

## Mathematics Curriculum Guide

### Fifth Grade

#### A. Number Sense

The students will compute with whole numbers, decimals, and fractions and understand the relationship among decimals, fractions, and percents. They will understand the relative magnitudes of numbers. They will understand prime and composite numbers.

The students will:

- Count, read, write, compare, and plot on a number line decimals to thousandths using words, models and expanded form.
- Compare and order fractions and decimals to thousandths by using the symbols for less than ( $<$ ), equal to ( $=$ ), and greater than ( $>$ ).
- Identify and explain prime and composite numbers.
- Use words, models, standard form and expanded form to represent place value of decimal numbers to thousandths.
- Convert between numbers in words and numbers in figures, for numbers up to millions and decimals to thousandths.
- Round whole numbers and decimals to any place value.
- Interpret percents as a part of a hundred. Find decimal and percent equivalents for common fractions and explain why they represent the same value.
- Explain different interpretations of fractions: as parts of a whole, parts of a set, and division of whole numbers by whole numbers.
- Identify on a number line the relative positions of simple positive fractions, positive mixed numbers, and positive decimals.
- Convert between standard and expanded forms of numbers.

#### B. Computation

The students will solve problems involving multiplication and division of whole numbers and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals.

The students will:

- Solve problems involving multiplication and division of whole numbers fluently using a standard algorithmic approach and explain how to treat the remainders in division.

- Solve problems involving addition and subtraction of decimals, fractions, and mixed numbers using a standard algorithmic approach.
- Solve problems involving the multiplication of fractions using a standard algorithmic approach. Explain the relationship of the product relative to the factors.
- Construct and analyze line graphs and double bar graphs from data, including data collected through observations, surveys and experiments.
- Perform simple experiments gathering data from a large number of trials and use data from experiments to predict the chance of future outcomes.
- Use basic facts in addition, subtraction, multiplication and division of any whole numbers.
- Solve problems involving multiplication and division of any whole numbers.
- Add and subtract fractions with different denominators.
- Use models to show an understanding of multiplication and division of fractions.
- Multiply and divide fractions to solve problems.
- Add and subtract decimals and verify the reasonableness of the results.
- Use estimation to decide whether answers are reasonable in addition, subtraction, multiplication, and division problems.
- Use mental arithmetic to add or subtract simple decimals.
- Find the least common multiple (LCM) for two or three fractions.
- Express quotients with remainders as mixed numbers.
- Convert improper fractions to mixed numbers, and mixed numbers to improper fractions.
- Divide a decimal by a whole number.
- Use models and manipulatives to explore percents.
- Divide a decimal by ten, hundred, or thousand.
- Write a fraction or decimal as a percent, and a percent as a fraction or decimal.

### C. Algebra and Functions

The students will use variables in simple expressions, compute the value of an expression for specific values of the variable, and plot, and interpret the results. They will use two-dimensional coordinate grids to represent points and graph lines.

The students will:

- Write and evaluate simple algebraic expressions.
- Use two-dimensional coordinate grids to represent points in the first quadrant that fit linear equations and draw the line determined by the points. (Find ordered pairs that fit a linear equation, graph the ordered pairs, and draw the line they determine.)
- Use a variable to represent an unknown number.

- Write simple algebraic expressions with one or two variables and evaluate them by substitution.
- Use the distributive property in numerical equations and expressions.
- Identify and graph ordered pairs of positive numbers.
- Understand that the length of a horizontal line segment on a coordinate plane equals the difference between the x-coordinates and that the length of a vertical line segment on a coordinate plane equals the difference between the y-coordinates.
- Use information taken from a graph or equation to answer questions about a problem situation.

#### D. Geometry

The students will identify, describe, and classify the properties of plane and solid geometric shapes and the relationships between them.

The students will:

- Measure angles and describe angles in degrees.
- Identify, classify and draw polygons and triangles (equilateral, isosceles, scalene, right, acute and obtuse triangles).
- Describe the attributes (such as number of edges, vertices, and number of faces) of solids, including cubes, pyramids and cylinders.
- Identify and describe using words and pictures, transformations such as reflections, rotations, and translations and use this knowledge to design and analyze simple tilings and tessellations.
- Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, triangles, and circles by using appropriate tools.
- Identify congruent triangles and justify your decisions by referring to sides and angles.
- Identify, describe, draw, and classify polygons, such as pentagons and hexagons.
- Identify and draw the radius and a diameter and describe the differences and similarities between the two.
- Understand that  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ , and  $360^\circ$  are associated with quarter, half, three-quarters, and full turns respectively.
- Construct prisms and pyramids using appropriate materials.
- Given a picture of a three-dimensional object, build the object with blocks.

#### E. Measurement

The students will understand and compute the areas and volumes of simple objects, as well as measuring weight, temperature, time, and money.

The students will:

- Develop and use the formulas for the perimeter and area of triangles, parallelograms and trapezoids using appropriate units for measures. Find the area of complex shapes by dividing them into basic shapes.
- Develop and use the formulas for the surface area and volume of rectangular prisms using appropriate units for measures.
- Use formulas for the areas of rectangles and triangles to find the area of complex shapes by dividing them into basic shapes.
- Find the surface area and volume of rectangular solids using appropriate units.
- Understand and use the smaller and larger units for measuring weight and their relationship to pounds and kilograms.
- Compare temperatures in Celsius and Fahrenheit, knowing that the freezing point of water is  $0^{\circ}\text{C}$  and  $32^{\circ}\text{F}$  and that the boiling point is  $100^{\circ}\text{C}$  and  $212^{\circ}\text{F}$ .
- Add and subtract with money in decimal notation.

#### F. Data Analysis and Probability

The students will collect, display, analyze, compare, and interpret data sets. The students will use the results of probability experiments to predict future events.

The students will:

- Explain which types of displays are appropriate for various sets of data.
- Find the mean, median, mode, and range of a set of data and describe what each does and does not tell about the data set.

#### G. Problem Solving

The students will make decisions about how to approach problems and communicate their ideas. Students will also use strategies, skills, and concepts in finding and communicating solutions to problems. Students will also determine when a solution is complete and reasonable and move beyond a particular problem by generalizing to other situations.

The students will:

- Analyze problems by identifying relationships, telling relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
- Decide when and how to break a problem into simpler parts.
- Apply strategies and results from simpler problems to solve more complex problems.

- Express solutions clearly and logically by using the appropriate mathematical terms and notation. Support solutions with evidence in both verbal and symbolic work.
- Recognize the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- Know and apply appropriate methods for estimating results of rational-number computations.
- Make precise calculations and check the validity of the results in the context of the problem.
- Decide whether a solution is reasonable in the context of the original situation.
- Note the method of finding the solution and show a conceptual understanding of the method by solving similar problems.
- Use appropriate vocabulary to solve and evaluate mathematical problems and concepts.
- Express solutions clearly and logically by using appropriate math vocabulary, symbols, and notations. Support solutions with written work (i.e. show work).
- Analyze, own and other's work, to determine errors in arithmetic, concepts, and or process.

#### Math Process Standards or Skills

The students will use the following skills in solving and evaluating arithmetic problems. These are the skills that we at Northwestern School Corporation feel are important for mathematical success.

- Problem Solving – build new mathematical knowledge through problem solving; solve problems that arise in mathematics and in other contexts; apply and adapt a variety of appropriate strategies to solve problems.
- Reasoning and Proof – recognize reasoning and proof as fundamental aspects of mathematics; make and investigate mathematical conjectures; develop and evaluate mathematical arguments and proofs; select and use various types of reasoning and methods of proof.
- Communication – organize and consolidate their mathematical thinking through communication; communicate their mathematical thinking coherently and clearly to peers, teacher, and other; analyze and evaluate the mathematical thinking and strategies of others; use the language of mathematics to express mathematical ideas precisely.
- Connections – recognize and use connections among mathematical ideas; understand how mathematical ideas interconnect and build on one another to produce a coherent whole; recognize and apply mathematics in contexts outside of mathematics.
- Representation – create and use representations to organize, record, and communicate mathematical ideas; select, apply and translate among mathematical representations to solve problems; use representations to model and interpret physical, social, and mathematical phenomena.

- Estimation and Mental Computation – know and apply appropriate methods for estimating the results of computations; round numbers to a specified place value; use estimation to decide whether answers are reasonable; decide when estimation is an appropriate strategy for solving a problem; determine appropriate accuracy and precision of measurement in problem situations; use properties of numbers and operations to perform mental computation; recognize when the numbers involved in a computation allow for a mental computation strategy.
- Technology – should be used as a tool in mathematics education to support and extend the mathematics curriculum; can contribute to concept development, simulation, representation, communication, and problem solving; ensuring that it supports – but is not a substitute for the development of skills with basic operations, quantitative reasoning, and problem-solving skills.