Number and Operations in Base Ten

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CONTENT AREA Mathematics

DOMAIN Number and Operations in Base Ten

Kindergarten

Cluster	Standards as written	
Work with numbers 11–19 to gain foundations for place value.	**K.NBT.A.1**	Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

ENTRY POINTS and ACCESS SKILLS for Number and Operations in Base Ten Standards in Kindergarten

Less Complex ⟵ ⟶ **More Complex**

	ACCESS SKILLS		**ENTRY POINTS**	
	The student will:	**The student will:**	**The student will:**	**The student will:**
Work with numbers 11–19 to gain founda-tions for place value.	♦ Respond to materials as they are counted ♦ Shift focus from materials to speaker counting materials ♦ Grasp materials as they are counted ♦ Release materials as they are counted ♦ Give materials as they are counted ♦ Move objects as they are counted ♦ Orient objects as they are counted (e.g., turn flowerpots upright) ♦ Manipulate objects with two hands as they are counted ♦ Locate objects partially hidden, or out of sight, to add or subtract to a collection of objects to be counted ♦ Use one object to act on another as objects are counted (e.g., use a pointer to tap) ♦ Adjust plane to move objects in counting activities (e.g., tip plank so that materials can be named in counting sequence as they fall)	♦ Count by ones up to 10 ♦ Represent a number of objects (up to 5) with a written numeral (with 0 representing a count of no objects). ♦ Compose numbers from 1 to 9 to create 10 and record each composition by using objects. ♦ Decompose 10 into two numbers between 1 and 9 and record each decomposition by using objects ♦ Answer yes/no questions related to numbers, quantities or counting	♦ Compose numbers from 1 to 9 to create 10, record each composition by using objects and/or drawings. ♦ Decompose 10 into two numbers between 1 and 9; record each decomposition by using objects and/or drawings	♦ Compose numbers from 1 to 9 to create 10 and record each composition by using objects, drawings and/or equations (e.g., 1 + 9 = 10) ♦ Decompose 10 into two numbers between 1 and 9 and record each decomposition by using objects, drawings and/or equations (e.g., 10 - 1 = 9)

ACCESS SKILLS (continued) for Number and Operations in Base Ten Standards in Kindergarten

Less Complex ← → **More Complex**

	ACCESS SKILLS The student will:	**ENTRY POINTS The student will:**
Work with numbers 11–19 to gain foundations for place value. (continued)	♦ Construct using materials that have been counted in sequence (e.g., tower of blocks) ♦ Turn device on/off to participate in counting sequence activity (e.g., activate preprogrammed voice-generating device to recite number names) ♦ Imitate action in counting sequence activity ♦ Initiate cause-and-effect response in counting sequence activity (e.g., use switch to activate a number-naming cause-and-effect computer program) ♦ Sustain counting sequence activity through response ♦ Gain attention in counting sequence activity ♦ Make a request in counting sequence activity (e.g., request a turn to move the marker on a board game) ♦ Choose from an array of two during a counting sequence activity (e.g., choose materials to be counted) ♦ Choose beyond an array of two during a counting sequence activity (e.g., choose materials to be counted) ♦ Follow directions in counting sequence activities (e.g., follow direction to "Put the pencils in the box" as the teacher counts) ♦ Attend visually, aurally, or tactilely to objects as they are counted	

CONTENT AREA Mathematics
DOMAIN Number and Operations in Base Ten

Grade 1

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

ENTRY POINTS for Number and Operations in Base Ten Standards in Grade 1

Less Complex ← → **More Complex**

	The student will:	**The student will:**	**The student will:**
Extend the counting sequence.	♦ Count by ones up to 20 *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Count by tens to 100. ♦ Represent a number of objects (between 10 and 20) with a numeral by writing and/or using layered place value cards or flip books ♦ Count forward beginning from a given number up to 20 within the known sequence (e.g., count on from 13)	♦ Count by ones up to 100 ♦ Represent a number of objects (up to 99) with a numeral by writing and/or using layered place value cards or flip books ♦ Count forward beginning from a given number up to 100 within the known sequence (e.g., count on from 23). *Continue to address skills and concepts that approach grade-level expectations in this cluster*
Understand place value.	♦ Create groups/bundles of 10 from 10, 20, and/or 30 single objects ♦ Visually represent quantities between 11 and 19 as a bundle of "ten" and the appropriate number of "ones" use manipulatives on a place value mat ♦ Label bundles with numerals of up to twenty objects grouped/bundled into tens and ones on a place value mat ♦ Compare objects bundled into one "ten" or up to 9 "ones" using the terms "greater than," "equal to," or "less than" *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Visually represent quantities up to 50 as bundles of 10 ones (as "tens"), and up to 9 ones (as "ones") using manipulatives on a place value mat ♦ Use numerals to accurately label groups of up to fifty objects grouped/bundled into tens and ones on a place value mat ♦ Compare up to 50 objects grouped into tens and ones using the terms "greater than," "equal to," or "less than"	♦ Use numerals to accurately label groups of objects (up to 99) grouped/bundled into tens and ones on a place value mat ♦ Visually represent quantities up to 99 as bundles of "tens" and the appropriate number of "ones" using manipulatives on a place value mat or drawings ♦ Compare objects grouped into tens and ones using symbols (<, >, =) up to 50 *Continue to address skills and concepts that approach grade-level expectations in this cluster*

ENTRY POINTS for
Number and Operations in Base Ten Standards in Grade 1

Less Complex ⟷ **More Complex**

	The student will:	**The student will:**	**The student will:**
Use place value understanding and properties of operations to add and subtract.	♦ Add within 20 based on place value strategies use a visual representation (manipulatives, place value mats, drawings, and/or technology) *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Add within 20 using equations based on place value strategies and a visual representation (e.g., manipulatives, place value mats, drawings, and/or technology) ♦ Identify "ten more" than a given two-digit number (using manipulatives, drawings, sounds, fingers, or counting by ones)	♦ Add and subtract within 5 using equations and visual representations based on place value strategies to (manipulatives, place value mats, drawings and/or technology) ♦ Identify "ten more" or "ten less" than a given two-digit number (using manipulatives bundled into tens and ones, place value mats, drawings, and/or counting on fingers) *Continue to address skills and concepts that approach grade-level expectations in this cluster*

CONTENT AREA Mathematics
DOMAIN Number and Operations in Base Ten

Grade 2

Cluster	Standards as written	
Understand place value.	**2.NBT.A.1**	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.
	Understand the following (1a and 1b) as special cases:	
	2.NBT.A.1a	100 can be thought of as a bundle of ten tens—called a "hundred."
	2.NBT.A.1b	The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
	2.NBT.A.2	Count within 1,000; skip-count by 5s, 10s, and 100s. Identify patterns in skip counting starting at any number.
	2.NBT.A.3	Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.
	2.NBT.A.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
Use place value understanding and properties of operations to add and subtract.	**2.NBT.B.5**	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
	2.NBT.B.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.
	2.NBT.B.7	Add and subtract within 1,000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
	2.NBT.B.8	Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
	2.NBT.B.9	Explain why addition and subtraction strategies work, using place value and the properties of operations. [1]

[1] Explanations may be supported by drawings or objects.

ENTRY POINTS for
Number and Operations in Base Ten Standards in Grade 2

Less Complex ← → **More Complex**

	The student will:	**The student will:**	**The student will:**
Understand place value.	♦ Skip-count place value units by 100 within 1000 ♦ Using place value strategies, demonstrate the concept of trading equal amounts (e.g., 10 singles = a bundle of 10; 10 bundles = a bundle of 100) ♦ Represent a number of objects (up to 200) bundled into hundreds, tens and ones with a numeral by writing, using layered place value cards and/or flip books ♦ Create groups/bundles of 100 from bundles of "tens" ♦ Compare objects grouped into one hundred or up to 9 tens and up to 9 ones using the terms "greater than," "equal to," or "less than" (e.g., 100 is greater than 8 tens and 5 ones) ♦ Show numbers in expanded form up to 99 (e.g., 11 can be shown as 10 + 1; 12 can be shown as 10 + 2) ♦ Use number names to accurately label groups of objects to 99 into tens and ones ♦ Add and subtract single-digit numbers *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Skip-count place value units by 10 within 100 ♦ Use numerals to accurately label groups of objects (up to 500) grouped/bundled into hundreds, tens and ones (i.e. by writing, using layered place value cards and/or flip books) ♦ Use number names to accurately label groups of objects (up to 500) grouped/bundled into hundreds, tens and ones ♦ Visually represent quantities up to 500 as bundles of 10 tens (as "hundreds"), 10 ones (as "tens"), and up to 9 ones (as "ones") using manipulatives and place value mats ♦ Express the "hundreds" digit, the "tens" digit and "ones" digit of a written numeral between 11 to 499 by using manipulatives, place value mats and/or technology ♦ Compare objects grouped into hundreds, tens and ones using the terms "greater than," "equal to," or "less than," up to 200 ♦ Show numbers in expanded form up to 200 (e.g., 111 can be shown as 100 + 10 + 1; 125 can be shown as 100 + 20 + 5) ♦ Add and subtract double - digit numbers	♦ Skip-count place value units by 5 within 100 ♦ Use numerals to accurately label groups of objects (up to 999) grouped/bundled into hundreds, tens and ones (i.e. by writing, using layered place value cards and/or flip books) ♦ Use number names to accurately label groups of objects (up to 999) grouped/bundled into hundreds, tens and ones ♦ Visually represent quantities up to 999 as bundles using manipulatives and place value mats ♦ Compare objects grouped into hundreds, tens and ones using symbols (=, >, <) up to 500 ♦ Add and subtract three-digit numbers *Continue to address skills and concepts that approach grade-level expectations in this cluster*

ENTRY POINTS for Number and Operations in Base Ten Standards in Grade 2

Less Complex ← → **More Complex**

Use place value understanding and properties of operations to add and subtract.	♦ Solve column addition and subtraction problems of 2 two-digit numbers that are multiples of ten using place value strategies (including manipulatives and drawings) ♦ Demonstrate the relationship between addition and subtraction within 10 using equations and place value materials (e.g., 5 + 3 = 8; 8 - 3 = 5) ♦ Add and subtract 100 to or from a given set of up to 900 objects *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Solve column addition and subtraction problems of two-digit numbers use place value strategies including manipulatives and drawings ♦ Add ten and subtract 10 to a given set of up to 100 objects ♦ Add up to three two-digit numbers using place value manipulatives ♦ Solve multi-digit column addition and subtraction problems using the standard algorithm ♦ Add and subtract single and/or double-digit numbers	♦ Solve column addition and subtraction problems of three-digit numbers use place value strategies including manipulatives and drawings ♦ Demonstrate the relationship between addition and subtraction within 20 using number sentences and place value materials (e.g., 5 + 12 = 17; 17 - 5 = 12) ♦ Add and subtract ten to or from a given set of up to 900 objects using strategies based on place value ♦ Add up to three two-digit numbers using strategies based on place value and/or place value manipulatives *Continue to address skills and concepts that approach grade-level expectations in this cluster*

CONTENT AREA Mathematics

DOMAIN Number and Operations in Base Ten

Grade 3

Cluster	Standards as written	
Use place value understanding and properties of operations to perform multi-digit arithmetic[1].	**3.NBT.A.1**	Use place value understanding to round whole numbers to the nearest 10 or 100.
	3.NBT.A.2	Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
	3.NBT.A.3	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.

[1] A range of algorithms may be used.

ENTRY POINTS for
Number and Operations in Base Ten Standards in Grade 3

Less Complex ⟷ **More Complex**

	The student will:	**The student will:**	**The student will:**
Use place value understanding and properties of operations to perform multi-digit arithmetic.	♦ Round whole two-digit numbers to the nearest 10 using place value materials *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Round whole three-digit numbers to the nearest 100 using place value materials	♦ Multiply one-digit numbers by a multiple of 10 (in the range of 10-90) using manipulatives, repeated addition, skip counting by tens or place value strategies ♦ Round whole three-digit numbers to the nearest 10 using place value materials *Continue to address skills and concepts that approach grade-level expectations in this cluster*

CONTENT AREA Mathematics

DOMAIN Number and Operations in Base Ten

Grade 4

Cluster	Standards as written	
Generalize place value understanding for multi-digit whole numbers less than or equal to 1,000,000.	**4.NBT.A.1**	Recognize that in a multi-digit whole number, a digit in any place represents 10 times as much as it represents in the place to its right. *For example, recognize that 700 ☐ 70 = 10 by applying concepts of place value and division.*
	4.NBT.A.2	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
	4.NBT.A.3	Use place value understanding to round multi-digit whole numbers to any place.
Use place value understanding and properties of operations to perform multi-digit arithmetic on whole numbers less than or equal to 1,000,000.	**4.NBT.B.4**	Fluently add and subtract multi-digit whole numbers using the standard algorithm.
	4.NBT.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
	4.NBT.B.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

ENTRY POINTS for Number and Operations in Base Ten Standards in Grade 4

Less Complex ← → **More Complex**

	The student will:	The student will:	The student will:
Generalize place value understanding for multi-digit whole numbers less than or equal to 1,000,000.	♦ Compose and decompose multi-digit numbers by their place values using expanded form and base-ten materials (e.g., layered place value cards, flip books) ♦ Represent a three-digit whole number to demonstrate that the digit in tens place represents ten times what it represents in the ones place and the digit in the hundreds place represents ten times what it represents in the tens place (e.g., in number 324, the 3 represents 30 bundles of tens and the 2 represents 20 units of ones) *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Compare two numbers within 100 using "more than," "less than," or "equal to" (e.g., place value materials) ♦ Interpret multi-digit whole numbers using base-ten materials, layered place value cards and/or flip books "express" answer ♦ Represent a four-digit whole number using place value manipulatives (e.g., in number 5,324, the 5 represents 50 hundreds, the 3 represents 30 tens and the 2 represents 20 ones) ♦ Round whole numbers to the nearest 10 using place value	♦ Show numbers in expanded form (e.g., 1,111 can be shown as 1,000 + 100 + 10 + 1; 6,125 can be shown as 6,000 + 100 + 20 + 5) ♦ Compare numbers within 1,000 using the symbols >, <, or = ♦ Round whole numbers to the nearest 100 using place value *Continue to address skills and concepts that approach grade-level expectations in this cluster*
Use place value understanding and properties of operations to perform multi-digit arithmetic on whole numbers less than or equal to 1,000,000.	♦ Multiply up to 10 x 10 (e.g., using visual representations and/or manipulatives) ♦ Multiply one-digit numbers by a multiple of 100 and/or 1,000 (e.g., using manipulatives, place value strategies, or the properties of multiplication) ♦ Divide up to a two-digit number by a one-digit number without remainders (e.g., using place value materials, rectangular arrays, or area models)	♦ Multiply a one-digit number by at least a two-digit number ♦ Divide up to a three-digit number by a one-digit number without remainders (e.g., using equations and place value materials, rectangular arrays, or area models) ♦ Solve division problems up to two digits by one digit, using the relationship between multiplication and division to demonstrate that, for example, 76÷4=19 because 19x4=76 ♦ Divide up to a three-digit number by a one-digit number without remainders using various strategies or methods	♦ Multiply a two-digit number by a two digit-number (e.g., using equations, an array, or area model) ♦ Divide up to a three-digit number by a one-digit number with remainders ♦ Solve three-digit by one-digit division word problems *Continue to address skills and concepts that approach grade-level expectations in this cluster*

CONTENT AREA Mathematics

DOMAIN Number and Operations in Base Ten

Grade 5

Cluster	Standards as written	
Understand the place value system.	**5.NBT.A.1**	Recognize that in a multi-digit number, including decimals, a digit in any place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.
	5.NBT.A.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
	5.NBT.A.3	Read, write, and compare decimals to thousandths.
	5.NBT.A.3a	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
	5.NBT.A.3b	Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
	5.NBT.A.4	Use place value understanding to round decimals to any place.
Perform operations with multi-digit whole numbers and with decimals to hundredths.	**5.NBT.B.5**	Fluently multiply multi-digit whole numbers (include two-digit x four-digit numbers and, three-digit x three-digit numbers) using the standard algorithm.
	5.NBT.B.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
	5.NBT.B.7	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 and between multiplication and division; relate the strategy to a written method and explain the reasoning used.

ENTRY POINTS for
Number and Operations in Base Ten Standards in Grade 5

Less Complex ← → **More Complex**

	The student will:	**The student will:**	**The student will:**
Understand the place value system.	♦ Express decimals to the hundredths (e.g., using place value materials, flip books) ♦ Compare decimals to the tenths using symbols (=, >, <) (e.g., flip books and/or manipulatives) ♦ Connect money to decimals by rounding up to the nearest dollar (e.g., $2.57 becomes $3) *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Express decimals to the thousandths (e.g., using place value materials, flip books) ♦ Compare decimals to the hundredths using symbols (=, >, <) (e.g., using place value materials, flip books and/or manipulatives) ♦ Express decimals to the hundredths using expanded form ♦ Show that in a three-digit whole number, a digit in one place represents 1/10 what it represents in the place to the left (e.g., use place value materials to show that the 5 in 356 is 1/10 the value of the 5 in 514) ♦ Connect money to decimals by rounding up to the nearest dime (e.g., $2.57 becomes $2.60)	♦ Write decimals to the hundredths (e.g., using place value materials, flip books) ♦ Write decimals to the hundredths using expanded form ♦ Rounds decimals to the nearest tenth ♦ Use whole number exponents to denote powers of ten (e.g., show that 10 x 10 x 10 = 1,000 and 10^3 ♦ Multiply multi-digit whole numbers *Continue to address skills and concepts that approach grade-level expectations in this cluster*

ENTRY POINTS for Number and Operations in Base Ten Standards in Grade 5

Less Complex ← → **More Complex**

Perform operations with multi-digit whole numbers and with decimals to hundredths.	♦ Add decimals to the tenths using various strategies ♦ Subtract decimals to the tenths using various strategies *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Divide up to a three-digit number by a two-digit number without remainders (e.g., using place value materials, rectangular arrays or area models) ♦ Multiply a whole number by a decimal in the tenths using estimation (e.g., 6 x 0.19 is close to 6 x $0.20 which is $1.20 my number will be one whole and a decimal.) ♦ Multiply a whole number by a decimal in the tenths using number lines ♦ Multiply a whole number by a decimal in the tenths using repeated addition ♦ Multiply a whole number by a decimal in the tenths using coins ♦ Multiply a whole number by a decimal in the tenths (e.g., using a hundreds grid, I can shade 19 squares 6 times to show on whole grid and 14 hundredths or 1.14) ♦ Divide up to a four-digit number by a two-digit number with remainders using equations ♦ Divide a number that includes a decimal to the hundredths by a decimal	♦ Divide up to a three-digit number by a two-digit number with remainders (e.g., using place value materials, rectangular arrays, or area models) ♦ Add decimals to hundredths (e.g., place value materials, concrete models, drawings or strategies based on properties of operations) ♦ Subtract decimals to hundredths (e.g., using place value materials, concrete models, drawings, or strategies based on properties of operations) ♦ Divide a number that includes a decimal to tenths by a whole number using estimation based on properties of operations (e.g., if 7.6÷4 is close to 8÷4, my answer will be close to 2) ♦ Divide a number that includes a decimal to tenths by a whole number using repeated subtraction based on properties of operations ♦ Divide a number that includes a decimal by a whole number using coins based on properties of operations (e.g., share $7.60 with 4 people; each person will get 1 dollar and 9 dimes. My answer is 1.90) ♦ Divide a number that includes a decimal to tenths by a whole number *Continue to address skills and concepts that approach grade-level expectations in this cluster*

The Number System

	Standards	Entry Points	Access Skills
6	Pages 74 – 75	Pages 76 – 79	Pages 76 – 80
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CONTENT AREA Mathematics
DOMAIN The Number System

Grade 6

Cluster	Standards as written	
Apply and extend previous under-standings of multiplication and division to divide fractions by fractions.	**6.NS.A.1**	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ☐ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ☐ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. In general, (a/b) ☐ (c/d) = ad/bc. How much chocolate will each person get if three people share 1/2 lb. of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mile and area 1/2 square mile?*
Compute fluently with multi-digit numbers and find common factors and multiples.	**6.NS.B.2**	Fluently divide multi-digit numbers using the standard algorithm.
	6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
	6.NS.B.4	Use prime factorization to find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two relatively prime numbers. *For example, express 36 + 8 as 4(9 + 2).*
Apply and extend previous under-standings of numbers to the system of rational numbers.	**6.NS.C.5**	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, and positive/negative electric charge). Use positive and negative numbers (whole numbers, fractions, and decimals) to represent quantities in real-world contexts, explaining the meaning of zero in each situation.
	6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
	6.NS.C.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that zero is its own opposite.
	6.NS.C.6b	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
	6.NS.C.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
	6.NS.C.7	Understand ordering and absolute value of rational numbers.

Apply and extend previous understandings of numbers to the system of rational numbers. (continued)	**6.NS.C.7a**	Interpret statements of inequality as statements about the relative positions of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*
	6.NS.C.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3oC > –7oC to express the fact that –3oC is warmer than –7oC.*
	6.NS.C.7c	Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.*
	6.NS.C.7d	Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*
	6.NS.C.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

ENTRY POINTS and ACCESS SKILLS for The Number System Standards in Grade 6

Less Complex ⟷ **More Complex**

	ACCESS SKILLS		ENTRY POINTS	
	The student will:	**The student will:**	**The student will:**	**The student will:**
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	♦ Respond to materials that demonstrate objects that can be divided into equal parts ♦ Track materials that demonstrate that objects can be divided into equal parts ♦ Shift focus from materials that demonstrate that objects can be divided into equal parts ♦ Grasp materials that demonstrate that objects can be divided into equal parts ♦ Use two hands to hold materials that demonstrate that objects can be divided into equal parts ♦ Release materials that demonstrate that objects can be divided into equal parts ♦ Move materials that demonstrate that objects can be divided into equal parts	♦ Demonstrate, using manipulatives, that the whole is equal to the sum of partitioned parts (e.g., show that four equal quarter-sized parts of an object together comprise the entire object) ♦ Identify parts of a whole using concrete objects (e.g., distinguish one quarter of an object from one half of the object) ♦ Match visual representations of simple fractions to the fraction itself (e.g., one third of a pie as $\frac{1}{3}$) ♦ Match improper fractions to equivalent mixed numbers or mixed numbers to equivalent improper fractions (e.g., from side-by-side lists) ♦ Use manipulatives and strategies to show repeated division (e.g., paper folding)	♦ Identify parts of a whole using visual fraction models (e.g.,$\frac{1}{2}$,$\frac{2}{3}$,$\frac{7}{8}$, etc.) ♦ Convert an improper fraction to a mixed number or a mixed number to an improper fraction (e.g., equate $\frac{5}{4}$ and $1\frac{1}{4}$) ♦ Multiply a fraction by a whole number (e.g., $4 \times \frac{2}{3}$, $\frac{3}{5} \times 18$, etc.) ♦ Divide a whole number by a fraction or a fraction by a whole number (e.g., $12 \div \frac{1}{5}$, $\frac{2}{7} \div 2$, etc.) ♦ Create visual representations of simple fractions to the fraction itself (e.g., show one third of a pie as $\frac{1}{3}$)	♦ Multiply a fraction by a fraction (e.g., $\frac{7}{8} \times \frac{4}{7}$, $\frac{1}{2} \times \frac{6}{5}$, etc.) ♦ Divide two fractions with the same denominator (e.g., $\frac{2}{3} \div \frac{5}{3}$, $\frac{6}{7} \div \frac{8}{7}$, etc.) ♦ Divide two fractions with the same numerator (e.g., $\frac{4}{4} \div \frac{4}{3}$, $\frac{9}{2} \div \frac{9}{4}$, etc.) ♦ Solve word problems involving multiplication and division of fractions (e.g., Graham has $\frac{2}{3}$ cup of soda and Lucy has half as much soda as Graham) *Continue to address skills and concepts that approach grade-level expectations in this cluster*

ENTRY POINTS and ACCESS SKILLS for The Number System Standards in Grade 6

Less Complex ← → **More Complex**

	ACCESS SKILLS		ENTRY POINTS	
	The student will:	**The student will:**	**The student will:**	**The student will:**
Compute fluently with multi-digit numbers and find common factors and multiples.	♦ Respond to materials as they are counted ♦ Shift focus from materials to speaker counting materials ♦ Grasp materials as they are counted ♦ Release materials as they are counted ♦ Give materials as they are counted ♦ Move objects as they are counted ♦ Orient objects as they are counted (e.g., turn flowerpots upright) ♦ Manipulate objects with two hands as they are counted ♦ Locate objects partially hidden or out of sight to add or subtract to a collection of objects to be counted ♦ Use one object to act on another as objects are counted (e.g., use a pointer to tap) ♦ Adjust plane to move objects in counting activities (e.g., tip plank so that materials can be named in counting sequence as they fall)	♦ Describe real-world quantities as greater than or less than zero (e.g., elevation, temperature, etc.) ♦ Add and/or subtract one-digit whole numbers to/from two-digit whole numbers (e.g., $6 + 11$, $81 - 8$, etc.) ♦ Multiply and divide one- and two-digit whole numbers (e.g., 5×14, $68 \div 4$, etc.) ♦ Multiply multi-digit numbers by one-digit numbers using manipulatives (e.g., illustrate 3×12 by combining three groups of twelve objects) ♦ Divide two-digit numbers by one-digit numbers using manipulatives (e.g., illustrate $15 \div 3$ by separating fifteen objects into three groups of five) ♦ Represent repeated addition problems using concrete manipulatives (e.g., $7 + 7 + 7$ can be represented by three groups of seven) ♦ Identify numbers that are multiples of 2 (e.g., from a list of numbers) ♦ Multiply one-digit number by a one-digit number	♦ Multiply a whole number by a decimal (e.g., 0.7×13, 16×2.1, etc.) ♦ Multiply a three-digit number by a one-digit number (e.g., 6×101, 3×313, etc.) ♦ Divide a two-digit number by a one-digit number (e.g., without remainders) ♦ Add and subtract numbers including decimals to tenths (e.g., $9.5 + 4.7$, $49.1 - 6.0$, etc.) ♦ Identify numbers that are multiples of 2 or 3 (e.g., from a list of numbers) ♦ Identify numbers within 50 that have a common factor (e.g., 9 and 33 have a common factor of 3, and 33 and 44 have a common factor of 11) ♦ Divide numbers including decimals to tenths (e.g., $30.3 \div 3.0$, $6.4 \div 12.8$, etc.) ♦ Factorize numbers to 50 (e.g., the factors of 28 are 1, 2, 4, 7, 14, 28)	♦ Multiply two decimal numbers (e.g., 21.4×1.3, 6.7×6.22, etc.) ♦ Multiply multi-digit numbers (e.g., 124×71, 88×88, etc.) ♦ Divide three-digit numbers by one-digit numbers (e.g., without remainders) ♦ Add and subtract numbers including decimals to hundredths (e.g., $71.62 + 22.82$, $150.01 - 77.8$, etc.) ♦ Identify numbers within 100 that have a common factor (e.g., 91 and 13 have a common factor of 13, but 33 and 49 have no common factors) ♦ Demonstrate the distributive property by finding a common factor (e.g., show $36 + 48$ as $12(3 + 4)$) ♦ Divide numbers including decimals to hundredths (e.g., $30.36 \div 3.0$, $6.40 \div 12.8$, etc.) ♦ Factorize numbers to 100 (e.g., the factors of 80 are 1, 2, 4, 5, 8, 10, 16, 20, 40, 80, but the factors of 83 are 1 and 83)

ENTRY POINTS and ACCESS SKILLS for The Number System Standards in Grade 6

Less Complex ← → **More Complex**

	ACCESS SKILLS		ENTRY POINTS	
	The student will:	**The student will:**	**The student will:**	**The student will:**
Compute fluently with multi-digit numbers and find common factors and multiples. (continued)	♦ Construct using materials that have been counted in sequence (e.g., tower of blocks) ♦ Turn device on/off to participate in counting sequence activity (e.g., activate preprogrammed voice-generating device to recite number names) ♦ Imitate action in counting sequence activity ♦ Initiate cause-and-effect response in counting sequence activity (e.g., use switch to activate a number-naming cause-and-effect computer program) ♦ Sustain counting sequence activity through response ♦ Gain attention in counting sequence activity ♦ Make a request in counting sequence activity (e.g., request a turn to move the marker on a board game) ♦ Choose from an array of two during a counting sequence activity (e.g., choose materials to be counted)	♦ Demonstrate a variety of number combinations that when added equal a whole number using manipulatives (e.g., twelve objects can be separated into groups of 4 and 8 objects, 2 and 10 objects, etc.) ♦ Identify equivalent forms of common decimals and fractions less than 1 (e.g., $0.5 = \frac{1}{2}$)	♦ Use factors of to show different multiplication expressions to represent a number (e.g., 20 can be represented by 1×20, 2×10, 4×5) ♦ Add and/or subtract whole digit numbers	♦ Identify numbers up to 100 as prime or composite (e.g., 53 is prime and 57 is composite) *Continue to address skills and concepts that approach grade-level expectations in this cluster*

ENTRY POINTS and ACCESS SKILLS for The Number System Standards in Grade 6

Less Complex ⟷ **More Complex**

	ACCESS SKILLS		ENTRY POINTS	
	The student will:	**The student will:**	**The student will:**	**The student will:**
Apply and extend previous understandings of numbers to the system of rational numbers.	♦ Locate objects partially hidden or out of sight to add or subtract to a collection of objects to be counted ♦ Use one object to act on another as objects are counted (e.g., use a pointer to tap) ♦ Adjust plane to move objects in counting activities (e.g., tip plank so that materials can be named in counting sequence as they fall) ♦ Gain attention in counting sequence activity ♦ Make a request in counting sequence activity (e.g., request a turn to move the marker on a board game) ♦ Choose from an array of two during a counting sequence activity (e.g., choose materials to be counted)	♦ Locate numbers on a horizontal number line including positive and negative integers and zero (e.g., given a calibrated number line and a point of reference, locate -5, 0, 7, etc.) ♦ Locate the negative number on a number line that is an equal distance from zero as its opposite (e.g., locate -6 on a number line given the locations of 0 and 6) ♦ Use inequality symbols to compare negative numbers (e.g., choose < or > when given two numbers to compare) ♦ Determine the absolute value of positive and negative numbers (e.g., $\lvert -2\rvert$ is 2 because -2 is 2 units from zero) ♦ Represent a real-life negative quantity using a vertical or horizontal number line (e.g., degrees below zero, meters below sea level, etc.)	♦ Locate fractions between 0 and 1 on a number line (e.g., given a calibrated number line and reference points 0 and 1, locate $\frac{1}{2}$, $\frac{3}{5}$, $\frac{5}{8}$, etc.) ♦ Plot points in the first quadrant on a coordinate grid (e.g., locate the points $(2,3)$, $(5,1)$, etc.) ♦ Determine how many units separate two points on a number line that includes positive and negative numbers (e.g., find the distance between -5 and 7) ♦ Compare absolute values using a number line (e.g., $\lvert -7\rvert > \lvert 3\rvert$ because -7 is further away from zero than 3 and $\lvert -5\rvert = \lvert 5\rvert$ because they are both 5 units from zero)	♦ Locate positive numbers including fractions and mixed numbers on a number line (e.g., given a calibrated number line and reference point(s), locate $\frac{1}{4}$, 3, $2\frac{1}{2}$, etc.) ♦ Locate rational numbers on a number line (e.g., including fractions and negatives) ♦ Plot points on a coordinate grid (e.g., locate the points $(-3,10)$, $(0,2)$, $(-1,-1)$, etc.) ♦ Determine the coordinates of points plotted on a coordinate grid (e.g., from any quadrant) ♦ Add and subtract the absolute values of rational numbers (e.g., $\left\lvert -\frac{5}{8}\right\rvert + \left\lvert \frac{3}{8}\right\rvert$)

ENTRY POINTS and ACCESS SKILLS for The Number System Standards in Grade 6

Less Complex ← → **More Complex**

	ACCESS SKILLS The student will:	ENTRY POINTS The student will:
Apply and extend previous understandings of numbers to the system of rational numbers. (continued)	♦ Choose beyond an array of two during a counting sequence activity (e.g., choose materials to be counted) ♦ Follow directions in counting sequence activities (e.g., follow direction to "Put the pencils in the box" as the teacher counts) ♦ Respond to materials as they are counted in sequence ♦ In the context of an academic activity on addition (putting together and adding to) and subtraction (taking apart and taking from), respond to materials to be added or subtracted ♦ Track object as it is added or subtracted from set ♦ Attend visually, aurally, or tactilely to objects as they are counted	

CONTENT AREA Mathematics
DOMAIN The Number System

Grade 7

Cluster	Standards as written	
Apply and extend previous understand-ings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.A.1**	Apply and extend previous understandings of addition and subtraction to add and subtract integers and other rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
	7.NS.A.1a	Describe situations in which opposite quantities combine to make zero. *For example: A hydrogen atom has zero charge because its two constituents are oppositely charged; If you open a new bank account with a deposit of $30 and then withdraw $30, you are left with a $0 balance.*
	7.NS.A.1b	Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
	7.NS.A.1c	Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
	7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.
	7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers.
	7.NS.A.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
	7.NS.A.2b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
	7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers.
	7.NS.A.2d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
	7.NS.A.3	Solve real-world and mathematical problems involving the four operations with integers and other rational numbers.[1]

[1] Computations with rational numbers extend the rules for manipulating fractions to complex fractions.

ENTRY POINTS for
The Number System Standards in Grade 7

Less Complex ⟷ **More Complex**

	The student will:	**The student will:**	**The student will:**
Apply and extend previous understand-ings of operations with fractions to add, subtract, multiply, and divide rational numbers.	♦ Add positive and negative numbers using a number line, manipulatives or zero sums (e.g., represent $5 + (-3)$ on a number line by starting at 0, moving 5 units right, and then 3 units left) ♦ Add and subtract positive or negative multi-digit numbers and decimals (e.g., $61 - 24.5$, $77 - (-52)$, etc.) *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Add positive and negative numbers to solve a real-life problem (e.g., find the population of a town of 32022 people after 432 of them move away) ♦ Multiply and divide positive or negative multi-digit numbers or decimals (e.g., $16 \times (-10)$, $(-234) \div (-11.7)$, etc.)	♦ Add and subtract fractions (e.g., using any strategy) ♦ Multiply and divide fractions (e.g., $\frac{1}{3} \times \frac{3}{8}$, $\frac{2}{7} \div \frac{9}{5}$, etc.) ♦ Multiply and divide numbers to solve a real-life problem (e.g., find the weight of each tire if 12 of them weigh 252 pounds) ♦ Use any operation to compute with signed numbers (e.g., $-17 - (-20)$, $14 \times (-40)$, etc.) *Continue to address skills and concepts that approach grade-level expectations in this cluster*

CONTENT AREA Mathematics
DOMAIN The Number System

Grade 8

Cluster	Standards as written	
Know that there are numbers that are not rational, and approximate them by rational numbers.	**8.NS.A.1**	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion. For rational numbers show that the decimal expansion repeats eventually and convert a decimal expansion which repeats eventually into a rational number.
	8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of* $\sqrt{2}$ *show that* $\sqrt{2}$ *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

ENTRY POINTS for
The Number System Standards in Grade 8

Less Complex ⟷ **More Complex**

	The student will:	**The student will:**	**The student will:**
Know that there are numbers that are not rational, and approximate them by rational numbers.	♦ Order integers on a number line (e.g., plot integers on a number line given a point of reference) ♦ Compare decimals (e.g., given two numbers with decimals compare with symbols) *See entry points for earlier grades in this or a related cluster that are challenging and use age-appropriate materials*	♦ Order rational numbers on a number line (e.g., plot integers, decimals, and/or fractions on a number line given a point of reference) ♦ Compare decimals ♦ Convert fractions to decimal equivalent (e.g., convert $\frac{1}{8}$ to 0.125 and $\frac{2}{7}$ to $0.\overline{285714}$) ♦ Estimate square roots of rational numbers (e.g., $\sqrt{3} \approx 1.7$ and $\sqrt{22} \approx 4.7$) ♦ Classify numbers as rational or irrational (e.g., $\frac{13}{41}$, $2.\overline{33}$, 3.567, $\sqrt{25}$, and $\sqrt[3]{8}$ are rational, but $\sqrt{10}$ and 2π are not)	♦ Order rational and irrational numbers on a number line (e.g., given a number line and a point of reference) ♦ Solve problems involving square roots (e.g., if the area of a square is 42 square units, the length of each side is about 6.5 units) *Continue to address skills and concepts that approach grade-level expectations in this cluster* **Note:** An *irrational number* is one that cannot be expressed as a quotient of two integers, e.g. $\sqrt{2}$. A number is irrational if, and only if, it cannot be written as a repeating or terminating decimal.

High School Conceptual Category – Number and Quantity

CONTENT AREA Mathematics

CONCEPTUAL CATEGORY Number and Quantity

DOMAIN The Real Number System

High School

Cluster	Standards as written	
Extend the properties of exponents to rational exponents.	**H.N-RN.1**	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define 5 1/3 to be the cube root of 5 because we want $(5\ 1/3)^3 = 5\ (1/3)^3$ to hold, so $(5\ 1/3)^3$ must equal 5.*
	H.N-RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
Use properties of rational and irrational numbers.	**H.N-RN.3**	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Less Complex ⟷ **More Complex**

	ACCESS SKILLS		ENTRY POINTS	
	The student will:	**The student will:**	**The student will:**	**The student will:**
Extend the properties of exponents to rational exponents.	♦ Respond to materials as they are counted ♦ Shift focus from materials to speaker counting materials ♦ Grasp materials as they are counted ♦ Release materials as they are counted ♦ Give materials as they are counted ♦ Move objects as they are counted ♦ Orient objects as they are counted (e.g., turn flowerpots upright) ♦ Manipulate objects with two hands as they are counted ♦ Locate objects partially hidden or out of sight to add to a collection of objects to be counted ♦ Use one object to act on another as objects are counted (e.g., use a pointer to tap) ♦ Use two hands to manipulate objects to be counted ♦ Functionally use materials in a counting activity ♦ Activate device in a counting activity ♦ Imitate action in a counting activity	♦ Match the figure of a square with given dimensions to the area of the square (e.g., match a square with side lengths of 5 units to an area of 25 square units) ♦ Illustrate a representation of a cube using manipulatives or arrays (e.g. a Rubik's Cube has dimensions $3 \times 3 \times 3$, or choose the cubic array from a group of arrays shaped like non-cubic prisms)	♦ Rewrite whole number expressions of repeated multiplication using exponents, or rewrite exponent expressions using whole numbers representing repeated multiplication (e.g., $2 \times 2 \times 2 = 2^3$ and/or $6^4 = 6 \times 6 \times 6 \times 6$) ♦ Evaluate numbers or expressions written with exponents (e.g., 4^2 is equal to 16 and/or $(2x)^2$ is equal to $4x^2$) ♦ Illustrate the reciprocal relationship between a perfect square and a square root (e.g., $\sqrt{25} = 5$ and $5^2 = 25$) ♦ Identify perfect squares within 1000 (e.g., from a list of 200, 300, 400, and 500, the perfect square is 400) ♦ Write or evaluate an expression that represents the area of a square using exponents (e.g., $6 \times 6 = 6^2 = 36$)	♦ Illustrate the reciprocal relationship between a square and a square root for integers (e.g., $(\sqrt{7})^2 = 7$ and $(\sqrt{16})^2 = 4^2 = 16$) ♦ Identify perfect squares and perfect cubes within 1000 (e.g., from a list of 4, 24, 44, and 64, 4 is a perfect square and 64 is both a perfect square and a perfect cube) ♦ Represent numbers using scientific notation (e.g., $432 = 4.32 \times 10^2$) ♦ Solve problems using square roots (e.g., the side length of a square rug with an area of 20 ft² is $\sqrt{20}$ feet) ♦ Demonstrate, with integers or variables, the properties of exponents such as the Product Rule (e.g., $2^3 \cdot 2^2 = 2^5$), the Quotient Rule (e.g., $\frac{x^5}{x^2} = x^3$), or the Power Rule (e.g., $(7^2)^4 = 7^8$) *Continue to address skills and concepts that approach grade-level expectations in this cluster*

ACCESS SKILLS (continued) for Number and Quantity
The Real Number System Standards in High School

Less Complex ⟷ **More Complex**

	ACCESS SKILLS **The student will:**	**ENTRY POINTS** **The student will:**
Extend the properties of exponents to rational exponents. (continued)	♦ Locate partially hidden or out of sight objects or materials in a counting activity ♦ Construct or assemble materials in a counting activity ♦ Initiate cause and effect response in a counting activity ♦ Sustain activity through response in a counting activity ♦ Gain attention in a counting activity ♦ Make a request in a counting activity ♦ Choose from an array of errorless choices in a counting activity ♦ Use one object to act on another in a counting activity (e.g., use a pointer to tap) ♦ Attend visually aurally, or tactilely to materials as they are counted	

ENTRY POINTS and ACCESS SKILLS for Number and Quantity
The Real Number System Standards in High School

Less Complex ⟵ ⟶ **More Complex**

	ACCESS SKILLS	**ENTRY POINTS**	
	The student will:	**The student will:**	**The student will:**
Use properties of rational and irrational numbers.	(Refer to Access Skills above)	♦ Compare two fractions using symbols (e.g., $\frac{2}{7} < \frac{3}{7}$, $\frac{2}{3} = \frac{4}{6}$, or $\frac{12}{4} > \frac{12}{5}$) ♦ Locate fractions on a partitioned number line from zero to one (e.g., locate $\frac{4}{5}$ at the fourth line dividing one unit into fifths) ♦ Add and subtract fractions with like denominators using manipulatives, visual models, or technology (e.g. show that two halves comprise a whole, and two fourths together comprise a half)	♦ Sequence fractions or mixed numbers and integers in a list or on a number line (e.g., $\frac{4}{7}$ comes before 2, which comes before $3\frac{2}{5}$) ♦ Multiply and divide fractions (e.g., $\frac{1}{3} \cdot \frac{3}{5} = \frac{3}{15}$ or $\frac{1}{3} \div \frac{3}{5} = \frac{5}{9}$) ♦ Add and subtract fractions with like or unlike denominators (e.g., $\frac{6}{5} - \frac{2}{5} = \frac{4}{5}$ or $\frac{1}{3} + \frac{2}{6} = \frac{4}{6}$) ♦ Identify rational numbers (e.g., $\frac{6}{13}$ is a rational number because it is a ratio of two integers) or irrational numbers (e.g., from a list of numbers, identify π and $\sqrt{6}$ as irrational numbers)	♦ Estimate the location of irrational numbers on a number line (e.g., $\sqrt{23}$ lies between 4 and 5 on a number line, but closer to 5 since 23 is closer to 25 than 16) ♦ Estimate square roots of integers (e.g., $\sqrt{15}$ is a little less than 4, because $4^2 = 16$) ♦ Categorize rational and irrational numbers within the real number system (e.g., use a Venn diagram to illustrate to which each number in a list belongs) ♦ Determine whether a number is rational by showing that it can be written as a repeating or terminating decimal (e.g., $\frac{7}{3}$, $\frac{471}{100}$, and $\sqrt{25}$ are rational because they are equal to $2.\overline{33}$, 4.71, and 5, but $\sqrt{10}$ is irrational) *Continue to address skills and concepts that approach grade-level expectations in this cluster*

CONTENT AREA Mathematics
CONCEPTUAL CATEGORY Number and Quantity
DOMAIN Quantities

High School

Cluster	Standards as written	
Reason quantitatively and use units to solve problems.	**H.N-Q.1**	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ⋆
	H.N-Q.2	Define appropriate quantities for the purpose of descriptive modeling. ⋆
	H.N-Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ⋆
	H.N-Q.MA3a	Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements. Identify significant figures in recorded measures and computed values based on the context given and the precision of the tools used to measure. ⋆

⋆ indicates Modeling standard

ENTRY POINTS and ACCESS SKILLS for Number and Quantity Quantities Standards in High School

Less Complex ⟷ **More Complex**

	ACCESS SKILLS		**ENTRY POINTS**	
	The student will:	**The student will:**	**The student will:**	**The student will:**
Reason quantitatively and use units to solve problems.	♦ Shift focus from materials to speaker counting materials or measured ♦ Grasp materials as they are counted or measured ♦ Release materials as they are counted or measured ♦ Give materials as they are counted or measured ♦ Move objects as they are counted or measured ♦ Orient objects as they are counted or measured (e.g., turn flowerpots upright) ♦ Manipulate objects with two hands as they are counted or measured ♦ Locate objects partially hidden or out of sight to add or subtract to a collection of objects to be counted or measured	♦ Describe the relationship of two quantities by interpreting rate (e.g., show that a rate given in miles per hour shows the relationship of distance and time) ♦ Compare part-to-whole relationships (e.g., if, out of a total of 12 pets 5 are cats, then $\frac{5}{12}$ of the pets are cats) ♦ Compare part-to-part relationships (e.g., if there are 4 dolphins and 5 whales, then the ratio of dolphins to whales is represented by $4:5$) ♦ Round numbers to a specific place value in real-life and/or mathematical problems (e.g., 14,375 rounded to the nearest thousand is 14,000, but rounded to the nearest hundred is 14,400)	♦ Determine a suitable unit rate for a solution of a real-world problem (e.g., a suitable rate for a car on a trip is miles per day, but for a thrown ball is feet per second) ♦ Use rounding strategies to make simple estimates (e.g., a play with a duration of 115 minutes lasted about 2 hours) ♦ Choose an appropriate unit of measurement for a real-life problem (e.g., which would best describe the weight of a dog: grams, inches, kilograms, or tons?) ♦ Use rounding strategies to make estimates in real-life or mathematical problems (e.g., to purchase 5 gallons of milk which cost $3.35 each, one would need less than $20)	♦ Perform conversions of units between systems or scales of measurements (e.g., 3 kilograms is equal to 3000 grams, or 13,200 feet is equal to $2½$ miles) ♦ Solve proportions in real-life or mathematical situations where one quantity is unknown (e.g., $\frac{5}{3}=\frac{x}{9}$ or if you can buy 6 avocados for $3, how many can you buy with $12?) ♦ Determine the unit rate in real-life situations (e.g., if 4 cans of tomato soup cost $5, what is the cost per can of the soup?) ♦ Express the solutions of real-life measurement problems using the appropriate unit rate (e.g., a car that travels 80 miles in two hours averages 40 miles per hour, or a student who took 45 minutes to complete 15 homework problems worked at a rate of 3 minutes per problem) *Continue to address skills and concepts that approach grade-level expectations in this cluster*

ACCESS SKILLS (continued) for Number and Quantity Quantities Standards in High School

Less Complex ← → **More Complex**

	ACCESS SKILLS The student will:	ENTRY POINTS The student will:
Reason quantitatively and use units to solve problems. (continued)	♦ Use one object to act on another as objects are counted or measured (e.g., use a pointer to tap, hold measurement tool against object to be measured) ♦ Adjust plane to move objects in counting activities or measurement (e.g., tip plank so that materials can be named in counting sequence as they fall) ♦ Construct using materials that have been counted in sequence or measured (e.g., tower of blocks) ♦ Turn device on/off to participate in counting sequence or measurement activity (e.g., activate preprogrammed voice-generating device to recite number names) ♦ Imitate action in counting sequence or measurement activity ♦ Initiate cause-and-effect response in counting sequence or measurement activity (e.g., use switch to activate a number-naming cause-and-effect computer program) ♦ Sustain counting sequence activity through response ♦ Gain attention in counting sequence or measurement activity ♦ Make a request in counting sequence or measurement activity (e.g., request a turn to move the marker on a board game) ♦ Choose from an array of two during a counting sequence or measurement activity (e.g., choose materials to be counted or measured) ♦ Choose beyond an array of two during a counting sequence or measurement activity (e.g., choose materials to be counted or measured) ♦ Follow directions in counting sequence or measurement activities (e.g., follow direction to “Put the pencils in the box” as the teacher counts) ♦ Track object as it is added or subtracted from a set of objects ♦ Attend visually, aurally, or tactilely to materials as they are counted or measured	

CONTENT AREA Mathematics

CONCEPTUAL CATEGORY Number and Quantity

DOMAIN The Complex Number System

High School

Cluster	Standards as written	
Perform arithmetic operations with complex numbers.	**H.N-CN.1**	Know there is a complex number *i* such that *I squared = 1*, and every complex number has the form *a* + *bi* with *a* and *b* real.
	H.N-CN.2	Use the relation $i^2 = -1$ and the Commutative, Associative, and Distributive properties to add, subtract, and multiply complex numbers.
	H.N-CN.3	(+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
Represent complex numbers and their operations on the complex plane.	**H.N-CN.4**	(+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.
	H.N-CN.5	(+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,* $(-1 + \sqrt{3}i)^3 = 8$ *because* $(-1 + \sqrt{3}i)$ *has modulus 2 and argument 120°.*
	H.N-CN.6	(+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
Use complex numbers in polynomial identities and equations.	**H.N-CN.7**	Solve quadratic equations with real coefficients that have complex solutions.
	H.N-CN.8	(+) Extend polynomial identities to the complex numbers. *For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$.*
	H.N-CN.9	(+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

[+] indicates standard is beyond College and Career Ready

ENTRY POINTS and ACCESS SKILLS for Number and Quantity
The Complex Number System Standards in High School

Less Complex → **More Complex**

Standards labeled with a (+) symbol appear in courses intended for all students but are considered "beyond College and Career Ready" and will not be assessed.

Perform arithmetic operations with complex numbers.	These standards are not common to both high school pathways and will not be assessed.
Represent complex numbers and their operations on the complex plane.	These standards are considered "beyond College and Career Ready" and will not be assessed.
Use complex numbers in polynomial identities and equations.	These standards are not common to both high school pathways and will not be assessed.

CONTENT AREA Mathematics
CONCEPTUAL CATEGORY Number and Quantity
DOMAIN Vector and Matrix Quantities

High School

Cluster	Standards as written	
Represent and model with vector quantities.	**H.N-VM.1**	(+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\boldsymbol{v}$, $\lvert\boldsymbol{v}\rvert$, $\lVert\boldsymbol{v}\rVert$, v).
	H.N-VM.2	(+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
	H.N-VM.3	(+) Solve problems involving velocity and other quantities that can be represented by vectors.
Perform operations on vectors.	**H.N-VM.4**	(+) Add and subtract vectors.
	H.N-VM.4a	(+) Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that (+) the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
	H.N-VM.4b	(+) Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
	H.N-VM.4c	(+) Understand vector subtraction $\boldsymbol{v} - \boldsymbol{w}$ as $\boldsymbol{v} + (-\boldsymbol{w})$, where $-\boldsymbol{w}$ is the additive inverse of $\boldsymbol{w}$, with the same magnitude as $\boldsymbol{w}$ and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.
	H.N-VM.5	(+) Multiply a vector by a scalar.
	H.N-VM.5a	(+) Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.
	H.N-VM.5b	(+) Compute the magnitude of a scalar multiple $c\boldsymbol{v}$ using $\lVert c\boldsymbol{v}\rVert = \lvert c\rvert\boldsymbol{v}$. Compute the direction of $c\boldsymbol{v}$ knowing that when $\lvert c\rvert\boldsymbol{v} \neq 0$, the direction of $c\boldsymbol{v}$ is either along $\boldsymbol{v}$ (for $c > 0$) or against $\boldsymbol{v}$ (for $c < 0$).

[+] indicates standard is beyond College and Career Ready

Perform operations on matrices and use matrices in applications.	**H.N-VM.6**	(+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
	H.N-VM.7	(+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
	H.N-VM.8	(+) Add, subtract, and multiply matrices of appropriate dimensions.
	H.N-VM.9	(+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a Commutative operation, but still satisfies the Associative and Distributive properties.
	H.N-VM.10	(+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
	H.N-VM.11	(+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.
	H.N-VM.12	(+) Work with 2×2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.

[+] indicates standard is beyond College and Career Ready

ENTRY POINTS and ACCESS SKILLS for Number and Quantity
Vector and Matrix Quantities Standards in High School

Less Complex ⟷ **More Complex**

Standards labeled with a (+) symbol appear in courses intended for all students but are considered "beyond College and Career Ready" and will not be assessed.

Represent and model with vector quantities.	These standards are considered "beyond College and Career Ready" and will not be assessed.
Perform operations on vectors.	These standards are considered "beyond College and Career Ready" and will not be assessed.
Perform operations on matrices and use matrices in applications.	These standards are considered "beyond College and Career Ready" and will not be assessed.