Mississippi College and Career Readiness Standards for Mathematics Scaffolding Document

Grade 3

GRADE 3

Operations and Algebraic Thinking

Represent and solve problems involving multiplication and division

3.OA.1
Interpret products of whole numbers, e.g., interpret 5 • 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Repeated addition is connected to multiplication. • Equal groups can be modeled by partitioning rectangles. • How to skip count by 2s, 5s and 10s. • How to use a rectangular array to find the total number of objects. • Interpretation means to communicate symbolically, numerically, abstractly, and/or with a model. • How to add using the commutative and identity properties. • Patterns connecting addition and subtraction.	• Multiplication means "groups of." • Multiply by using a set of equal groups. • Arrays can be used to represent multiplication. • How to define the terms factor and product. • Properties (rules about how numbers work) of multiplication can be used to solve problems. • Patterns are found in the multiplication table.	• Find products of whole numbers as the total number of objects in *n* groups of *n* objects each. • Solve multiplication problems by using equal groups, arrays, area, and/or measurement quantities. • Represent a multiplication situation as an equation. • For example, choose the equation that represents the picture:  *a) 4 + 4 + 4 + 4* *b) 2 x 6* *c) 2 + 6* *d) 6 ÷ 2*

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Operations and Algebraic Thinking

Represent and solve problems involving multiplication and division

3.OA.2
Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8*.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Repeated subtraction is related to division. • How to skip count by 2s, 5s, 10s, and 100s. • Patterns are found in the multiplication table. • How to partition shapes and groups of objects into equal shares. • Interpretation means to communicate symbolically, numerically, abstractly, and/or with a model. • Patterns connecting addition and subtraction.	• Division means to separate into parts. • A quotient describes how many groups there are or how many objects are in each group. • The numbers in a division equation represent a number of equal shares and the number of items in each share. • The relationship between multiplication and division is an inverse relationship. • Models and arrays can be used to solve division problems.	• Explain what division means and how it relates to equal shares. • Interpret quotients as the number of objects (shares) or the number of groups when a set of objects is divided equally. • Solve division problems by using equal groups, arrays, area, and/or measurement quantities. • Represent a division situation as an equation. • For example, choose the division number sentence that represents the picture: a) 12 ÷ 4 = 3 b) 12 ÷ 6 = 2 c) 6 ÷ 6 = 1 d) 12 ÷ 1 = 12 

GRADE 3

Operations and Algebraic Thinking

Represent and solve problems involving multiplication and division

3.OA.3 **Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1]**	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to solve one- and two-step addition and subtraction word problems. • Addition can be used to find the total number of objects arranged in rectangular arrays. • How to skip count by 2s, 5s, and 10s. • A variable represents the unknown number. • How to solve equations for the unknown. • Multiplication and division are related. • Multiplication is repeated addition and division is repeated subtraction. • How to find products and quotients within 100.	• Multiplication is used to find the sum of equal groups. • Division is used to find the number of objects in a share or the number of equal shares. • Arrays can be used to model multiplication and division problems. • The rows and columns of an array differ based on orientation of the array. • The relationship between multiplication and division (inverse operations) can be used to find the unknown.	• Solve a variety of problem solving situations including the product, the group size, or the number of groups. • Represent a word problem using a picture, an equation with a symbol for the unknown number, or in other ways. • Solve real-life multiplication and division problems where the product/quotient is greater than 5. • For example, Maria cuts 12 feet of ribbon into three equal pieces so she can share it with her two sisters. Use words, numbers, and/or pictures to show how long each piece is.

GRADE 3

Operations and Algebraic Thinking

Represent and solve problems involving multiplication and division

3.OA.4
Determine the unknown whole number in a multiplication or division equation relating three whole numbers, with factors 0-10. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ? ÷ 3, 6 × 6 = ?*

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to find an unknown whole number in an addition and subtraction equation. • Addition can be used to find the total number of objects arranged in rectangular arrays. • How to skip count by 2s, 5s, and 10s. • A variable represents the unknown number. • How to multiply and divide within 100 using basic multiplication facts. • How to express the relationship between multiplication and division as fact families.	• How to use related facts and properties of operations to find the unknown number. • The relationship between multiplication and division (inverse operations) can be used to find the unknown. • Factors and products and divisors and dividends express part-whole relationships in multiplication and division. • The meaning of the equal sign as “the same as” to interpret an equation with an unknown. • Products from single digit factors 0-9 and 10.	• Select the operation (multiplication or division) needed to determine the unknown whole number. • Solve to find the unknown whole number (factor, product, quotient) in a multiplication or division equation where products and quotients are greater than 5. • For example, solve the equations below: 24= ? x 6 72 ÷ ? = 9 • For example, Candace has four bags. There are three marbles in each bag. How many marbles does Candace have altogether (4 x 3 = m)?

GRADE 3

Operations and Algebraic Thinking

Understand properties of multiplication and the relationship between multiplication and division

3.OA.5
Apply properties of operations as strategies to multiply and divide.[2]
Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Understand and apply the properties of operations (commutative, associative, and identity) to add and subtract. • Addition can be used to find the total number of objects arranged in rectangular arrays. • How to multiply and divide within 100. • How to use arrays, bar diagrams, and drawings as strategies to multiply and divide. • Fact families are expressions of the relationship between multiplication and division.	• The commutative property states that the order in which the factors are multiplied does not change the product. • The associative property states the way in which numbers are grouped does not change their product. • The distributive property states that a sum may be found by multiplying each addend separately and then adding the products. • The identity property of multiplication states that the product of 1 and a number is the number itself. • Factors can be decomposed as a strategy for finding a product.	• Explain how the properties of operations work. • Apply properties of operations as strategies to multiply and divide. • Find products and quotients by using known facts. • For example, for each expression in A–D, answer Yes or No if the expression is equivalent to the product of 7 and 9. a) 7 x (1 + 8) Yes No b) 9 x (3 + 6) Yes No c) (2 x 5) + (5 x 4) Yes No

GRADE 3

Operations and Algebraic Thinking

Understand properties of multiplication and the relationship between multiplication and division

3.OA.6
Understand division as an unknown-factor problem, where a remainder does not exist. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8 with no remainder*.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to find an unknown whole number in an addition and subtraction equation. • Addition can be used to find the total number of objects arranged in rectangular arrays. • How to skip count by 2s, 5s, and 10s. • The equal sign is an expression of equality. • How to use models and arrays to find quotients to division problems. • A variable represents the unknown number. • How to multiply and divide within 100.	• How to use multiplication to find the unknown number in a division problem. • The relationship between multiplication and division (inverse operations) can be used to find the unknown. • Factors and products and divisors and dividends express part-whole relationships in multiplication and division. • The difference between division with and without a remainder and the impact to factors in multiplication.	• Find quotients to division problems by using multiplication facts. • Recognize multiplication and division as related operations and explain how they are related. • For example, 3 x 5 =15; 5 x 3= 15 15 ÷ __ = 5 (3) 15 ÷ __ = 3 (5) • For example, a student knows that 4 x 6 = 24. How can he use that fact to determine the answer to the following problem: Twenty-four students are divided into four groups in Art class. How many students are in each group? Write a division equation and explain your reasoning.

GRADE 3

Operations and Algebraic Thinking

Multiply and divide within 100

3.OA.7 ***Fluently*** **multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. Know from memory all products of two one-digit numbers; and fully understand the concept when a remainder does not exist under division.**	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to add and subtract fluently within 20 and recall single-digit sums from memory. • Patterns and relationships are found in the multiplication table. • The relationship between multiplication and division is an inverse relationship. • Multiplication is used to find the sum of equal groups. • Division is used to find the number of objects in a share or the number of equal shares.	• Visual images and numerical patterns of multiplication and division can be used to solve problems. • Various strategies are used to attain fluency with basic multiplication and division facts. • Numbers can be used flexibly to solve multiplication and division problems. • Fluently means quickly and accurately. • Multiplication and division within 100.	• Analyze a multiplication or division problem in order to choose an appropriate strategy to fluently multiply or divide within 100. • Recall from memory all products of two one-digit numbers. • For example: 6 x 7 = 42 8 x 8 = 64 42 ÷ 6 = 7 72 ÷ 9 = 8

GRADE 3

Operations and Algebraic Thinking

Solve problems involving the four operations, and identify and explain patterns in arithmetic

3.OA.8

Solve two-step (two operational steps) word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.[3] Include problems with whole dollar amounts.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to solve two-step word problems involving addition and subtraction. • How to recall multiplication and division facts from memory. • How to use problem-solving structures for area/arrays and for equal groups. • How to define the meaning of addition, subtraction, multiplication, and division. • A variable represents the unknown number. • Rounding is an estimation strategy. • How to describe the order of operations (without parentheses).	• How to construct an equation with a letter standing for the unknown quantity. • How to describe strategies for solving problems involving addition, subtraction, multiplication, and division. • Using strategies for estimating. • How to represent whole dollar amounts. • How to subtract across zeros when working with whole dollar amounts.	• Solve two-step problems involving addition, subtraction, multiplication, and division. • Solve for an unknown in various positions. • Justify answers using various estimation strategies. • For example, a roller skating team has 10 members. Each team member has two skates. Each skate has four wheels. What is the total number of skate wheels that the team has? _____ wheels Show how you got your answer.

GRADE 3

Operations and Algebraic Thinking

Solve problems involving the four operations, and identify and explain patterns in arithmetic

3.OA.9
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*.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to use an addition table, a multiplication table, and a hundreds chart. • Arithmetic patterns are patterns that change by the same rate, such as adding the same number. • The properties of operations can be used to identify arithmetic patterns. • How to determine whether a number is even or odd.	• Patterns can be found in the addition and multiplication tables. • Visual images and numerical patterns of multiplication and division will help in solving problems. • Identifying arithmetic patterns related to the properties of operations. • Identifying patterns (such as even and odd numbers, patterns in an addition table, patterns in a multiplication table, patterns regarding multiples and sums).	• Identify arithmetic patterns (including patterns in the addition or multiplication tables). • Explain rules for a pattern using properties of operations. • Explain relationships between the numbers in a pattern. • For example, the products of which numbers are always even? a) 4 b) 6 c) 8 d) all of the above

GRADE 3

Numbers and Operations in Base Ten

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

3.NBT.1
Use place value understanding to round whole numbers to the nearest 10 or 100.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Each digit in a three-digit number represents an amount of hundreds, tens, and ones. • Three-digit numbers can be compared based on the hundreds, tens, and ones digits, and >, =, and < symbols are used to record the results of comparisons. • A hundreds chart and a number line illustrate place-value relationships.	• Rounding is a method of approximating an answer. • There are rules for rounding. • The digits in the ones, tens, and hundreds places are used to round whole numbers. • A number line and a hundreds chart are tools to support rounding. • Rounding applies to real life. • When rounding to the nearest 10, the ones digit is used to determine if the number is rounded up or down. • When rounding to the nearest 100, the tens digit is used to determine if the number is rounded up or down.	• Use a number line, hundreds chart, and/or rounding rules to round whole numbers to the nearest 10 or 100. • Model the rounding process and reasoning for rounding to represent the structure of the base-ten number system. • Use patterns in the number system in the rounding process. • For example, when rounding to the nearest 10: What is the smallest whole number that will round to 50? What is the largest whole number that will round to 50? How many different whole numbers will round to 50?

GRADE 3

Numbers and Operations in Base Ten

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

3.NBT.2
Fluently **add and subtract (including subtracting across zeros) within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. Include problems with whole dollar amounts.**

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to add and subtract fluently within 100. • How to apply various strategies (i.e., the standard algorithm, concrete models, make 10, and make 100) to add and subtract. • The properties of operations (associative, commutative, and distributive properties) can be used to solve addition and subtraction problems. • The relationship between addition and subtraction is an inverse relationship.	• A variety of strategies can be used to attain fluency with addition and subtraction. • These strategies can include the standard algorithm (borrowing or regrouping) and thinking about multi-digit numbers as groups of hundreds, tens, and ones. • Numbers can be used flexibly to solve addition and subtraction problems such as using the properties of operations. • Fluently means quickly and accurately. • Strategies for subtracting across zeros using place value understanding.	• Add and subtract within 1,000 without context. • Model algorithms based on place value, properties of operations, and/or the inverse relationship between addition and subtraction. • Demonstrate fluency (speed, accuracy, and understanding) with addition and subtraction problems within 1,000. • For example, 272 – 189 = ___. • Subtract across zeros using understanding of place value.

GRADE 3

Numbers and Operations in Base Ten

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

3.NBT.3 **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.**	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to count by multiples of 10. • How to compose and decompose multiples of 10 as groups of 10. • How to find the product of two one-digit numbers; develop fluency with basic multiplication facts. • Rectangular arrays can be constructed to find the sum of a repeated addition problem.	• Base-ten blocks, diagrams, and a hundreds chart can be used to multiply a one-digit number by multiples of 10. • The patterns in place value connect the products of one-digit numbers to the products of one-digit numbers multiplied by multiples of 10. For example, 6 x 8 = 48 and 6 x 80 = 480.	• Multiply one-digit numbers by a multiple of 10 using various strategies. • Recognize patterns in multiplying by multiples of 10. • For example, 30 is 3 tens and 70 is 7 tens; 2 x 40 is 2 groups of 4 tens or 8 groups of ten; 5 x 60 is 5 groups of tens or 30 tens; and 30 tens is 300. • For example, 40 x 5 = n.

GRADE 3

Numbers and Operations – Fractions

Develop understanding of fractions as numbers

3.NF.1
Understand a fraction 1/*b* as the quantity formed by 1 part when *a* whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by a parts of size 1/*b*.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to divide shapes (circles and rectangles) into no more than four equal parts. • Fraction models include area (parts of a whole) models (circles, rectangles, and squares) and number lines. • A fraction is written with a numerator/denominator. • A fraction represents quantities where a whole is divided into equal parts. • The numerator of a fraction is the number of parts. • The denominator of a fraction represents the total number of parts that make up the whole. • Equal shares of the same whole need not have the same shape.	• The size of the fractional part is relative to the size of the whole. • Fractions are composed of unit fractions, which have a numerator of 1. For example, the fraction $^3/_4$ is composed of three pieces that each have a size of $^1/_4$. • Fractions represent quantities where a whole is divided into equal-sized parts using models, manipulatives, words, and/or number lines. • Fractions can be used as a tool to model and understand quantities and relationships.	• Represent a whole using unit fractions. • Use the terms *numerator* for the number of relevant parts and *denominator* for the total number of parts in the whole. • Use accumulated unit fractions to represent numbers equal to, less than, and greater than one ($^1/_3$ and $^1/_3$ is $^2/_3$; $^1/_3$, $^1/_3$, $^1/_3$, and $^1/_3$ is $^4/_3$). • For example, four children share one chocolate bar that was broken into six pieces. What portion of the chocolate bar will each child receive? • For example, six children share one chocolate bar that was broken into four pieces. What portion of the chocolate bar will each child receive?

GRADE 3

Numbers and Operations – Fractions

Develop understanding of fractions as numbers

3.NF.2a
Understand a fraction as a number on the number line; represent fractions on a number line diagram.
Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts.
Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to divide shapes (circles and rectangles) into no more than four equal parts. • How to share a whole that was partitioned or split. • Fraction models include area models (parts of a whole using circles, rectangles, and squares) and number lines. • The numerator of a fraction is the number of relevant parts. • The denominator of a fraction represents the total number of parts that make up a whole. • Fractions are composed of unit fractions.	• Fractions can be used as a tool to model and understand quantities and relationships. • Fractions can be represented on a number line. The whole is divided into equal-sized parts between whole numbers. • How to define the interval from 0 to 1 on a number line as the whole. • The equal parts between 0 and 1 have a fractional representation. • The size of the fractional part is relative to the size of the whole.	• Divide a number line diagram into equal segments and label the appropriate fractional parts. • Explain that the end of each equal part is represented by a fraction (1/the number of equal parts). • For example, in a number line diagram, the space between 0 and 1 is divided (partitioned) into four equal regions. The distance from 0 to the first segment is 1 of the 4 segments from 0 to 1 or $^1/_4$.

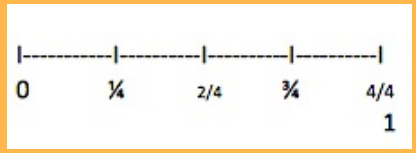
GRADE 3

Numbers and Operations- Fractions

Develop understanding of fractions as numbers

3.NF.2b
Understand a fraction as a number on the number line; represent fractions on a number line diagram.
Represent a fraction *a*/*b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to divide shapes (circles and rectangles) into no more than four equal parts. • Sharing of a whole being partitioned or split. • Fraction models include area models (parts of a whole using circles, rectangles, and squares) and number lines. • The numerator of a fraction is the number of relevant parts. • The denominator of a fraction represents the total number of parts that make up the whole.	• Fractions can be used as a tool to model and understand quantities and relationships. • The size of the fractional part is relative to the size of the whole. • Fractions represent quantities where a whole is divided into equal-sized parts using number lines. • How to define the interval from 0 to 1 on a number line as the whole. • How to divide on a number line into equal parts.	• Represent each equal part on a number line with a fraction. • Explain that the endpoint of each equal part represents the total number of parts. • For example, on a number line, the space between 0 and 1 is partitioned into four equal regions. The distance from 0 to the first segment is one of the four segments from 0 to 1 or $^1/_4$. The distance from 0 to $^2/_4$ represents two of the four segments between 0 and 1. 

GRADE 3

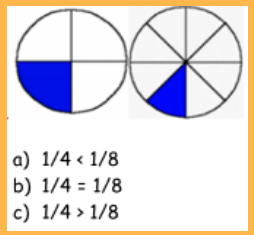
Numbers and Operations – Fractions

Develop understanding of fractions as numbers

3.NF.3a

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. Recognize that comparisons are valid only when the two fractions refer to the same whole.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to divide shapes (circles and rectangles) into no more than four equal parts. • Measure length and represent that data in a line plot. • Fraction models include area models (parts of a whole using circles, rectangles, and squares) and number lines. • The numerator of a fraction is the number of relevant parts. • The denominator of a fraction represents the total number of parts that make up a whole.	• Fractions that represent equal-sized quantities or parts of a whole are equivalent. • Two fractions are equivalent if they are the same size, or represent the same portion on a number line. • Visual fraction models (area models) and number lines are helpful in exploring equivalence. • What makes fractions equivalent.	• Represent different fractions as parts of a whole and compare the shaded or relevant parts. • Compare fractions by reasoning about their size to determine equivalence. • Model equivalent fractions using manipulatives, pictures, or number line diagrams and explain in words why the fractions are equivalent. • For example: Which statement is true about the diagrams below?  a) 1/4 < 1/8 b) 1/4 = 1/8 c) 1/4 > 1/8

GRADE 3

Numbers and Operations – Fractions

Develop understanding of fractions as numbers

3.NF.3b
Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to divide shapes (circles and rectangles) into no more than 4 equal parts and use vocabulary terminology to describe. • How to measure length and represent that data in a line plot. • Fraction models include area models (parts of a whole using circles, rectangles, and squares) and number lines. • The numerator of a fraction is the number of relevant parts. • The denominator of a fraction represents the total number of parts that make up a whole.	• Fractions that represent equal-sized quantities or parts of a whole are equivalent. • Visual fraction models (area models) and number lines are helpful in exploring equivalence. • What makes fractions equivalent. • Two fractions are equivalent (equal) if they are the same size, or represent the same portion on a number line.	• Compare fractions by reasoning about their size to determine equivalence. • Recognize and construct equivalent fractions using manipulatives, pictures, or number line diagrams and explain in words why the fractions are equivalent. • For example, which symbol can be used to compare the following fractions? $\frac{3}{6}$ - $\frac{1}{2}$ a) > b) < c) =

GRADE 3

Numbers and Operations – Fractions

Develop understanding of fractions as numbers

3.NF.3c
Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram*.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to divide shapes (circles and rectangles) into no more than four equal parts and use correct terms to describe (halves, thirds, fourths). • Fraction models include area models (parts of a whole using circles, rectangles, and squares) and number lines. • The numerator of a fraction is the number of relevant parts. • The denominator of a fraction represents the total number of parts that make up a whole. • Fractions that represent equal-sized quantities are equivalent.	• Writing whole numbers as fractions relates to fractions as division problems. For example, $^{6}/_{2}$ is six wholes divided into two groups. • The difference between a whole number and a fraction. • Two fractions are equivalent (equal) if they are the same size, or represent the same portion on a number line. • Equivalence of fractions depends upon the same whole.	• Explain how a fraction relates to or is equivalent to a whole number. • Represent whole numbers as fractions using area models, number line diagrams, and numbers. • For example, if a small pie is cut into four pieces and shared between three people, what fraction of the pie would each person receive? • For example, which fraction is equivalent to the number 1? a) $^{1}/_{4}$ b) $^{2}/_{4}$ c) $^{3}/_{4}$ d) $^{4}/_{4}$ How do you know that the fraction you selected is equal to 1?

GRADE 3

Numbers and Operations- Fractions

Develop understanding of fractions as numbers

3.NF.3d
Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to divide shapes (circles and rectangles) into no more than four equal parts and use correct vocabulary to describe (halves, thirds, fourths). • Two fractions are equivalent (equal) if they are the same size, or represent the same portion on a number line. • Fraction models include area models (parts of a whole using circles, rectangles, and squares) and number lines. • The numerator of a fraction is the number of relevant parts. • The denominator of a fraction represents the total number of parts that make up the whole. • The size of the fractional part is relative to the size of the whole.	• Fractions can be compared with or without visual fraction models including number lines. • When fractions have common denominators, the larger numerator has the larger number of equal parts, i.e., $^2/_6 < {}^5/_6$. • When fractions have common numerators, each fraction has the same number of relevant equal parts, but the total number of parts is different. The whole with more parts has smaller pieces than the whole with fewer parts, i.e., $^3/_8 < {}^3/_4$.	• Determine that comparisons are valid only when the two fractions refer to same-sized wholes. • Compare two fractions with the same numerator and compare two fractions with the same denominator using visual fraction models, symbols, and words. • Record the results of fraction comparisons using the symbols >, <, or =. • Justify conclusions about the equivalence of fractions. • For example, Mary checked out six books from the library. Of these, $^2/_3$ were fiction and $^2/_6$ were nonfiction. Mary had more of which type of book? How do you know?

GRADE 3

Measurement and Data

Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects

3.MD.1 **Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.**	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to tell and write time to the nearest hour, half-hour, and 5 minutes using digital and analog clocks. • How to skip count by 5s. • How to add and subtract within 100. • An analog clock has an hour and minute hand. Sometimes an analog clock has a second hand. • A.M. represents time from midnight to noon. P.M. represents time from noon to midnight. • Sixty minutes is equivalent to 1 hour.	• The space between two consecutive tick marks on an analog clock represents 1 minute. • Elapsed time is the interval of time, given a specific unit, from a starting time to an ending time. • A number line is a tool that may be used to represent time on an analog clock and may be used as a tool for finding elapsed time.	• Compare an analog clock face to a number line. • Tell and write time to the nearest minute. • Use a number line to add and subtract time intervals in hours and minutes. • Create and solve word problems involving addition and subtraction of time intervals in hours and minutes. • For example, Jonathan wakes us at 5:45 a.m. It takes him 5 minutes to shower, 10 minutes to get dressed, and 15 minutes to eat breakfast. What time will he be ready for school?

GRADE 3

Measurement and Data

Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects

3.MD.2 **Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[6] Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.[7]**	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• Objects have measurable attributes including length and mass. • How to measure and estimate the length of an object using units of inches, feet, centimeters, and meters. • How to solve one-step addition and subtraction word problems within 100 involving the same unit.	• Capacity is the amount of liquid that a container can hold and can be measured in liters. • Mass is the amount of matter that an object has and can be measured in grams or kilograms. • Mass is different than weight. • Liters, grams, and kilograms are all units used to measure in the Metric System. • How to solve one-step word problems involving mass and one-step word problems involving capacity. (Given in the same unit.)	• Measure and estimate capacity using liters and mass using grams and kilograms. • Solve one-step, addition, subtraction, multiplication, or division word problems involving capacity and mass. (Problems contain only one unit of measure. No conversions between units.) • For example, a paper clip weighs about (a) 1 gram, (b) 10 grams, or (c) 100 grams? • For example, Mrs. Smith uses a backpack on a hiking trip. Her backpack had a mass of 8 kg. She took 2 kg of food out of her backpack. What is the mass of the backpack now?

GRADE 3

Measurement and Data

Represent and interpret data

3.MD.3 **Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets*.**	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to draw a single-unit scale picture graph and a bar graph to represent a data set with up to four categories. • How to solve simple one-step problems using information from picture graphs and bar graphs (with single-unit scale). • Scaled pictographs include symbols that represent units. Graphs should include a title, labeled categories, a key, and data. • Scaled bar graphs can be horizontal or vertical and use bars of different lengths/ heights to show data. Graphs include a title, labeled scale, labeled categories, and data, • How to skip count by 5s, 10s, and 100s.	• Information (data) can be represented using scaled bar and picture graph forms. These graphs can be used to solve one- and two-step math problems. • The scale of a graph can be greater than one. • How to find "how many more," "how many less," and "how many fewer." • How to find the difference between the greatest and the least values. • Two-step word problems involving the four operations.	• Create a scaled picture graph or scaled bar graph to show data in multiple categories. • Interpret a bar/picture graph to solve one- or two-step problems asking "how many more" and "how many less." • Analyze a scaled graph with a scale greater than one and solve problems. • For example, Ms. Bennett collected data to show the number of students in the third grade who were wearing each color of shirt. Draw a bar graph to show the information below: Blue – 28, Red – 15, Green – 23, and Yellow – 17

GRADE 3

Measurement and Data

Represent and interpret data

3.MD.4
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.

Desired Student Performance

A student should know

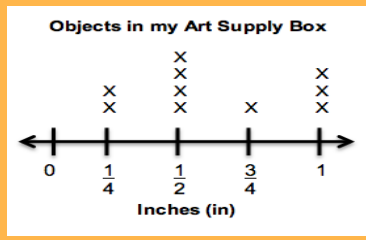
- How to draw a picture graph and a bar graph to represent a data set.
- How to measure length in whole units using both metric and U.S. customary systems and represent that data in a line plot.
- X's are drawn above the number line to represent data values.
- How to read and use a standard ruler, including halves and quarter inch marks on a ruler.
- Fractions are related to measuring one-half and one-quarter inch.
- Measuring is approximate.

A student should understand

- How to use a line plot to represent data.
- The horizontal scale is marked off in appropriate units.
- Some items will not measure exactly $^1/_4$, $^1/_2$, or 1 inch.
- How to determine an appropriate scale for the line plot.
- Fractions on a number line.

A student should be able to do

- Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.
- Create a line plot where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.
- Analyze data from a line plot.
- For example, Measure the objects in your art supply box to the nearest $^1/_2$ or $^1/_4$ of an inch and display data collected on a line plot. How many objects measured $^1/_4$, $^1/_2$, etc.?



GRADE 3

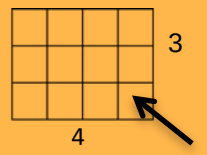
Measurement and Data

Geometric measurement: understand concepts of area and relate area to multiplication and to addition

3.MD.5a

Recognize area as an attribute of plane figures and understand concepts of area measurement. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to partition a rectangle into rows and columns of same-size squares and count to find the total number of them. • Plane figures are two-dimensional shapes that include triangles, quadrilaterals, pentagons, and hexagons. • What it means to find the length of an object. • How to measure the length of an object using the customary and metric units of inches, feet, centimeters, and meters.	• Area as the amount of two-dimensional space in a bounded region. • A square unit is used to measure the area of a given plane figure or surface. • Area can be measured in square units. • How to find area by decomposing figures using cutting and folding techniques.	• Cover the area of a plane figure with unit squares without gaps or overlaps. • Relate the number (*n*) of unit squares to the area of a plane figure. • For example, determine the area in square units of the rectangle below.  one square unit

GRADE 3

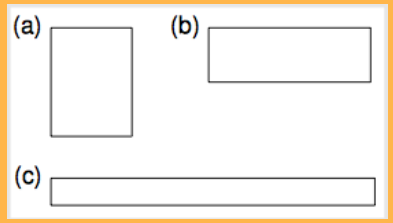
Measurement and Data

Geometric measurement: understand concepts of area and relate area to multiplication and to addition

3.MD.5b

Recognize area as an attribute of plane figures and understand concepts of area measurement. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Area can be found by partitioning a rectangle into rows and columns of same-size squares and counting the squares. • How to measure length in whole units using both metric and U.S. customary systems. • Plane figures are two-dimensional shapes that include triangles, quadrilaterals, pentagons, and hexagons. • Everyday objects have a variety of attributes each of which can be measured in different ways.	• A two-dimensional geometric figure that is covered by a certain number of squares without gaps or overlaps has an area of that number of square units. • Area can be measured in square units. • How to use square units to measure area by filling in an area with the same sized square units and counting the number of square units • Plane figures have different attributes such as length and area.	• Relate the number of unit squares (*n*) to the area of a plane figure. • Cover a plane figure with square tiles and count the number of units (tiles) to find the area. • Find the area of plane figures. • For example, which of the three rectangles covers the most area? 

GRADE 3

Measurement and Data

Geometric measurement: understand concepts of area and relate area to multiplication and to addition

3.MD.6
Measure areas by counting unit squares (square *cm*, square *m*, square *in*, square *ft*, and improvised units).

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• Area can be found by partitioning a rectangle into rows and columns of same-size squares and counting the squares. • How to use a ruler to measure length including the length of a side on a plane figure. • Area can be measured in units of centimeters (*cm*), meters (*m*), inches (*in*), and feet (*ft*). • Addition problem-solving strategies.	• Area is the amount of two-dimensional space in a bound region, and it is measured by choosing a unit of area, often a square, and iterating it over the entire space. • Squares units can be square centimeters, square meters, square inches, square feet, or other improvised square units. • Everyday objects have a variety of attributes each of which can be measured in different ways. • Area and addition are related.	• Place square tiles on a surface without gaps or overlays and count the number of units (tiles) to find the area of the surface. • For example, find the area in square units of the figure below. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

GRADE 3

Measurement and Data

Geometric measurement: understand concepts of area and relate area to multiplication and to addition

3.MD.7a
Relate area to the operations of multiplication and addition. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to partition rectangles into equal-sized groups of rows and columns using square units. • Problem-solving structures for area/arrays and for equal-sized groups. • How to skip count by 5s, 10s, and 100s. • Multiplication facts for all single digits 1 through 9 and 10.	• Area is additive. • There is a relationship between area and multiplication. • The properties of operations will help in finding area. • Find the area of a rectangle by tiling it in unit squares. • Find the side lengths of a rectangle in units. • Skip counting and multiplication to determine the number of squares in an array. • Area models of multiplication.	• Tile areas of rectangles and determine the area in square units. Record the length and width of the rectangle, and investigate the patterns in the numbers (equal-sized groups in rows and columns). • Compare the area found by counting the tiles in a rectangle to the area found by adding equal-sized groups of tiles. If there are three rows and four columns, find the area by adding 3 + 3 + 3 + 3 or 4 + 4 + 4. • Compare the area found by tiling a rectangle to the area found by multiplying the side lengths and discover that the area is the length times the width.

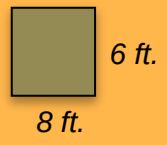
GRADE 3

Measurement and Data

Geometric measurement: understand concepts of area and relate area to multiplication and to addition

3.MD.7b
Relate area to the operations of multiplication and addition. Multiply side lengths to find areas of rectangles with whole-number side lengths (where factors can be between 1 and 10, inclusively) in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to model with equal-sized groups by partitioning rectangles. • Problem-solving structures for area/arrays and for equal groups. • Addition problem-solving strategies. • Multiplication facts for all single digits 1 through 9 and 10	• Area is additive. • There is a relationship between area and multiplication. • The properties of operations will help in finding area. • Multiply side lengths to find areas of rectangles. • Area is a square measure.	• Solve real-world and mathematical area problems by multiplying whole-number side lengths of rectangles. • Use rectangular arrays to represent whole-number products in multiplication problems. • For example, Betsy wants to tile the bathroom floor using square foot tiles. How many square foot tiles will she need?  *6 ft.* *8 ft.*

GRADE 3

Measurement and Data

Geometric measurement: understand concepts of area and relate area to multiplication and to addition

3.MD.7c
Relate area to the operations of multiplication and addition. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths *a* and *b* + *c* is the sum of *a* × *b* and *a* × *c*. Use area models to represent the distributive property in mathematical reasoning.

Desired Student Performance

A student should know

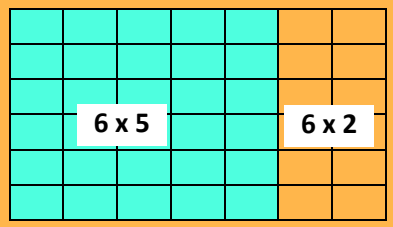
- How to model with equal-sized groups by partitioning rectangles.
- Problem-solving structures for area/arrays and for equal groups.
- Addition problem-solving strategies.
- Multiplication facts for all single digits 1 through 9 and 10.

A student should understand

- Area is additive.
- There is a relationship between area and multiplication.
- The properties of operations, specifically the distributive property, will help in finding area.
- How to multiply using an area model or array.
- How to use the distributive property to represent a real-world problem:
  $a \times (b + c) = a \times b + a \times c$

A student should be able to do

- Relate area of a rectangle to multiplication and addition by modeling the distributive property.
- For example, in the picture below, the area of a 6 x 7 figure can be determined by finding the area of a 6 x 5 and 6 x 2 figure and adding the two products.



6 x 7= (6 x 5) + (6 x 2)
(30) + (12) = 42

GRADE 3

Measurement and Data

Geometric measurement: understand concepts of area and relate area to multiplication and to addition

3.MD.7d

Relate area to the operations of multiplication and addition. 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. Recognize area as additive.

Desired Student Performance

A student should know

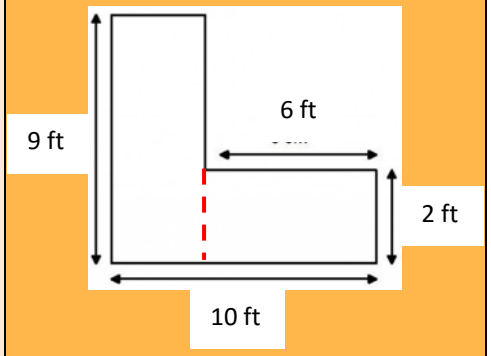
- How to decompose figures.
- A rectilinear figure is a polygon that has all right angles.
- How to find areas of rectangles.
- How to add areas of rectangles.
- Problem-solving structures for area/arrays and for equal groups.
- Multiplication facts for all single digits 1 through 9 and 10.

A student should understand

- Area is additive.
- There is a relationship between area and multiplication.
- The properties of operations will help in finding area.
- Areas of each rectangle in a rectilinear (straight line) figure can be added together to find the area of the figure.

A student should be able to do

- Decompose rectilinear figures into different rectangles and find the area of each rectangle that is part of a larger figure.
- Find the area of each larger figure by adding the areas of each of the rectangles. See the example below.



The area for the above figure is
(9 x 4) + (2 x 6) = 48 square feet.

GRADE 3

Measurement and Data

Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures

3.MD.8 **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 (including, but not limited to: modeling, drawing, designing, and creating) rectangles with the same perimeter and different areas or with the same area and different perimeters.**	**Desired Student Performance**		
	A student should know	**A student should understand**	**A student should be able to do**
	• How to relate addition and subtraction to length. • How to measure and estimate lengths in standard units. • How to relate to an open array used in multiplication and area problems. • Addition problem-solving strategies. • A polygon is a closed, flat figure formed using line segments that meet only at their ends. • For a polygon, the length of the perimeter is the sum of the lengths of the sides. • Perimeter equals the distance around a closed figure.	• Perimeter and addition are related and connected to the commutative property of multiplication. • Patterns exist when finding the sum of the lengths and widths of rectangles. • The difference between perimeter and area. • The length of all sides in a polygon must be known to find the perimeter of the polygon. • Unknown side lengths may be found by measuring or reasoning using given sides.	• Solve real-world and mathematical problems involving perimeters of polygons. • Find the perimeter of a polygon given the side lengths. • Find the perimeter of a polygon when there is an unknown side length. • Exhibit (design, create, draw, model, etc.) rectangles with the same perimeter and different areas. • Exhibit rectangles with the same area and different perimeters. • Solve real-world and mathematical problems involving perimeters of polygons.

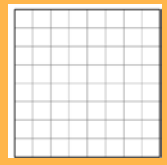
GRADE 3

Geometry

Reason with shapes and their attributes

3.G.1
Understand that shapes in different categories (e.g., rhombuses, rectangles, circles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Desired Student Performance

A student should know	A student should understand	A student should be able to do
• How to recognize and draw shapes having specified attributes such as a given number of angles and sides. Identify triangles, quadrilaterals, pentagons, and hexagons. • Triangles, quadrilaterals, pentagons, etc. are two-dimensional shapes. • How to identify and count angles and sides within a shape to label a shape.	• Shapes can be described and compared using their geometric attributes. • Shapes are categorized according to their attributes including the number of sides and angles within the shape. Those categories can contain subcategories, for example, rhombuses, rectangles, squares, trapezoids, parallelograms, etc. • Attributes of a circle.	• Describe, analyze, and compare properties of two-dimensional shapes. • Compare and classify shapes by attributes, sides and angles. • Group shapes with shared attributes to define a larger category (e.g., quadrilaterals). • Draw examples and non-examples of quadrilaterals with specific attributes. • For example, if a student writes, “All quadrilaterals are squares, rectangles, or rhombuses.” Draw a quadrilateral on the grid that proves this statement is false. 

GRADE 3

Geometry

Reason with shapes and their attributes

3.G.2
Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape*.

Desired Student Performance

A student should know

- A whole shape can be divided into equal parts. The equal parts may not be the same shape.
- How to divide shapes (circles and rectangles) into two, three, or four equal parts and use the terms *halves, thirds,* or *fourths* to describe the parts.
- A fraction represents quantities where a whole is divided into equal-sized parts.
- How to use the term numerator to indicate the number of parts and denominator to represents the total number of parts a whole is portioned into.

A student should understand

- Unit fractions can be used to describe a whole that has been divided into parts.
- The size of the fractional part is relative to the size of the whole.
- Composition and decomposition of rectangular regions.
- How to partition a rectangle into equal squares.

A student should be able to do

- Divide shapes into parts with equal areas.
- Represent the area of each part as a unit fraction.
- For example, which of these shows $^1/_3$ of the shaded figure?