

# Essential Concepts for Mathematics – 4<sup>th</sup> Grade

## Number and Operations

- Read and write whole numbers to one million and decimals to hundredths in standard and expanded form.
- Identify the place and the value of a given digit in a six-digit numeral, including decimals to hundredths
- Round to the nearest tenth
- Name and write a fraction to represent a portion of a unit whole, length, or set for halves, thirds, fourths, fifths, sixths, eighths, and tenths.
- Identify and represent square numbers.
- Order and compare numbers up to six digits, simple fractions, and decimals, and use the symbols  $<$ ,  $>$ ,  $=$
- Identify equivalences between fractions and decimals.
- Generate equivalent fractions and simplify fractions.
- Model the meanings of multiplication and division of whole numbers and addition and subtraction of fractions (e.g. equal sized groups, rectangular arrays, area models, equal intervals on the number line).
- Use rectangular arrays to interpret factoring.
- Demonstrate the mathematical relationship between multiplication and division, and use that relationship to explain that division by 0 is not possible.
  - Use estimation, mental math, paper and pencil, and calculators to perform mathematical calculations.
- Write a story problem that relates to a given equation, and write a number sentence to solve a problem.
- Solve problems involving simple fractions and interpret the meaning of the solution.
- Recall basic multiplication and division facts.
- Multiply up to a three-digit factor by a 2-digit factor.
- Divide up to a three-digit dividend by a one-digit divisor.
  - Add and subtract decimals and simple fractions where one single denominator is 1, 2, or 3 times the other.

## Algebra

- Analyze growing patterns using objects, pictures, numbers and tables to determine a rule for the pattern.
- Identify simple relationships in real-life contexts and use mathematical operations to describe the pattern.
- Use the order of operations to evaluate, simplify, and compare mathematical expressions.
- Express single-operation problem situations as equations and solve the equation.
- Recognize that a symbol represents the same number throughout an equation or expression.
- Describe and use the commutative, associative, distributive, and identity properties of addition and multiplication, and the zero property of multiplication.

## Geometry

- Identify and describe attributes of two-dimensional geometric shapes.
- Name and describe lines that are parallel, perpendicular, and intersecting.
- Identify and describe right, acute, obtuse, and straight angles.
- Identify and describe figures that have line symmetry and rotational symmetry.
- Specify location of coordinates or regions using grids and maps.
- Identify and apply transformations using translations, rotations, or reflections of a geometric shape.
- Recognize that  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ , and  $360^\circ$  are associated with  $1/4$ ,  $1/2$ ,  $3/4$ , and full turns.

## Measurement

- Describe the relative size among metric units of length, capacity, and weight, and customary units of capacity.
- Estimate and measure capacity using milliliters, liters, cups, pints, quarts, and gallons and measure weight using grams and kilograms.
- Recognize that angles are measured in degrees and develop benchmark angles (e.g.  $45^\circ$ ,  $60^\circ$ ,  $120^\circ$ ) using  $90^\circ$  angles to estimate angle measurement.
- Measure angles using a protractor or angle ruler.
- Describe area as a measurable attribute of two-dimensional shapes and calculate area measurements.
- Develop and use the area formula for a rectangle, right triangle, and parallelogram.
- Determine possible perimeters for a rectangle with a fixed area, and determine possible areas when given a rectangle with a fixed perimeter.

## Data Analysis and Probability

- Collect, organize and display data to answer questions using tables, bar graphs, line plots, and stem and leaf plots.

- Identify and distinguish between clusters and outliers of a data set.
- Describe and predict simple random outcomes of experiments using simple ratios (e.g. 4 out of 9,  $\frac{4}{9}$ ).
- Use the results of simple probability experiments, with and without replacement, to describe the likelihood of an outcome.