

# Math Standards

## Fifth Grade

### Course Abilities

#### 1. Develop abilities in math.

- A. Higher thinking (analyze, evaluate, classify, predict, decide, estimate, generalize, solve, relate, interpret, simplify).
- B. Communications (present, persuade, collaborate, explain, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

#### 2. Be able to apply math knowledge and skills to a variety of purposes.

- A. Be able to solve one- and two-step problems using the four-step problem-solving method with time, money, and measurement in standard and metric units (determine problem, select operations, estimate, solve and label solution) and check for common sense.
- B. Be able to conduct research (locate, observe/gather, present).
- C. Be able to solve one-step problems using graphs, charts, tables, calculators and computers (safely, effectively efficiently, accurately).
- D. Possess technical skills:
  - read/write/present: instructions, table, chart, thank you letter, letter of request, letter of response, proposal, lab report, research report, summary
  - technology: word processing, database, Internet, AV production

### Course Content

#### 1. Be able to divide multi-digit numbers.

- A. Be able to divide multi-digit numbers, using standard algorithms. Recognize that quotients can be represented in a variety of ways, including a whole number with a remainder, a fraction or mixed number, or a decimal.

*For example:* Dividing 153 by 7 can be used to convert the improper fraction  $\frac{153}{7}$  to the mixed number  $21\frac{6}{7}$ .

- B. Be able to consider the context in which a problem is situated to select the most useful form of the quotient for the solution and use the context to interpret the quotient appropriately.

*For example:* If 77 amusement ride tickets are to be distributed equally among 4 children, each child will receive 19 tickets, and there will be one left over. If \$77 is to be distributed equally among 4 children, each will receive \$19.25, with nothing left over.

- C. Be able to estimate solutions to arithmetic problems in order to assess the reasonableness of results.
- D. Be able to solve real-world and mathematical problems requiring addition, subtraction, multiplication and division of multi-digit whole numbers. Use various strategies, including the inverse relationships between operations, the use of technology, and the context of the problem to assess the reasonableness of results.

*For example:* The calculation  $117 \div 9 = 13$  can be checked by multiplying 9 and 13.

#### 2. Be able to read, write, represent and compare fractions and decimals.

- A. Be able to Read and write decimals using place value to describe decimals in terms of groups from millionths to millions.

*For example:* Possible names for the number 0.0037 are:

37 ten thousandths  
3 thousandths + 7 ten thousandths;  
a possible name for the number 1.5 is 15 tenths.

- B. Be able to find 0.1 more than a number and 0.1 less than a number. Find 0.01 more than a number and 0.01 less than a number. Find 0.001 more than a number and 0.001 less than a number.
- C. Be able to order fractions and decimals, including mixed numbers and improper fractions, and locate on a number line.

*For example:* Which is larger 1.25 or  $\frac{6}{5}$  ?

*Another example:* In order to work properly, a part must fit through a 0.24 inch wide space. If a part is  $\frac{1}{4}$  inch wide, will it fit?

- D. Be able to recognize and generate equivalent decimals, fractions, mixed numbers and improper fractions in various contexts.

*For example:* When comparing 1.5 and  $\frac{19}{12}$ , note that  $1.5 = 1\frac{1}{2} = 1\frac{6}{12} = \frac{18}{12}$ , so  $1.5 < \frac{19}{12}$ .

- E. Be able to round numbers to the nearest 0.1, 0.01 and 0.001.

*For example:* Fifth grade students used a calculator to find the mean of the monthly allowance in their class. The calculator display shows 25.80645161. Round this number to the nearest cent.

### **3 . Be able to add and subtract fractions, mixed numbers and decimals and write in simplest form.**

- A. Be able to add and subtract decimals and fractions, using efficient and generalizable procedures, including standard algorithms.
- B. Be able to model addition and subtraction of fractions and decimals using a variety of representations.

*For example:* Represent  $\frac{2}{3} + \frac{1}{4}$  and  $\frac{2}{3} - \frac{1}{4}$  by drawing a rectangle divided into 4 columns and 3 rows and shading the appropriate parts or by using fraction circles or bars.

- C. Be able to estimate sums and differences of decimals and fractions to assess the reasonableness of results.

*For example:* Recognize that  $12\frac{2}{5} - 3\frac{3}{4}$  is between 8 and 9 (since  $\frac{2}{5} < \frac{3}{4}$ ).

- D. Be able to solve real-world and mathematical problems requiring addition and subtraction of decimals, fractions and mixed numbers, including those involving measurement, geometry and data.

*For example:* Calculate the perimeter of the soccer field when the length is 109.7 meters and the width is 73.1 meters.

### **4 . Be able to multiply fractions and mixed numbers and write in simplest form.**

- A. Be able to convert between mixed numbers and improper fractions.

### **5 . Be able to recognize and represent patterns of change; use patterns, tables, graphs and rules.**

- A. Be able to create and use rules, tables, spreadsheets and graphs to describe patterns of change and solve problems.

*For example:* An end-of-the-year party for 5<sup>th</sup> grade costs \$100 to rent the room and \$4.50 for each student. Know how to use a spreadsheet to create an input-output table that records the total cost of the party for any number of students between 90 and 150.

- B. Be able to use a rule or table to represent ordered pairs of positive integers and graph these ordered pairs on a coordinate system.

**6 . Be able to use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving whole numbers.**

- A. Be able to apply the commutative, associative and distributive properties and order of operations to generate equivalent numerical expressions and to solve problems involving whole numbers.

*For example:* Purchase 5 pencils at 19 cents and 7 erasers at 19 cents. The numerical expression is  $5 \times 19 + 7 \times 19$  which is the same as  $(5 + 7) \times 19$ .

**7. Be able to understand and apply equations and inequalities involving variables and whole numbers.**

- A. Be able to determine whether an equation or inequality involving a variable is true or false for a given value of the variable.

*For example:* Determine whether the inequality  $1 + x < 10$  is true for  $x = 2$ ,  $x = 8$ , or  $x = 9$ .

- B. Be able to represent real-world situations using equations and inequalities involving variables. Create real-world situations corresponding to equations and inequalities.

*For example:*  $250 - 27 \times a = b$  can be used to represent the number of sheets of paper remaining from a packet of 250 sheets when each student in a class of 27 is given a certain number of sheets.

- C. Evaluate expressions and solve equations involving variables when values for the variables are given.

*For example:* Using the formula,  $A = \ell w$ , determine the area when the length is 5, and the width 6, and find the length when the area is 24 and the width is 4.

**8 . Be able to describe, classify, and draw representations of three-dimensional figures.**

- A. Be able to describe and classify three-dimensional figures including cubes, prisms and pyramids by the number of edges, faces or vertices as well as the types of faces.  
B. Be able to recognize and draw a net for a three-dimensional figure.

*For example:*

**9 . Be able to determine the area of triangles and quadrilaterals; determine the surface area and volume of rectangular prisms.**

- A. Be able to develop and use formulas to determine the area of triangles, parallelograms and figures that can be broken into triangles.

- B. Be able to use various tools and strategies to measure the volume and surface area of objects that are shaped like rectangular prisms.

*For example:* Use a net or decompose the surface into rectangles.

*Another example:* Measure the volume of a cereal box by using a ruler to measure its height, width and length, or by filling it with cereal and then emptying the cereal into containers of known volume.

- C. Be able to understand that the volume of a three-dimensional figure can be found by counting the total number of same-sized cubic units that fill a shape without gaps or overlaps. Use cubic units to label volume measurements.

*For example:* Use cubes to find the volume of a small box.

- D. Be able to develop and use the formulas  $V = \ell wh$  and  $V = Bh$  to determine the volume of rectangular prisms. Justify why base area  $B$  and height  $h$  are multiplied to find the volume of a rectangular prism by breaking the prism into layers of unit cubes.

**10. Display and interpret data; determine mean, median, mode, and range.**

- A. Be able to know and use the definitions of the mean, median, mode, and range of a set of data. Know how to use a spreadsheet to find the mean, median and range of a data set. Understand that the mean is a "leveling out" of data.

*For example:* The set of numbers 1, 1, 4, 6 has mean 3. It can be leveled by taking one unit from the 4 and three units from the 6 and adding them to the 1s, making four 3s.

- B. Be able to create and analyze double-bar graphs and line graphs by applying understanding of whole numbers, fractions and decimals. Know how to create spreadsheet tables and graphs to display data.

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