Content Scope & Sequence

GRADE 4

SCOTT FORESMAN

Investigations

IN NUMBER, DATA, AND SPACE®

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Factors, Multiples, and Arrays (Multiplication and Division 1)

Mathematical Emphases

❶ Whole-Number Operations Understanding and working with an array model of multiplication

Math Focus Points

- Using arrays to model multiplication situations
- Breaking an array into parts to find the product represented by the array
- Using arrays to find factors of 2-digit numbers
- Identifying features of numbers, including prime, square, and composite numbers

❷ Whole-Number Operations Reasoning about numbers and their factors

Math Focus Points

- Finding the multiples of a number by skip counting
- Determining whether one number is a factor or multiple of another
- Identifying the factors of a given number
- Identifying all the factors of 100
- Using knowledge of the factors of 100 to find factors of multiples of 100
- Using known multiplication combinations to find related multiplication combinations for a given product (e.g., if 4 x 50 = 200, then 8 x 25 = 200)
- Using representations to show that a factor of a number is also a factor of its multiples (e.g., if 25 is a factor of 100, then 25 is also a factor of 300)

❸ Computational Fluency Fluency with multiplication combinations to 12 x 12

Math Focus Points

- Identifying and learning multiplication combinations not yet known fluently
- Using known multiplication combinations to determine the products of more difficult combinations

Ten-Minute Math activities focus on

- Generating equivalent expressions for a number using particular constraints
- Practicing computation skills
- Using notation to record expressions
- Organizing and analyzing visual images
- Writing equations to represent the total number of dots in a pattern
- Finding the multiples of numbers through skip counting
- Becoming familiar with multiplication patterns
- Understanding the relationship between skip counting and multiplication

Assessed Benchmarks

- Use known multiplication combinations to find the product of any multiplication combination up to 12 x 12
- Use arrays, pictures or models of groups, and story contexts to represent multiplication situations
- Find the factors of 2-digit numbers

Describing the Shape of the Data (Data Analysis and Probability)

Mathematical Emphases

❶ Data Analysis Representing data

Math Focus Points

- Organizing ordered numerical data to describe a data set
- Using a line plot to represent ordered numerical data
- Representing two sets of data in order to compare them

❷ Data Analysis Describing, summarizing, and comparing data

Math Focus Points

- Describing the shape of a data set: where the data are spread out or concentrated, what the highest and lowest values are, what the range is, and what the outliers are
- Describing what values are typical or atypical in a data set
- Determining the range of a data set
- Describing and interpreting data that compare two groups
- Finding the median of a data set
- Using medians to compare groups
- Considering what information a median does and does not provide
- Comparing two sets of data using the shape and spread of the data

❸ Data Analysis Analyzing and interpreting data

Math Focus Points

- Developing arguments based on data
- Drawing conclusions based on data

❹ Data Analysis Designing and carrying out a data investigation

Math Focus Points

- Recording and keeping track of data
- Considering how well a data representation communicates to an audience
- Developing and revising a survey question

❺ Probability Describing the probability of an event

Math Focus Points

- Associating the word probability with the likelihood of an event
- Arranging events along a line representing the range of certain to impossible
- Using numbers from 0 to 1 as measures of probability
- Associating verbal descriptions of probability with numeric descriptions
- Comparing the expected probability of an event with the actual results of repeated trials of that event

This Unit also focuses on

- Using U.S. standard units to measure lengths longer than the measuring tool

Ten-Minute Math activities focus on

- Describing features of the data
- Interpreting and posing questions about the data
- Generating equivalent expressions for a number using particular constraints
- Practicing computation skills
- Using notation to record expressions

Assessed Benchmarks

- Design an effective survey question to compare two groups
- Organize and represent data about two groups in order to compare the groups
- Describe the shape of the data from a numerical data set, including where the data are concentrated and the highest, lowest, and median values
- Use data to compare two groups
- Use evidence from a set of data to support an argument
- Describe the likelihood of an event in terms of a scale from impossible (probability of 0) to certain (probability of 1)

Multiple Towers and Division Stories (Multiplication and Division 2)

Mathematical Emphases

❶ Computational Fluency Solving multiplication problems with 2-digit numbers

Math Focus Points

- Developing strategies for multiplying that involve breaking apart numbers
- Reviewing multiplication combinations to 12 x 12
- Multiplying multiples of 10

❷ Whole-Number Operations Understanding and using the relationship between multiplication and division to solve division problems

Math Focus Points

- Solving division story problems
- Using and interpreting division notation
- Solving division problems by making groups of the divisor
- Using known multiplication combinations to solve division problems

❸ Whole-Number Operations Reasoning about numbers and their factors

Math Focus Points

- Understanding the effect of multiplying by a multiple of 10 (e.g., describing the relationship between 3 x 4 and 3 x 40)
- Finding multiples of 2-digit numbers
- Describing a sequence of multiples in order to predict other multiples
- Determining the effect on the product when a factor is doubled or halved

❹ Whole-Number Operations Representing the meaning of multiplication and division

Math Focus Points

- Representing a multiplication or division problem with pictures, diagrams, or models
- Using arrays to model multiplication
- Making sense of remainders in terms of the problem context
- Creating a story problem to represent a division expression
- Comparing visual representations of multiplication situations

Ten-Minute Math activities focus on

- Organizing and analyzing visual images
- Writing equations to represent the total number of dots in a pattern
- Finding the multiples of numbers through skip counting
- Becoming familiar with multiplication patterns
- Understanding the relationship between skip counting and multiplication

Assessed Benchmarks

- Multiply 2-digit numbers by 1-digit and small 2-digit numbers (e.g., 12, 15, 20), using strategies that involve breaking the numbers apart
- Solve division problems (2-digit and small 3-digit numbers divided by 1-digit numbers), including some that result in a remainder
- Use story problems, pictures, or concrete models to represent division situations
- Multiply by 10 and multiples of 10
- Demonstrate fluency with multiplication combinations up to 12 x 12

Size, Shape, and Symmetry (2-D Geometry and Measurement)

Mathematical Emphases

❶ Linear Measurement Measuring with standard units

Math Focus Points

- Reviewing the lengths of units of measure (inches, feet, yards, centimeters, meters)
- Using U.S. standard and metric units to accurately measure length
- Estimating lengths based on common units (centimeter, inch, foot, yard, meter)
- Determining when estimates or exact measurements are needed
- Finding perimeter using standard units
- Recognizing and explaining possible sources of measurement error
- Comparing different paths that have the same length

❷ Features of Shape Describing and classifying 2-dimensional figures

Math Focus Points

- Defining polygons as closed figures with line segments as sides, and vertices
- Classifying polygons by attribute, including number of sides, length of sides, and size of angles
- Combining polygons to make new polygons
- Recognizing number of sides as a descriptor of various polygons
- Developing vocabulary to describe attributes and properties of quadrilaterals
- Understanding the relationship between squares and rectangles

❸ Features of Shape Describing and measuring angles

Math Focus Points

- Identifying a right angle as 90˚
- Measuring acute angles by relating them to 90˚
- Using known angles to find the measure of other angles

❹ Area Measurement Finding and understanding area

Math Focus Points

- Finding the area of symmetrical designs
- Understanding that the larger the unit of area, the smaller the number of units needed to measure the area
- Dividing irregular polygons into two shapes that have equal area
- Finding the area of polygons by decomposing shapes
- Finding the area of polygons using square units
- Finding the area of rectangles
- Finding the area of triangles in relation to the area of rectangles

This Unit also focuses on

- Making designs with mirror symmetry

Ten-Minute Math activities focus on

- Organizing and analyzing visual images
- Developing language and concepts needed to communicate about spatial relationships
- Decomposing images of 2-D shapes and then recombining them to make a given design
- Generating equivalent expressions for a number using particular constraints
- Practicing computation skills
- Using notation to record expressions

Assessed Benchmarks

- Use appropriate measurement tools to measure distance
- Identify quadrilaterals as any four-sided closed figure
- Know that a right angle measures 90˚, and use this as a landmark to find angles of 30˚, 45˚, and 60˚
- Find the area of polygons using a square unit of measure

Landmarks and Large Numbers (Addition, Subtraction, and the Number System)

Mathematical Emphasis

❶ The Base-Ten Number System Extending knowledge of the number system to 10,000

Math Focus Points

- Reading, writing, and sequencing numbers to 1,000 and 10,000
- Understanding the structure of 10,000 and its equivalence to one thousand 10s, one hundred 100s, and ten 1,000s
- Recognizing the place value of digits in large numbers

❷ Computational Fluency Adding and subtracting accurately and efficiently

Math Focus Points

- Adding and subtracting multiples of 10, 100, and 1,000
- Using multiples of 10 and 100 to find the difference between any 3-digit number and 1,000
- Adding 3- and 4-digit numbers
- Using clear and concise notation for recording addition and subtraction strategies
- Finding combinations of 3-digit numbers that add to 1,000
- Solving subtraction problems by breaking numbers apart
- Solving multistep addition and subtraction problems
- Combining positive and negative numbers

❸ Whole-Number Operations Describing, analyzing, and comparing strategies for adding and subtracting whole numbers

Math Focus Points

- Representing addition and subtraction on a number line
- Identifying, describing, and comparing addition and subtraction strategies by focusing on how each strategy starts
- Developing arguments about why two addition expressions are equivalent (e.g., $597 + 375 = 600 + 372$)
- Using story contexts and representations to support explanations about equivalent addition expressions
- Understanding the meaning of the steps and notation of the U.S. algorithm for addition
- Developing arguments about how the differences represented by two subtraction expressions are related (e.g., 432 - 198 and 432 - 200)
- Using story contexts and representations to support explanations about related subtraction expressions

❹ Whole-Number Operations Understanding different types of subtraction problems

Math Focus Points

- Understanding the action of subtraction problems
- Representing subtraction situations

Ten-Minute Math activities focus on

- Generating equivalent expressions for a number using particular constraints
- Practicing computation skills
- Using notation to record expressions
- Reading and writing numbers up to 10,000
- Adding multiples of 10 to, and subtracting multiples of 10 from 3- and 4-digit number

Assessed Benchmarks

- Read, write, and sequence numbers up to 10,000
- Add and subtract multiples of 10 (including multiples of 100 and 1,000) fluently
- Solve addition problems efficiently, choosing from a variety of strategies
- Solve subtraction problems with 3-digit numbers by using at least one strategy efficiently

Fraction Cards and Decimal Squares (Fractions and Decimals)

Mathematical Emphases

❶ Rational Numbers Understanding the meaning of fractions and decimal fractions

Math Focus Points

- Finding fractional parts of a rectangular area
- Finding fractional parts of a group (of objects, people, etc.)
- Interpreting the meaning of the numerator and the denominator of a fraction
- Writing, reading, and applying fraction notation
- Representing fractions greater than 1
- Identifying everyday uses of fractions and decimals
- Reading and writing tenths and hundredths
- Representing tenths and hundredths as parts of an area

❷ Rational Numbers Comparing the values of fractions and decimal fractions

Math Focus Points

- Identifying relationships between unit fractions when one denominator is a multiple of the other (e.g., halves and fourths, thirds and sixths)
- Comparing the same fractional parts of different-sized wholes
- Identifying equivalent fractions
- Ordering fractions and justifying their order through reasoning about fraction equivalencies and relationships
- Representing fractions using a number line
- Comparing fractions to the landmarks 0, ½, 1, and 2
- Ordering decimals and justifying their order through reasoning about representations and the meaning of the numbers
- Identifying decimal and fraction equivalents

❸ Computation with Rational Numbers Using representations to add rational numbers

Math Focus Points

- Using representations to add fractions that sum to 1
- Estimating sums of fractions
- Adding fractions with the same and related denominators (e.g., halves, fourths, and eighths; thirds and sixths)
- Estimating sums of decimal numbers
- Adding decimal numbers that are multiples of 0.1 and 0.25 (e.g., 2.3 + 3.25)
- Using representations to combine tenths and hundredths

Ten-Minute Math activities focus on

- Reading and writing numbers up to 10,000
- Adding multiples of 10 to, and subtracting multiples of 10 from 3- and 4-digit numbers
- Reading and writing decimal fractions and decimal numbers
- Adding tenths and hundredths, and subtracting them from decimal fractions and decimal numbers
- Describing features of the data
- Interpreting and posing questions about the data

Assessed Benchmarks

- Identify fractional parts of an area
- Identify fractional parts of a group (of objects, people, etc.)
- Read, write, and interpret fraction notation
- Order fractions with like and unlike denominators
- Read, write, and interpret decimal fractions in tenths and hundredths

Moving Between Solids and Silhouettes (3-D Geometry and Measurement)

Mathematical Emphases

❶ Features of Shape Describing properties of 3-dimensional shapes

Math Focus Points

- Describing attributes of geometric solids
- Naming geometric solids

❷ Features of Shape Translating between 2-dimensional and 3-dimensional shapes

Math Focus Points

- Understanding how 3-D solids project silhouettes with 2-D shapes (for example, how a cone can produce both triangular and circular silhouettes)
- Decomposing images of 3-D shapes and then recombining them to make a given structure
- Visualizing what 3-D figures look like from different perspectives
- Recognizing how components of 3-D cube buildings come together to form the whole building
- Drawing silhouettes of 3-D cube buildings from different perspectives
- Integrating different silhouettes of an object, both to form a mental model and to build the whole object

❸ Volume Structuring rectangular prisms and determining their volume

Math Focus Points

- Seeing that cubes filling a rectangular prism can be decomposed into congruent layers
- Finding the volume of cube buildings
- Designing patterns for boxes that hold a given number of cubes (volume)
- Developing a strategy for determining the volume of rectangular prisms
- Finding the number of cubes (volume) that will fit into the box made by a given pattern
- Doubling the number of cubes for a given box and considering how that changes the dimensions of the original box

Ten-Minute Math activities focus on

- Reading and writing decimal fractions and decimal numbers
- Adding multiples of one-tenth to, and subtracting multiples of one-tenth from decimal fractions and decimal numbers
- Organizing and analyzing visual images
- Developing language and concepts needed to communicate about spatial relationships
- Decomposing images of 3-D shapes and then recombining them to make a given structure

Assessed Benchmarks

- Identify 2-D silhouettes of 3-D solids (e.g., a cone can project a triangular silhouette)
- Draw 2-D representations showing different perspectives of a 3-D object
- Find the volume of cube buildings and rectangular prisms

How Many Packages? How Many Groups? (Multiplication and Division 3)

Mathematical Emphases

❶ Computational Fluency Solving multiplication problems with 2-digit numbers

Math Focus Points

- Estimating solutions to 2-digit multiplication problems
- Multiplying multiples of 10
- Solving 2-digit multiplication problems by breaking a problem into smaller parts and combining the subproducts
- Solving 2-digit multiplication problems by changing one factor to create an easier problem

❷ Whole-Number Operations Understanding division as making groups of the divisor

Math Focus Points

- Solving division problems by breaking the problem into parts
- Using multiples of 10 to solve division problems
- Using the relationship between multiplication and division to solve division problems

This Unit also focuses on

- Representing a multiplication or division problem with pictures or diagrams, including arrays and pictures of groups
- Using a story problem represented by a multiplication expression to keep track of parts of the problem

Ten-Minute Math activities focus on

- Becoming familiar with multiplication patterns
- Finding the multiples of numbers through skip counting
- Using the nearest landmark number to find multiples of a given number
- Approximating numbers to nearby landmark numbers, e.g., multiples of 10 or 100
- Calculating mentally
- Comparing answer choices to find the one closest to the actual answer

Assessed Benchmarks

- Multiply 2-digit numbers efficiently
- Solve division problems with 1-digit and small 2-digit divisors by using at least one strategy efficiently

Penny Jars and Plant Growth (Patterns, Functions, and Change)

Mathematical Emphases

❶ Using Tables and Graphs Using graphs to represent change

Math Focus Points

- Interpreting the points and shape of a graph in terms of the situation the graph represents
- Finding the difference between two values on a line graph
- Discriminating between features of a graph that represent quantity and those that represent changes in quantity
- Identifying points in a graph with corresponding values in a table and interpreting the numerical information in terms of the situation the graph represents
- Plotting points on a coordinate grid to represent a situation in which one quantity is changing in relation to another
- Comparing situations by describing the differences in their graphs
- Describing the relative steepness of graphs or parts of graphs in terms of different rates of change
- Comparing tables, graphs, and situations of constant change with those of nonconstant change

❷ Using Tables and Graphs Using tables to represent change

Math Focus Points

- Using tables to represent the relationship between two quantities in a situation of constant change
- Interpreting numbers in a table in terms of the situation they represent

❸ Linear Change Describing and representing a constant rate of change

Math Focus Points

- Finding the value of one quantity in a situation of constant change, given the value of the other
- Creating a representation for a situation of constant change
- Describing the relationship between two quantities in a situation of constant change, taking into account a beginning amount and a constant increase
- Writing an arithmetic expression for finding the value of one quantity in terms of the other in a situation of constant change
- Making rules that relate one variable to another in situations of constant change
- Using symbolic letter notation to represent the value of one variable in terms of another

This Unit also focuses on

- Measuring in centimeters

Ten-Minute Math activities focus on

- Describing features of the data
- Interpreting and posing questions about the data
- Approximating numbers to nearby landmark numbers, e.g., multiples of 10 or 100
- Calculating mentally
- Comparing answer choices to find the one closest to the actual answer

Assessed Benchmarks

- Connect tables and graphs to each other and to the situations they represent
- Make a graph on a coordinate grid from a table of values
- Describe how a graph shows change: where the rate of change is increasing, decreasing, or remaining constant, and how differences in steepness represent differences in the rate of change
- Take into account the starting amount and the amount of change in describing and comparing situations of constant change
- In a situation of constant change, write rules (using words or arithmetic expressions) to determine the value of one quantity, given the value of the other