reinforce and use appropriate vocabulary: points, lines, lines segments, rays, angles, perpendicular and parallel lines.
Prerequisite Skills	• Understand that shapes in different categories (e.g., rectangles, rhombuses, squares, etc.) may share attributes (e.g., having 4 sides), and that the shared attributes can define a larger category (e.g., quadrilaterals).
Connections Within and Beyond Grade Level	Within: • 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. • Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. • 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. • An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. • Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. • 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

Element	Exemplars
	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. Beyond: ● 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. ● Classify two-dimensional figures in a hierarchy based on properties.
Instructional Examples/Lessons/Tasks	• The Geometry of Letters • What's the Point
Assessment Examples	• Sample Smarter Balanced Item

Geometry

Cluster

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

NVACS 4.G.A.2 (Major Supporting Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students will use two-shapes and spatial reasoning to solve problems involving symmetry. • MP 5 Students will use technology and hands on tools (paper, pencils, rulers,etc.) to draw lines, points, segments, angles, parallel and perpendicular lines. • MP 6 Students will describe and analyze lines, angles, and symmetrical shapes through discussion.
Instructional Strategies	• Identify parallel and perpendicular lines in two-dimensional shapes. • Remind students of the different types of quadrilaterals and analyze the properties of them using parallel and perpendicular lines. • Identify right, acute, and obtuse angles in two-dimensional shapes. • Draw right, acute, and obtuse angles. • Identify right triangles as a category. • Discuss the relationships of two-dimensional shapes using these attributes. • Reinforce and use appropriate vocabulary: parallel, perpendicular, and right angle.
Prerequisite Skills	• Understand that shapes in different categories (e.g., rectangles, rhombuses, squares, etc.) may share attributes (e.g., having 4 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.
Connections Within and Beyond Grade Level	Within: • Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. • Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. Beyond: • 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. • Classify two-dimensional figures in a hierarchy based on properties.

Element	Exemplars
Instructional Examples/Lessons/Tasks	• What Shape Am I? • Are These Right? • Defining Attributes of Rectangles as Parallelograms • What is a Trapezoid? • Identifying Right Triangles
Assessment Examples	• Sample Smarter Balanced Item

Geometry

Cluster

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

NVACS 4.G.A.3 (Major Supporting Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students will use two-shapes and spatial reasoning to solve problems involving symmetry. • MP 5 Students will use technology and hands on tools (paper, pencils, rulers,etc.) to draw lines, points, segments, angles, parallel and perpendicular lines. • MP 6 Students will describe and analyze lines, angles, and symmetrical shapes through discussion.
Instructional Strategies	• Create shapes and divide them into two equal parts. • Determine shapes which cannot be divided into equal parts. • Find line(s) of symmetry of two dimensional shapes by folding along a line to see the matching parts. • Draw line(s) of symmetry.
Prerequisite Skills	• Partition shapes into parts with equal areas.
Connections Within and Beyond Grade Level	Within: • Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. • 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. Beyond: • Builds foundational skills for later geometry work.
Instructional Examples/Lessons/Tasks	• Finding Lines of Symmetry • Lines of Symmetry for Triangles • Lines of Symmetry for Quadrilaterals
Assessment Examples	• Symmetrical Patterns

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Elko County School District

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Clark County School District

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Southern RPDP

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Elko County School District

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Northwest RPDP

Jennifer Loescher
Southern RPDP

Dubb Mapp
Nye County School District

Christie McKenzie
Clark County School District

Candice Meiries
Southern RPDP

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Clark County School District

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Elko County School District

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Douglas County School District

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Washoe County School District

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Elko County School District

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Douglas County School District

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Clark County School District

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Clark County School District

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Elko County School District

Kelly Sarbacker
Elko County School District

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Doral Academy – Las Vegas

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Douglas County School District

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Clark County School District

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Elko County School District

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Elko County School District

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Elko County School District

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Jhone Ebert

Superintendent of Public Instruction

Jonathan Moore, Ed.D

Deputy Superintendent for Student Achievement

Dave Brancamp

Director of Standards and Instructional Support

Tracy Gruber

K-12 Mathematics Education Program Professional

The Nevada Ready! Network

Standards-Based Instruction for ALL Nevada Students