

Arkansas Mathematics Standards
Grades K-5
2016

Introduction to the Grades K-5 Arkansas Mathematics Standards

When charged with the task of revising the previous mathematics standards, a group of qualified individuals from across the state came together to craft standards that were specific for the schools and students of Arkansas. The result of this work, the Arkansas Mathematics Standards, is contained in this document. These standards reflect what educators across our state know to be best for our students.

These standards retain the same structure as the previous standards in terms of organization. The standards are organized by domains, clusters, and standards. Domains represent the big ideas that are to be studied at each grade level and sometimes across grade bands. These big ideas support educators in determining the proper amount of focus and instructional time to be given to each of these topics.
Clusters represent collections of standards that are grouped together to help educators understand the building blocks of rich and meaningful instructional units. These units help students make connections within clusters and avoid seeing mathematics as a discreet list of skills that they must master. Standards represent the foundational building blocks of math instruction. The standards outlined in this document work together to ensure that students are college and career ready and on track for success.

There are additional similarities shared by these new standards and the previous standards. The main similarity is the structure of the nomenclature. The only change that was made to the naming system was intended to reflect that these standards belong to Arkansas. However, educators may still search for open education resources by using the last part of the label, which will link to the resources for the previous standards. New standards can be found at the end of each cluster in which a new standard was deemed necessary.

Another similarity to the previous standards is the use of the symbols (+) and (*) to distinguish certain standards from others. The plus (+) symbol is used to designate standards that are typically beyond the scope of an Algebra II course. However, some of the plus (+) standards are now included in courses that are not considered to be beyond Algebra II. Standards denoted with the asterisk (*) symbol represent the modeling component of the standards. These standards should be presented in a modeling context where students are required to engage in the modeling process that is outlined in the Standards for Mathematical Practice.

The revision committee opted to include some new elements in the Arkansas Mathematics Standards that represent an attempt at greater clarity and more consistent implementation across the state. Many of the revisions are a rewording of the original Common Core State Standards. The purpose of the rewording is often to help educators better understand the areas of emphasis and focus within the existing standard. Likewise, many of the standards are separated into a bulleted list of content. This does not mean that teachers should treat this content as a checklist of items that they must teach one at a time. The content was bulleted out so that teachers can better understand all that is included in some of the broader standards. Many of the examples that were included in the original standards were either changed for clarity or separated from the body of the actual standard. The committee wanted

educators to understand that the examples included in the body of the standards document in no way reflect all of the possible examples. Likewise, these examples do not mandate curriculum or problem types. Local districts are free to select the curriculum and instructional methods they think best for their students.

In some instances, notes of clarification were added. These notes were intended to clarify, for teachers, what the expectations are for the student. Likewise, these notes provide instructional guidance as well as limitations so that teachers can better understand the scope of the standard. This will help the educators in determining what is developmentally appropriate for students when they are working with certain standards.

Finally, the Arkansas Mathematics Standards will become a living document. The staff of the Arkansas Department of Education hopes that this document portrays the hard work of the Arkansas educators who took part in the revision process and that it represents an improvement to the previous set of standards. As these standards are implemented across schools in the state, the Arkansas Department of Education welcomes further suggestions related to notes of clarification, examples, professional development needs, and future revisions of the standards.

Abbreviations:
Counting and Cardinality – CC
Operations and Algebraic Thinking – OA
Number and Operations in Base Ten – NBT
Number and Operations – Fractions – NF
Measurement and Data – MD
Geometry – G

Kindergarten – Arkansas Mathematics

Counting and Cardinality	**Know number names and the count sequence**
AR.Math.Content.K.CC.A.1	Count to 100 by ones, fives, and tens
AR.Math.Content.K.CC.A.2	Count forward, by ones, from any given number up to 100
AR.Math.Content.K.CC.A.3	Read, write, and represent numerals from 0 to 20 Note: K.CC.A.3 addresses the writing of numbers and using the written numerals 0-20 to describe the amount of a set of objects. Due to varied progression of fine motor and visual development, a reversal of numerals is anticipated for the majority of students. While reversals should be pointed out to students, the emphasis is on the use of numerals to represent quantities rather than the correct handwriting of the actual number itself.

Counting and Cardinality	**Count to tell the number of objects**
AR.Math.Content.K.CC.B.4	Understand the relationship between numbers and quantities; connect counting to cardinality When counting objects: • Say the numbers in order, pairing each object with only one number and each number with only one object (one to one correspondence) • Understand that the last number said tells the number of objects counted • Understand that each successive number refers to a quantity that is one larger Note: Students should understand that the number of objects is the same regardless of their arrangement or the order in which they were counted.
AR.Math.Content.K.CC.B.5	Count to answer “how many?”: • Count up to 20 objects in any arrangement • Count up to 10 objects in a scattered configuration • Given a number from 1-20, count out that many objects Note: As students progress they may first move the objects, counting as they move them. Students may also line up objects to count them. If students have a scattered arrangement, they may touch each item as they count it, or if students have a scattered arrangement, they may finally be able to count them by visually scanning without touching the items.

Kindergarten – Arkansas Mathematics

Counting and Cardinality	**Compare numbers**
AR.Math.Content.K.CC.C.6	Identify whether the number of objects in one group from 0-10 is greater than (more, most), less than (less, fewer, least), or equal to (same as) the number of objects in another group of 0-10 For example: Use matching and counting strategies to compare *values*.
AR.Math.Content.K.CC.C.7	Compare two numbers between 0 and 20 presented as written numerals Note: The use of the symbols for greater than/less than should not be introduced in this grade level. Appropriate terminology to use would be more than, less than, or the same as.
AR.Math.Content.K.CC.C.8	Quickly identify a number of items in a set from 0-10 without counting (e.g., dominoes, dot cubes, tally marks, ten-frames)

Kindergarten – Arkansas Mathematics Standards

Operations and Algebraic Thinking	**Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from**
AR.Math.Content.K.OA.A.1	Represent addition and subtraction using objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, *expressions* (e.g., 2+3), or *equations* (e.g., 2+3 =) Note: *Expressions* and *equations* are not required but are recommended by the end of Kindergarten.
AR.Math.Content.K.OA.A.2	Solve real-world problems that involve addition and subtraction within 10 (e.g., by using objects or drawings to represent the problem)
AR.Math.Content.K.OA.A.3	Use objects or drawings to decompose (break apart) numbers less than or equal to 10 into pairs in more than one way, and record each decomposition (part) by a drawing or an equation (e.g., 5 = 2 + 3 and 5 = 4 + 1) Note: Students should see *equations* and be encouraged to recognize that the two parts make the whole. However, writing *equations* is not required.
AR.Math.Content.K.OA.A.4	Find the number that makes 10 when added to the given number (e.g., by using objects or drawings) and record the answer with a drawing or equation Note: Use of different manipulatives such as ten-frames, cubes, or two-color counters, assists students in visualizing these number pairs.
AR.Math.Content.K.OA.A.5	Fluently add and subtract within 10 by using various strategies and manipulatives Note: Fluency in this standard means accuracy (correct answer), efficiency (a reasonable amount of steps), and flexibility (using various strategies). Fluency is developed by working with many different kinds of objects over an extended period of time. This objective does not require the students to instantly know the answer.

Kindergarten – Arkansas Mathematics Standards

Number and Operations in Base Ten	**Work with numbers 11-19 to gain foundations for place value**
AR.Math.Content.K.NBT.A.1	Develop initial understanding of *place value* and the base-ten number system by showing equivalent forms *of whole numbers* from 11 to 19 as groups of tens and ones using objects and drawings

Kindergarten – Arkansas Mathematics

Measurement and Data	**Describe and compare measureable attributes**
AR.Math.Content.K.MD.A.1	Describe several measurable *attributes* of a single object, including but not limited to length, weight, height, and temperature Note: Vocabulary may include short, long, heavy, light, tall, hot, cold, warm, or cool.
AR.Math.Content.K.MD.A.2	Describe the difference when comparing two objects (side-by-side) with a measurable *attribute* in common, to see which object has more of or less of the common *attribute* Note: Vocabulary may include shorter, longer, taller, lighter, heavier, warmer, cooler, or holds more.

Measurement and Data	**Classify objects and count the number of objects in each category**
AR.Math.Content.K.MD.B.3	Classify, sort, and count objects using both measureable and non-measureable *attributes* such as size, number, color, or shape Note: Limit category count to be less than or equal to 10. Students should be able to give the reason for the way the objects were sorted.

Measurement and Data	**Work with time and money**
AR.Math.Content.K.MD.C.4	• Understand concepts of time including morning, afternoon, evening, today, yesterday, tomorrow, day, week, month, and year • Understand that clocks, both analog and digital, and calendars are tools that measure time
AR.Math.Content.K.MD.C.5	Read time to the hour on digital and analog clocks Note: This is an introductory skill and is addressed more formally in the upcoming grade levels.
AR.Math.Content.K.MD.C.6	Identify pennies, nickels, and dimes, and know the *value* of each Note: This is an introduction skill and is addressed more formally in the upcoming grade levels.

Kindergarten – Arkansas Mathematics

Geometry	**Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)**
AR.Math.Content.K.G.A.1	Describe the positions of objects in the environment and geometric shapes in space using names of shapes, and describe the relative positions of these objects Note: Positions could be inside, outside, between, above, below, near, far, under, over, up, down, behind, in front of, next to, to the left of, to the right of, or beside.
AR.Math.Content.K.G.A.2	Correctly name shapes regardless of their orientations or overall size Note: Orientation refers to the way the shape is turned (upside down, sideways).
AR.Math.Content.K.G.A.3	Identify shapes as two-dimensional (flat) or three-dimensional (solid)

Geometry	**Analyze, compare, create, and compose shapes**
AR.Math.Content.K.G.B.4	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/corners), and other *attributes* (e.g., having sides of equal length) Note: 2-D shapes: squares, circles, triangles, rectangles, and hexagons 3-D shapes: cube, cone, cylinder, and sphere
AR.Math.Content.K.G.B.5	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and by drawing shapes
AR.Math.Content.K.G.B.6	Compose two-dimensional shapes to form larger two-dimensional shapes For example: Join two squares to make a rectangle or join six equilateral triangles to form a hexagon.

Grade 1 – Arkansas Mathematics Standards

Operations and Algebraic Thinking	**Represent and solve problems involving addition and subtraction**
AR.Math.Content.1.OA.A.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions (e.g., by using objects, drawings, and *equations* with a symbol for the unknown number to represent the problem)
AR.Math.Content.1.OA.A.2	Solve word problems that call for addition of three *whole numbers* whose *sum* is less than or equal to 20 (e.g., by using objects, drawings, and *equations* with a symbol for the unknown number to represent the problem)

Operations and Algebraic Thinking	**Understand and apply properties of operations and the relationship between addition and subtraction**
AR.Math.Content.1.OA.B.3	Apply properties of operations as strategies to add and subtract For example: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known (*commutative property of addition*). To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12 (*associative property of addition*). Note: Students need not use formal terms for these properties.
AR.Math.Content.1.OA.B.4	Understand subtraction as an unknown-addend problem For example: Subtract 10 - 8 by finding the number that makes 10 when added to 8.

Grade 1 – Arkansas Mathematics Standards

Operations and Algebraic Thinking	**Add and subtract within 20**
AR.Math.Content.1.OA.C.5	Relate counting to addition and subtraction (e.g., by *counting on* 2 to add 2)
AR.Math.Content.1.OA.C.6	Add and subtract within 20, demonstrating *computational fluency* for addition and subtraction within 10 Use strategies such as: • *Counting on* • Making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14) • Decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9) • Using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4) • Creating equivalent but easier or known *sums* (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13) Note: *Computational fluency* is demonstrating the method of student choice. Students should understand the strategy he/she selected and be able to explain how it can efficiently produce accurate answers.

Operations and Algebraic Thinking	**Work with addition and subtraction equations**
AR.Math.Content.1.OA.D.7	Understand the meaning of the equal sign and determine if *equations* involving addition and subtraction are true or false For example: Which of the following *equations* are true and which are false? 6 = 6, 7 = 8 - 1, 5 + 2 = 2 + 5, or 4 + 1 = 5 + 2.
AR.Math.Content.1.OA.D.8	Determine the unknown whole number in an addition or subtraction equation relating three *whole numbers* For example: Determine the unknown number that makes the equation true in each of the *equations* 8 + ? = 11, 5 = _ - 3, and 6 + 6 = _

Grade 1 – Arkansas Mathematics Standards

Number and Operations in Base Ten	**Extend the counting sequence**
AR.Math.Content.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.

Number and Operations in Base Ten	**Understand place value**
AR.Math.Content.1.NBT.B.2	Understand that the two digits of a two-digit number represent amounts of tens and ones Understand the following as special cases: • 10 can be thought of as a bundle of ten ones — called a "ten" • The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones • 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
AR.Math.Content.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 <

Grade 1 – Arkansas Mathematics Standards

Numbers and Operations in Base Ten	**Use place value understanding and properties of operations to add and subtract**
AR.Math.Content.1.NBT.C.4	Add within 100 using concrete models or drawings, relate the strategy used to a written expression or equation, and be able to explain the reasoning Note: Strategies should be based on *place-value*, properties of operations, and the relationship between addition and subtraction.
AR.Math.Content.1.NBT.C.5	Mentally find 10 more or 10 less than a given two-digit number, without having to count Note: Students should be able to explain the reasoning used.
AR.Math.Content.1.NBT.C.6	Subtract multiples of 10 from multiples of 10 (both in the range of 10-90) using concrete models or drawings, relate the strategy to a written method, and explain the reasoning used Note: Strategies should be based on *place value*, properties of operations, and the relationship between addition and subtraction. Note: *Differences* should be zero or positive.

Grade 1 – Arkansas Mathematics Standards

Measurement and Data	**Measure lengths indirectly and by iterating length units**
AR.Math.Content.1.MD.A.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object
AR.Math.Content.1.MD.A.2	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps Note: Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

Measurement and Data	**Work with time and money**
AR.Math.Content.1.MD.B.3	Tell and write time in hours and half-hours using analog and digital clocks Note: The intention of this standard is to continue the introduction of the concept with the goal of mastery by the end of third grade.
AR.Math.Content.1.MD. B.4 (New Standard)	Identify and know the *value* of a penny, nickel, dime, and quarter
AR.Math.Content.1.MD. B.5 (New Standard)	Count collections of like coins (pennies, nickels, and dimes)

Measurement and Data	**Represent and interpret data**
AR.Math.Content.1.MD.C.6	• Organize, represent, and interpret data with up to three categories, using tally tables, picture graphs and bar graphs • Ask and answer questions about the total number represented, how many in each category, and how many more or less are in one category than in another

Grade 1 – Arkansas Mathematics Standards

Geometry	**Reason with shapes and their attributes**
AR.Math.Content.1.G.A.1	Distinguish between defining *attributes* (e.g., triangles are closed and three-sided) versus non-defining *attributes* (e.g., color, orientation, overall size); build and draw shapes to possess defining *attributes*
AR.Math.Content.1.G.A.2	Compose two-dimensional shapes (e.g., rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (e.g., cubes, right *rectangular prisms*, right circular cones, and right circular cylinders) to create a composite shape Note: Students do not need to learn formal names such as "right *rectangular prism*".
AR.Math.Content.1.G.A.3	• Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of • Describe the whole as two of, or four of, the shares • Understand for these examples that decomposing into more equal shares creates smaller shares

Operations and Algebraic Thinking	**Represent and solve problems involving addition and subtraction**
AR.Math.Content.2.OA.A.1	• Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions • Represent a strategy with a related equation including a symbol for the unknown number

Operations and Algebraic Thinking	**Add and subtract within 20**
AR.Math.Content.2.OA.B.2	• Fluently add and subtract within 20 using mental strategies • By the end of Grade 2, know from memory all *sums* of two one-digit numbers Note: *Fact fluency* means that students should have automaticity when recalling these *facts*.

Operations and Algebraic Thinking	**Work with equal groups of objects to gain foundations for multiplication**
AR.Math.Content.2.OA.C.3	• Determine whether a group of objects (up to 20) has an odd or even number of members (e.g., by pairing objects or counting them by 2s) • Write an equation to express an even number (up to 20) as a *sum* of two equal addends
AR.Math.Content.2.OA.C.4	• Use addition to find the total number of objects arranged in *rectangular arrays* with up to 5 rows and up to 5 columns • Write an equation to express the total as a *sum* of equal addends

Grade 2 - Arkansas Mathematics Standards

Number and Operations in Base Ten	**Understand place value**
AR.Math.Content.2.NBT.A.1	• Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 726 equals 7 hundreds, 2 tens, and 6 ones • Understand that 100 can be thought of as a group of ten tens — called a "hundred" • Understand that the numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine groups of 100
AR.Math.Content.2.NBT.A.2	• Count within 1000 • Skip-count by 5s, 10s, and 100s beginning at zero
AR.Math.Content.2.NBT.A.3	• Read and write numbers to 1000 using base-ten numerals, number names, and a variety of *expanded forms* • Model and describe numbers within 1000 as groups of 10 in a variety of ways
AR.Math.Content.2.NBT.A.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols and correct terminology for the symbols to record the results of comparisons

Number and Operations in Base Ten	**Use place value understanding and properties of operations to add and subtract**
AR.Math.Content.2.NBT.B.5	Add and subtract within 100 with *computational fluency* using strategies based on *place value*, properties of operations, and the relationship between addition and subtraction
AR.Math.Content.2.NBT.B.6	Add up to four two-digit numbers using strategies based on *place value* and properties of operations
AR.Math.Content.2.NBT.B.7	Add and subtract within 1000, using concrete models or drawings and strategies based on *place value*, properties of operations, and the relationship between addition and subtraction; relate the strategy to a written expression or equation
AR.Math.Content.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
AR.Math.Content.2.NBT.B.9	Explain why addition and subtraction strategies work, using *place value* and the properties of operations Note: Explanations could be supported by drawings or objects.

Grade 2 - Arkansas Mathematics Standards

Measurement and Data	**Measure and estimate lengths in standard units**
AR.Math.Content.2.MD.A.1	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes
AR.Math.Content.2.MD.A.2	• Measure the length of an object twice with two different length units • Describe how the two measurements relate to the size of the unit chosen For example: A desktop is measured in both centimeters and inches. Student compares the size of the unit of measure and the number of those units.
AR.Math.Content.2.MD.A.3	Estimate lengths using units of inches, feet, centimeters, and meters
AR.Math.Content.2.MD.A.4	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit

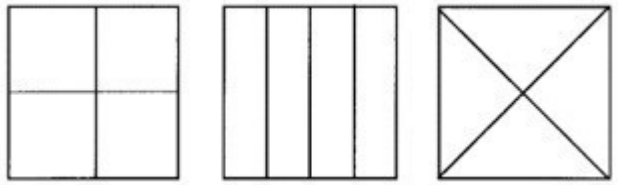
Measurement and Data	**Relate addition and subtraction to length**
AR.Math.Content.2.MD.B.5	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, and write *equations* with a symbol for the unknown number to represent the problem
AR.Math.Content.2.MD.B.6	Represent *whole numbers* as lengths from 0 on a *number line diagram* with equally spaced points corresponding to the numbers 0, 1, 2, ..., and solve addition and subtraction problems within 100 on the *number line diagram*

Grade 2 - Arkansas Mathematics Standards

Measurement and Data	**Work with time and money**
AR.Math.Content.2.MD.C.7	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. Note: This standard is a continuation of previous instruction at lower grades with the expectation of mastery by the end of third grade.
AR. Math.Content.2.MD.C.8	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately For example: A student has 2 dimes and 3 pennies; how many cents does he have?

Measurement and Data	**Represent and interpret data**
AR.Math.Content.2.MD.D.9	• Generate data by measuring the same *attribute* of similar objects to the nearest whole unit • Display the measurement data by making a *line plot*, where the horizontal scale is marked off in whole- number units • Generate data from multiple measurements of the same object • Make a *line plot*, where the horizontal scale is marked off in whole-number units, to compare precision of measurements Note: After several experiences with generating data to use, the students can be given data already generated to create the *line plot.*
AR.Math.Content.2.MD.D.10	• Draw a picture graph and a bar graph, with single-unit scale, to represent a data set with up to four categories • Solve simple put-together, take-apart, and compare problems using information presented in a bar graph

Grade 2 - Arkansas Mathematics Standards

Geometry	**Reason with shapes and their attributes**
AR.Math.Content.2.G.A.1	• Recognize and draw shapes having specified *attributes* (e.g., number of angles, number of sides, or a given number of equal faces) • Identify triangles, quadrilaterals, pentagons, hexagons, and cubes Note: Sizes are compared directly or visually, not compared by measuring.
AR.Math.Content.2.G.A.2	Partition a rectangle into rows and columns of same-size squares and count to find the total number of squares
AR.Math.Content.2.G.A.3	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths
AR.Math.Content.2.G.A.4	Recognize that equal shares of identical wholes need not have the same shape 

Grade 3 – Arkansas Mathematics Standards

Operations and Algebraic Thinking	**Represent and solve problems involving multiplication and division**
AR.Math.Content.3.OA.A.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.
AR.Math.Content.3.OA.A.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.
AR.Math.Content.3.OA.A.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)
AR.Math.Content.3.OA.A.4	Determine the unknown whole number in a multiplication or division equation relating three *whole numbers* For example: Determine the unknown number that makes the equation true in each of the *equations* 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?

Operations and Algebraic Thinking	**Understand properties of multiplication and the relationship between multiplication and division**
AR.Math.Content.3.OA.B.5	Apply properties of operations as strategies to multiply and divide For example: 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). Note: Students are not required to use formal terms for these properties.
AR.Math.Content.3.OA.B.6	Understand division as an unknown-factor problem For example: Find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.

Grade 3 – Arkansas Mathematics Standards

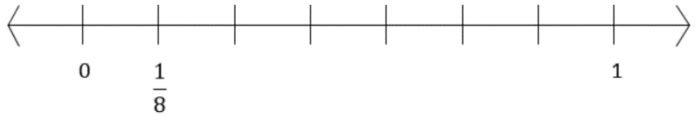
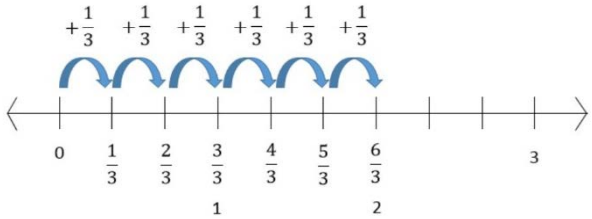
Operations and Algebraic Thinking	**Multiply and divide within 100**
AR.Math.Content.3.OA.C.7	• Using *computational fluency*, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one know 40 ÷ 5 = 8) or properties of operations • By the end of Grade 3, automatically (*fact fluency*) recall all *products* of two one-digit numbers Note: *Computational fluency* is defined as a student's ability to efficiently and accurately solve a problem with some degree of flexibility with their strategies.

Operations and Algebraic Thinking	**Solve problems involving the four operations, and identify and explain patterns in arithmetic**
AR.Math.Content.3.OA.D.8	Solve two-step word problems using the four operations, and be able to: • Represent these problems using *equations* with a letter standing for unknown quantity • Assess the reasonableness of answers using mental computation and estimation strategies including rounding Note: This standard is limited to problems posed with *whole numbers* and having whole-number answers; students should know how to perform operations in conventional order when there are no parentheses to specify a particular order (Order of Operations).
AR.Math.Content.3.OA.D.9	Identify arithmetic patterns (including, but not limited to, 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.

Grade 3 – Arkansas Mathematics Standards

Number and Operations in Base Ten	**Use place value understanding and properties of operations to preform multi-digit arithmetic**
AR.Math.Content.3.NBT.A.1	Use *place value* understanding to round *whole numbers* to the nearest 10 or 100
AR.Math.Content.3.NBT.A.2	Using *computational fluency*, add and subtract within 1000 using strategies and *algorithms* based on *place value*, properties of operations, and the relationship between addition and subtraction Note: *Computational fluency* is defined as a student's ability to efficiently and accurately solve a problem with some degree of flexibility with their strategies.
AR.Math.Content.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
AR.Math.Content.3.NBT.A.4	Understand that the four digits of a four-digit number represent amounts of thousands, hundreds, tens, and ones (e.g., 7,706 can be portrayed in a variety of ways according to *place value* strategies) Understand the following as special cases: • 1,000 can be thought of as a group of ten hundreds---called a thousand • The numbers 1,000, 2,000, 3,000, 4,000, 5,000, 6,000, 7,000, 8,000, 9,000 refer to one, two, three, four, five, six, seven, eight, or nine thousands
AR.Math.Content.3.NBT.A.5	Read and write numbers to 10,000 using base-ten numerals, number names, and *expanded form(*s) For example: Using base-ten numerals "standard form" (347) Number name form (three-hundred forty seven) *Expanded form*(s) (300 + 40 + 7 = 3 × 100 + 4 × 10 + 7 × 1)
AR.Math.Content.3.NBT.A.6	Compare two four-digit numbers based on meanings of thousands, hundreds, tens, and ones digits using symbols (<, >, =) to record the results of comparisons

Grade 3 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Develop understanding of fractions as numbers**
AR.Math.Content.3.NF.A.1	• Understand a *fraction* 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts For example: *Unit fractions* are *fractions* with a *numerator* of 1 derived from a whole partitioned into equal parts and having 1 of those equal parts (1/4 is 1 part of 4 equal parts). • Understand a *fraction a*/*b* as the quantity formed by *a* parts of size 1/*b* For example: *Unit fractions* can be joined together to make non-unit fractions (¼ + ¼ + ¼ = ¾).
AR.Math.Content.3.NF.A.2	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 Example:  • 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 Example: 

AR.Math.Content.3.NF.A.3	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 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*) • Express *whole numbers* as *fractions* and recognize *fractions* that are equivalent to *whole numbers* (e.g., 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*) • 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 symbols (>, =, <) and justify the conclusions (e.g., by using a *visual fraction model*)

Note: Grade 3 expectations in this domain are limited to *fractions* with *denominators* 2, 3, 4, 6, and 8.

Grade 3 – Arkansas Mathematics Standards

Measurement and Data	**Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects**
AR.Math.Content.3.MD.A.1	• Tell time using the terms quarter and half as related to the hour (e.g., quarter-past 3:00, half-past 4:00, and quarter till 3:00) • 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*)
AR.Math.Content.3.MD.A.2	• Measure and estimate liquid volumes and masses of objects using standard units such as: grams (g), kilograms (kg), liters (l), gallons (gal), quarts (qt), pints (pt), and cups (c) • 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) Note: Conversions can be introduced but not assessed. Excludes compound units such as cubic centimeters and finding the geometric volume of a container. Excludes multiplicative comparison problems (problems involving notions of “times as much”).

Measurement and Data	**Represent and interpret data**
AR.Math.Content.3.MD.B.3	• Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories (e.g., Draw a bar graph in which each square in the bar graph might represent 5 pets) • Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled picture graphs and scaled bar graphs
AR.Math.Content.3.MD.B.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

Grade 3 – Arkansas Mathematics Standards

Measurement and Data	**Geometric measurement: understand concepts of area and relate area to multiplication and to addition**
AR.Math.Content.3.MD.C.5	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. • 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
AR.Math.Content.3.MD.C.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units)
AR.Math.Content.3.MD.C.7	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 • Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number *products* as rectangular areas in mathematical reasoning • 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 • Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems

Measurement and Data	**Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures**
AR.Math.Content.3.MD.D.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 rectangles with the same perimeter and different areas or with the same area and different perimeters

Grade 3 – Arkansas Mathematics Standards

Geometry	**Reason with shapes and their attributes**
AR.Math.Content.3.G.A.1	• Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share *attributes* (e.g., having four sides) and that the shared *attributes* can define a larger category (e.g., quadrilaterals) • Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories Note: An informal discussion of types of lines (parallel and perpendicular) and angles is needed; however, student assessment is not required. Note: Trapezoids will be defined to be a quadrilateral with at least one pair of opposite sides parallel, therefore all parallelograms are trapezoids.
AR.Math.Content.3.G.A.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.

Grade 4 – Arkansas Mathematics Standards

Operations and Algebraic Thinking	**Use the four operations with whole numbers to solve problems**
AR.Math.Content.4.OA.A.1	• Interpret a multiplication equation as a comparison (e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5) • Represent verbal statements of multiplicative comparisons as multiplication *equations*
AR.Math.Content.4.OA.A.2	• Multiply or divide to solve word problems involving multiplicative comparison • Use drawings and *equations* with a letter for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison
AR.Math.Content.4.OA.A.3	• Solve multistep word problems posed with *whole numbers* and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using *equations* with a letter standing for the unknown quantity • Assess the reasonableness of answers using mental computation and estimation strategies including rounding

Operations and Algebraic Thinking	**Gain familiarity with factors and multiples**
AR.Math.Content.4.OA.B.4	• Find all factor pairs for a whole number in the range 1-100 • Recognize that a whole number is a multiple of each of its *factors* • Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number • Determine whether a given whole number in the range 1-100 is prime or composite Note: Informal classroom discussion might include divisibility rules, finding patterns and other strategies.

Grade 4 – Arkansas Mathematics Standards

Operations and Algebraic Thinking	**Generate and analyze patterns**
AR.Math.Content.4.OA.C.5	• Generate a number or shape pattern that follows a given rule • Identify apparent features of the pattern that were not explicit in the rule itself For example: Given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain why the numbers will continue to alternate in this way.

Grade 4 – Arkansas Mathematics Standards

Number and Operations in Base Ten	**Generalize place value understanding for multi-digit whole numbers**
AR.Math.Content.4.NBT.A.1	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right For example: Recognize that 700 ÷ 70 = 10 or 700 =10x70 by applying concepts of *place value* and division.
AR.Math.Content.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 symbols (>, =, <) to record the results of comparisons
AR.Math.Content.4.NBT.A.3	Use *place value* understanding to round multi-digit *whole numbers* to any place

Grade 4 – Arkansas Mathematics Standards

Number and Operations in Base Ten	**Use place value understanding and properties of operations to perform multi-digit arithmetic**
AR.Math.Content.4.NBT.B.4	Add and subtract multi-digit *whole numbers* with *computational fluency* using a standard *algorithm* Notes: • *Computational fluency* is defined as a student's ability to efficiently and accurately solve a problem with some degree of flexibility with their strategies. • A standard *algorithm* can be viewed as, but should not be limited to, the traditional recording system. • A standard *algorithm* denotes any valid base-ten strategy.
AR.Math.Content.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 area models Note: Properties of operations need to be referenced.
AR.Math.Content.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 the relationship between multiplication and division • Illustrate and explain the calculation by using *equations*, *rectangular arrays*, and area models

Grade 4 expectations in this domain are limited to *whole numbers* less than or equal to 1,000,000.

Grade 4 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Extend understanding of fraction equivalence and ordering**
AR.Math.Content.4.NF.A.1	• By using *visual fraction models*, explain why a *fraction a/b* is equivalent to a *fraction* (*n* × *a*)/(*n* × *b*) with attention to how the number and size of the parts differ even though the two *fractions* themselves are the same size • Use this principle to recognize and generate equivalent *fractions* For example: 1/5 is equivalent to (2x1) / (2x5).
AR.Math.Content.4.NF.A.2	• Compare two *fractions* with different *numerators* and different *denominators* (e.g., by creating common *denominators* or *numerators*, or by comparing to a benchmark *fraction* such as ½) • Recognize that comparisons are valid only when the two *fractions* refer to the same whole. Record the results of comparisons with symbols (>, =, <), and justify the conclusions (e.g., by using a *visual fraction model*)

Grade 4 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Build fractions from unit fractions by applying and extending previous understanding of operations of whole numbers**
AR.Math.Content.4.NF.B.3	Understand a *fraction a*/*b* with *a* > 1 as a *sum* of *fractions* 1/*b* (e.g., 3/8=1/8+1/8+1/8): • Understand addition and subtraction of *fractions* as joining and separating parts referring to the same whole • Decompose a *fraction* into a *sum* of *fractions* with the same *denominator* in more than one way, recording each decomposition by an equation and justify decompositions (e.g., by using a *visual fraction model*) (e.g., 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8) • Add and subtract mixed numbers with like *denominators* (e.g., by using properties of operations and the relationship between addition and subtraction and by replacing each number with an equivalent *fraction*) • Solve word problems involving addition and subtraction of *fractions* referring to the same whole and having like *denominators* (e.g., by using *visual fraction models* and *equations* to represent the problem) Note: Converting a mixed number to an improper *fraction* should not be viewed as a separate technique to be learned by rote memorization, but simply a case of *fraction* addition (e.g., 7 1/5 =7 + 1/5 = 35/5 + 1/5 = 36/5).
AR.Math.Content.4.NF.B.4	Apply and extend previous understandings of multiplication to multiply a *fraction* by a whole number: • Understand a *fraction a/b* as a multiple of 1/b (e.g., Use a *visual fraction model* to represent 5/4 as the *product* 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4)) • Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a *fraction* by a whole number (e.g., Use a *visual fraction model* to express 3 × (2/5) as 6 × (1/5), recognizing this *product* as 6/5 (In general, n × (a/b) = (n × a)/b)) • Solve word problems involving multiplication of a *fraction* by a whole number (e.g., by using *visual fraction models* and *equations* to represent the problem) For example: If each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two *whole numbers* does your answer lie? Note: Emphasis should be placed on the relationship of how the *unit fraction* relates to the multiple of the *fraction*.

Grade 4 expectations in this domain are limited to *fractions* with *denominators* 2, 3, 4, 5, 6, 8, 10, 12, and 100.

Grade 4 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Understand decimal notation for fractions, and compare decimal fractions**
AR.Math.Content.4.NF.C.5	Express a *fraction* with *denominator* 10 as an equivalent *fraction* with denominator 100, and use this technique to add two *fractions* with respective *denominators* 10 and 100 For example: Express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. Note: Students who can generate equivalent *fractions* can develop strategies for adding *fractions* with unlike *denominators* in general. However, addition and subtraction with unlike *denominators* in general is not a requirement at this grade.
AR.Math.Content.4.NF.C.6	Use decimal notation for *fractions* with *denominators* 10 or 100 For example: Write 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a *number line diagram.*
AR.Math.Content.4.NF.C.7	• Compare two decimals to hundredths by reasoning about their size • Recognize that comparisons are valid only when the two decimals refer to the same whole • Record the results of comparisons using symbols (>, =, <), and justify the conclusions (e.g., by using a visual model)

Grade 4 expectations in this domain are limited to *fractions* with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

Grade 4 – Arkansas Mathematics Standards

Measurement and Data	**Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit**
AR.Math.Content.4.MD.A.1	• Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec; yd, ft, in; gal, qt, pt, c • Within a single system of measurement, express measurements in the form of a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table For example: Know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), and (3, 36).
AR.Math.Content.4.MD.A.2	• Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money including the ability to make change; including problems involving simple *fractions* or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit • Represent measurement quantities using diagrams such as *number line diagrams* that feature a measurement scale Note: This is a standard that may be addressed throughout the year focusing on different context.
AR.Math.Content.4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems For example: Find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown *factor.*

Measurement and Data	**Represent and interpret data**
AR.Math.Content.4.MD.B.4	• Make a *line plot* to display a data set of measurements in *fractions* of a unit (e.g., 1/2, 1/4, 1/8) • Solve problems involving addition and subtraction of *fractions* by using information presented in *line plots* For example: From a *line plot*, find and interpret the *difference* in length between the longest and shortest specimens in an insect collection.

Grade 4 – Arkansas Mathematics Standards

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

Grade 4 – Arkansas Mathematics Standards

Geometry	**Draw and identify lines and angles, and classify shapes by properties of their lines and angles**
AR.Math.Content.4.G.A.1	• Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines • Identify these in two-dimensional figures
AR.Math.Content.4.G.A.2	• Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size • Recognize right triangles as a category and identify right triangles Note: Trapezoids will be defined to be a quadrilateral with at least one pair of opposite sides parallel, therefore all parallelograms are trapezoids.
AR.Math.Content.4.G.A.3	• Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts • Identify line-symmetric figures and draw lines of symmetry

Grade 5 – Arkansas Mathematics Standards

Operations and Algebraic Thinking	**Write and interpret numerical expressions**
AR.Math.Content.5.OA.A.1	Use *grouping symbols* including parentheses, brackets, or braces in numerical *expressions*, and evaluate *expressions* with these symbols Note: *Expressions* should not contain nested *grouping symbols* such as [4+2(10+3)] and they should be nomore complex than the *expressions* one finds in an application of the associative or distributive property (e.g., (8+7) x2 or {6 X 30} + {6 X 7}).
AR.Math.Content.5.OA.A.2	Write simple *expressions* that record calculations with numbers, and interpret numerical *expressions* without evaluating them For Example: Express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated *sum* or *product.*

Operations and Algebraic Thinking	**Analyze patterns and relationships**
AR.Math.Content.5.OA.B.3	• Generate two numerical patterns, each using a given rule • Identify apparent relationships between corresponding terms by completing a function table or input/output table • Using the terms created, form and graph ordered pairs in the first quadrant of the *coordinate plane* Note: Terms of the numerical patterns will be limited to whole number coordinates.

Number and Operations in Base Ten	**Understand the place value system**
AR.Math.Content.5.NBT.A.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left
AR.Math.Content.5.NBT.A.2	Understand why multiplying or dividing by a power of 10 shifts the *value* of the digits of a whole number or decimal: • Explain patterns in the number of zeros of the *product* when multiplying a whole number by powers of 10 • 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
AR.Math.Content.5.NBT.A.3	Read, write, and compare decimals to thousandths: • Read and write decimals to thousandths using base-ten numerals, number names, and *expanded form*(s) Examples could include: o Base-ten numerals “standard form” (347.392) o Number name form (three-hundred forty seven and three hundred ninety-two thousandths) o *Expanded form*(s): 300 + 40 + 7 + .3 + .09 +.002 = 300 +40 +7 +3/10 + 9/100 + 2/100 = 3 x 100 + 4 x 10 + 7 x 1 + 3 x (1/10) + 9 x (1/100) +2 x (1/1000)= $3 \times 10^2 + 4 \times 10^1 \times 7 \times 10^0 + 3x (1/10^1) + 9x (1/10^2) + 2 \times (1/10^3)$ • Compare two decimals to thousandths based on the *value* of the digits in each place, using >, =, and < symbols to record the results of comparisons
AR.Math.Content.5.NBT.A.4	Apply *place value* understanding to round decimals to any place

Number and Operations in Base Ten	**Perform operations with multi-digit whole numbers and with decimals to hundredths**
AR.Math.Content.5.NBT.B.5	Fluently (efficiently, accurately and with some degree of flexibility) multiply multi-digit *whole numbers* using a standard *algorithm* Note: A "standard *algorithm*" can be viewed as, but should not be limited to, the traditional recording system. A "standard *algorithm*" denotes any valid base-ten strategy.
AR.Math.Content.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: o *Place value* o The properties of operations o Divisibility rules; and o The relationship between multiplication and division • Illustrate and explain calculations by using *equations*, *rectangular arrays*, and area models
AR.Math.Content.5.NBT.B.7	Perform basic operations on decimals to the hundredths place: • Add and subtract decimals to hundredths using concrete models or drawings and strategies based on *place value*, properties of operations, and the relationship between addition and subtraction • Multiply and divide decimals to hundredths using concrete models or drawings and strategies based on *place value*, properties of operations, and the relationship between multiplication and division

Grade 5 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Use equivalent fractions as a strategy to add and subtract fractions**
AR.Math.Content.5.NF.A.1	Efficiently, accurately, and with some degree of flexibility, add and subtract *fractions* with unlike *denominators* (including mixed numbers) using equivalent *fractions* and common *denominators* For example: Understand that 2/3 + 5/4 = 8/12 + 15/12 = 23/12 (In general, a/b + c/d = (ad + bc)/bd) Note: The focus of this standard is applying equivalent *fractions*, not necessarily finding *least common denominators* or putting results in *simplest form*.
AR.Math.Content.5.NF.A.2	• Solve word problems involving addition and subtraction of *fractions* referring to the same whole, including cases of unlike *denominators* For example: Use *visual fraction models* or *equations* to represent the problem. • Use benchmark *fractions* and number sense of *fractions* to estimate mentally and assess the reasonableness of answers For example: Recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.

Grade 5 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Apply and extend previous understandings of multiplication and division**
AR.Math.Content.5.NF.B.3	• Interpret a *fraction* as division of the *numerator* by the *denominator* (*a*/*b* = *a* ÷ *b*), where *a* and *b* are natural numbers For example: Interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. • Solve word problems involving division of natural numbers leading to answers in the form of *fractions* or mixed numbers For example: Use *visual fraction models* or *equations* to represent the problem. If 9 people want to share a 50- pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two *whole numbers* does your answer lie?
AR.Math.Content.5.NF.B.4	Apply and extend previous understandings of multiplication to multiply a *fraction* or whole number by a *fraction*: • Interpret the *product* (*a*/*b*) × *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b* For example: Use a *visual fraction model* to show (2/3) × 12 means to take 12 and divide it into thirds (1/3 of 12 is 4) and take two of the parts (2 X 4 is 8), so (2/3) X 12 = 8, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.). • Find the area of a rectangle with fractional (less than and/or greater than 1) side lengths, by tiling it with unit squares of the appropriate *unit fraction* side lengths, by multiplying the fractional side lengths, and then show that both procedures yield the same area

Grade 5 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Apply and extend previous understandings of multiplication and division**
AR.Math.Content.5.NF.B.5	Interpret multiplication as scaling (resizing), by: • Comparing the size of a *product* to the size of one *factor* on the basis of the size of the other *factor*, without performing the indicated multiplication For example: Understand that 2/3 is twice as large as 1/3. • Explaining why multiplying a given number by a *fraction* greater than 1 results in a *product* greater than the given number • Explain why multiplying a given number by a *fraction* less than 1 results in a *product* smaller than the given number • Relate the principle of *fraction* equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1
AR.Math.Content.5.NF.B.6	Solve real world problems involving multiplication of *fractions* and mixed numbers For example: Use *visual fraction models* or *equations* to represent the problem.

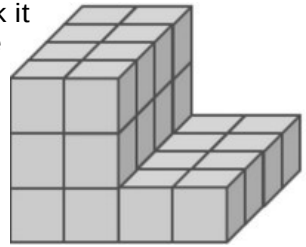
Grade 5 – Arkansas Mathematics Standards

Number and Operations - Fractions	**Apply and extend previous understandings of multiplication and division**
AR.Math.Content.5.NF.B.7	Apply and extend previous understandings of division to divide *unit fractions* by *whole numbers* and *whole numbers* by *unit fractions*: Note: Students able to multiply *fractions* in general can develop strategies to divide *fractions* in general, by reasoning about the relationship between multiplication and division. But division of a *fraction* by a *fraction* is not a requirement at this grade. • Interpret division of a *unit fraction* by a natural number, and compute such *quotients* For example: Create a story context for (1/3) ÷ 4, and use a *visual fraction model* to show the *quotient*. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3). • Interpret division of a whole number by a *unit fraction*, and compute such *quotients* For example: Create a story context for 4 ÷ (1/5), and use a *visual fraction model* to show the *quotient*. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4). • Solve real world problems involving division of *unit fractions* by natural numbers and division of *whole numbers* by *unit fractions* For example: Use *visual fraction models* and *equations* to represent the problem. How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

Measurement and Data	**Convert like measurement units within a given measurement system**
AR.Math.Content.5.MD.A.1	• Convert among different-sized standard measurement units within the metric system For example: Convert 5 cm to 0.05 m. • Convert among different-sized standard measurement units within the customary system For example: Convert 1 ½ ft to 18 in. • Use these conversions in solving multi-step, real world problems

Measurement and Data	**Represent and interpret data**
AR.Math.Content.5.MD.B.2	• Make a *line plot* to display a data set of measurements in *fractions* of a unit (1/2, 1/4, 1/8) • Use operations on *fractions* for this grade to solve problems involving information presented in *line plots* For example: Given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally. Given different measurements of length between the longest and shortest pieces of rope in a collection, find the length each piece of rope would measure if each rope's length were redistributed equally or other examples that demonstrate measures of center (*mean*, *median*, *mode*).

Grade 5 – Arkansas Mathematics Standards

Measurement and Data	**Geometric measurement: understand concepts of volume**
AR.Math.Content.5.MD.C.3	Recognize volume as an *attribute* of solid figures and understand concepts of volume measurement: • A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume • A solid figure, which can be packed without gaps or overlaps using *n* unit cubes, is said to have a volume of *n* cubic units
AR.Math.Content.5.MD.C.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units
AR.Math.Content.5.MD.C.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume: • Find the volume of a right *rectangular prism* with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base (**B**) • Represent threefold whole-number *products* as volumes (e.g., to represent the associative property of multiplication) • Apply the formulas V = l × w × h and V = **B** × h for *rectangular prisms* to find volumes of right *rectangular prisms* with whole-number edge lengths in the context of solving real world and mathematical problems • Recognize volume as additive • Find volumes of solid figures composed of two non-overlapping right *rectangular prisms* by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems Example: John was finding the volume of this figure. He decided to break it apart into two separate *rectangular prisms*. John found the volume of the solid below using this expression: (4 x 4 x 1) + (2 x 4 x 2). Decompose the figure into two *rectangular prisms* and shade them in different colors to show one way John might have thought about it.  Phillis also broke this solid into two *rectangular prisms*, but she did it differently than John. She found the volume of the solid below using this expression: (2 x 4 x 3) + (2 x 4 x 1). Decompose the figure into two *rectangular prisms* and shade them in different colors to show one way Phillis might have thought about it.

Geometry	Graph points on the coordinate plane to solve real-world and mathematical problems
AR.Math.Content.5.G.A.1	• Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the *origin*) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its *coordinates* • Understand that the first number indicates how far to travel from the *origin* in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the *coordinates* correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate) Note: Graphing will be limited to the first quadrant and the non-negative *x*- and *y*-axes only.
AR.Math.Content.5.G.A.2	• Represent real world and mathematical problems by graphing points in the first quadrant and on the non-negative *x*- and *y*-axes of the *coordinate plane* • Interpret coordinate values of points in the context of the situation

Geometry	Classify two-dimensional figures into categories based on their properties
AR.Math.Content.5.G.B.3	Understand that *attributes* belonging to a category of two-dimensional figures also belong to all subcategories of that category For example: All rectangles have four right angles and squares are rectangles, so all squares have four right angles. All isosceles triangles have at least two sides *congruent* and equilateral triangles are isosceles. Therefore, equilateral triangles have at least two *congruent* sides.
AR.Math.Content.5.G.B.4	Classify two-dimensional figures in a hierarchy based on properties Note: Trapezoids will be defined to be a quadrilateral with at least one pair of opposite sides parallel, therefore all parallelograms are trapezoids.

Glossary

Addition and subtraction within 5, 10, 20, 100, or 1,000	Addition or subtraction of two whole numbers with whole number answers, and with sum or minuend in the range 0-5, 0-10, 0-20, or 0-100, respectively; example: 8 + 2 = 10 is an addition within 10, 14 – 5 =9 is a subtraction within 20, and 55 – 18 = 37 is a subtraction within 100
Additive inverses	Two numbers whose sum is 0 are additive inverses of one another; example: 3/4 and (-3/4) are additive inverses of one another because 3/4 + (- 3/4) + 3/4 = 0
Algorithm	Set of rules for solving math problems which if done properly will give a correct answer each time
Associative property of addition	See Table 1 in this Glossary
Associative property of multiplication	See Table 1 in this Glossary
Attributes	Characteristics or properties of an object
Commutative property	See Table 1 in this glossary
Computational Algorithm	A set of predefined steps applicable to a class of problems that gives the correct result in every case when the steps are carried out correctly
Computational Fluency	When a student can efficiently and accurately solve a problem with some degree of flexibility with their strategies
Computational Strategy	Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another. *See also* : computation algorithm
Congruent	Two planes or solid figures are congruent if one can be obtained from the other by rigid motion (a sequence of rotations, reflections, and translations)
Coordinate	An ordered pair of numbers in the form (*x, y*) that describes the location of a point on a coordinate plane
Coordinate Plane	A plane spanned by the *x*- and *y*- axis
Counting On	A strategy for finding the number of objects in a group without having to count every member of the group. For example, if a stack of books to have 8 books and 3 more books are added to the top, it is not necessary to count the stack all over again. One can find the total by *counting on*-pointing to the top book and saying “eight”, following this with “nine, ten, eleven.” There are eleven books now.
Denominator	The term of a fraction, usually written under the line, that indicates the number of equal parts into which the unit is divided; divisor
Difference	The result of a subtraction problem
Dividend	A number that is being divided by another number (divisor)
Divisor	The number by which another number is being divided
Dot plot	*See*: line plot
Equations	A statement where two expressions are equal (such as 8 + 3 = 11 or 2x- 3 = 7)
Expanded form	A multi-digit number is expressed in expanded form when it is written as a sum of the single-digit multiples of powers of ten. For example, 643 = 600 + 40 + 3
Exponent	A symbol that is written above and to the right of a number to show how many times the number is to be multiplied by itself
Expressions	A mathematical phrase consisting of numbers, variables, and operations
Fluency	The ability to automatically recall basic math facts
Fact	An addition fact is any two whole numbers added together, up to and including 10+10. A subtraction fact is any two numbers subtracted one from the other, from 20 down. Facts should be committed to memory for quick and easy recall
Factor	One or more numbers that are multiplied together to get a product (5 and 2 are both factors because 5 x 2 =10)

Glossary

Fraction	A number expressible in the form *a/b* where *a* is a whole number and *b* is a whole number. (The word fraction in these standards always refers to a non-negative number.) *See also*: rational number
Grouping symbols	Symbols parenthesis, brackets, fraction line that show where a group starts and ends, establishes the order used to apply math operations. Ex. $\frac{3(5+7)}{(4+2)}$
Identity property of 0	See Table 1 in Glossary
Least common denominator	The least common multiple of two or more denominators
Line plot	A method of visually displaying a distribution of data values where each data value is shown as a dot or mark above a number line. Also known as a dot plot
Mean	A measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list. 4 Example: For the data set {1, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the mean is 21.
Median	A measure of center in a set of numerical data. The median of a list of values is the value appearing at the center of a sorted version of the list- or the mean of the two central values, if the list contains an even number of values.
Mode	A measure of center in a set of numerical data; the most common value in list of values
Multiplication and division within 100	Multiplication or division of two whole numbers with whole number answers, and with product or dividend in the range 0 - 100. Example: 72 ÷ 8 = 9
Multiplicative inverses	Two numbers whose product is 1 are multiplicative inverses of one another; example: 3/4 and 4/3 are multiplicative inverses of one another because 3/4 x 4/3 = 4/3 x 3/4 = 1
Number line diagram	A diagram of the number line used to represent numbers and support reasoning about them. In a number line diagram for measurement quantities, the interval from 0 to 1 on the diagram represents the unit of measure for the quantity
Numerator	The number in a fraction that is above the fraction line and that is divided by the number below the fraction line
Origin	The point in a Cartesian coordinate system where axes intersect
Place value	The value of the place of a digit in a numeral; the relative worth of each number that is determined by its position
Product	The number or expression resulting from the multiplication together of two or more numbers or expressions
Properties of equality	See table 2 in this glossary
Properties of inequality	See table 3 in this glossary
Properties of operations	See table 1 in this glossary
Quotient	The number that results when one number is divided by another
Rectangular array	A set of quantities arranged in rows and columns
Rectangle Prism	A polyhedron-a prism with congruent, rectangular bases and rectangular faces
	A fraction is in the simplest form when the numerator and denominator cannot be any smaller (while still being whole numbers)
Sum	The result of adding two or more numbers
Tape diagram	A drawing that looks like a segment of tape, used to illustrate number relationships. Also known as a strip diagram, bar model, fraction strip, or length model
Unit fraction	A fraction where the numerator is 1 and the denominator is the positive integer
Value	Numerical worth or amount
Visual fraction model	A tape diagram, number line diagram, or area model
Volume	Amount of space occupied by a 3D object, measured in cubic units
Whole numbers	The numbers 0, 1, 2, 3…..

Appendix

Table 1: Properties of Operations

Associative property of addition	(a + b) + c = a + (b + c)
Commutative property of addition	a + b = b + a
Additive identity property of 0	a + 0 = 0 + a = a
Existence of additive inverses	For every a there exists –a so that *a + (-a) = (-a)* + a = *0*
Associative property of multiplication	(a x b) x c = a x (b x c) *
Commutative property of multiplication	a x b = b x a *
Multiplicative identity property 1	a x 1 = 1a = a *
Existence of multiplication inverses	For every a ≠ 0 there exists 1/*a* so that a x 1/a = 1/a x a = 1 *
Distributive property of multiplication over addition	a x (b + c) = a x b + a x c *

***The x represents multiplication not a variable**.

Table 2: Properties of Equality

Reflexive property of equality	a = a
Symmetric property of equality	If a = b, then b = a.
Transitive property of equality	If a = b and b = c, then a = c.
Addition property of equality	If a = b, then a + c = b + c.
Subtraction property of equality	If a = b, then a – c = b – c.
Multiplication property of equality	If a = b, then a x c = b x c. *
Division property of equality	If a = b and c ≠ 0, then a ÷ c = b ÷ c.
Substitution property of equality	If a = b, then b may be substituted for a in any expression containing a.

***The x represents multiplication not a variable.**

Table 3: Properties of Inequality

Exactly one of the following is true: a < b, a = b, a > b.
If a > b and b > c, then a > c.
If a > b, b < a.
If a > b, then a $\pm$ c > b $\pm$ c.
If a > b and c > 0, then a x c > b x c. *
If a > b and c < 0, then a x c < b x c. *
If a > b and c > 0, then a ÷ c > b ÷ c.
If a > b and c < 0, then a ÷ c < b ÷ c.

***The x represents multiplication not a variable.**

Appendix

Common addition and subtraction.

	RESULT UNKNOWN	CHANGE UNKNOWN	START UNKNOWN
ADD TO	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 =5
TAKE FROM	Five apples were on the table. I ate two apples. How many apples are on the table now?5-2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before?? -2 = 3
	TOTAL UNKNOWN	**ADDEND UNKNOWN**	**BOTH ADDENDS UNKNOWN**
PUT TOGETHER / TAKE APART	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5-3 = ?	Grandma has five flowers. How many can she put in the red vase and how many in her blue vase? 5 = 0 + 5, 5 + 0 5 = 1 +4, 5 = 4 +1 5 = 2 + 3, 5 = 3 + 2
COMPARE	**DIFFERENCE UKNOWN**	**BIGGER UNKNOWN**	**SMALLER UNKNOWN**
	(“How many more?” version):Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?(“How many fewer?” version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have then Julie? 2 + ? = 5, 5 – 2 = ?	(Version with “more”): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with “more”):Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?(Version with “fewer”): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

http://www.corestandards.org/Math/Content/mathematics-glossary/Table-1/

Appendix

Common multiplication and division situations.

	UNKNOWN PRODUCT	GROUP SIZE UNKNOWN ("HOW MANY IN EACH GROUP?" DIVISION)	NUMBER OF GROUPS UNKNOWN ("HOW MANY GROUPS?" DIVISION)
	3 x 6 = ?	3 x ? = 18, and 18 ÷ 3 = ?	? x 6 = 18, and 18 ÷ 6 = ?
EQUAL GROUPS	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example.* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example.* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example.* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
ARRAYS, AREA	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example.* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example.* A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example.* A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
COMPARE	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example.* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example.* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example.* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
GENERAL	a x b = ?	a x ? = p and p ÷ a = ?	? x b = p, and p ÷ b = ?

http://www.corestandards.org/Math/Content/mathematics-glossary/Table-2/