Mathematics

Mathematics is an area of academics designed to prepare individuals for our global society that is increasing in moral and technological complexity. To meet these demands, the students in Diocese of Green Bay Catholic schools will develop problem solving skills in light of Catholic faith and doctrine, with an understanding that Mathematics reflects order and unity in God's universe and describes real life consistencies which God created and sustains.

These standards define what a student at particular grade levels should understand and be able to do by the end of that grade level. Standards do not dictate the curriculum, resources and teaching methods used to teach the concepts.

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Mathematics

NUMBER SENSE and NUMERATION

Develop an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

Kindergarten	First Grade	Second Grade
1. **Count with understanding and recognized "how many" in sets of objects** a. Matches sets of objects, one to one up to 20 b. Count, recognize, represent, name and order a number of objects (up to 50) c. Given a row of objects and the number, tell and write the number for a row that has one more. d. Count, read numbers 0-100 e. Count numbers 0-100 by ones and tens f. Identify missing numbers in a series through 100 g. Writes numbers from 0-20 h. Compare two groups of up to 20 objects by one to one matching.	1. **Count with understanding and recognized "how many" in sets of objects** a. Count, read and write numbers 0-120 b. Count forward, in a range, beginning with *any* number 0-120 c. Identify and writes missing numbers in a series through 300.	1. **Count with understanding and recognized "how many" in sets of objects**
2. **Use multiple models to develop initial understanding of place value and the base-10 number system** a. Identify the number of groups of tens and ones in numbers less than 20 b. Understand how to represent numbers from 11-19 as a 10 and ones.	2. **Use multiple models to develop initial understanding of place value and the base-10 number system** a. Identify the number of groups of ten and ones in numbers less than 100 b. Identify that 10 can be thought of as a bundle of ten ones – called a "ten" c. Use expanded form to represent numbers less than 100. (35 represented as 3 tens and 5 ones.	2. **Use multiple models to develop initial understanding of place value and the base-10 number system** a. Identify place value up to and including the thousands place. b. Identify and read numbers up to 1000 c. Write numbers up to and including the thousands place using expanded form d. Demonstrate equivalent representations

	d. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, <, = e. Add and subtract multiples of 10 in a range 10-90, using concrete models or drawings and strategies based on place value.	of a given number. (i.e., 35 represented as 35 ones, or 3 tens and 5 ones, or 2 tens and 15 ones) e. Use a number line to round numbers to the nearest tens and hundreds. f. Add within 100, adding a two-digit number and one-digit number with understanding of the place value of each digit (correctly adding tens to tens, ones to ones) g. Mentally find 10 more or 10 less than any two digit number without counting.
3. **Develop understanding of the relative position and magnitude of whole numbers and the connection between ordinal and cardinal numbers** a. Model and name positions of ordinal numbers up to the fifth position. b. Find the number that is one more or one less than any whole number up to 20 c. Count backward from 20 to zero d. Compare whole numbers up to 30 and arrange them in numerical order	3. **Develop understanding of the relative position and magnitude of whole numbers and the connection between ordinal and cardinal numbers** a. Compare whole numbers up to 120 and arrange them in numerical order b. Name the number that is ten more or less than any number up to 120 c. Identify ordinal numbers first-tenth and show position (i.e., find the fifth person in line)	3. **Develop understanding of the relative position and magnitude of whole numbers and the connection between ordinal and cardinal numbers** a. Match ordinal number words and numbers (first, second, third…) up to 100
4. **Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing, and decomposing numbers.** a. Record and organize information using objects and pictures b. Compare sets of up to 20 objects and identify and use the vocabulary to describe if one set is *equal to*, *more than*, or *less than* another	4. **Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing, and decomposing numbers.** a. Show equivalent forms of the same number (up to 20) using objects, diagrams, numbers and equations (i.e., 15=8+7, 15=10+5)	4. **Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing, and decomposing numbers.** a. Identify and explain numbers as odd and even b. Use numbers and expanded form to represent numbers up to 1000 c. Round numbers up to 100 to the nearest 10

c. Show equivalent forms of the same number (up to ten) using objects, diagrams, numbers and equations (i.e., 5=3+2, 5=1+4)		
5. **Connect number words and numerals to the qualities they represent, using various physical models and representations** a. Recognize and represent number words through ten.	5. **Connect number words and numerals to the qualities they represent, using various physical models and representations** a. Recognize and represent number words through twenty	5. **Connect number words and numerals to the qualities they represent, using various physical models and representations** a. Read and represent number words up to 100 b. Using number words, write the expanded form to 100 c. Identify the name of a coin and bill and its value (penny, nickel, dime, quarter, half-dollar and dollar)
6. **Understand and represent commonly used fractions** a. Divide shapes into equal parts (up to four) b. Model dividing shapes into parts by ½ and ¼	6. **Understand and represent commonly used fractions** a. Recognize equal parts of an object. b. Recognize shapes ½ and ¼ c. For a shape divided into four or less congruent (equal) parts, describe the shaded portion as "___ out of ___ parts" d. For a set of four or fewer objects, describe a subset as "____ out of ____ objects"	6. **Understand and represent commonly used fractions** a. Recognize fractions as parts of a whole or parts of a group (up to 12 parts) b. Know that when all fractional parts are included, the result is equal to the whole and to one. c. Represent familiar fractions such as ½, 1/3, ¼ d. Represent familiar fractions geometrically as part of a whole. e. Using pictures, compare the fractions ½, 1/3, ¼, 1/5, 1/8, 1/10, 1/12

OPERATIONS and ALGEBRAIC THINKING

Use basic and advanced procedures while performing the processes of computation and apply basic and advanced properties of functions and algebra.

Kindergarten	First Grade	Second Grade

1. **Understand patterns, relations and functions.**
 	
   a. Classify and sort familiar shapes by various attributes.
 	
   b. Describe the reasons for sorting objects in a particular way.
	2. **Understand patterns, relations and functions.**
	
	   a. Classify and sort a variety of objects with varying attributes such as length, shape, capacity, weight and temperature
		1. **Understand patterns, relations and functions.**
		
		   a. Explain why objects were classified and sorted in a particular way.

2. **Recognize, describe, and extend patterns such as sequence of sounds and shapes or numeric patterns and translate from one representation to another**
 	
   a. Identify, copy, extend and make simple patterns (i.e., AB, AAB, AABB, AAAB or red, green, blue, blue, red…)
 	
   b. Skip count by 5's and 10's to 100
	2. **Describe, extend and analyze patterns such as a sequence of geometric or numeric patterns and make generalizations about how the pattern is generated.**
	
	   a. Skip count by 2's, 5's, 10's to 100.
	
	   b. Recognize odd and even amounts
	
	   c. Describe the rule of a variety of patterns.
		2. **Describe, extend and analyze patterns such as a sequence of geometric or numeric patterns and make generalizations about how the pattern is generated.**
		
		   a. Create and recognize patterns using numbers
		
		   b. Solve problems using patterns
		
		   c. Find the missing number in an addition or subtraction problem.

3. **Understand meanings of operations and how they relate to one another. (Computation)**
 	
   a. Represent addition and subtraction with objects, fingers, drawings or claps.
 	
   b. Demonstrate a logical process of estimating a group of objects (up to 10)
 	
   c. Demonstrate addition concepts
	3. **Understand meanings of operations and how they relate to one another. (Computation)**
	
	   a. Demonstrate fluency and automaticity of addition and subtraction facts (sums to 12) (begin working on sums to 18)
	
	   b. Add and subtract whole numbers of at least two digits, demonstrating fluency with standard algorithms (no
		3. **Understand meanings of operations and how they relate to one another (Computation)**
		
		   a. Demonstrate fluency and automaticity of addition and subtraction facts (sums to 20)
		
		   b. Add and subtract whole numbers of at least four digits, demonstrating fluency with standard algorithms

Final Revision August 2015

through pictures and manipulative objects (for any two sets with fewer than 10 objects when joined)

d. Demonstrate and Describe the meaning of addition using objects (putting together, adding to, increasing)

e. Demonstrate subtraction by removing objects from sets (for numbers less than 10)

f. Demonstrate and describe the meaning of subtraction using objects (taking away, comparing, find the difference)

g. Use addition and subtraction tools to solve problems. (i.e., number line, draw a picture, count on, and count back)

h. Describe addition and subtraction situations through story problems (for numbers less than 10)

i. Choose the appropriate operation to solve story problems

j. Write and solve number sentences up to 10

k. Understand situations that entail multiplication and division such as equal groupings of objects or dividing sets into equal groups (ten or fewer objects)

l. Demonstrate fluency and automaticity of addition and subtraction facts (sums to 5)

regrouping)

c. Describe the role of zero in addition and subtraction

d. Compute addition sentences with more than 2 single digit addends (1+2+3=6)

e. Understand the inverse relationship between addition and subtraction (Fact Families – 4+2=6, 6-4=2)

f. Find a missing number in an addition or subtraction equation. (i.e., 8 + __ = 11)

g. Understand situations that entail multiplication and division such as equal groupings of objects or dividing sets into equal groups (ten or fewer objects)

h. Divide a set of less than 20 objects into smaller groups of equal size

i. Represent the concept of multiplication as repeated addition

c. Add numbers with regrouping to the tens place

d. Explain why place value allows renaming and regrouping

e. Use estimation to decide whether an answer is reasonable in addition and subtraction problems.

f. Choose the appropriate operation to solve story problems.

g. Determine the value of a collection of pennies, nickels, dimes, quarters, half-dollars, and dollars.

h. Represent the concept of multiplication as repeated addition

i. Solve multiplication facts of 1's, 2's, 5's and 10's with factors up to 10.

4. **Illustrate general principles and properties of operations, such as the commutative property, using specific numbers**
 	
   a. Recognize that two addends may be reversed and the sum remains unchanged (i.e., 2+3 = 5 and 3+2 =5) (facts 0-10)
 	
   b. Understand the inverse relationship between addition and subtraction (fact families 0-10)
	4. **Illustrate general principles and properties of operations, such as the commutative and associative properties, using specific numbers**
	
	   a. Apply the commutative and associative properties for addition. (i.e., 7+6+4=…students should be able to see 6+4 = 10 and 10+7 is 17)
		4. **Illustrate general principles and properties of operations, such as the commutative and associative properties, using specific numbers**
		
		   a. Use the commutative and associative properties to add multiple-digit whole numbers (i.e., 12+15=15+12; 25+(50+19) = (25+50)+19

5. **Use concrete, pictorial and verbal representations to develop an understanding of conventional symbolic notations**
 	
   a. Identify and define the +, -, and = symbols
	5. **Use concrete, pictorial and verbal representations to develop an understanding of conventional symbolic notations**
	
	   a. Identify, define, and use the >,<, +,-,= symbols
		5. **Use concrete, pictorial and verbal representations to develop an understanding of conventional symbolic notations**
		
		   a. Identify, define and use >, <, = symbols
		
		   b. Determine the missing number in an addition and subtraction equation.

MEASUREMENT

Estimate and measure in both customary and metric measurements of length, weight, capacity, temperature, time and money.

Kindergarten	First Grade	Second Grade
1. **Understand measurable attributes of objects and the units, systems, and processes of measurement**	1. **Understand measurable attributes of objects and the units, systems, and processes of measurement**	1. **Understand measurable attributes of objects and the units, systems, and processes of measurement using standard units of measure.**
a. Make direct comparisons of temperature, length, capacity, weight, and height of objects; recognize which object is shorter/ longer, taller/shorter, lighter/heavier, wider/narrower, warmer, cooler, and holds more	a. **Time** - Identify the hour and minute hands on a clock and describe their function	a. Identify measurable attributes of an object – *length, weight, volume*
b. **Time** - Recognize concepts of time: morning, afternoon, evening, today, yesterday, tomorrow, week, month, and year	b. **Time** - Identify time to the hour and half hour on an analog and digital clock.	b. **Time** – Identify time and know the relationships including: *seconds, minutes, hours, days, weeks, months, years a.m., p.m.,*
c. **Time** - Recognize that clocks and calendars are tools that measure time.	c. **Time** - Tell time to the nearest 30 minute interval.	c. **Time** – Tell and write time to the nearest five minutes using a.m and p.m.
d. **Time** - Identify days of the week	d. **Time** - Determine elapsed time to the hour.	d. **Time** – Identify elapsed time to the hour and half hour.
e. **Time** - Identify months of the year	e. **Capacity** - Identify measures of capacity (*cup, pint, quart, liter*)	e. **Capacity** – Identify and compare measures of capacity – *fluid ounce, cup, pint, quart, gallon, milliliter, liter*
	f. **Length** - Identify measures of length (*inches, centimeters, yard, meter*)	f. **Length** – Identify and compare measure of length – *half-inch, inch, foot, yard, centimeter, and meter*
	g. **Weight** - Identify measures of weight (*pound, kilogram*)	g. **Length** – Estimate lengths in inches, feet, centimeters, and meters.
	h. **Money** - Identify the values of all U.S. coins and know their comparative value (i.e., dime is greater value than a nickel)	h. **Weight** – Identify and compare measures of weight – *ounce, pound, gram, kilogram*
	i. **Money** - Find equivalent values of money (i.e., nickel = 5 pennies)	i. **Temperature** – Identify and compare measures of degrees
	j. **Money** - Use appropriate notation (i.e., 69¢ and $ and decimal)	
	k. **Temperature** - Identify measures of temperature (degrees in Fahrenheit)	

		– Fahrenheit, Celsius **j. Money –** Write money amount using ¢ and $ and decimal

2. **Understand how to measure using non-standard and standard units**
 	
   a.   Show how to measure with non-standard units
 	
   b.   Identify names of coins – penny, nickel, dime, quarter
	2. **Understand how to measure using non-standard and standard units**
	
	   a. **Length – Capacity –** Compare and order a group of objects based on appropriate non-standard and standard units of measure.
	
	   b. **Length** - Express the length of an object as a whole number of length units.
	
	   c. **Length** - Understand that the length measurement of an object is the number of same-side length units that span it with no gaps or overlaps.
	
	   d. **Weight** - Describe the relationship of heavy/light on a balance scale.
	
	   e. **Time –** Describe the function of a calendar
	
	   f. **Temperature –** Describe the function of a thermometer.
	
	   g. **Money –** Demonstrate counting the value of coins.
		2. **Understand how to measure using non-standard and standard units**
		
		   a. **Length –** Measure to find out how much longer one object is than another.
		
		   b. **Length –** Use drawings and equations to solve word problems within 100, involving lengths the same units.
		
		   c. **Capacity –** Demonstrate how to measure capacity using: fluid ounce, cup, pint, quart, gallon, milliliter, and liter
		
		   d. **Time -** Describe the function of the hands on an analog clock and the relationship between them.
		
		   e. **Time –** Describe the notation on a digital clock: *5:25 am* and relate it to time of the day.
		
		   f. **Time –** Identify time on an analog and digital clock to the nearest *hour, half hour, quarter hour, 5 and 15 minute* intervals

3. **Apply appropriate techniques, tools, and formulas to determine measurements**
 	
   a.   Compare and order a group of objects from greatest to least, longest to shortest, biggest to smallest.
 	
   b.   Measure length, capacity, and weight using non-standard single units (paper clips, cubes) and describe the measurement. (i.e.,
	3. **Apply appropriate techniques, tools, and formulas to determine measurements**
	
	   a. Select the appropriate tool for the attribute being measured (ruler, measuring cup, clock, calendar, scale, thermometer)
	
	   b. Select the appropriate unit for the attribute being measured. (i.e., ruler/yard or meter stick, cup/liter)
		3. **Apply appropriate techniques, tools, and formulas to determine measurements**
		
		   a. Identify, select and use the different tools that are used to measure for the attribute being measured: *ruler, yard stick, meter stick, thermometer, measuring cups, balance scale, clock, calendar*
		
		   b. Solve word problems involving

This is 3 paper clips long. This weighs as much as 4 cubes.) c. Utilize non-standard and standard measuring tools (in play) (rulers, measuring cups, scales) d. Identify time to the hour.	c. **Length –** Measure length of an object to the nearest inch and centimeter. d. **Capacity (Volume) –** Measure capacity using measuring cups e. **Time –** Measure using a calendar and clock f. **Temperature –** Measure using a thermometer g. **Weight –** Measure weight using a balance scale.	dollar bills and coins using ¢ and $ and decimal notations

GEOMETRY

Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about geometric relationships.

Kindergarten	First Grade	Second Grade

1. **Recognize, name, build, draw, compare, and sort two and three dimensional shapes.**
 	
   a. Identify and describe common geometric objects: circle, oval, triangle, square, rectangle, hexagon, rhombus, cube, cylinder and sphere
 	
   b. Draw simple two dimensional shapes (square, circle, rectangle, oval, triangle, rhombus)
 	
   c. Identify objects flat (plane) or solid (three dimensional)
 	
   d. Compose simple shapes to create another shape (two triangles to make a square)
	1. **Recognize, name, build, draw, compare, and sort and classify two and three dimensional shapes.**
	
	   a. Construct or compose two dimensional (plane – rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) and three dimensional (solid) shapes (cubes, right rectangular prisms, right circular cones and right circular cylinders) to create a composite shape and compose new shapes from the composite shape
	
	   b. Sort and classify two-dimensional (plane) and three-dimensional (solid) shapes by size, shape and number of sides, faces, vertices (corners), edges and other attributes
		1. **Recognize, name, build, draw, compare, and sort and classify two and three dimensional shapes.**
		
		   a. Identify, describe, compare, and sort three-dimensional (solid) shapes: cube, pyramid, cone, cylinder, rectangular prism, sphere
		
		   b. Construct or compose two dimensional (plane – rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) and three dimensional (solid) shapes (cubes, right rectangular prisms, right circular cones and right circular cylinders) to create a composite shape and compose new shapes from the composite shape
		
		   c. Predict the results of putting together and taking apart two-dimensional (plane) and three-dimensional (solid) shapes.

2. **Describe attributes and parts of two and three dimensional shapes.**
 	
   a. Understand that a shape can have any orientation or size.
 	
   b. Compare and sort two dimensional common objects by
	2. **Describe attributes and parts of two and three dimensional shapes.**
	
	   a. Identify, describe, compare, and sort two-dimensional (plane - rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) and three-dimensional
		2. **Describe attributes and parts of two and three dimensional shapes.**
		
		   a. Identify, compare and classify attributes of two-dimensional (plane) and three-dimensional (solid) shapes according to attributes: number of sides,

shape and size. c. Construct two dimensional shapes using a variety of materials.	(solid - cubes, right rectangular prisms, right circular cones and right circular cylinders) shapes	edges, vertices, faces and shape type

3. **Specify locations and describe spatial relationships using coordinate geometry and other representational systems.**
 	
    a. Identify and describe relative positions in space and apply ideas about relative position. (i.e., over, under, next to, behind, in front of, top, bottom, inside, outside, between, above, below.
 	
    b. Identify left and right positions
 	
    c. Describe and demonstrate movement of an object's position up, down, forward, backward
 	
    d. Identify near and far
	3. **Specify locations and describe spatial relationships using coordinate geometry and other representational systems.**
	
	    a. Arrange and describe objects in space by position and direction: near, far, left, and right.
	
	    b. Demonstrate direction and distance on a plane using right, left, up and down.
	
	    c. Use a coordinate grid, move the correct number of spaces to the right and up to find an object on the grid.
	
	    d. Describe the relationship between points on a map.
		3. **Specify locations and describe spatial relationships using coordinate geometry and other representational systems.**
		
		    a. Demonstrate direction and distance on a plane using right left, up, and down.
		
		    b. Use a coordinate grid, move the correct number of spaces to the right and up to find an object on the grid.
		
		    c. Use ordered pairs, locate points on a map or grid.

4. **Apply transformations and use symmetry to analyze mathematical situations**
 	
    a. Identify objects having equal parts
 	
    b. Recognize and draw lines of symmetry
 	
    c. Describe and apply changes (transformations) as turning and sliding shapes.
	4. **Apply transformations and use symmetry to analyze mathematical situations**
	
	    a. Partition circles and rectangles into two and four equal shares. Describe shares of wholes using the words *halves, fourths, quarters*
	
	    b. Recognize and draw lines of symmetry.
		4. **Apply transformations and use symmetry to analyze mathematical situations**
		
		    a. Describe and apply changes (transformations): flipping, turning, and sliding shapes.
		
		    b. Identify objects having equal parts
		
		    c. Recognize symmetry in a variety of forms.
		
		    d. Recognize and draw lines of symmetry.

5. **Use visualization, spatial reasoning, and geometric modeling to solve problems**
 	
    a. Identify and describe, from memory, shapes seen in the surroundings (pictures, books, home, community)
	5. **Use visualization, spatial reasoning, and geometric modeling to solve problems**
	
	    a. Create new images combining mental images of geometric shapes
	
	    b. Understand that directionality will
		5. **Use visualization, spatial reasoning, geometric modeling and relate ideas in geometry to ideas in number and measurement to solve problems**
		
		    a. Create new images combining mental images of geometric shapes

b. Recognize and represent shapes from different perspectives. Explain that directionality will not change the attributes of basic shapes.	not change the attributes of basic shapes.	b. Identify congruent plane shapes in any position c. Determine perimeter of a square and rectangle. d. Determine the area of a square or rectangle using square units.
6. **Recognize geometric shapes and structures in the environment and specify their location.** a. Identify two-dimensional and three-dimensional shapes in various environments	6. **Recognize geometric shapes and structures in the environment and specify their location.** a. Identify two-dimensional and three-dimensional shapes in various environments	6. **Recognize geometric shapes and structures in the environment and specify their location.** a. Identify two-dimensional and three-dimensional shapes in various environments

STATISTICS, PROBABILITY, AND DATA ANALYSIS

Kindergarten	First Grade	Second Grade
1. **Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer the question.** a. Gather data within the classroom and determine the outcome of a certain inquiry. b. Sort and classify objects by one or more attributes c. Create and compare data, in graph format using a variety of manipulatives, including pictographs and tally marks d. Interpret the data or graph, answer questions regarding most, least, how many more/less, how many in all	1. **Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer the question.** a. Gather, organize, represent and interpret data with up to three categories. b. Represent data using a bar graph, pictograph, or tally graph c. Interpret the data or graph, answer questions regarding most, least, how many more/less, how many in all	1. **Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer the question.** a. Pose questions and gather data about self, others, and surroundings. b. Organize data according to attributes c. Represent data using a bar graph, pictograph or tally graph. d. Interpret the data or graph, answer questions regarding most, least, how many more/less, how many in all e. Find the mode, range, and median in a set of data.
2. **Develop and evaluate inferences and predictions that are based on data** a. Make simple predictions based on data.	2. **Develop and evaluate inferences and predictions that are based on data** a. Predict and determine an event to be certain, probable, impossible b. Using a set of data, predict an event to be more, less, or equally likely of occurring	2. **Develop and evaluate inferences and predictions that are based on data** a. Predict and determine an event to be certain, probable, impossible. b. Using a set of data, predict an event to be more, less, or equally likely of occurring