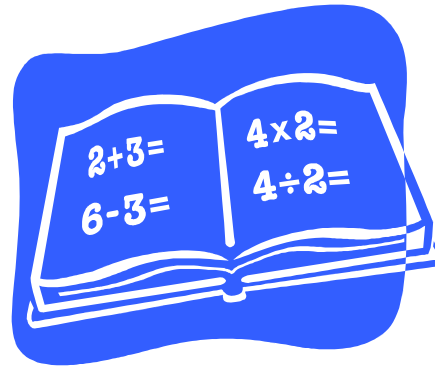


# Mathematics

# Third Grade



*Second - Third Grade Department*  
SY2009-2010

**September Grade 3 Mathematics****Essential Understanding: Patterns exist in the natural world and can be represented by numbers.****Indicators:**

- P1.** Extend multiplicative and growing patterns, and describe the pattern or rule in words.
- P2.** Analyze and replicate arithmetic sequences with and without a calculator.
- P3.** Use patterns to make predictions, identify relationships, and solve problems.
- P6.** Express mathematical relationships as equations and inequalities.
- P7.** Create tables to record, organize and analyze data to discover patterns and rules.
- NS1** Identify and generate equivalent forms of whole numbers;  
e.g.,  $36$ ,  $30 + 6$ ,  $9 \times 4$ ,  $46 - 10$ , number of inches in a yard.
- NS2.** Use place value concepts to represent whole numbers and decimals using numerals, words, expanded notation and physical models. For example:
- Recognize 100 means “10 tens” as well as a single entity (1 hundred) through physical models and trading games.
  - Model the size of 1000 in multiple ways; e.g., packaging 1000 objects into 10 boxes of 100, modeling a meter with centimeter and decimeter strips, or gathering 1000 pop-can tabs.
- NS3.** Use mathematical language and symbols to compare and order;  
e.g., less than, greater than, at most, at least,  $<$ ,  $>$ ,  $=$ ,  $\leq$ ,  $\geq$ .

**Authentic Assessment**

Teacher  
Use Only

**October Grade 3 Mathematics**

**Essential Understanding: Mathematical expressions and equations represent relationships among quantities. Strategies for computations are based upon place value and concepts.**

**Indicators:**

- NS4.** Count money and make change using coins and paper bills to ten dollars.
- NS10.** Explain and use relationships between operations, such as:  
a. relate addition and subtraction as inverse operations;
- NS11.** Model and use the commutative and associative properties for addition.
- NS12.** Add and subtract whole numbers with and without regrouping.
- NS15.** Evaluate the reasonableness of computations based upon operations and the numbers involved; e.g., considering relative size, place value and estimates. (Rounding)
- P4.** Model problem situations using objects, pictures, tables, numbers, letters and other symbols.
- P5.** Write, solve and explain simple mathematical statements, such as  $7 + \square > 8$  or  $\Delta + 8 = 10$ .

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**November Grade 3 Mathematics**

**Essential Understanding: The type of data determines how it will be organized, displayed, and analyzed. Probability describes the likelihood of phenomena occurring in a real-life event.**

**Indicators:**

- DAP1.** Collect and organize data from an experiment, such as recording and classifying observations or measurements, in response to a question posed.
- DAP2.** Draw and interpret picture graphs in which a symbol or picture represents more than one object.
- DAP3.** Read, interpret and construct bar graphs with intervals greater than one.
- DAP4.** Support a conclusion or prediction orally and in writing, using information in a table or graph.
- DAP5.** Match a set of data with a graphical representation of the data.
- DAP6.** Translate information freely among charts, tables, line plots, picture graphs and bar graphs; e.g., create a bar graph from the information in a chart.
- DAP7.** Analyze and interpret information represented on a timeline.
- DAP8.** Identify the mode of a data set and describe the information it gives about a data set.
- DAP9.** Conduct a simple experiment or simulation of a simple event, record the results in a chart, table or graph, and use the results to draw conclusions about the likelihood of possible outcomes.
- DP10.** Use physical models, pictures, diagrams and lists to solve problems involving possible arrangements or combinations of two to four objects.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**December Grade 3 Mathematics****Essential Understanding: Geometric figures can be represented mathematically, graphically, and with models.****Indicators:**

- G1.** Analyze and describe properties of two-dimensional shapes and three-dimensional objects using terms such as vertex, edge, angle, side and face.
- G2.** Identify and describe the relative size of angles with respect to right angles as follows:
- Use physical models, like straws, to make different sized angles by opening and closing the sides, not by changing the side lengths.
  - Identify, classify and draw right, acute, obtuse and straight angles.
- G3.** Find and name locations on a labeled grid or coordinate system; e.g., a map or graph.
- G4.** Draw lines of symmetry to verify symmetrical two-dimensional shapes.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**January Grade 3 Mathematics****Essential Understanding: Multiplication and division have many strategies and properties to aid in problem solving.****Indicators:**

**NS2.** Use place value concepts to represent whole numbers and decimals using numerals, words, expanded notation and physical models. For example:

- b. Describe the multiplicative nature of the number system; e.g., the structure of 3205 as  $3 \times 1000$  plus  $2 \times 100$  plus  $5 \times 1$ .

**NS8.** Model, represent and explain multiplication; e.g., repeated addition, skip counting, rectangular arrays and area model. For example:

- a. Use conventional mathematical symbols to write equations for word problems involving multiplication.
- b. Understand that, unlike addition and subtraction, the factors in multiplication and division may have different units; e.g., 3 boxes of 5 cookies each.

**NS9.** Model, represent and explain division; e.g., sharing equally, repeated subtraction, rectangular arrays and area model. For example:

- a. Translate contextual situations involving division into conventional mathematical symbols.

**NS10.** Explain and use relationships between operations, such as:

- b. relate multiplication and division as inverse operations;
- c. relate addition to multiplication (repeated addition);
- d. relate subtraction to division (repeated subtraction).

**NS11.** Model and use the commutative and associative properties for multiplication.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**February Grade 3 Mathematics**

**Essential Understanding: Fractions and decimals represent equal sharing; parts of a whole or parts of a set, and can be used interchangeably.**

**Indicators:**

- NS2.** Use place value concepts to represent whole numbers and decimals using numerals, words, expanded notation and physical models. For example:
- d. Explain the concept of tenths and hundredths using physical models, such as metric pieces, base ten blocks, decimal squares or money.
- NS5.** Represent fractions and mixed numbers using words, numerals and physical models.
- NS6.** Compare and order commonly used fractions and mixed numbers using number lines, models (such as fraction circles or bars), points of reference (such as more or less than  $\frac{1}{2}$ ), and equivalent forms using physical or visual models.
- NS7.** Recognize and use decimal and fraction concepts and notations as related ways of representing parts of a whole or a set; e.g., 3 of 10 marbles are red can also be described as  $\frac{3}{10}$  and 3 tenths are red.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**March/April Grade 3 Mathematics****Essential Understanding: Standard units enable people to interpret results or data in the same way.**

Indicators:

- M1.** Identify and select appropriate units for measuring:
- length – miles, kilometers and other units of measure as appropriate;
  - volume (capacity) – gallons;
  - weight – ounces, pounds, grams, or kilograms;
  - temperature – degrees (Fahrenheit or Celsius).
- M2.** Establish personal or common referents to include additional units; e.g., a gallon container of milk; a postage stamp is about a square inch.
- M3.** Tell time to the nearest minute and find elapsed time using a calendar or a clock.
- M4.** Read thermometers in both Fahrenheit and Celsius scales.
- M5.** Estimate and measure length, weight and volume (capacity), using metric and U.S. customary units, accurate to the nearest  $\frac{1}{2}$  or  $\frac{1}{4}$  unit as appropriate.
- M6.** Use appropriate measurement tools and techniques to construct a figure or approximate an amount of specified length, weight or volume (capacity); e.g., construct a rectangle with length  $2\frac{1}{2}$  inches and width 3 inches, fill a measuring cup to the  $\frac{3}{4}$  cup mark.
- M7.** Make estimates for perimeter, area and volume using links, tiles, cubes and other models.
- G5.** Build a three-dimensional model of an object composed of cubes; e.g., construct a model based on an illustration or actual object.
- NS 8.** Model, represent and explain multiplication; e.g., repeated addition, skip counting, rectangular arrays and **area model**.
- P8.** Identify and describe quantitative changes, especially those involving addition and subtraction; e.g., the height of water in a glass becoming 1 centimeter lower each week due to evaporation.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**May Grade 3 Mathematics**

**Essential Understanding: Math equations can help clarify and explain real-world situations.**

**Indicators:**

**NS 9.** Model, represent and explain division; e.g., sharing equally, repeated subtraction, rectangular arrays and area model. For example:

- b. Explain how a remainder may impact an answer in a real-world situation; e.g., 14 cookies being shared by 4 children.

**NS13.** Demonstrate fluency in multiplication facts through 10 and corresponding division facts.

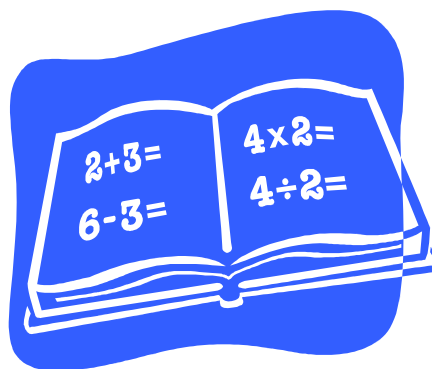
**NS14.** Multiply and divide 2- and 3-digit numbers by a single-digit number, without remainders for division.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

# Mathematics

# Fourth Grade



**September Grade 4 Mathematics**

**Essential Understanding: Estimation, predictions, counting and measuring are interrelated based upon place value concepts. Lines can be described, organized and compared using their attributes.**

Indicators:

**NS 2** Use place value structure of the base-ten number system to read, write, represent and compare whole numbers through millions.

**NS 3** Round whole numbers to a given place value.

**NS 9** Estimate the results of computations involving whole numbers

**NS 8** Solve problems involving counting money and making change, using both coins and paper bills.

**NS 6** Use associative and distributive properties to simplify and perform computations; e.g., use left to right multiplication and the distributive property to find an exact answer without paper and pencil, such as  $5 \times 47 = 5 \times 40 + 5 \times 7 = 200 + 35 = 235$ .

**NS 11** Develop and explain strategies for performing computations mentally.

**NS 12** Analyze and solve multi-step problems involving addition, subtraction.

**NS 13** Use a variety of methods and appropriate tools for computing with whole numbers; e.g., mental math, paper and pencil, and calculator.

**NS 14** Demonstrate fluency in adding and subtracting whole numbers.

**G 1** Demonstrate fluency in adding and subtracting whole numbers and in multiplying and dividing whole numbers by 1- and 2-digit numbers and multiples of ten.

**G 5** Describe points, lines and planes, and identify models in the environment.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**October Grade 4 Mathematics**

**Essential Understanding: Mathematical expressions and equations represent relationships among quantities. Ordered pairs show an exact location on a coordinate graph.**

**Indicators:**

**NS 14** Demonstrate fluency in adding and subtracting whole numbers and in multiplying whole numbers by 1- and 2-digit numbers and multiples of ten.

**P 4** Use rules and variables to describe patterns and other relationships.

**P 5** Represent mathematical relationships with equations or inequalities.

**P 6** Describe how a change in one variable affects the value of a related variable; e.g., as one increases the other increases or as one increases the other decreases.

**G 6** Specify locations and plot ordered pairs on a coordinate plane, using first quadrant points.

**NS 12** Analyze and solve multi-step problems involving addition, subtraction, multiplication and division using an organized approach, and verify and interpret results with respect to the original problem.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**November Grade 4 Mathematics**

**Essential Understanding: Standard units provide common language for communicating measurement. Geometric figures can be represented in different ways through motion.**

**Indicators:**

- P 1** Use models and words to describe, extend and make generalizations of patterns and relationships occurring in computation, numerical patterns, geometry, graphs and other applications
- P 2** Represent and analyze patterns and functions using words, tables and graphs.
- P 3** Construct a table of values to solve problems associated with a mathematical relationship.
- M 5** Make simple unit conversions within a measurement system; e.g., inches to feet, kilograms to grams, quarts to gallons.
- M 6** Write, solve and verify solutions to multi-step problems involving measurement.
- M 1** Relate the number of units to the size of the units used to measure an object; e.g., compare the number of cups to fill a pitcher to the number of quarts to fill the same pitcher.
- G 7** Identify, describe and use reflections (flips), rotations (turns), and translations (slides) in solving geometric problems; e.g., use transformations to determine if 2 shapes are congruent.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**December Grade 4 Mathematics****Essential Understanding:**

**The way you represent data can affect its interpretation. Shapes can be described and sorted by the number of sides, edges, and angles.**

**Indicators:**

- D 1** Create a plan for collecting data for a specific purpose.
- D 2** Represent and interpret data using tables, bar graphs, line plots and line graphs.
- D 3** Interpret and construct Venn diagrams to sort and describe data.
- D 4** Compare different representations of the same data to evaluate how well each representation shows important aspects of the data, and identify appropriate ways to display the data.
- D 5** Propose and explain interpretations and predictions based on data displayed in tables, charts and graphs.
- G 4** Identify and define triangles based on angle measures (equiangular, right, acute and obtuse triangles) and side lengths (isosceles, equilateral and scalene triangles).

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**January Grade 4 Mathematics**

**Essential Understanding:** We measure our world to understand its boundaries and limits. An object or event can be measured in different ways.

**Indicators:**

**M 2** Demonstrate and describe perimeter as surrounding and area as covering a two-dimensional shape, and volume as filling a three-dimensional object.

**M 3 a,b,c** Identify and select appropriate units to measure:

- a. perimeter – string or links (inches or centimeters).
- b. area – tiles (square inches or square centimeters).
- c. volume – cubes (cubic inches or cubic centimeters)

**M 4** Develop and use strategies to find perimeter using string or links, area using tiles or a grid, and volume using cubes; e.g., count squares to find area of regular or irregular shapes on a grid, layer cubes in a box to find its volume

**P 1** Use models and words to describe, extend and make generalizations of patterns and relationships occurring in computation, numerical patterns, geometry, graphs and other applications

**G 8** Use geometric models to solve problems in other areas of mathematics, such as number (multiplication/division) and measurement (area, perimeter, border).

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**February Grade 4 Mathematics****Essential Understanding:****Indicators:**

**NS 12** Analyze and solve multi-step problems involving addition, subtraction, multiplication and division using an organized approach, and verify and interpret results with respect to the original problem.

**NS 14** Demonstrate fluency in adding and subtracting whole numbers and in multiplying and dividing whole numbers by 1- and 2-digit numbers and multiples of ten.

**NS 7** Recognize that division may be used to solve different types of problem situations and interpret the meaning of remainders; e.g., situations involving measurement, money.

**NS 4** Identify and represent factors and multiples of whole numbers through 100, and classify numbers as prime or composite.

**G 3** Identify similarities and differences of quadrilaterals; e.g., squares, rectangles, parallelograms and trapezoids

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**March Grade 4 Mathematics****Essential Understanding:****Indicators:**

**D 7** Identify the median of a set of data and describe what it indicates about the data

**D 6** Describe the characteristics of a set of data based on a graphical representation, such as range of the data, clumps of data, and holes in the data.

**D 8** Use range, median and mode to make comparisons among related sets of data.

**NS 1 a,b** Identify and generate equivalent forms of fractions and decimals. For example:

- a. Connect physical, verbal and symbolic representations of fractions, decimals and whole numbers; e.g.,  $\frac{1}{2}$ ,  $\frac{5}{10}$ , “five tenths,” 0.5, shaded rectangles with half, and five tenths.
- b. Understand and explain that ten tenths is the same as one whole in both fraction and decimal form.

**NS 5** Use models and points of reference to compare commonly used fractions.

**NS 10** Use physical models, visual representations, and paper and pencil to add and subtract decimals and commonly used fractions with like denominators.

**G 2** Describe, classify, compare and model two- and three-dimensional objects using their attributes

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**April Grade 4 Mathematics**  
**Essential Understanding:**

**Indicators:**

**D 9** Conduct simple probability experiments and draw conclusions from the results; e.g., rolling number cubes or drawing marbles from a bag.

**D 10** Represent the likelihood of possible outcomes for chance situations; e.g., probability of selecting a red marble from a bag containing 3 red and 5 white marbles

**D 11** Relate the concepts of impossible and certain-to-happen events to the numerical values of 0 (impossible) and 1 (certain).

**D 12** Place events in order of likelihood and use a diagram or appropriate language to compare the chance of each event occurring; e.g., impossible, unlikely, equal, likely, certain.

**D 13** List and count all possible combinations using one member from each of several sets, each containing 2 or 3 members; e.g., the number of possible outfits from 3 shirts, 2 shorts and 2 pairs of shoes.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**May Grade 4 Mathematics****Essential Understanding:****Indicators:**

**NS 1 a,b** Identify and generate equivalent forms of fractions and decimals. For example:

- a. Connect physical, verbal and symbolic representations of fractions, decimals and whole numbers; e.g.,  $\frac{1}{2}$ ,  $\frac{5}{10}$ , “five tenths,” 0.5, shaded rectangles with half, and five tenths.
- b. Understand and explain that ten tenths is the same as one whole in both fraction and decimal form.

**NS 5** Use models and points of reference to compare commonly used fractions.

**NS 9** Estimate the results of computations involving whole numbers, fractions and decimals, using a variety of strategies

**NS 10** Use physical models, visual representations, and paper and pencil to add and subtract decimals and commonly used fractions with like denominators.

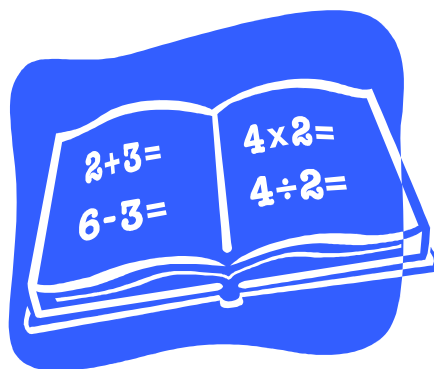
**NS 15** for over achievers: GAS long division and 2-3 step multiplication

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

# Mathematics

# Fifth Grade



**September Grade 5 Mathematics**

**Essential Understanding:** 1. Mathematical problems can be solved in more than one way.  
2. The decimal point separates the whole from the parts.

**Indicators:**

**NS7** Use commutative, associative, distributive, identity and inverse properties to simplify and perform computations.

**NS8** Identify and use relationships between operations to solve problems.

**NS13** Estimate the results of computations involving whole numbers, fractions and decimals, using a variety of strategies.

**DAPI** Read, construct and interpret frequency tables, circle graphs and line graphs.

**PF5** Model problems with physical materials and visual representations, and use models, graphs and tables to draw conclusions and make predictions.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**October Grade 5 Mathematics****Essential Understanding: 1. Mathematical expressions and equations represent relationships among quantities.****Indicators:**

- DAP 1** Read, construct and interpret frequency tables, circle graphs and line graphs.
- DAP 3** Read and interpret increasingly complex displays of data, such as double bar graphs.
- NS4** Round decimals to a given place value and round fractions (including mixed numbers) to the nearest half.
- NS9** Use order of operations, including use of parentheses, to simplify numerical expressions.
- NS11** Explain how place value is related to addition and subtraction of decimals; e.g.,  $0.2 + 0.14$ ; the two tenths is added to the one tenth because they are both tenths.
- NS12** Use physical models, points of reference, and equivalent forms to add and subtract commonly used fractions with like and unlike denominators and decimals.
- NS13** Estimate the results of computations involving decimals, using a variety of strategies.
- PF 5** Model problems with physical materials and visual representations, and use models, graphs and tables to draw conclusions and make predictions.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**November Grade 5 Mathematics****Essential Understanding: 1. The ways data is displayed often influences the interpretation****Indicators:**

**DAP6** Determine and use the range, mean, median and mode, and explain what each does and does not indicate about the set of data.

**DAP8** Identify the probability of events within a simple experiment, such as three chances out of eight.

**DAP11** Make predictions based on experimental and theoretical probabilities

**PFA 1** Justify a general rule for a pattern or a function by using physical materials, visual representations, words, tables or graphs.

**PFA2** Use calculators or computers to develop patterns, and generalize them using tables and graphs

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**December Grade 5 Mathematics****Essential Understanding:****Indicators:****Geometry and Spatial Sense Standard**

- GS1** Draw circles, and identify and determine relationships among the radius, diameter, center and circumference; e.g., radius is half the diameter, the ratio of the circumference of a circle to its diameter is an approximation of  $\pi$ .
- GS2** Use standard language to describe line, segment, ray, angle, skew, parallel and perpendicular.
- GS3** Label vertex, rays, interior and exterior for an angle
- GS4** Describe and use properties of congruent figures to solve problems.
- GS8** Predict what three-dimensional object will result from folding a two-dimensional net, then confirm the prediction by folding the net.
- MS1** Identify and select appropriate units to measure angles i.e. degrees
- MS7** Use benchmark angles (e.g. 45, 90, 120) to estimate the measure of angles and use a tool to measure and draw angles.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**January Grade 5 Mathematics****Essential Understanding:****Indicators:**

- MS 2** Identify paths between points on a grid or coordinate plane and compare lengths of the oaths; shortest path, paths of equal length.
- MS 3** Demonstrate and describe the difference between covering the faces (surface area) and filling the interior (volume) of three dimensional objects.
- MS 4** Demonstrate understanding of the differences among linear units, square units and cubic units.
- MS 5** Make conversions within the same measurement system while performing computations.
- MS 6** Use strategies to develop formulas for determining perimeter and area of triangles, rectangles and parallelograms, and volume of rectangular prisms.
- GSS 8** Predict what three-dimensional object will result from folding a two-dimensional net, then confirm the prediction by folding the net.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**February Grade 5 Mathematics**  
**Essential Understanding:**

**Indicators:**

- NS 1** Use models and visual representations to develop the concept of ration as part-to-part and part-to-whole, and the concept of percent as part-to-whole.
- DAP 2** Select and use a graph that is appropriate for the type of data to be displayed e.g. numerical vs. categorical data, discrete vs. continuous data
- DAP 3** Read and interpret increasingly complex displays of data, such as double bar graph.
- DAP 4** Determine appropriate data to be collected to answer questions posed by students of teacher, collect and display data, and clearly communicate finds.
- DAP 5** Modify initial conclusions propose and justify new interpretations and predictions as additional data are collected.
- DAP 7** List and explain all possible outcomes in a given situation.
- DAP 9** Use 0, 1 and rations between 0 and 1 to represent probability of outcomes for an event, and associate the ratio with the likelihood of the outcome.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**March Grade 5 Mathematics****Essential Understanding:****Indicators:**

**NS 2** Use various forms of “one” to demonstrate the equivalence of fractions; e.g.,  $\frac{18}{24} = \frac{9}{12} \times \frac{2}{2} = \frac{3}{4} \times \frac{6}{6}$ .

**NS 3** Identify and generate equivalent forms of fractions, decimals and percents.

**NS 6** Represent and compare numbers less than 0 by extending the number line and using familiar applications; e.g., temperature, owing money.

**NS 10** Justify why fractions need common denominators to be added or subtracted.

**GS 6** Extend understanding of coordinate system to include points whose  $x$  or  $y$  values may be negative numbers.

**AUTHENTIC ASSESSMENTS**

Teacher  
Use Only

**April Grade 5 Mathematics**  
**Essential Understanding:**

**Indicators:**

**Under Construction**

**AUTHENTIC ASSESSMENTS**

**Under Construction**

**May Grade 5 Mathematics**  
**Essential Understanding:**

**Indicators:**

**AUTHENTIC ASSESSMENTS**

**Under Construction**

**Under Construction**