Third Grade Mathematics

Description The Appleton Area School District elementary mathematics program provides students opportunities to develop mathematical skills in thinking and applying problem-solving strategies. The framework of the program is based on providing students the knowledge of when and how to apply mathematical concepts and skills as well as an understanding of why the mathematical processes work.

Credits

Prerequisites

Textbooks/Resources Fuson, Dr. Karen C. *Math Expressions Common Core: Student Activity Book, Volume 1 & 2.* Houghton Mifflin Harcourt, 2013. ISBN# 978-0-547-82474-1.

Required Assessments District-wide, standards-based assessments identified

Board Approved April 1999
Revised September 2009

AASD Mathematics Goals for K-12 Students

➢ *Become mathematical problem solvers.*
➢ *Learn to reason mathematically.*
➢ *Learn to communicate mathematically.*
➢ *Make mathematical connections.*
➢ *Develop conceptual understanding of mathematics.*
➢ *Develop procedural fluency.*
➢ *Learn to use technology appropriately.*

AASD Mathematics Standards for Students in Grade Three

Mathematical Practice Standards

1. Make Sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Mathematics Content Standards

Domain	*Cluster*
I. Operations and Algebraic Thinking	A. Represent and solve problems involving multiplication and division.
	B. Understand properties of multiplication and the relationship between multiplication and division.
	C. Multiply and divide within 100.
	D. Solve problems involving the four operations, and identify and explain patterns in arithmetic.
II. Number and Operations in Base Ten	A. Use place value understanding and properties of operations to perform multi-digit arithmetic.
III. Number and Operations - Fractions	A. Develop understanding of fractions as numbers.
IV. Measurement and Data	A. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
	B. Represent and interpret data.
	C. Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
	D. Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.
V. Geometry	A. Reason with shapes and their attributes.

Essential Learning Objectives	Performance Indicators	Classroom Assessments
1. Develop deep conceptual understanding of mathematics by engaging in age-appropriate mathematical habits.	**Performance will be satisfactory when the student:** a. makes Sense of problems and perseveres in solving them. b. reasons abstractly and quantitatively. c. constructs viable arguments and critiques the reasoning of others. d. models with mathematics. e. uses appropriate tools strategically. f. attends to precision. g. looks for and makes use of structure. h. looks for and expresses regularity in repeated reasoning.	
Objectives are linked to the Mathematical Practice Standards.		

Essential Learning Objectives	Performance Indicators	Classroom Assessments
2. Represent and solve problems involving multiplication and division.	**Performance will be satisfactory when the student:** a. interprets products of whole numbers, e.g., interprets 5×7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* b. interprets whole-number quotients of whole numbers, e.g., interprets $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* c. uses multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. d. determines the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 =☐ ÷ 3, 6 × 6 =☐.*	
Objectives are linked to the following AASD Mathematics Domains: I. Operations and Algebraic Thinking		

Essential Learning Objectives	Performance Indicators	Classroom Assessments
3. Understand properties of multiplication and the relationship between multiplication and division.	**Performance will be satisfactory when the student:** a. applies properties of operations as strategies to multiply and divide. *Examples: If 6 x 4 = 24 is known, then 4 x 6 = 24 is also known. (Commutative property of multiplication.) 3 x 5 x 2 can be found by 3 x 5 = 15, then 15 x 2 = 30, or by 5 x 2 = 10, then 3 x 10 = 30. (Associative property of multiplication.) Knowing that 8 x 5 = 40 and 8 x 2 = 16, one can find 8 x 7 as 8 x (5 + 2) = (8 x 5) + (8 x 2) = 40 + 16 = 56. (Distributive property.)* b. understands division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	
Objectives are linked to the following AASD Mathematics Domains: I. Operations and Algebraic Thinking		
4. Multiply and divide within 100.	**Performance will be satisfactory when the student:** a. fluently multiplies and divides within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, knows from memory all products of two one-digit numbers.	
Objectives are linked to the following AASD Mathematics Domains: I. Operations and Algebraic Thinking		

Essential Learning Objectives	Performance Indicators	Classroom Assessments
5. Solve problems involving the four operations, and identify and explain patterns in arithmetic.	**Performance will be satisfactory when the student:** a. solves two-step word problems using the four operations. Represents these problems using equations with a letter standing for the unknown quantity. Assesses the reasonableness of answers using mental computation and estimation strategies including rounding. b. identifies arithmetic patterns (including patterns in the addition table or multiplication table), and explains them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	
Objectives are linked to the following AASD Mathematics Domains: I. Operations and Algebraic Thinking		
6. Use place value understanding and properties of operations to perform multi-digit arithmetic.	**Performance will be satisfactory when the student:** a. uses place value understanding to round whole numbers to the nearest 10 or 100. b. fluently adds and subtracts within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. c. multiplies one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.	
Objectives are linked to the following AASD Mathematics Domains: II. Number and Operations in Base Ten		

Essential Learning Objectives	Performance Indicators	Classroom Assessments

7. Develop understanding of fractions as numbers.	**Performance will be satisfactory when the student:**
	a. understands a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understands a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.
	b. understands a fraction as a number on the number line; represents fractions on a number line diagram.
	    1. Represents a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognizes that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.
	    2. Represents a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognizes that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.
	c. explains equivalence of fractions in special cases, and compares fractions by reasoning about their size.
	    1. Understands two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
	    2. Recognizes and generates simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
	    3. Expresses whole numbers as fractions, and recognizes fractions that are equivalent to whole numbers.
	Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.
	    4. Compares two fractions with the same numerator or the same denominator by reasoning about their size. Recognizes that comparisons are valid only when the two fractions refer to the same whole. Records the results of comparisons with the symbols >, =, or <, and justifies the conclusions, e.g., by using a visual fraction model.	

Objectives are linked to the following AASD Mathematics Domains: III. Number and Operations - Fractions		

Essential Learning Objectives	Performance Indicators	Classroom Assessments
8. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	**Performance will be satisfactory when the student:** a. tells and writes time to the nearest minute and measures time intervals in minutes. Solves word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. b. measures and estimates liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Adds, subtracts, multiplies, or divides to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	
Objectives are linked to the following AASD Mathematics Domains: IV. Measurement and Data		
9. Represent and interpret data.	**Performance will be satisfactory when the student:** a. draws a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solves one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.* b. generates measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Shows the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	
Objectives are linked to the following AASD Mathematics Domains: IV. Measurement and Data		

Essential Learning Objectives	Performance Indicators	Classroom Assessments

10. Geometric measurement: understand concepts of area and relate area to multiplication and to addition.	**Performance will be satisfactory when the student:**
	a. recognizes area as an attribute of plane figures and understands concepts of area measurement.
	   1. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
	   2. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
	b. measures areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
	c. relates area to the operations of multiplication and addition.
	   1. Finds the area of a rectangle with whole-number side lengths by tiling it, and shows that the area is the same as would be found by multiplying the side lengths.
	   2. Multiplies side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represents whole-number products as rectangular areas in mathematical reasoning.
	   3. Uses tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Uses area models to represent the distributive property in mathematical reasoning.
	   4. Recognizes area as additive. Finds areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applies this technique to solve real world problems.	

Objectives are linked to the following AASD Mathematics Domains: IV. Measurement and Data		

	Performance will be satisfactory when the student:	
11. Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	a. solves real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	

Objectives are linked to the following AASD Mathematics Domains:
IV. Measurement and Data

	Performance will be satisfactory when the student:	
12. Reason with shapes and their attributes.	a. understands that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognizes rhombuses, rectangles, and squares as examples of quadrilaterals, and draws examples of quadrilaterals that do not belong to any of these subcategories. b. partitions shapes into parts with equal areas. Expresses the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*	

Objectives are linked to the following AASD Mathematics Domains:
V. Geometry

Resources and learning activities that address course objectives: