School District of Marshfield Mathematics Standards –

3rd Grade

MATHEMATICS – Counting and Cardinality, Operations and Algebraic Thinking, Number and Operations in Base Ten, Measurement and Data, and Geometry

Wisconsin Academic Standards *Specific knowledge and skills that students will know and be able to do by the end of 3rd Grade*	***Marshfield Student Learning Target ("I can …")*** *These learning targets could be taught in the context of whole group, mini lessons, small groups and conferences.*
Operations and Algebraic Thinking	
Represent and Solve Problems Involving Multiplication and Division • Interpret products of whole numbers, e.g., interpret 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.* **3.OA.1** • Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 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.* **3.OA.2** • Use 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.[1] **3.OA.3** • Determine 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 = ?.* **3.OA.4**	***Represent and Solve Problems Involving Multiplication and Division*** • I can understand multiplication by thinking about groups of objects. • I can understand division by thinking about how one group can be divided into smaller groups. • I can use what I know about multiplication and division to solve word problems. • I can find the missing number in a multiplication or division equation.
Understand Properties of Multiplication and the Relationship between Multiplication and Division • Apply properties of operations as strategies to multiply and divide.[2] *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)* **3.OA.5** • Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.* **3.OA.6**	***Understand Properties of Multiplication and the Relationship between Multiplication and Division*** • I can use the Commutative property of multiplication. (To figure out 3 x 5 x 2, I can multiply 3 x 5 = 15, then 15 x 2 = 30 OR multiply 5 x 2 = 10, then 3 x 10 = 30.) • I can use the Distributive property of multiplication. (To figure out 8 x 7, I can think of 8 x (5 + 2) which means (8 x 5) + (8 x 2) = 40 + 16 = 56.) • I can find the answer to a division problem by thinking of the missing factor in a multiplication problem. (I can figure out 32 ÷ 8 because I know that 8 x 4 = 32.

[1] See Table 1
[2] Students need not use formal terms for these properties.

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Operations and Algebraic Thinking	
Multiple and Divide within 100 • Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **3.OA.7**	***Multiple and Divide within 100*** • I can multiply and divide within 100 easily and quickly because I know how multiplication and division are related.
Solve Problems Involving the Four Operations, and Identify and Explain Patterns in Arithmetic • Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.[3] **3.OA.8** • Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain 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.* **3.OA.9**	***Solve Problems Involving the Four Operations, and Identify and Explain Patterns in Arithmetic*** • I can solve two-step word problems that involve addition, subtraction, multiplication and division. • I can solve two-step word problems by writing an equation with a letter in place of the number I don't know. • I can use mental math to figure out if the answers to two-step word problems are reasonable. • I can find patterns in addition and multiplication tables and explain them using what I know about how numbers work.
Number and Operations in Base Ten	
Use Place Value Understanding and Properties of Operations to Perform Multi-Digit Arithmetic[4] • Use place value understanding to round whole numbers to the nearest 10 or 100. **3.NBT.1** • Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **3.NBT.2** • Multiply 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. **3.NBT.3**	***Use Place Value Understanding and Properties of Operations to Perform Multi-Digit Arithmetic*** • I can use place value to help me round numbers to the nearest 10 or 100. • I can quickly and easily add and subtract numbers within 1000. • I can multiply any one digit whole number by a multiple of 10 (6 x 90, 4 x 30).

[3] This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
[4] A range of algorithms may be used.

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Number and Operations - Fractions[5]	
Develop Understanding of Fractions as Numbers • Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* the quantity formed by *a* parts of size 1/*b*. **3.NF.1** • Understand a fraction as a number on the number line; represent fractions on a number line diagram. **3.NF.2** a. Represent 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. Recognize 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. **3.NF.2A** b. Represent a fraction *a*/*b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line. **3.NF.2B** • Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. **3.NF.3** a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. **3.NF.3A** b. Recognize and generate 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.NF.3B** c. Express whole numbers as fractions, and recognize 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.* **3.NF.3C** d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. **3.NF.3D**	***Develop Understanding of Fractions as Numbers*** • I can show and understand that fractions represent equal parts of a whole, where the top number is the part and the bottom number is the total number of parts in the whole. • I can understand a fraction as a number on the number line by showing fractions on a number line diagram. • I can label fractions on a number line because I know the space between any two numbers on the number line can be thought of as a whole. • I can show a fraction on a number line by marking off equal parts between two whole numbers. • I can understand how some different fractions can actually be equal. • I can compare fractions by reasoning about their size. • I can understand two fraction as equivalent (equal) if they are the same size or at the same point on a number line. • I can recognize and write simple equivalent (equal) fractions and explain why they are equal using words or models. • I can show whole numbers as fractions. (3 = 3/1) • I can recognize fractions that are equal to one whole. (1 = 4/4) • I can compare two fractions with the same numerator (top number) or the same denominator (bottom number) by reasoning about their size. • I can understand that comparing two fractions is only reasonable if they refer to the same whole. • I can compare fractions with the symbols >, =, < and prove my comparison by using models.

[5] Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.

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Measurement and Data	
Solve Problems Involving Measurement and Estimation of Intervals of Time, Liquid Volumes, and Masses of Objects • Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. **3.MD.1** • Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[6] Add, subtract, multiply, or divide 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.[7] **3.MD.2**	***Solve Problems Involving Measurement and Estimation of Intervals of Time, Liquid Volumes, and Masses of Objects*** • I can tell and write time to the nearest minute. • I can measure time in minutes. • I can solve telling time word problems by adding and subtracting minutes. • I can measure liquids and solids with grams (g), kilograms (kg) and liters (l). • I can use addition, subtraction, multiplication and division to solve word problems about mass or volume.
Represent and Interpret Data • Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve 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.* **3.MD.3** • Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units - whole numbers, halves, or quarters. **3.MD.4**	***Represent and Interpret Data*** • I can make a picture or bar graph to show data and solve problems using the information from the graphs. • I can create a line plot from measurement data, where the measured objects have been measured to the nearest whole number, half or quarter.
Geometric Measurement: Understand Concepts of Area and Relate Area to Multiplication and to Addition • Recognize area as an attribute of plane figures and understand concepts of area measurement. **3.MD.5** a) 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. **3.MD.5A** b) 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. **3.MD.5B** • Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). **3.MD.6**	***Geometric Measurement: Understand Concepts of Area and Relate Area to Multiplication and to Addition*** • I can understand that one way to measure plane shapes is by the area they have. • I can understand that a "unit square" is a square with side lengths of 1 unit and it is used to measure the area of plane shapes. • I can cover a plane shape with square units to measure its area. • I can measure areas by counting units squares (square cm, square m, square in, square ft).

[6] Excludes compound units such as cm^3 and finding the geometric volume of a container.
[7] Excludes multiplicative comparison problems (problems involving notions of "times as much"; See Table 2).

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Measurement and Data	
Geometric Measurement: Understand Concepts of Area and Relate Area to Multiplication and to Addition • Relate area to the operations of multiplication and addition. **3.MD.7** a) Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. **3.MD.7A** b) Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. **3.MD.7B** c) Use 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 $a \times c$. Use area models to represent the distributive property in mathematical reasoning. **3.MD.7C** d) Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **3.MD.7D**	***Geometric Measurement: Understand Concepts of Area and Relate Area to Multiplication and to Addition*** • I can understand area by thinking about multiplication and addition. • I can find the area of a rectangle using square tiles and also by multiplying the two side lengths. • I can solve real world problems about area using multiplication. • I can use models to show that the area of a rectangle can be found by using the distributive property (side lengths and b + c is the sum of a x b and a x c). • I can find the area of a shape by breaking it down into smaller shapes and then adding those areas to find the total area.
Geometric Measurement: Recognize Perimeter as an Attribute of Plane Figures and Distinguish Between Linear and Area Measures • Solve 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. **3.MD.8**	***Geometric Measurement: Recognize Perimeter as an Attribute of Plane Figures and Distinguish Between Linear and Area Measures*** • I can solve real world math problems using what I know about how to find the perimeter of shapes.
Geometry	
Reason with Shapes and their Attributes • Understand 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). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. **3.G.1** • Partition shapes into parts with equal areas. Express 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.* **3.G.2**	***Reason with Shapes and their Attributes*** • I can place shapes into categories depending upon their attributes (parts). • I can name a category of many shapes by looking at their attributes (parts). • I can recognize and draw quadrilaterals (shapes with four sides) including rhombuses, rectangles and squares. • I can divide shapes into parts with equal areas and show those areas as fractions.

TABLE 1. Common Multiplication and Division Situations[8]

	Unknown Product	Group Size Unknown (How many in each group?" Division)	Number of Groups Unknown ("How many groups?" Division)
	3 x 6 = ?	**3 x ? = 18, and 18 ÷ 3 = ?**	**? x 6 = 18, and 18 ÷ 6 ?**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays[1], Area[2]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example*. What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example*. A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example*. A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example*. A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example*. A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example*. A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	a x b = ?	a x ? = p, and p ÷ a = ?	? x b = p, and p ÷ b = ?

[1]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

[2]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

[8] The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.