5TH GRADE MATHEMATICS

CURRICULUM GUIDE

BIG IDEAS

- Properties of mathematical operations make it possible to effectively and efficiently solve problems.
- Understanding why division procedures work helps one to recognize and accurately solve problems that involve dividing.
- Patterns in the place value system make it easier to interpret and solve problems.
- Number benchmarks are useful for relating numbers and estimating amounts.
- Volume can be quantified by finding the number of same-sized cubic units needed to fill a space without any gaps or overlaps.
- The unit of measurement used depends on the degree of precision required to accurately measure an object.
- Standard measurement units simplify communication about the relative size of objects.
- Variables represent and describe relationships among numerical values.
- Number patterns, algebraic expressions, numerical relationships, and equations can be represented in many ways.

THEMATIC FOCUS

- Math classrooms are lively places for learning where students receive a rich diet of the following:
  - The use of mathematics to *solve problems*.
  - Application of *logical reasoning* to justify procedures and solutions.
  - Design and analyze multiple *representations*, make *connections* in and out of school.
  - See the National Council of Teachers of Mathematics (NCTM) PRINCIPLES & STANDARDS FOR SCHOOL MATHEMATICS for further information.

UNITS OF STUDY

- Properties of math operations
- Models of division
- Division of multidigit whole numbers
- Addition and subtraction of decimals
- Addition and subtraction of fractions
- Properties of three-dimensional shapes
- Volume of rectangular prisms
- Surface area of rectangular prisms
- Estimating fractional & decimal sums and differences
- Properties of polyhedra

CONCEPTS AND SKILLS

It is essential that the following concepts and skills be addressed in contexts that promote problem solving, reasoning, communication, making connections and designing and analyzing representations. See FOCAL POINTS for more information about grade level content for mathematics.

5.1 Number and Operation and Algebra: Developing and understanding of and fluency with division of whole numbers

- Apply understanding of models for division (e.g., equal-sized groups, arrays, area models, equal intervals on the number line) and the relationship of division to multiplication to solve problems. (5.1.1)
- Apply concepts of place value and the properties of operations to solve problems involving division. (5.1.2)
- Select and use appropriate estimation strategies for division (e.g., use benchmarks, overestimate, underestimate, round) to calculate mentally based on the problem situation when computing with whole numbers. (5.1.3)

CONCEPTS AND SKILLS (CONTINUED)

- Develop and use accurate, efficient, and generalizable methods to find quotients for multi-digit division problems. (5.1.4)
- Develop fluency with efficient procedures for dividing whole numbers and justify why the procedures work on the basis of place value and number properties. (5.1.5)
- Determine the most appropriate form of the quotient and interpret the remainder in a problem situation. (5.1.6)

5.2 Number and Operations: Developing an understanding of and fluency with addition and subtraction of fractions and decimals

- Use fraction models to represent the addition and subtraction of fractions with unlike denominators. (5.2.1)
- Use decimal models, place value, and number properties to add and subtract decimals (to the thousandths). (5.2.2)
- Select and use appropriate strategies to estimate fraction and decimal sums and differences. (5.2.3)
- Develop fluency with efficient procedures for adding and subtracting fractions and decimals and justify why the procedures work. (5.2.4)
- Solve problems involving the addition and subtraction of fractions and decimals. (5.2.5)
- Use ordered pairs on coordinate graphs to specify locations and describe paths. (5.2.6)
- Construct and analyze double bar, line, and circle graphs to solve problems involving fractions and decimals. (5.2.7)

5.3 Geometry and Measurement and Algebra: Describing three-dimensional shapes and analyzing their properties, including volume and surface area

- Identify and classify triangles by their angles (acute, right, obtuse) and sides (scalene, isosceles, equilateral). (5.3.1)
- Find and justify relationships among the formulas for the areas of triangles and parallelograms. (5.3.2)
- Describe three-dimensional shapes (triangular and- rectangular prisms, cube, triangular- and square-based pyramids, cylinder, cone, and sphere) by the number of edges, faces, and/or vertices as well as types of faces. (5.3.3)
- Recognize volume as an attribute of three-dimensional space. (5.3.4)
- Determine volume by finding the total number of same-sized units of volume that fill a three-dimensional shape without gaps or overlaps. (5.3.5)
- Recognize a cube that is one unit on an edge as the standard unit for measuring volume. 5.3.6
- Determine the appropriate units, strategies, and tools for solving problems that involve estimating or measuring volume. (5.3.7)
- Decompose three-dimensional shapes and find surface areas and volumes of triangular and rectangular prisms. (5.3.8)
- Identify and measure necessary attributes of shapes to use area , surface area, and volume formulas to solve problems (e.g., to find which of two gift boxes needs the most wrapping paper or has the greater volume?). (5.3.9)

♦ **5th Grade Connections**

The following connections to the concepts and skills bring in other important topics in meaningful ways. For example, the grade 2ND Grade Connections highlight the fact that the measurement focal point for grade 2 ("Developing an understanding of linear measurement and facility in measuring lengths") includes work with applications and models using the shapes from the geometry focal point for grade 1 ("Composing and decomposing geometric shapes"). At the same time, students in grade 2 continue to use vocabulary and spatial reasoning that will be essential for learning the content specified in the geometry focal point for grade 3 ("Describing and analyzing properties of two-dimensional shapes"). Because a curriculum that is integrated and internally connected (see FOCAL POINTS OVERVIEW for additional information) in this way uses related concepts and skills to support and enrich one or more focal points at a grade level, it has the potential to maximize students' learning.

CONCEPTS AND SKILLS (CONTINUED)

- Algebra
  - Solve simple equations and inequalities
  - Create graphs of simple equations
  - Explore prime and composite numbers
  - Understand and apply order of operations
- Measurement
  - Approximation and precision with solids and volume
- Data Analysis
  - Ordered pairs on coordinate grid
  - Analyze double-bar and line graphs
- Number and Operations
  - Extend place value through millions and millionths
  - Apply multiplication to larger numbers
  - Describe negative numbers

- **Math Work Samples & Assessment** In 5th grade, students should be provided multiple opportunities to complete math work samples and are required to complete at least one teacher-scored math work sample based on the official scoring guide. 5th graders are also required to take the Oregon Assessment of Knowledge and Skills (OAKS) test in the spring (see Assessment section for math scoring guides, sample tasks, and additional information).
- **Problem Solving** (see Problem Solving section for definitions, grade level descriptions, and instructional resources)
- **Math Placement** (see Placement section for course flowcharts, placement criteria, and additional information)

ESSENTIAL QUESTIONS

- Why do we use a particular order of operations to solve math problems?
- What is division and how do we use it in real life?
- Why, when given data, do we create graphs?
- What information can one derive from a 3-dimensional figure?
- How do you determine and justify which operation to use when solving a problem?

ESSENTIAL SKILLS

- Apply mathematics in a variety of settings
  - Interpret a situation and apply workable mathematical concepts and strategies, using appropriate technologies where applicable.
  - Produce evidence, such as graphs, data, or mathematical models, to obtain and verify a solution.
  - Communicate and defend the verified process and solution, using pictures, symbols, models, narrative or other methods.
- Think critically and analytically. This skill includes all of the following:
  - Identify and explain the key elements of a complex event, text, issue, problem or phenomenon.
  - Develop a method to explore the relationships between the key elements of a complex event, text, issue, problem or phenomenon.
  - Propose defensible conclusions that address multiple and diverse perspectives.
  - Evaluate the strength of conclusions, differentiating reasoning based on facts from reasoning based on opinions.
  - See ESSENTIAL SKILLS for more information about ODE requirements.