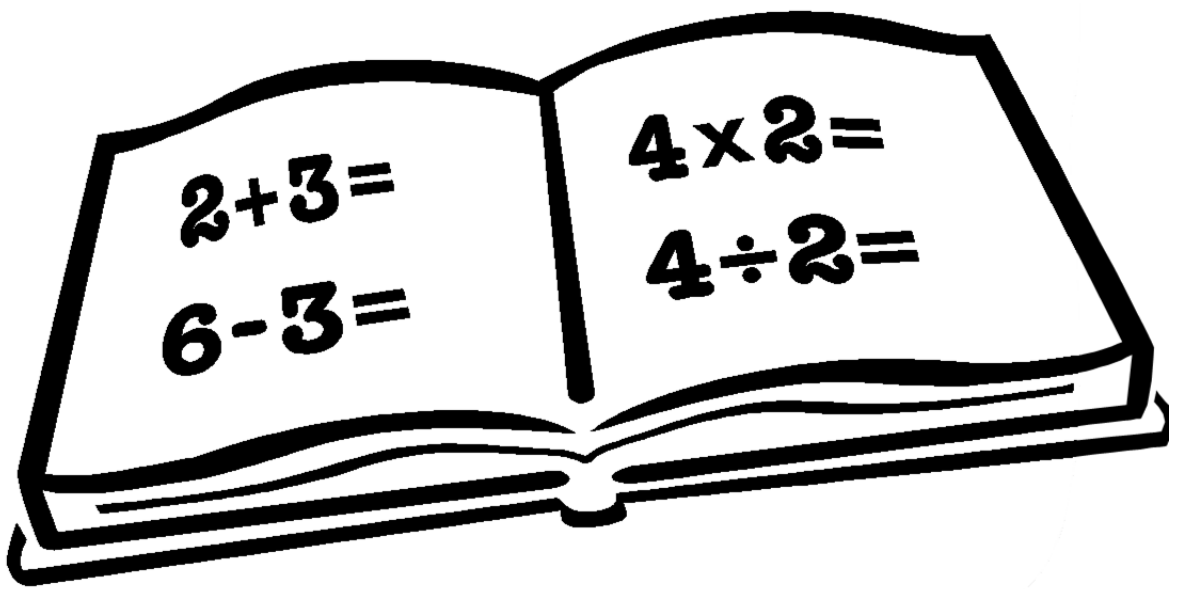# Rockcastle County Schools

Curriculum for Math Grades K-5

Spring 2011

Mathematical Practices for all Elementary Grades

Use the following practices in learning and applying math skills:

Use logical thinking strategies to make sense of problems and persevere in solving them.

Reason abstractly and quantitatively.

Construct viable arguments and critique the reasoning of others.

Model with mathematics.

Use appropriate tools strategically.

Attend to precision.

Look for and make use of structure.

Look for and express regularity in repeated reasoning.

Kindergarten Focus

The kindergarten focus is on the critical areas of:

Using numbers and numerals to represent quantities and to solve quantitative problems such as counting objects in a set, counting out a given number of objects, comparing sets or numerals, modeling simple joining and separating situations with sets of objects and eventually with equations

Choosing, combining, and applying effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away

Describing their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary

Identifying, naming, and describing basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations)

Identifying, naming, and describing basic three-dimensional shapes, such as cubes, cones, cylinders, and spheres

Using basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes

Kindergarten Math

Counting and Cardinality

Whole Numbers

Count to 100 by ones and tens. K.CC1.

Count forward to 100 beginning from any given number. K.CC2.

Determine the number before and after a given number.

Write numbers from 0 to 20. K.CC3.

Count objects arranged in arrays, lines, or circles to 20 using one-to-one correspondence; tell and write the number that shows how many. (Understand that the last number name said tells how many.)K.CC3., K.CC4.a., b.

Understand that the quantity is the same regardless of the way objects are arranged or the order in which they are counted. K.CC4.b.

Count objects to 10 in a scattered configuration. K.CC5.

Understand that each successive number is one larger than the previous number. K.CC4.c.

Estimate amounts of objects of different sizes (as closer to 10, 50, or 100).

Understand the relationship between numbers and quantities. K.CC4.

Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group. K.CC6.

Compare two numbers 0-10 presented as written numerals as less than, greater than, or equal. K.CC7.

Fractions

Identify two fractional parts as two halves, or a whole.

Identify one of two fractional parts of a whole as one half of the whole.

Operations

Understand addition as putting together and adding to. K.OA

Understand subtraction as taking apart and taking from. K.OA

Add and subtract within 10 using objects, pictures, fingers, mental images, etc. K.OA1.

Use addition and subtraction to solve oral word problems, determining which operation to use. K.OA2.

Use numbers and addition/subtraction equations to represent word problems. K.OA1.

Add and subtract equations using numbers and signs (+, -, =).

Develop word problems involving addition and subtraction.

Explore how rules for addition and subtraction can be derived (e.g., count pictures of 3 objects first, then 2 objects and the total equals 5; then count the 2 objects first and the 3 objects last and the total equals 5; therefore, 3+2=2+3).

Decompose numbers within 10 (e.g., 6=4+2, 6=3+3) using objects or drawings, and record each by a drawing or equation. K.OA3.

Using numbers 0-9, find the number that makes 10 when added to a given number. K.OA4.

Explore number sentences with missing values.

Fluently add and subtract within 5. K.OA5.

Place Value

Compose and decompose numbers within 20 into groups of 10 ones and more ones; record by writing 10 + 1, 10 + 2, 10 + 3, etc.; refer to as a ten and ___ ones. K.NBT1.

Measurement and Data

Describe measurable attributes of objects (length, weight, volume, capacity). K.MD1.

Describe several measurable attributes of a single object. K.MD1.

Directly compare two objects with a measurable attribute in common and identify as shorter, heavier, more, will hold more or less, etc. K.MD2.

Using a variety of objects, explore, compare, and order:

> Length in terms of longer, shorter, same

> Weight in terms of heavier, lighter, same

> Volume in terms of more, less, same

> Capacity in terms of holding more, less, same

Use nonstandard units of measure (paper clips, string, pencils, bears) to measure length, perimeter or distance around an area, weight, and circumference.

Use standard units to:

> Tell time to the hour.

> Count pennies and identify as one cent.

> Identify nickels as worth five cents.

> Identify dimes as worth ten cents.

> Identify quarters as worth twenty-five cents.

Classify objects into given categories; count the number of objects in each category (10 or less); sort the categories by count. K.MD3.

Collect, organize, and describe data (e.g., classroom chart of student eye color).

Construct, read, and interpret displays of data (pictographs, bar graphs).

Geometry

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). K.G

Correctly identify shapes regardless of orientations or size. K.G2.

Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, inside, outside, between, and next to. K.G1.

Demonstrate spatial relationships of two objects using the above terms.

Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional (solid). K.G3.

Sort objects by shape and compare attributes.

Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, describing attributes (e.g., have same number of sides and corners, have sides of equal length). K.G4.

Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. K.G5.

Compose simple shapes to form larger shapes (e.g., two triangles to form a rectangle, two squares to form a rectangle, etc.). K.G6.

Recognize symmetry and use knowledge to construct a geometric shape or design.

Algebraic Thinking and Probability

Identify, find rules for, create, and extend patterns.

Predict the probability of a likely and unlikely event (e.g., if one red ball and 9 green balls are in a bag, it is unlikely that one would reach in and get the red ball).

First Grade Focus

The first grade focus is on the critical areas of:

Developing understanding of addition, subtraction, and strategies for addition and subtraction within 20

Understand the connection between counting and addition and subtraction

Use the properties of addition

Make tens to add

Developing understanding of whole number relationships and place value, including grouping tens and ones

Solve problems involving the comparison of whole numbers and their relative sizes

Think of whole numbers between 10 and 100 in terms of tens and ones

Add within 100 and subtract multiples of 10

Developing understanding of linear measurement and measuring lengths as iterating length units

Reasoning about attributes of and composing and decomposing geometric shapes

Understand part-whole relationships

Recognize shapes from different perspectives and orientations

Describe geometric attributes, including likenesses and differences

Develop background for measurement, congruence, and symmetry

First Grade Math

Counting and Cardinality

Count to 200 by ones from any number less than 200. 1.NBT1.

Locate numbers on a number line.

Read and write numerals to 200. 1.NBT1.

Represent a number of objects with a written numeral. 1.NBT1.

Determine the number before, after, and between within 200.

Represent numbers in multiple ways (base-ten blocks, groups of objects, number charts) to describe whole numbers.

Compare and order numbers using appropriate symbols (=, <, >).

Count and write numbers by fives and tens from any number less than 200.

Using manipulatives, divide and group objects by fives and tens to count.

Divide groups of objects into equal groups of various amounts (e.g., 4 groups of 6, 2 groups of 4) and count to determine the total amount, as a prerequisite for multiplication and division.

Identify whether a number is less than, greater than, or equal to another number within 200.

Identify and give examples of odd and even numbers.

Estimate amounts of objects (as closer to 1, 50, 100, and 200).

Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). 1.OA5.

Operations and Algebraic Thinking

Addition and Subtraction

Solve word problems within 20 involving adding to or putting together two or three groups of objects, using manipulatives, drawings, and equations with a symbol for the unknown number. 1.OA2.

Subtract within 20 to solve word problems involving taking from or taking apart amounts of objects. 1.OA1.

Recognize symbols *+, -,* and *=.*

Understand terms *in all, altogether, are left, addition, subtraction, how many more,* and *equal(s).*

Compose a word problem for a given equation.

Understand and apply properties of operations and strategies to add or subtract: (1.OA3.)

    Commutative property (6+3=3+6)

    Associative property (3+5+5=3+10=13)

    Counting on

    Making 10

    Number families

    Creating equivalent but easier or known sums (6+7=6+6+1=13)

Understand how rules for addition and subtraction can be derived (e.g., count together a group of 4 objects, then two objects which equal 6, then count two objects first and four objects, which equal 6; hence, 4 + 2 = 2 + 4—commutative property) .

Add and subtract within 10 with fluency. 1.OA6.

Add (2 or three digits) and subtract within 20, using knowledge of the above properties and strategies. 1.OA6.

Determine the unknown whole number in all positions in addition and subtraction equations relating 3 whole numbers (e.g., __+8=11, 6+__=7, or 9-2=__). 1.OA8.

Using knowledge of place value and strategies for addition and subtraction listed above, add within 100: (1.NBT4.)

A two-digit number and a one-digit number (1.NBT4.)

A two-digit number and a multiple of 10 (1.NBT4.)

Find 10 more or 10 less than a given number mentally, without having to count, and explain the reasoning. 1.NBT5.

Understand that when adding two-digit numbers, ones and ones are added together and tens and tens are added together, and sometimes it is necessary to compose a ten. 1.NBT4.

Add two- and three-digit numbers within 200 without having to compose a ten.

Add two- and three-digit numbers, composing a ten.

Subtract multiples of 10 from multiples of 10 (in the range 10-90) using knowledge of place value, concrete models or drawings, and strategies for addition and subtraction; explain the reasoning. 1.NBT6.

Subtract 2- and three-digit numbers with no decomposing of tens or hundreds.

Understand subtraction as an unknown-addend problem (5-3=__ can be solved by thinking "What can I add to 3 to make 5?"). 1.OA4.

Understand the meaning and use of equations (e.g., 6-1=4+1, 4+3=3+4). 1.OA7.

Determine whether equations are true or false. 1.OA7.

Patterns

Find rules for, extend, and create patterns.

Understand how patterns of numbers, pictures, and words are alike and different.

Use number lines to understand the relationship of numbers.

Place Value

Understand that the 2 digits of a 2-digit number represent amounts of tens and ones and that: 1.NBT2.

> 10 can be thought of as a bundle of ten ones that is called a "ten". 1.NBT2.a.
>
> The numbers from 11 to 19 are composed of a ten and 1, 2, 3, 4, 5, 6, 7, 8, or 9 ones. 1.NBT2.b.
>
> The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, and nine tens, and 0 ones. 1.NBT2.c.

Compare 2 two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, +, or <. 1.NBT3.

Identify numerals in the hundreds place, and understand the meaning.

Understand that ten tens make one hundred.

Measurement

Order and compare 3 objects by: (1.MD1.)

> Length in terms of longer, shorter, or equal
>
> Mass in terms of heavier, lighter, or equal
>
> Area in terms of bigger, smaller, or equal
>
> Volume in terms of more, less, or equal amounts
>
> Capacity in terms of holding more, less, or equal amounts

Explore the conservation (equivalence, even though not obvious) of mass, length, volume, and capacity.

Express the length of an object as a whole number of length units by laying length units end to end (e.g., placing same-size paper clips end to end above a string with no gaps or overlaps, from one end to the other, and expressing the length as __ paper clips long). 1.MD2.

Use non-standard units for a variety of measurements (e.g., a string to measure the circumference of a pumpkin, or pencils end-to-end to measure the length of a desk).

Use standard units (choosing appropriate tools and units) to measure:

Length, perimeter, and circumference (inches, cm.)

Mass (pounds)

Volume and capacity (liters, quarts)

Temperature (degrees to tens)

Time (hour and half hour using analog and digital clocks) 1.MD3.

Identify amounts of money to $1.00.

Identify pennies, nickels, dimes, and quarters as 1, 5, 10, and 25 cents, respectively.

Identify $1.00 as 100 cents.

Understand the equivalence of 5 pennies and a nickel, 5 nickels and a quarter, 10 dimes and a dollar, etc.

Count a variety of coins to identify amounts of money up to $1.00.

Geometry

Understand the meaning of positional words (above, below, behind, before, after, under, over, etc.).

Describe the spatial relationship of two objects using the above terms.

Identify, sort, describe, and compose two-dimensional shapes in various orientations (rectangles, squares, trapezoids, triangles, circles, half-circles, quarter circles, and ovals) and compare attributes. 1.G2.

Explore symmetry and use to construct a two-dimensional geometric design.

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.* 1.G3.

Describe a whole as *two of* or *four of* the shares. 1.G3.

Understand that decomposing into more equal shares creates smaller shares. 1.G3.

Order and compare whole and parts of a whole; express with pictures or objects and match to appropriate whole numbers and fractional parts.

Identify, sort, and describe three-dimensional shapes in various orientations (cubes, prisms, cones and cylinders) and compare attributes. 1.G2.

Describe differences between two- and three-dimensional shapes.

Build and draw shapes to possess defining attributes, such as a triangle that is closed and has three sides. 1.G1.

Distinguish between defining attributes (e.g., number and length of sides and angles) and non-defining attributes (e.g., color, orientation, overall size). 1.G1.

Compose a variety of two-dimensional shapes or three dimensional shapes to form a composite shape; then compose new shapes from the composite shape. 1.G2.

Data and Probability

Explore, as a class, the process of using data: pose a question, plan, collect data, organize and display data, and analyze and make inferences from data displays.

Organize, represent, and interpret data with up to four categories and answer questions, such as:

What is the total amount or number of data points?

How many are there in each category?

How many more or less are in one category than in another?

How many are in two categories combined? (e.g., "How many students have either a dog or a cat as a pet?")

Predict the probability of a likely and unlikely event (e.g., if you put a quarter in a toy machine with many rings and three watches, you are most likely to get a ring).

Second Grade Focus

The second grade focus is on the critical areas of:

Extending understanding of base-ten notation

Count in fives, tens, and multiples of hundreds, tens, and ones

Understand number relationships involving these units (compare)

Understand multi-digit numbers to 1000

Recognize that numbers in each place represent amounts of thousands, hundreds, tens, and ones

Building fluency with addition and subtraction

Solve problems within 1000, computing sums and differences of whole numbers

Select and apply methods to mentally calculate sums and differences for numbers with only tens or only hundreds

Using standard units of measure

Understand that linear measure involves an iteration of units

Recognize that the smaller the unit, the more iteration they need to cover a given length.

Describing and analyzing shapes

Examine their sides and angles

Decompose and combine shapes to make other shapes

Develop a foundation for understanding area, volume, congruence, similarity, and symmetry

Second Grade Math

Counting and Cardinality

Count by ones, twos, fives, tens, and hundreds within 1000, starting with any given number. 2.NBT2.

Read and write numerals within 1000, using numerals, number names, and expanded form. 2.NBT3.

Order and compare numbers within 1000 (>, <, =). 2.NBT4.

Represent numbers in multiple ways (e.g., drawings, manipulatives, symbols, base-ten blocks, number lines).

Tell whether a number is odd or even. 2.OA3.

Determine whether a group of objects has an odd or even number of objects, by grouping or counting the objects by twos. 2.OA3.

Estimate quantities visually by making comparisons; check estimation by counting.

Estimate by rounding numbers to the nearest 10 and the nearest 100.

Operations and Algebraic Thinking

Addition and Subtraction Equations

Understand and apply properties of operations and strategies to add or subtract: (2.NBT5.)

Commutative property

Associative property

Property of zero

Counting on or back

Number families (7+7=14, so 14-7=7)

Creating equivalent but easier or known sums or differences (9+8=8+8=1=17)

Fluently add and subtract numbers within 20 using mental strategies, knowing from memory all sums of two one-digit numbers by the end of second grade. 2.OA2.

Write equations to express an even number as a sum of two equal addends. 2.OA3.

Understand the concept of equations and solve problems with unknowns in all positions. 2.OA1.

Solve one- and two-step word problems within 100 involving adding to, putting together, comparing, taking from, or taking apart. 2.OA1.

Solve number and word problems within 100, with unknowns in all positions.2.OA1.

Fluently add and subtract within 100 using strategies based on place value and properties of operations. 2.NBT5.

Add up to four two-digit numbers using strategies based on place value and properties of operations. 2.NBT6.

Add 1-, 2-, and 3-digit numbers within 1000, with and without composing tens and hundreds. 2.NBT7.

Subtract 1-, 2-, and 3-digit numbers within 1000, with and without decomposing tens and hundreds. 2.NBT7.

Patterns

Recognize and create patterns; find and explain rules for patterns and extend them.

Investigate patterns in number sequences to extend the pattern.

Analyze patterns by creating T-tables (input, output functions).

Multiplication and Division

Work with equal groups of objects as a prerequisite for multiplication and division: 2.OA

Group objects by twos, counting by twos to determine the amount and express amounts orally as equations (6 groups of 2 equals 12, 2 groups of 2 equals 4). 2.OA3.

Group objects by fives, count, and express amounts orally as equations (e.g., 4 groups of 5 equals 20, 7 groups of 5 equals 35, etc.).

Arrange and count objects in rectangular arrays of up to 5 rows and 5 columns; write an equation to express the total as the sum of equal addends (e.g., 4+4+4=12; 5+5+5+5=20). 2.OA4.

Learn multiplication facts to multiply 1 digit by 1 digit.

Divide objects into groups (e.g., 24 into 3 groups of 8, 4 groups of 6, 2 groups of 12).

Place Value

Understand that the 4 digits of a four-digit number represent amounts of thousands, hundreds, tens, and ones. 2.NBT1

Write and interpret expanded form.

Understand that 100 can be thought of as 10 groups of 10. 2.NBT1.a.

Understand that 100 equals 1hundred, no tens, and no ones; 200 equals 2 hundreds, no tens, and no ones; …..1000 equals 1 thousand, no hundreds, no tens, and no ones. 2.NBT1.b.

Using knowledge of place value, mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900. 2.NBT8.

Using knowledge of place value and properties of operations, explain why addition and subtraction strategies work. 2.NBT9

Measurement, Data, and Probability

Length

Select appropriate tools to measure the length of an object (rulers, yardsticks, meter sticks, and tape measures). 2.MD1.

Measure the length of an object with different units (e.g., measure the length of a desk in inches and feet) and describe how the measurements relate to the size of the unit chosen (e.g., because inches are smaller than feet, it takes more inches to make up the length than feet). 2.MD2.

Estimate lengths using units of inches, feet, centimeters, and meters. 2.MD3.

Measure to determine how much longer in inches or centimeters one object is than another. 2.MD4.

Solve word problems involving length using addition and subtraction, drawings (e.g., of rulers), and equations with a symbol for the unknown number to represent the problem. 2.MD5.

Apply knowledge of lengths to whole numbers, 0 ->, on a number line, with equally spaced points corresponding to the numbers. 2.MD6.

Represent whole-number sums and differences on a number line diagram, understanding distances and relationships of numbers. 2.MD6.

Measure, using appropriate tools:

Volume and capacity in quarts, liters, cups, pints, gallons

Perimeter and circumference in inches and centimeters

Temperature above and below zero (Fahrenheit) in 5 degree intervals

Weight in pounds

Time and Money

Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. 2.MD7.

Identify coin amounts and equivalences.

Count money involving various combinations of coins and bills.

Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using dollar and cent symbols appropriately. 2.MD8.

Add and subtract money using decimals and dollar signs.

Data

Generate measurement data (e.g., by measuring lengths of several objects to the nearest whole unit, by making repeated measurements of the same object, or by measuring a plant as it grows). 2.MD9.

Show measurements by making a line plot, where the horizontal scale is marked off in whole-number units. 2.MD9.

Solve simple put-together, take-apart, and comparing word problems using the information presented in a bar graph. 2.MD10.

Read and interpret simple displays of data (pictographs, bar graphs, tables, Venn diagrams, tally tables).

Practice the process of using data to answer questions:

     Pose a question

     Plan

     Collect, organize, and describe data (tables, charts)

     Choose an appropriate way to display data (pictographs, bar graphs, or Venn Diagram)

Analyze, answer questions, and make inferences from data displays

Draw a picture graph and a bar graph (with a single-unit scale) to represent a data set with up to 4 categories. 2.MD10.

Probability

Predict the probability of a likely and unlikely event.

Understand that the probability of an unlikely event is near 0 and the probability of a likely event is near 1(e.g., 1/10, 9/10).

Generate possible outcomes in simple probability activities.

Geometry

Identify and draw two-dimensional shapes (triangles, circles, quadrilaterals, pentagons, and hexagons). 2.G1.

Identify and draw three-dimensional shapes (spheres, pyramids, and cubes). 2.G1.

Understand how two- and three-dimensional shapes are alike and different.

Identify, describe, and provide examples of geometric elements (lines, sides, and angles).

Use knowledge of symmetry to determine whether a shape has symmetry and to construct a symmetrical geometrical design.

Recognize and draw shapes having specified attributes (e.g., a given number of angles, sides, or equal faces).

Identify and describe congruent and similar figures.

Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. 2.G2.

Identify measurable attributes of shapes, make estimates, measure, and compare estimate with measure.

Partition circles and rectangles into two, three, or four equal shares and describe the shares using the words halves, thirds, half of, a third of, etc. 2.G3.

Describe a partitioned whole as 2 halves, 3 thirds, 4 fourths, etc. 2.G3.

Recognize that equal shares of identical wholes need not have the same shape. 2.G3.

Match drawings of or manipulative fractional parts to numerical representations.

Order and compare simple fractions with like denominators.

Explore equivalent fractions using manipulatives (1/2 =2/4).

Understand how whole numbers and fractions relate as to equivalence and order (e.g., put shape parts in order from smallest to largest—1/4, 1/3, ½, 1).

Third Grade Focus

The third grade focus is on the critical areas of:

Developing understanding of multiplication and division and strategies for multiplication and division within 100

Use properties of operations to calculate products of whole numbers

Find the unknown factor in division problems involving single-digit factors

Developing understanding of fractions, especially unit fractions

Understand that the size of a fractional part is relative to the size of the whole

Use fractions to represent numbers equal to, less than, and greater than one

Solve problems that involve comparing fractions

Developing understanding of the structure of rectangular arrays and of area as an attribute of two-dimensional regions

Find the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area

Decompose rectangles into rectangular arrays of squares to connect area to multiplication; justify using multiplication to determine the area of a rectangle

Describing and analyzing two-dimensional shapes

Compare and classify shapes by their sides and angles, and connect these with definitions of shapes

Relate fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

Third Grade Math

Number and Operations in Base Ten

Whole Numbers

Identify and understand whole numbers to 100,000.

> Read, write, and represent in multiple ways (e.g., drawings, base ten blocks, and expanded form)

> Count by ones, twos, fives, tens, and hundreds from any given number within 100,000

> Identify odd and even numbers

> Order and compare (<, >, =)

> Compose and decompose

Number and Algebraic Thinking

Understand how rules involving simple number patterns can be explained.

Find rules for, extend, and create number patterns.

Investigate patterns in number sequences and relate to real world experiences.

Understand and analyze functions (input-output) by creating T-tables.

Place Value

Identify and understand place value of numbers to 100,000.

Use place value understanding to round whole numbers to the nearest 10 or 100. 3.NBT1.

Explain how the base ten number system relates to place value (e.g., ten tens make 100, ten hundreds make 1000)

Understand that numbers can be regrouped (e.g., 5 tens can become 4 tens and 10 ones; 14 ones can become 1 ten and 4 ones).

Operations and Algebraic Thinking

Apply knowledge of place value and properties of operations as strategies to **fluently** add and subtract numbers within 1,000 with and without regrouping: 3.NBT2.

Commutative *(6 + 4 = 4 + 6)*

Associative *(6 + 4) + 5 = 6 + (4 + 5)*

Identity *5 + 0 = 5; 5 − 0 = 5*

Inverse operations: *addition/subtraction*

Apply and describe appropriate strategies for estimating quantities of objects and computational results, such as rounding to the nearest 10 or 100.

Know from memory all products of 2 one-digit numbers. 3.OA7.

Understand and apply the properties of multiplication and the relationship between multiplication and division to solve problems (students do not have to know terms for the properties, only the rules): 3.OA5

Commutative *(5 x 3 = 3 x 5)*

Associative (5 x 3) 2 = 5(3 x 2)

Distributive *2 x (3 + 4) = 2 x 3 + 2 x 4*

Identity *7 x 1 = 7*

Zero *8 x 0 = 0; 8 ÷ 0 = 0*

Inverse operations: *multiplication/division*

Using the above strategies and knowledge of place value, multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 6 x 80; 5 x 90). 3.NBT3.

Understand division as an unknown-factor problem (e.g., find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8). 3.OA6.

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division and properties of operations. 3.OA7.

Represent, solve, and understand the meaning of problems involving multiplication and division. 3.OA

> Interpret products of whole numbers (e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects. *Describe a context in which a total number of objects can be expressed as 5 x 7*). 3.OA1.
>
> 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. *Describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8).* 3.OA2.
>
> Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities by using drawings and equations, with a symbol for the unknown number to represent the problem. 3.OA3.
>
> Determine the unknown whole number in a multiplication or division equation relating three whole numbers (e.g., determine the unknown number that makes the equation true in each of the equations 8 x ? = 48; 5 = [] + 3; and 6 x 6 = ?). 3.OA4.

Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. 3.OA8.

Assess the reasonableness of answers using mental computation and estimation strategies including rounding. 3.OA8.

Identify arithmetic patterns, including patterns in the addition table or multiplication table, and explain them using properties of operations (e.g., observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends). 3.OA9.

Fractions

Develop an understanding of fractions as numbers. 3.NF

Identify fractional parts of shapes divided into equal parts (e.g., identify 1 part of 8 as 1/8 of the whole; 2 parts as 2/8 of the whole … 8 parts as 8/8 of the whole, or 1 whole).

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 $1/b$. 3.NF1.

Apply multiple representations (e.g., drawings, manipulative shapes, and number lines) to describe fractions.

Understand a fraction as a number on the number line; represent fractions on a number line diagram. 3.NF2.

> 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. 3.NF2.a.

> 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. 3.NF2.b.

Recognize, using visual models, that the same whole divided into fewer or more parts discloses equivalent fractions; identify parts as equivalent. 3.NF3.b.

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. 3.NF3.

Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. 3.NF3.a.

Recognize and generate simple equivalent fractions (e.g., ½ = 2/4; 4/6 = 2/3). Explain why the fractions are equivalent using methods such as a visual fraction model. 3.NF3.b.

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. 3.NF3.c.

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. Use the symbols <, >, and = to compare, and justify the conclusions (e.g., by using a visual fraction model). 3.NF3.d.

Explain how whole numbers, fractions, and mixed numbers relate as to equivalence and order; plot numbers in order on a number line.

Measurement and Data

Time, Money, and Temperature

Tell and write time to the nearest minute and measure time intervals in minutes. 3.MD1.

Solve word problems involving addition and subtraction of time intervals, including elapsed time, in minutes. 3.MD1.

Count money involving all coins to $1.00.

Count combinations of coins and bills.

Add and subtract money amounts using appropriate decimal placing and dollar signs.

Solve word problems involving money.

Identify temperature in Celsius and Fahrenheit degrees, above and below zero.

Liquid Volume/Capacity and Mass/Weight

Measure and estimate liquid volumes using the standard units of liters, cups, pints, quarts, and gallons. 3.MD2.

Add, subtract, multiply, and divide to solve one-step word problems involving volumes that are given in the same units. 3.MD2.

Measure and estimate masses of objects using standard units of grams, kilograms, ounces, and pounds. 3.MD2.

Add, subtract, multiply, and divide to solve one-step word problems involving masses that are given in the same units. 3.MD2.

Length

Measure length in inches (including fractional inch units of ½ and ¼). 3.MD4.

Add and subtract measurements of length given in the same whole units.

Representation and Interpretation of Data

Read, interpret, and construct displays of data.

Practice the process of using data to answer questions:

       Pose a question

       Plan

       Collect, organize, and describe data (tables, charts)

       Choose appropriate ways to display the data

       Interpret the data

       Analyze and make inferences from data displays

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 (e.g., draw a bar graph in which each square in the bar graph might represent 5 pets). 3.MD3.

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. 3.MD4.

Geometric Measurement

Understand the concept of area and relate area to multiplication and division. 3.MD

Recognize area as an attribute of plane figures and understand concepts of area measurement. 3.MD5.

> Understand that 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. 3.MD5.a.

> Understand that 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. 3.MD5.b.

> Measure areas by counting unit squares (*square cm, square m, square in, square ft*, and improvised units). 3.MD6.

Relate area to the operations of multiplication and addition. 3.MD7.

> 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. 3.MD7.a.

> 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. 3.MD7.b.

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 x b* and *a x c*; use area models to represent the distributive property in mathematical reasoning. 3.MD7.c.

Recognize area as additive; find areas of rectilinear figures by decomposing them into non-overlapping parts, applying this technique to solve real world problems. 3.MD7.d.

Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. 3.MD

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. 3.MD8.

Geometry

Describe and provide examples of geometric elements and terms—lines (perpendicular, parallel, and intersecting), sides, faces, and angles (right, obtuse, and acute).

Describe and provide examples of two-dimensional shapes—circles, triangles, squares, rectangles, pentagons, hexagons, and octagons.

Describe and provide examples of three-dimensional shapes—spheres, cubes, pyramids, cones, and cylinders.

Describe and provide examples of line symmetry to construct a geometrical design.

Identify and describe congruent and similar figures in real-world or mathematical situations.

Reason with shapes and their attributes. 3.G

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). 3.G1.

Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. 3.G1.

Partition shapes into parts with equal areas; express the area of each part as a unit fraction of the whole (e.g., partition a shape into 4 parts with equal area, and describe the area of each part as ¼ of the area of the shape. 3.G2.

Probability

Predict the probability of a likely and unlikely event.

Understand that the probability of an unlikely event is near 0 (e.g., 1/10) and the probability of a likely event is near 1 (e.g., 9/10).

Generate possible outcomes in simple probability activities.

Fourth Grade Focus

The fourth grade focus is on the critical areas of:

Developing an understanding and fluency with multi-digit multiplication using knowledge of place value to 1,000,000, properties of operations (particularly distributive), estimation, and mental calculation

Developing an understanding of dividing to find quotients involving multi-digit dividends using knowledge of the above strategies and inverse operations

Developing an understanding of fraction equivalence

Developing an understanding of addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers

Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry

Fourth Grade Math

Number and Operations in Base Ten

Whole Numbers

Understand multi-digit whole numbers to 1,000,000:

> Read, write, and represent in multiple ways (e.g., drawings, base ten numerals, expanded form) 4.NBT2.

> Identify odd and even numbers

> Order and compare based on meanings of the digits in each place (<, >, =) 4.NBT2.

> Compose and decompose

Place Value

Identify place value of numbers in the one's, ten's, hundred's, thousand's, ten thousand's, hundred thousand's, and million's place.

Understand the base ten number system and how it relates to place value.

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 (e.g., recognize that $700 \div 70 = 10$ by applying concepts of place value and division). 4.NBT1.

Use knowledge of place value to round to any place. 4.NBT3.

Apply and describe appropriate strategies for estimating quantities.

Patterns and Algebraic Thinking

Describe rules for simple number patterns.

Understand how rules involving number patterns can be explained.

Investigate, find rules for, and extend number patterns, relating them to real world situations.

Generate and analyze number or shape patterns that follow a given rule. Identify apparent features of a pattern that were not explicit in the rule itself (e.g., 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).4.OA5.

Operations with Whole Numbers and Algebraic Thinking

Add, subtract, multiply, and divide whole numbers using knowledge of the properties of operations:

Commutative *(a + b = b + a); a b = b a*

Associative *(a + b) + c = a + (b + c); (a b) c = a (b c)*

Distributive *a x (b + c) = a x b + a x c*

Identity *a + 0 = a; a − 0 = a*

Zero *a x 0 = 0; a ÷ 0 = 0*

Inverse operations: *addition/subtraction, multiplication/division*

Fluently add and subtract multi-digit whole numbers using the standard algorithm. 4.NBT4.

Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 4.NBT5.

Interpret a multiplication equation as a comparison (e.g., interpret 35 =5 x 7 as a statement that 35 is 5 times as many as 7, and 7 times as many as 5.) 4.OA1.

Represent verbal statements of multiplicative comparisons as multiplication equations. 4.OA1.

Identify, define, and understand factors, multiples, and prime and composite numbers.

Find all factor pairs for a whole number in the range 1 – 100. 4.OA4.

Recognize that a whole number is a multiple of each of its factors. 4.OA4.

Determine whether a given whole number in the range 1 – 100 is a multiple of a given one-digit number. 4.OA4.

Determine whether a given whole number in the range 1 – 100 is prime or composite. 4.OA4.

Multiply or divide to solve word problems involving multiplicative comparison (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem) and distinguish between multiplicative and additive comparison. 4.OA2.

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 with equations and a letter standing for the unknown quantity. 4.OA3.

Assess the reasonableness of answers to problems using mental computation and estimation strategies including rounding. 4.OA3.

Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 4.NBT6.

Fractions and Operations

Read, write, order, and compare fractions with like denominators.

Explain why a fraction *a/b* is equivalent to a fraction *(n x a)/(n x b)* by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. 4.NF1.

Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or numerators or by comparing to a benchmark fraction such as 1/2). Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols <, >, or =, and justify conclusions by using a visual fraction model. 4.NF2.

Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. 4.NF

Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$ (e.g., if $a = 3$ and $b = 4$, ¾ = ¼ + ¼ + ¼). 4.NF3.

> Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. 4.NF3.a.

> Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition with an equation. Justify decompositions by using a visual fraction model (e.g., 3/8 = 1/8 + 1/8+ 1/8 or 3/8 =1/8 + 2/8). 4.NF3.b.

> Add and subtract mixed numbers with like denominators by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction (e.g., 2 1/8 = 1 + 1 +1/8 = 8/8 +8/8 = 1/8 =17/8). 4.NF3.c.

> Using visual fraction models and equations to represent the problem, solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. 4.NF3.d.

Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. 4.NF4.

> 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 x (1/4), and record the conclusion by the equation 5/4 = 5 x (1/4)]. 4.NF4.a.

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 x (2/5) as 6 x (1/5), recognizing this product as 6/5--*n x (a/b) = (n x a)/b.* 4.NF4.b.

Solve word problems involving multiplication of a fraction by a whole number, by using visual fraction models and equations to represent the problem (e.g., 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?) 4.NF4.c.

Decimals

Understand decimal notation to hundredths for fractions and compare decimal fractions. 4.NF

Identify place value of decimal numerals.

Place numbers with decimals in order from smallest to largest.

Identify equivalent decimals.

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 (e.g., express 3/10 as 30/100; add 3/10 + 4/100 = 34/100). 4.NF5.

Use decimal notation for fractions with denominators 10 or 100 (e.g., rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram). 4.NF6.

Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols <, >, =, and justify the conclusions (e.g., with a visual model). 4.NF7.

Understand how whole numbers, fractions, and decimals relate as to equivalence and order; plot on a number line to show relationships.

Add and subtract numbers with decimals to hundredths.

Geometry

Identify two-dimensional shapes—circles, triangles, all quadrilaterals (squares, rectangles, trapezoids, rhombuses), pentagons, hexagons, and octagons.

Identify three-dimensional shapes—spheres, cubes, cones, cylinders, pyramids, and rectangular prisms.

Compare and understand how two-dimensional and three-dimensional shapes are alike or different.

Identify congruent and similar shapes.

Identify, visualize, and draw different representations and orientations of two- and three-dimensional figures using 90 degree rotations (turns), reflections (flips), and translations (slides).

Identify measureable attributes of shapes.

Identify points, lines, line segments, rays, angles (right, acute, obtuse), and lines (perpendicular and parallel) in two-dimensional figures. 4.G1.

Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. 4.G1.

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. 4.G2.

Recognize right triangles as a category and identify right triangles. 4.G2.

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. 4.G3.

Measurement and Data

Review of Time, Money, and Temperature

Tell and record time to the minute from analog and digital clocks.

Know the relative sizes of an hour, minute, and second; express a larger unit in terms of a smaller unit (e.g., identify seconds as 1/60 of a minute, and know that 60 seconds make a minute) and record equivalents in a two-column table. 4.MD1.

Determine elapsed time.

Solve word problems involving intervals of time and elapsed time.

Count money involving all U.S. coins and paper amounts.

Add, subtract, multiply, and divide money amounts, using correct decimal placements and symbols.

Solve word problems involving money.

Determine temperature above and below zero, from Celsius and Fahrenheit scales.

Conversion of Like Measurement Units

Identify U. S. Customary units and equivalences.

Length: inch, foot, yard, mile

Area: square inch, square foot, square yard, square mile

Volume and capacity: cubic inch, cubic foot, cubic yard

Liquid volume: fluid ounce, cup, pint, quart, gallon

Dry volume: pint, quart, peck, bushel

Mass: ounce, pound

Identify metric units and equivalences.

Length: centimeter, meter, kilometer 4.MD1.

Area: square centimeters, square meters

Volume and capacity: cubic centimeters, square meters

Liquid volume: milliliter, liter 4.MD1.

Mass: gram, kilogram

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.4.MD

Know the relative sizes of measurement units within the system of units. 4.MD1.

Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit, recording measurement equivalents in a two-column table (e.g., know that 1 ft. is 12 times as long as 1 inch and express the length of a 4 ft. snake as 48 in.). 4.MD1.

Generate conversion tables for measurement units within the same measurement system [e.g., for feet and inches, listing the number pairs (1, 12), (2, 24), (3, 36)]. 4.MD1.

Use the four operations to solve word problems involving measurements, such as distances, liquid volumes, and masses of objects, including those involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. 4.MD2.

Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. 4.MD2.

Define **perimeter** and use the formula $s + s + s + s$ to determine the perimeter of 4-sided objects. 4.MD3.

Define area and use the formula *lw* to determine the area of rectangular objects. 4.MD3.

Use known formulas to determine the perimeter of objects, with unknowns in various positions (e.g., given that the area of a rectangle = 40 ft. and the length = 8 ft., find the width of the object and use the information to find the perimeter).4.MD3.

Use appropriate operations to find the mean, median, mode, and range of a set of data.

Read, interpret, analyze and make inferences from a variety of data displays.

Collect and construct displays of data, understanding how the type of display is related to the data.

Represent and interpret fractional data. 4.MD

Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). 4.MD4.

Use information from a line plot to solve problems involving addition and subtraction of fractions (e.g., from a line plot, find and interpret the difference in length between the longest and shortest specimens in an insect collection). 4.MD4.

Geometric Measurement

Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: 4.MD5.

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. 4.MD5.a.

An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. 4.MD5.b.

Measure angles in whole-number degrees using a protractor. 4.MD6.

Sketch angles of a specified measure. 4.MD6.

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. 4.MD7.

Solve addition and subtraction problems to find unknown angle measures on a diagram in real world and mathematical problems by using an equation with a symbol for the unknown angle measure. 4.MD7.

Probability

Understand that the probability of an unlikely event is near 0 and the probability of a likely event is near 1(e.g., if 1 red pen and 9 blue pens were in a bag, the likelihood of drawing out a red one is 1/10, and the likelihood of getting a blue one is 9/10).

Determine up to 6 possible outcomes in simple probability activities.

Fifth Grade Focus

The fifth grade focus is on the critical areas of:

Extending division to 2-digit divisors and developing fluency in all operations

> **Understand why division procedures work based on the meaning of base-ten numerals and properties of operations**

> **Finalize fluency with multi-digit addition, subtraction, multiplication, and division**

Integrating decimal fractions into the place value system and performing operations with decimals to hundredths

> **Use the relationships between decimals and fractions and finite decimals and whole numbers to understand and explain why the procedures for multiplying and dividing finite decimals make sense**

> **Compute products and quotients of decimals to hundredths efficiently and accurately**

Developing fluency with whole number and decimal operations

Developing fluency with addition and subtraction of fractions

> **Represent fractions with unlike denominators as equivalent fractions to add or subtract**

Make reasonable estimates of addition and subtraction equations involving fractions

Developing an understanding of the multiplication and division of fractions and explaining why the procedures make sense

Developing an understanding of volume

Recognize volume as an attribute of three-dimensional space

Understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps

Understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume

Select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume

Decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes

Measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems

Fifth Grade Math

Number and Operations in Base Ten

Whole Numbers

Understand whole numbers:

Read, write, and represent in multiple ways (e.g., drawings, base ten blocks, expanded form)

Identify odd and even numbers

Order and compare (<, >, =)

Compose and decompose

Round numbers to the nearest 10, 100, 1000, etc.

Estimate quantities and answers to real world problems.

Place Value of Whole Numbers and Decimals

Understand the place value system. 5.NBT

Understand 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. 5.NBT1.

Use whole number exponents to denote powers of 10. 5NBT2.

Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 (25 x 1$\underline{0}$ = 25$\underline{0}$; 25 x 10^2 = 25$\underline{00}$; 25 x 10^3= 25$\underline{000}$). 5.NBT2.

Identify decimal amounts to thousandths, understanding the value of numbers in each place.

Read and write decimals to thousandths using base ten numerals, number names, and expanded form (e.g., 347.392 = 3 x 100 + 4 x 10 +7 x 1 +3 x (1/10) + 9 x (1/100) +2 x (1/1000). 5.NBT3.a.

Compare, using >, <, and = symbols, two decimals to thousandths, based on meanings of the digits in each place. 5.NBT3.b.

Use place value understanding to round decimals to any place. 5.NBT4.

Explain how the base ten number system relates to the place value of numerals to the left and to the right of decimals.

Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10 (e.g., 2.34×10^3 = 2340). 5.NBT2.

Identify equivalents of decimals.

 Operations with Whole Numbers and Algebraic Thinking

Fluently add, subtract, multiply, and divide whole numbers using knowledge of the properties of operations:

Commutative *(a + b = b + a); a b = b a*

Associative *(a + b) + c = a + (b + c); (a b) c = a (b c)*

Distributive *a x (b + c) = a x b + a x c*

Identity *a + 0 = a; a − 0 = a*

Zero *a x 0 = 0; a ÷ 0 = 0*

Inverse operations: *addition/subtraction, multiplication/division*

Apply and describe estimation strategies to check the rationality of answers to addition, subtraction, multiplication, and division problems.

Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. 5.OA6.

Illustrate and explain division calculations by using equations, rectangular arrays, and/or area models. 5.OA6.

Understand why division procedures work based on the meaning of base-ten numerals and properties of operations. Focus Page

Identify and determine factors and multiples of numbers, including the least common multiple and the greatest common factor.

Determine prime and composite numbers.

Determine the mean, median, mode, and range of a set of data.

Write and interpret numerical expressions. 5.OA

Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA1.

Find solutions to equations with missing values in all positions.

Determine the value of an output given a function rule and an input value.

Describe and analyze patterns/functions through pictures, tables, and words.

Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them [e.g., express the calculation "add 8 and 7, then multiply by 2" as 2 x (8+7); recognize that 3 x (573 + 647) is 3 times as large as 573 + 647 without having to calculate the answer]. 5.OA2.

Operations with Decimals

Add, subtract, multiply, and divide decimals fluently to hundredths, using concrete models or drawings and strategies based on place value, properties of operations and/or the relationship of addition and subtraction; relate the strategy to a written method and explain the reasoning used. 5.OA7.

Make reasonable estimates of amounts involving decimals. Focus Page

Determine the operation and solve one- and two-part word problems involving decimals. Focus Page

Understand and explain why the procedures for multiplying and dividing finite decimals make sense, using the relationship between decimals and fractions and the relationship between finite decimals and whole numbers. Focus Page

Operations with Fractions

Read, write, and understand fractional amounts as parts of a whole.

Identify and understand equivalent fractions.

Reduce fractions to the lowest form.

Represent fractions in multiple ways (e.g., drawings, manipulatives, base ten blocks, number lines, decimals).

Order and compare whole numbers, mixed numbers, and fractions with like and unlike denominators.

Develop fluency in adding and subtracting fractions with like and unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions to produce equivalent sums or differences--*a/b + c/d = (a d + bc)/bd.* 5.NF1.

Make reasonable estimates of problems involving addition and subtraction of fractions. 5.NF2.

Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF

Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). 5.NF3.

Understand and explain why the procedures for multiplying and dividing fractions make sense in the case of dividing unit fractions (those with a 1 in the numerator) by whole numbers and whole numbers by unit fractions. Focus Page

Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, by using visual fraction models or equations to represent the problem. 5.NF2.

Use benchmark fractions [fractions that can be used to judge other fractions against or that fractions are usually rounded to ($^1/_4$, ½, ¾, and $^1/_{10}$ because of its relation to decimals)] and number sense of fractions to estimate mentally and assess the reasonableness of answers (e.g., recognize an incorrect result 2/6 + ½ = 3/8, by observing that 3/8 is less than ½). 5.NF2.

Solve word problems, by using visual fraction models or equations, involving division of whole numbers leading to answers in the form of fractions or mixed numbers (e.g., interpret 3/4 as the result of dividing 3 by 4, noting that ¾ x 4 = 3 and that when 3 wholes are shared equally by 4 people, each person will have a ¾ share; if 9 people share a 50 lb. bag of rice, how many lbs. will each person have?). 5.NF3.

Multiply a whole number or a fraction by a fraction. 5.NF4.

Interpret the product of *(a/b) x q* as *a* parts of a partition of *q* into *b* equal parts, using a visual fraction model (e.g., show (2/3) x 4 = 8/3, and create a story context for the equation. 5.NF4.a.

Use a visual fraction model and create a story context for equations such as (2/3) x (4/5) = 8/15. Understand that *(a/b) x (c/d) = ac/bd*. 5.NF4.a.

Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths. Show that the area is the same as would be found by multiplying the side lengths. 5.NF4.b.

Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. 5.NF4.b.

Interpret multiplication as scaling (resizing) by: 5.NF5.

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 5.NF5.a.

Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case) 5.NF5.b.

Explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b =(n x a)/(n x b) to the effect of multiplying a/b by 1 5.NF5.b.

Solve real world problems involving multiplication of fractions and mixed numbers (e.g., by using visual fraction models or equations to represent the problem). 5.NF6.

Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. 5.NF7.

Interpret division of a unit fraction by a non-zero whole number, and compute such quotients (e.g., 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 x 4 = 1/3. 5.NF7.a.

Interpret division of a whole number by a unit fraction, and compute such quotients (e.g., 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 x 1/5 = 4. 5.NF7.b.

Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions by using visual fraction models and equations to represent the problem (e.g., How much chocolate will each person get if 3 people share ½ lb. of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?) 5.NF7.c.

Geometry

Geometric Elements

Describe and provide examples of geometric elements including point, segment, ray, line (perpendicular, parallel, intersecting), side, edge, face, base, radius, diameter, vertex, plane, and angle (right, obtuse, acute).

Use attributes to describe, provide examples of, and compare regular and irregular figures:

> In two dimensions—circles, triangles (right, equilateral), all quadrilaterals, pentagons, hexagons, and octagons

> In three dimensions—spheres, cubes, cones, cylinders, pyramids, triangular and rectangular prisms

Use measurements to identify, describe, sort, and compare attributes and figures.

Classification of Figures Based on Attributes

Classify two-dimensional figures into categories based on their properties. 5.G

Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category (e.g., all rectangles have four right angles and squares are rectangles, so all squares have four right angles). 5.G3.

Classify two-dimensional figures in a hierarchy based on properties. 5.G4.

Coordinate Graphing and Algebraic Thinking

Graph points on a coordinate plane to solve real-world and mathematical problems. 5.G

> Define a coordinate system by using a pair of perpendicular number lines, called axes, and 0 as the intersection point. 5.G1.

Locate given points in the plane by using an ordered pair of numbers. Identify these numbers as coordinates. 5.G1.

Explain that the first number of the ordered pair indicates how far to travel from the origin in the direction of the horizontal, or *x* axis. 5.G1.

Explain that the 2nd number of the ordered pair indicates how far to travel from the origin in the direction of the vertical, or *y* axis. 5.G1.

Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. 5.G2.

Analyze patterns and relationships through coordinate graphing.

Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane (e.g., given the rule "add 3" and the starting number 0, and given the rule "add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain why this is so.). 5.OA3. [Sample answer: The ordered pairs for the first sequence would be   (1, 0), (2, 3), (3, 6), (4, 9), (5, 12); the ordered pairs for the second sequence would be (1, 0), (2, 6), (3, 12), (4, 18), (5, 24). The terms in the 2nd sequence are twice that of the first (other than the first term) because you are adding twice as much each time.]

Measurement and Data

Review of Time, Money, and Temperature

Tell and write time to the nearest minute and/or second from analog and digital clocks.

Convert units of time (e.g., minutes to hours, seconds to minutes, or hours to minutes).

Determine elapsed time.

Solve word problems involving intervals of time and elapsed time.

Count money involving all coins and paper amounts.

Add, subtract, multiply, and divide money amounts, using correct decimal placements and symbols.

Determine the temperature in both Fahrenheit and Celsius degrees, above and below 0; solve real-world problems involving temperature.

Measurement Units (Metric and U. S. Customary Units)

Identify U. S. Customary units and equivalences.

 Length: inch, foot, yard, mile

 Area: square inch, square foot, square yard, square mile

 Volume and capacity: cubic inch, cubic foot, cubic yard

 Liquid volume: fluid ounce, cup, pint, quart, gallon

 Dry volume: pint, quart, peck, bushel

 Mass: ounce, pound, ton

Measure accurately the length, height, and width of an object. Focus Page

Identify metric units and equivalences.

 Length: millimeter, centimeter, decimeter, meter, kilometer

 Area: square centimeters, square meters

 Volume and capacity: cubic centimeters, cubic meters

 Liquid volume: milliliter, centiliter, deciliter, liter, kiloliter

 Mass: milligram, centigram, decigram, gram, kilogram

Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to .05 m; convert 4 feet into 48 inches) and use these conversions in solving multi-step, real-world problems. 5.MD1.

Represent and Interpret Data

Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). 5MD2.

Use operations on fractions to solve problems involving measurement information presented in line plots (e.g., 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). 5.MD2.

Geometric Measurement

Define ***perimeter*** and determine the perimeter of various objects and shapes.

Define ***area*** and determine the area of figures that can be divided into rectangular shapes.

Define ***angle*** as a geometric shape that is formed wherever two rays share a common endpoint.

Measure angles with reference to a circle with its center at the common endpoint of rays, considering the fraction of the arc between the points where the two rays intersect the circle.

Understand that an angle that turns through 1/360 of a circle is called a one-degree angle, and an angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

Measure angles in whole-number degrees using a protractor, and sketch angles of specified measure.

Define ***volume*** and understand the concepts of volume measurement; relate volume to multiplication and to addition. 5.MD3.

Recognize volume as an attribute of solid figures and understand the concepts of volume measurement. 5.MD3.

Understand that measuring the volume of an object involves finding the total number of same size units required to fill the space without gaps or overlaps, and is the same as measuring the amount of space the object takes up. Focus Page

Place cubes together to make shapes and determine how many cubic units of volume there are. 5.MD4.

Identify a cube with side length of 1 unit as a "unit cube," having "one cubic unit" of volume that can be used to measure volume. 5.MD3.a.

Understand that 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. 5.MD3.b.

Measure volumes by counting unit cubes and by using cubic cm., cubic in., cubic ft., and improvised units. 5.MD4.

Decompose three-dimensional shapes and find volumes of right rectangular prisms and by viewing then as decomposed into layers of arrays of cubes. 5.MD5.a.

Select appropriate units, strategies and tools for solving problems that involve estimating and measuring volume. Focus Page

Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. 5.MD5.

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 by the height by the area of the base. Represent threefold whole-number products as volumes, using the associative property of multiplication. 5.MD5.a.

Apply the formulas V = l x w x h and v = b x 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. 5.MD5.b.

Recognize volume as additive—the combined volume of two shapes is greater than the volume of one of the shapes. 5.MD5.c.

Find the volume of 2 non-overlapping right rectangular prisms by adding the volumes of the parts, to solve real-world problems. 5.MD5.c.

Data Analysis and Probability

Predict the probability of a likely (near 1) and unlikely (near 0) event.

Determine the probability of an event and express as a fraction.

Determine all possible outcomes of an activity/event with up to six possible outcomes.

Construct, read, and interpret displays of data (graphs, line plots, tables/charts, tally tables, exploring how the type of display is related to the data

Practice the process of using data to answer questions:

Pose a question that can be answered by collecting data.

Plan and collect, organize, and describe data.

Choose an appropriate way to display data and construct displays.

Interpret, analyze, and make inferences from data displays.