

Math Curriculum - Fourth Grade

1. Number and Operations

Essential Skills:

1. Understand numbers, ways of representing numbers, relationships among numbers and number systems
2. Understand meanings of operations and how they relate to one another
3. Compute fluently
4. Make reasonable estimates and relate them to solutions

Important to Know:

- ◆ Demonstrate an understanding of place value by reading, writing, and decomposing whole numbers through the 10,000's place.
- ◆ Order numbers by placing them correctly on a number line through the 100,000 place.
- ◆ Compare any two whole numbers using $<$, $>$, or $=$ through 100,000.
- ◆ Round whole numbers to 10's, 100's, 1,000's, and 10,000's places
- ◆ Demonstrate an understanding of and identify odd and even numbers
- ◆ Demonstrate an understanding of numbers less than 0 using concrete materials (thermometers, coins, debt, depth)
- ◆ Demonstrate an understanding of numbers less than zero by extending the number line and accurately labeling through negative 20
- ◆ Add and subtract accurately and efficiently any 2 whole numbers through 100,000 when the problems are written horizontally or vertically
- ◆ Add and subtract decimals involving money
- ◆ Demonstrate that multiplication is repeated addition or is making equal groups of a number
- ◆ Memorize multiplication facts through 10×10
- ◆ Demonstrate that division is making equal groups from a set of objects or a number
- ◆ Demonstrate an understanding that multiplication of whole numbers greater than 1 makes the product bigger than either factor
- ◆ Demonstrate an understanding that when a whole number is divided by a number greater than 1, the quotient is smaller than the dividend
- ◆ Multiply a monetary amount by a whole number
- ◆ Write a monetary amount less than \$1.00 using both decimal point and "\$" sign or cent sign
- ◆ Using pictures/models, show 2 ways to solve a multiplication problem (2 digits X 1 digit) using the distributive property (do not have to identify it as the distributive property.)
- ◆ Accurately and efficiently, multiply any two 2-digit numbers when written vertically or horizontally.
- ◆ Divide with 1-digit divisor to obtain a 1-digit or 2-digit quotient with or without remainders.
- ◆ Express quotients as mixed numbers or as whole numbers with remainder "R"
- ◆ Divide by a multiple of 10 to obtain a 1-digit or 2-digit quotient with or without a remainder
- ◆ Use estimation strategies to judge the reasonableness of the answer to whole number computation
- ◆ Recognize and generate equivalent representations for a given common fraction ($1/2$'s, $1/3$'s, $1/4$'s, $1/8$'s, and $1/10$'s) using pictures and manipulatives.
- ◆ Name and identify a fraction given a physical representation (any fraction)
- ◆ Order fractions from least to greatest using pictures, manipulatives, or a number line (common fractions $1/2$'s, $1/3$'s, $1/4$'s, $1/8$'s, $1/10$'s)

2. Algebra

Essential Skills:

1. Understand patterns, relations, and functions
2. Represent and analyze mathematical situations and structures using algebraic symbols
3. Use mathematical models to represent and understand quantitative relationships
4. Analyze change in various contexts
5. Use paper and pencil to demonstrate skills prior to using technology

Important to Know:

- ◆ Recognize and extend a repetitive numeric pattern and communicate the rule
- ◆ Understand the use of letters/box as a variable to represent 1 unknown
- ◆ Communicate/explain strategies for solving computation problems with 1 variable
- ◆ Graph ordered pairs of letters and numbers in all four quadrants on a coordinate plane.

3. Geometry

Essential Skills:

1. Analyze characteristics and properties of two and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems
3. Apply transformations and use symmetry to analyze mathematical situations
4. Use visualization, spatial reasoning, and geometric modeling to solve problems
5. Use paper and pencil to demonstrate skills prior to using technology

Important to Know:

- ◆ Identify triangles, parallelograms, trapezoids, pentagons, hexagons, kites, quadrilaterals, pyramids, triangular and rectangular prisms, cones, and cylinders
- ◆ Identify parallel, perpendicular, and intersecting lines on a flat surface
- ◆ Use the words congruent and similar to describe shapes
- ◆ Identify the terms radius, diameter and circumference
- ◆ Plot points in the first quadrant of a coordinate grid
- ◆ Given a point in the first quadrant of a coordinate grid, describe its location using an ordered pair
- ◆ Label the axis of a graph as horizontal and vertical
- ◆ Demonstrate an understanding of direction using the terms northeast, northwest, southeast, and southwest
- ◆ Describe a motion that will show that two shapes are congruent using the terms slide, flip, and turn
- ◆ Identify 2 or more lines of symmetry in simple figures
- ◆ Draw triangles, squares, rectangles, circles, cones, cylinders, and spheres
- ◆ Draw 3-D representations of cylinders, cones, and spheres
- ◆ Recognize known shapes from different perspectives
- ◆ Recognize known shapes in the environment
- ◆ Use known geometric models to solve problems in other areas of mathematics such as number and measurement
- ◆ Recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or everyday life

4. Measurement

Essential Skills:

1. Understand measurable attributes of objects and the units, systems, and processes of measurement
2. Apply appropriate techniques, tools, and formulas to determine measurements
3. Use paper and pencil to demonstrate skills prior to using technology

Important to Know:

- ◆ Understand attributes of length and weight and select the appropriate type of unit and tool for measuring each attribute
- ◆ Measure in inches, centimeters, meters, yards, feet, pounds, grams, and ounces
- ◆ Using concrete materials and/or grid paper, find the area of a shape.
- ◆ Measure the perimeter of regular and simple irregular figures
- ◆ Using string, measure the circumference of circles
- ◆ Convert measurements from whole meters to centimeters, from whole feet to inches, and from whole yards to feet. whole yards to inches, hours to minutes, days to hours, minutes to seconds, and weeks to days
- ◆ Demonstrate the ability to measure a line to the nearest $\frac{1}{4}$ inch given a ruler with divisions to the $\frac{1}{4}$ inch.
- ◆ Tell time to nearest minute
- ◆ Determine elapsed time to the nearest 5 minutes
- ◆ Explain that different answers to measurements are the result of how precisely the measurement was taken.
- ◆ Explain when estimates in measurements are reasonable and when precise measurement is necessary.
- ◆ Verify the estimate of a measurement with the precise measurement of that object
- ◆ When asked to estimate the length or weight of an object, determine the most reasonable estimate from a set of choices
- ◆ Can make change from one dollar and five dollars
- ◆ Recognize values of coins and group coins for more efficient counting
- ◆ Determine the reasonableness of a measurement by using their knowledge of units of length and weight.

5. Data Management and Probability

Essential Skills:

1. Select and use appropriate statistical methods to analyze data
2. Develop and evaluate inferences and predictions that are based on data
3. Understand and apply basic concepts of probability
4. Use paper and pencil to demonstrate skills prior to using technology

Important to Know:

- ◆ Design an investigation to address a formulated question
- ◆ Collect data using observations, surveys, or experiments
- ◆ Represent data using tables, time lines, bar graphs and line graphs
- ◆ Recognize the difference in representing data by categories and numerically
- ◆ Make a graph using graph paper with horizontal and vertical axes and label them correctly
- ◆ Make a bar graph, plot and read the value of bars between two numbers on the numerical axis
- ◆ Given a set of data and definitions, find the mode
- ◆ Compare a pictograph, a bar graph and a line graph of the same data and determine which graph best represents the data so that others will understand it
- ◆ Make a prediction and design a study to investigate the prediction
- ◆ Predict the probability of outcomes of simple experiments. Test the predictions with concrete materials

6. Problem Solving

Essential Skills:

1. Work individually and as a member of a group in formulating and solving problems
2. Build new mathematical knowledge through problem solving
3. Identify and solve problems that arise in mathematics and in other contexts
4. Apply and adapt a variety of appropriate strategies, including choosing appropriate computations, to solve problems
5. Monitor and reflect on the process of mathematical problem solving

Important to Know:

- ◆ Identify needed information to solve a problem
- ◆ Use the following strategies: act it out, make a physical model, draw a diagram, make a chart or table, generalize, look for a pattern, guess/check/revise, work backwards, solve a simple problem
- ◆ Translate from words to mathematical symbols
- ◆ Identify relevant and irrelevant information
- ◆ Judge the reasonableness of solutions
- ◆ Solve two-step problems
- ◆ Generalize a problem solving situation to other content areas

7. Reasoning and Proof K-12

Essential Skills:

1. Recognize reasoning and proof as a fundamental aspect of mathematics
2. Make and investigate mathematical conjectures
3. Develop and evaluate mathematical arguments and proofs
4. Select and use various types of reasoning and methods of proof

8. Communication

Essential Skills:

1. Organize and consolidate mathematical thinking through communication
2. Communicate mathematical thinking coherently and clearly to peers, teachers, and others
3. Analyze and evaluate the mathematical thinking and strategies of others
4. Use the language of mathematics to express mathematical ideas precisely

Important to Know:

Oral

- ◆ Explain fluently what method was used to get an answer
- ◆ Validate the solution to a problem ("convince me")
- ◆ Generalize the solution to a problem

Written

- ◆ Record observations and investigations using pictures, numbers, and appropriate grade level terms
- ◆ Make weekly entries in a math journal using math concepts

Visual

- ◆ Use concrete materials to model mathematical ideas

Kinesthetic

- ◆ Use body language to act out mathematical ideas

9. Connections K-12

Essential Skills:

1. Recognize and use connections among mathematical ideas
2. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
3. Recognize and apply mathematics in contexts outside of mathematics

10. Representation K-12

Essential Skills:

1. Create and use representations to organize, record, and communicate mathematical ideas
2. Select, apply, and translate among mathematical representations to solve problems
3. Use representations to model and interpret physical, social, and mathematical phenomenon 4 - 5