

# Content Scope & Sequence



SCOTT FORESMAN

# Investigations

IN NUMBER, DATA, AND SPACE®



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# Number Puzzles and Multiple Towers (Multiplication and Division 1)

## Mathematical Emphases

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### ① Whole-Number Operations Reasoning about numbers and their factors

#### Math Focus Points

- Determining whether one number is a factor or multiple of another
- Identifying prime, square, even, and odd numbers
- Using known multiplication combinations to find equivalent multiplication combinations (e.g.,  $18 = 3 \times 6 = 3 \times (2 \times 3)$ )
- Using known multiplication combinations to find multiplication combinations for numbers related by place value (e.g.,  $3 \times 6 = 18$ ;  $3 \times 6 \times 10 = 180$ )
- Finding all the ways to multiply whole numbers for a given product
- Finding all the factors of a number
- Using properties (even, odd, prime, square) and relationships (factor, multiple) of numbers to solve problems
- Determining the prime factorization of a number

### ② Computational Fluency Solving multiplication problems with 2-digit numbers

#### Math Focus Points

- Solving 2-digit by 2-digit multiplication problems
- Describing and comparing strategies used to solve multiplication problems
- Breaking up multiplication problems efficiently
- Multiplying fluently by multiples of 10
- Estimating the product of two numbers
- Comparing multiplication problems to determine which product is greater

### ③ Whole-Number Operations Understanding and using the relationship between multiplication and division to solve division problems

#### Math Focus Points

- Solving division problems with 2-digit divisors
- Using knowledge of multiples of 10 to solve division problems
- Using and interpreting notation that represents division and relating division and multiplication notations (e.g.,  $170 \div 15 = \underline{\quad}$  and  $\underline{\quad} \times 15 = 170$ )
- Describing and comparing strategies used to solve division problems
- Comparing division problems to determine which quotient is greater
- Solving a division problem by breaking the dividend into parts

### ④ Whole-Number Operations Representing the meaning of multiplication and division

#### Math Focus Points

- Writing multiplication equations that describe dot arrangements
- Using arrays to model multiplication
- Representing a multiplication or division problem with a picture or diagram
- Creating a story problem represented by a multiplication or division expression
- Making sense of remainders in terms of problem contexts

#### This Unit also focuses on

- Using clear and concise notation
- Identifying and learning multiplication combinations (“facts”) not yet known fluently

#### Ten-Minute Math activities focus on

- Organizing and analyzing visual images
- Developing language and concepts needed to communicate spatial relationships
- Writing equations to describe dot patterns
- Identifying prime, square, even, and odd numbers
- Determining whether one number is a factor or multiple of another

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## Assessed Benchmarks

- Find the factors of a number
- Solve multiplication problems efficiently
- Solve division problems with 1- and 2-digit divisors

## Prisms and Pyramids (3-D Geometry and Measurement)

### Mathematical Emphases

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#### ① Features of Shape Translating between 2-dimensional and 3-dimensional shapes

##### Math Focus Points

- Decomposing 3-D shapes and then recombining them to make a given building

#### ② Volume Structuring rectangular prisms and determining their volume

##### Math Focus Points

- Determining the number of cubes that will fit into the box made by a given pattern
- Developing a strategy for determining the volume of rectangular prisms
- Designing patterns for boxes that hold a given number of cubes
- Finding the volume of rectangular prisms
- Considering how the dimensions of a box change when the volume is changed (doubled, halved, or tripled)
- Organizing rectangular packages to fit in rectangular boxes
- Designing a box that can be completely filled with several differently-shaped rectangular packages
- Determining the volume, in cubic centimeters, of a small prism
- Constructing units of volume—cubic centimeter, cubic inch, cubic foot, cubic yard (optional), cubic meter
- Choosing an appropriate unit of volume to measure a large space
- Finding the volume of a large space, such as the classroom, using cubic meters

#### ③ Volume Structuring prisms, pyramids, cylinders, and cones and determining their volume

##### Math Focus Points

- Comparing volumes of different-shaped containers
- Finding volume relationships between solids, particularly those with the same base and height
- Building a prism with three times the volume of a given pyramid
- Demonstrating the 3:1 relationship between rectangular prisms and pyramids with the same base and height
- Finding volume, in cubic centimeters, of prisms, pyramids, cylinders, and cones

#### This Unit also focuses on

- Describing and defending measurement methods
- Building rectangular solids

#### Ten-Minute Math activities focus on

- 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 building
- Estimating solutions to 2- and 3-digit multiplication and division problems
- Breaking apart, reordering, or changing numbers mentally to determine a reasonable estimate

### Assessed Benchmarks

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- Find the volume of rectangular prisms
- Use standard units to measure volume
- Identify how the dimensions of a box change when the volume is changed
- Explain the relationship between the volumes of prisms and pyramids with the same base and height

# Thousands of Miles, Thousands of Seats (Addition, Subtraction, and the Number System)

## Mathematical Emphases

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### ① The Base-Ten Number System Extending knowledge of the number system to 100,000 and beyond

#### Math Focus Points

- Reading, writing, and sequencing numbers to 10,000 and 100,000
- Understanding the place-value relationships between 10, 100, 1,000, and 10,000
- Learning the names of places larger than 100,000: million, billion, trillion

### ② Computational Fluency Adding and subtracting accurately and efficiently

#### Math Focus Points

- Adding and subtracting multiples of 100 and 1,000
- Finding the difference between a number and 10,000
- Finding combinations of 3-digit numbers that add to 1,000
- Solving addition and subtraction problems with large numbers by focusing on the place value of the digits
- Solving whole-number addition and subtraction problems efficiently
- Using clear and concise notation for recording addition and subtraction strategies
- Interpreting and solving multistep problems

### ③ Whole-Number Operations Examining and using strategies for subtracting whole numbers

#### Math Focus Points

- Identifying, describing, and comparing subtraction strategies by focusing on how each strategy starts
- Analyzing and using different subtraction strategies
- Developing arguments about how the differences represented by two subtraction expressions are related (e.g.,  $1,208 - 297$  and  $1,208 - 300$ )
- Understanding the meaning of the steps and notation of the U.S. algorithm for subtraction

### This Unit also focuses on

- Using story contexts and representations, such as number lines, to explain and justify solutions to subtraction problems
- Solving division problems related to the multiplication combinations to  $12 \times 12$  (the division facts, e.g.,  $64 \div 8$ ,  $54 \div 6$ ) with fluency

### Ten-Minute Math activities focus on

- Recognizing and interpreting the value of each digit in 4- and 5-digit numbers
- Finding different combinations of a number, using only 1,000s, 100s, 10s, and 1s and recognizing their equivalency (i.e. 1 hundred, 3 tens, and 7 ones = 12 tens and 17 ones, etc.)
- Reading and writing numbers up to 100,000
- Adding multiples of 10 to, and subtracting multiples of 10 from, 4- and 5-digit numbers
- Estimating solutions to 2- and 3-digit multiplication and division problems
- Breaking apart, reordering, or changing numbers mentally to determine a reasonable estimate

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## Assessed Benchmarks

- Read, write, and sequence numbers up to 100,000
- Solve subtraction problems accurately and efficiently, choosing from a variety of strategies
- Demonstrate fluency with division problems related to the multiplication combinations to  $12 \times 12$  (division facts)

## What's That Portion? (Fractions and Percents 1)

### Mathematical Emphases

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#### ① Rational Numbers Understanding the meaning of fractions and percents

##### Math Focus Points

- Interpreting everyday uses of fractions, decimals, and percents
- Finding fractional parts of a whole or of a group (of objects, people, and so on)
- Finding a percentage of a group (of objects, people, and so on)
- Finding a percentage of a rectangular area
- Identifying fraction and percent equivalents through reasoning about representations and known equivalents and relationships
- Finding fractional parts of a rectangular area
- Interpreting the meaning of the numerator and denominator of a fraction
- Using equivalent fractions and percents to solve problems
- Representing fractions on a number line

#### ② Rational Numbers Comparing fractions

##### Math Focus Points

- Ordering fractions and justifying their order through reasoning about fraction equivalents and relationships
- Comparing fractions and percents to the landmarks 0,  $\frac{1}{2}$ , and 1
- Finding and comparing fractional parts and percents of a whole or a group
- Comparing fractional parts of different-sized wholes
- Using equivalencies to place fractions on a set of number lines (fraction tracks)
- Comparing fractions on a number line
- Ordering mixed numbers and fractions greater than 1

#### ③ Computation with Rational Numbers Adding and subtracting fractions

##### Math Focus Points

- Finding fractional parts of the rotation around a circle
- Adding fractions by using a rotation model
- Adding and subtracting fractions through reasoning about fraction equivalents and relationships
- Adding and subtracting fractions by using a number line
- Finding combinations of fractions with sums between 0 and 2

#### Ten-Minute Math activities focus on

- Estimating solutions to 3-, 4-, and 5-digit addition and subtraction problems
- Breaking apart, reordering, or changing numbers mentally to determine a reasonable estimate
- Identifying fractions of a group
- Using evidence and formulating questions to make hypotheses about the common characteristics of groups of people
- Systematically eliminating possibilities

### Assessed Benchmarks

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- Use fraction-percent equivalents to solve problems about the percentage of a quantity
- Order fractions with like and unlike denominators
- Add fractions through reasoning about fraction equivalents and relationships

## Measuring Polygons (2-D Geometry and Measurement)

### Mathematical Emphases

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#### ① Features of Shape Describing and classifying 2-dimensional figures

##### Math Focus Points

- Identifying attributes of polygons
- Describing triangles by the sizes of their angles and the lengths of their sides
- Using attributes to describe and compare quadrilaterals, including parallelograms, rectangles, rhombuses, and squares
- Defining a regular polygon as a polygon with all sides and all angles equal

#### ② Features of Shape Describing and measuring angles

##### Math Focus Points

- Using known angles to find the measures of other angles

#### ③ Linear and Area Measurement Finding perimeter and area of rectangles

##### Math Focus Points

- Comparing the perimeters and areas of rectangles when the dimensions are multiplied by given amounts
- Using numerical and/or geometric patterns to describe how the perimeters and areas of rectangles change when the dimensions change
- Using representations to explain how perimeters and areas of rectangles change
- Creating different rectangles with the same area but different perimeters
- Understanding square units as a unit of measure
- Creating different rectangles with the same perimeter but different areas
- Describing the shapes of rectangles that have the same area or the same perimeter

#### ④ Features of Shape Creating and describing similar shapes

##### Math Focus Points

- Recognizing and building similar figures
- Examining the relationship among angles, line lengths, and areas of similar polygons
- Making a generalization about the changes in area of similar figures
- Building similar figures for polygons made from two or more Power Polygon pieces
- Using Power Polygons™ to find the areas of similar hexagons

#### Ten-Minute Math activities focus on

- Decomposing images of 2-D shapes and then recombining them to make a given design
- Developing language and concepts to communicate about spatial relationships
- Organizing and analyzing visual images
- Describing features of the data
- Interpreting and posing questions about the data

### Assessed Benchmarks

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- Identify different quadrilaterals by attribute, and know that some quadrilaterals can be classified in more than one way
- Use known angle sizes to determine the sizes of other angles ( $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ ,  $90^\circ$ ,  $120^\circ$ , and  $150^\circ$ )
- Determine the perimeter and area of rectangles
- Identify mathematically similar polygons

## Decimals on Grids and Number Lines (Decimals, Fractions, and Percents 2)

### Mathematical Emphases

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#### ① Rational Numbers Understanding the meaning of decimal fractions

##### Math Focus Points

- Identifying everyday uses of fractions and decimals
- Representing decimal fractions as parts of an area
- Reading and writing tenths, hundredths, and thousandths
- Identifying decimal, fraction, and percent equivalents
- Representing decimals by using a number line
- Interpreting fractions as division
- Interpreting the meaning of digits in a decimal number

#### ② Rational Numbers Comparing decimal fractions

##### Math Focus Points

- Ordering decimals and justifying their order through reasoning about decimal representations, equivalents, and relationships
- Comparing decimals to the landmarks 0,  $\frac{1}{2}$ , and 1

#### ③ Computation with Rational Numbers Adding decimals

##### Math Focus Points

- Estimating sums of decimal numbers
- Using representations to add tenths, hundredths, and thousandths
- Adding decimals to the thousandths through reasoning about place value, equivalents, and representations

#### This Unit also focuses on

- Explaining mathematical reasoning

#### Ten-Minute Math activities focus on

- Reading and writing numbers up to 100,000
- Adding multiples of 10 to, and subtracting multiples of 10 from, 4- and 5- digit numbers
- Reading and writing decimal fractions and decimal numbers
- Adding tenths or hundredths to, and subtracting them from, decimal fractions and decimal numbers
- Estimating solutions to 1- and 3-digit multiplication and division problems
- Breaking apart, reordering, or changing numbers mentally to determine a reasonable estimate

### Assessed Benchmarks

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- Read, write, and interpret decimal fractions to thousandths
- Order decimals to the thousandths
- Add decimal fractions through reasoning about place value, equivalents, and representations

## How Many People? How Many Teams? (Multiplication and Division 2)

### Mathematical Emphases

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#### ① Whole-Number Operations Reasoning about equivalent expressions in multiplication and division

##### Math Focus Points

- Generating equivalent multiplication expressions by doubling (or tripling) one factor and dividing the other by 2 (or 3)
- Using story contexts and representations to support explanations of the relationship between equivalent expressions
- Developing arguments about how to generate equivalent expressions in multiplication
- Comparing equivalent multiplication expressions to equivalent division expressions
- Generating equivalent division expressions

#### ② Whole-Number Operations Representing the meaning of multiplication and division

##### Math Focus Points

- Representing equivalent expressions in multiplication
- Representing equivalent expressions in division
- Representing a division problem with a picture or diagram
- Creating a story context for a division expression

#### ③ Computational Fluency Solving multiplication problems with 2-digit and 3-digit numbers

##### Math Focus Points

- Solving 2-digit by 2-digit or 3-digit multiplication problems fluently
- Describing and comparing strategies used to solve multidigit multiplication problems
- Estimating answers to multiplication and division problems
- Understanding the U.S. algorithm for multiplication

#### ④ Computational Fluency Solving division problems with 2-digit divisors

##### Math Focus Points

- Describing and comparing strategies used to solve division problems
- Solving division problems with a 2-digit divisor fluently

#### This Unit also focuses on

- Using clear and concise notation
- Solving multistep word problems
- Using all four operations to solve problems

#### Ten-Minute Math activities focus on

- Identifying prime, square, even, and odd numbers
- Determining if one number is a factor or multiple of another
- Estimating solutions to 2-digit to 4-digit multiplication and division problems
- Estimating solutions to addition and subtraction problems with fractions and mixed numbers
- Breaking apart, reordering, or changing numbers mentally to determine a reasonable estimate

### Assessed Benchmarks

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- Explain why doubling one factor in a multiplication expression ( $a \times b$ ) and dividing the other by 2 results in an equivalent expression
- Solve multiplication problems efficiently
- Solve division problems efficiently



# Growth Patterns (Patterns, Functions, and Change)

## Mathematical Emphases

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### ① Using Tables and Graphs Using tables to represent change

#### Math Focus Points

- Using tables to represent the relationship between two quantities

### ② Using Tables and Graphs Using graphs to represent change

#### Math Focus Points

- Plotting points on a coordinate grid to represent a situation in which one quantity is changing in relation to another
- Identifying points in a graph with corresponding values in a table and interpreting the numerical information in terms of the situation the graph represents
- Describing the relative steepness of graphs or parts of graphs in terms of different rates of change
- Comparing situations by describing differences in their graphs

### ③ Linear Change Describing and representing situations with a constant rate of change

#### Math Focus Points

- Describing the relationship between two quantities in a situation with a constant rate of change, taking into account a beginning amount and a constant increase (or decrease)
- Finding the value of one quantity in a situation with a constant rate of change, given the value of the other (e.g., If you know the age, what is the height? or If you know the number of rows, what is the perimeter?)
- Writing an arithmetic expression for finding the value of one quantity in terms of the other in a situation with a constant rate of change
- Making rules that relate one variable to the other in situations with a constant rate of change
- Using symbolic letter notation to represent the value of one variable in terms of another variable

### ④ Nonlinear Change Describing and representing situations in which the rate of change is not constant

#### Math Focus Points

- Comparing tables, graphs, and situations with a constant rate of change with those in which the rate of change is not constant
- Describing a situation in which the rate of change is not constant but can be determined
- Describing how a graph represents a situation in which the rate of change is not constant

#### This Unit also focuses on

- Measuring length with meters and centimeters
- Finding the perimeter of a rectangle
- Finding the area of a rectangle

#### Ten-Minute Math activities focus on

- Estimating solutions to 3- to 5-digit addition and subtraction problems
- Breaking apart, reordering, or changing numbers mentally to determine a reasonable estimate
- Reading and writing numbers up to 100,000
- Adding multiples of 10 to, and subtracting multiples of 10 from, 3- to 5-digit numbers
- Reading and writing decimal fractions and decimal numbers
- Adding tenths or hundredths to, and subtracting them from, decimal fractions and decimal numbers

## Assessed Benchmarks

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- Create graphs and tables to represent the relationship between two variables
- Use tables and graphs to represent the relationship between two variables
- Use symbolic notation to represent the value of one variable in terms of another variable in situations with constant rates of change

## How Long Can You Stand on One Foot? (Data Analysis and Probability)

### Mathematical Emphases

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#### ① Data Analysis Representing data

##### Math Focus Points

- Using a line plot to represent ordered, numerical data
- Representing two sets of data in order to compare them
- Considering how well a data representation communicates to an audience

#### ② Data Analysis Describing, summarizing, and comparing data

##### Math Focus Points

- Comparing sets of data using the shape and spread of the data
- Describing the shape of a set of data: where the data are concentrated, the median, what is typical, highest and lowest values, range, and outliers
- Using medians to compare groups

#### ③ Data Analysis Analyzing and interpreting data

##### Math Focus Points

- Developing arguments based on data
- Drawing conclusions based on data
- Considering how well conclusions are supported by data

#### ④ Data Analysis Designing and carrying out a data investigation

##### Math Focus Points

- Designing an experiment to answer a question about two groups, objects, or conditions
- Developing and carrying out consistent procedures for collecting data from an experiment
- Recording and keeping track of a set of data
- Carrying out multiple trials in an experiment

#### ⑤ Probability Describing the probability of an event

##### Math Focus Points

- Comparing the expected probability of an event with the actual results of repeated trials of that event
- Using numbers from 0 to 1 as measures of probability
- Determining the fairness of a game based on the probability of winning for each player

#### Ten-Minute Math activities focus on

- Describing features of data
- Interpreting and posing questions about data
- Estimating 2-, 3-, and 4-digit multiplication and division problems
- Breaking apart, reordering, or changing numbers mentally to determine a reasonable estimate

### Assessed Benchmarks

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- Describe major features of a set of data represented in a line plot or bar graph, and quantify the description by using median or fractional parts of the data
- Draw conclusions about how two groups compare based on summarizing the data for each group
- Design and carry out an experiment in order to compare two groups
- Use a decimal, fraction, or percent to describe and compare the theoretical probabilities of events with a certain number of equally likely outcomes