Mathematics Curriculum

Second Grade

By the end of second grade students are developing fluency in addition, subtraction, and beginning multiplication facts. They understand place value of ones, tens, hundreds and thousands. Students can use numbers to write, count, compare, and represent quantities up to 1000. They can use appropriate mathematical terms to describe problems with manipulatives, drawings, and numerical symbols. They are developing problem-solving strategies for simple addition, subtraction, and multiplication stories. They can describe, sort, and compare geometric shapes according to their properties. They can apply appropriate units of measurement to determine time, money, temperature, length, and weight. They can collect, represent, and analyze data in simple graphs.

Archdiocese of Santa Fe Standard 1:   **Numbers and Operations:**
**Students understand numbers, ways of representing numbers, relationships among numbers, and number systems; understand meanings of operations and how they relate to one another; and compute fluently and make reasonable estimates. NCTM**

Critical for Mastery in Grade 2

LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Number Sense: **Develop understanding of whole number relationships, including grouping in ones, tens, hundreds and thousands.**		
1. Count to 1000 by 1's, 2's, 5's, 10's and 100's.	• Given a partial number line from 0 to 1000, with intervals of 1's, 2's, 5's, 10's, or 100's student can write the number that comes next (e.g., 680, 690, 700, ____).	
2. Count to 1000 starting at any number.	• Given any 3-digit number, student can name and write the number that is one more.	
3. Count backward from 1000 starting at any number.	• Given any 3-digit number, student can name and write the number that is one less.	

4. Read/Model/Write whole numbers up to 1000.	• For any whole number 0 – 1000, student can verbally read the number; write the *dictated* number or construct the number using base ten blocks.	
5. Solve problems using even and odd numbers from 0 to 1000.	• Which of the following numbers can you add to 19 to get an even number? 10, 13, 14, 18	
6. Compare two whole numbers through 1000 using equality and inequality symbols.	• Add the correct symbol <, >, or = to make the following number sentence true: • 456 ___ 564	
7. Order three or more whole numbers through 1000 (least - greatest; greatest - least).	• Put the following numbers in order from least to greatest: 102, 221, 121, 220.	
8. Given a number between 0 – 1000 identify 1 more or 1 less, 10 more or 10 less, 100 more or 100 less.	• What is ten more than 647? _____ • What is one hundred less than 647?_____	
9. Identify place value of 1's, 10's, 100's, and 1000's.	• What is the value of the digit 9 in the following number? 1,392 • What digit represents tens in the following number? 785	
10. Convert three digit numbers from standard to expanded form.	• Write 347 in expanded form (e.g., 347 = 300 + 40 + 7). • Write 40 + 500 as a 3-digit number (e.g., 40 + 500 = 540).	
11. Estimate the number of objects in a group up to 1000.	• Given three bags with different amounts of pinto beans, student will guess and count the number in each bag with increasing accuracy.	
12. Solve problems using ordinal numbers.	• If you are the 18th person in line, how many people are standing in front of you?	
13. Round numbers to the nearest 10's and 100's.	• Round 48 to the nearest ten (e.g., 48 is closer to 50). • Round 325 to the nearest hundred (e.g., 325 is closer to 300).	
B. Addition and Subtraction:		

Develop understanding of addition and subtraction and strategies for basic addition and related subtraction facts.		
1. Demonstrate addition and subtraction facts with fluency and automaticity through 18.	• Student can say or write answer to basic addition or subtraction facts within three seconds.	
2. Add and subtract whole numbers of at least three digits with and without regrouping.	• $356 + 289 =$ _____ • $604 - 285 =$ _____	
3. Write number sentence for addition/subtraction story using two and three digit numbers. Write answer with appropriate labels.	• Two grades were collecting money for the Hunger Project. First grade collected $322 and second grade collected $415. How much more money did second grade collect than first grade?	
4. Find the sum of five or more one-digit numbers.	• Student can add a string of numbers by looking for sums of ten (e.g., $3 + 7 + 5 + 5 + 2 + 4 + 6 = 3$ tens and 2 ones, which is 32).	
5. Use the terms addend, sum, and difference when solving problems.	• Student can identify the addends, sum, or difference in a given number problem.	
C. Multiplication and Division: **Develop understanding of multiplication and division and strategies for basic multiplication and related division facts.**		
1. Identify and use the x symbol in multiplication.	• Use the correct symbol -, +, or x to make the following sentence true: $20 = 5$ ___4.	

2. Use strategies to learn multiplication facts:
   a. Skip count
   b. Arrays
   c. Repeated Addition
   d. Equal groups
   e. Area models
	a) Skip count by 2's to solve 8 x 2 = _____.
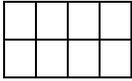	
	b) Student uses 2 by 4 array to solve 2 x 4 = ____.
	
	c) Student recognizes that multiplication is the same as repeated addition (e.g., 3 + 3 + 3 + 3 = 4 x 3).
	
	d) Student uses multiplication to solve "equal groups" stories (e.g., How many wheels do four cars have altogether?).
	
	e) Student uses 1 inch tiles to find area of rectangle and can match to related multiplication sentence.	

3. Develop fluency with multiplication facts (1's, 2's, 3's,4's, 5's, and 10's).	• Student can complete multiplication fact sheets with increasing accuracy and speed.	
4. Recognize and use terms factor and product.	• Match word to symbol or corresponding word problem.	
5. Solve simple multiplication word problems.	• Using manipulatives or pictures, student can write a corresponding multiplication number sentence.	
D. Properties: **Use properties of addition to add whole numbers.**		

1. Use commutative and associative properties to add two-digit whole numbers.	• Commutative Property:
	  o How much is 43 + 29?
	  o How much is 29 + 43?
	  o How do you know?
	• Associative Property:
	  o In this problem, where do you start to find your answer? Why?
	    4 + (5 + 9) = ____.	

E. Decimals/Fractions/Ratios/Percents: **Begin to understand, represent and**		

perform mathematical operations with decimals and fractions.		
1. Add and subtract decimals to the hundredths with and without regrouping.	• $\$3.25 \quad \$4.85$ $\underline{+\ 2.13} \quad \underline{-\ 1.57}$	
2. Use decimals through hundredths in contextual situations with money.	• Write two dollars and forty-eight cents using dollar sign and decimal point (e.g., $2.48).	
3. Compare two decimals through hundredths using money, models, or diagrams.	• Give student three quarters and three dimes. Have student write the amounts using a decimal point and tell which is more (e.g., $.75 > $.30).	
4. Identify and write fractions (halves, thirds, fourths, eighths, and tenths).	• Given diagrams or models that show a fractional part of a whole, student can name and write the corresponding fraction.	
5. Match fraction with appropriate diagram of partially shaded sections.	• Given diagrams that show a fractional part of a whole, student can match the picture to the corresponding fraction.	
6. Identify and write fractional part of a given set.	• Students are given a group of objects representing a whole. • Students name the fraction of the set that has a given characteristic (e.g., What fraction of these shapes is orange?).	
7. Compare and order fractions, 1/2, 1/3, and 1/4, in relation to 0 and 1, using physical models or diagrams.	• Given diagrams that show the fractional parts, students can tell which fraction is larger and put fractions in order from least to greatest.	
8. Represent and write a mixed number.	• Measure line segments to the nearest ½ inch and write length as a mixed number (e.g., 5 ½).	

Archdiocese of Santa Fe Standard 2:   **Measurement:**
Students understand measurable attributes of objects and the units, systems and processes of measurement; and apply the appropriate techniques, tools, and formulas to determine measurements. NCTM

Critical for Mastery in Grade 2

LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Linear: **Recognize and compare the measurable attributes of length.**		
1. Select appropriate tool to measure length (i.e., ruler, yard stick, meter stick).	• Given a picture of several objects to measure such as a pencil, door, rug, car, etc., student can name appropriate tool to measure length.	
2. Use, compare, and describe differences among customary and metric units of measurement (i.e., inches, feet, yards, centimeters, and meters).	• Students will measure a pencil in inches and centimeters and explain why measurements are different. • Students will measure the length of the classroom using feet, yards, and meters and explain why measurements are different.	
3. Establish personal or common referents for units of measure to make estimates and comparisons.	• Student recognizes the width of a finger is about a centimeter.	
4. Estimate, measure, add, and subtract lengths using inches, feet, yards, centimeters, and meters.	• Students work in partners to estimate how tall they are and measure with ruler. Students compare their heights.	
5. Use appropriate labels for answers.	• Students write complete answers with appropriate symbol or label (e.g., or inches).	
6. Develop an understanding of equivalent relationships (12 inches = 1 foot, 3 feet = 1 yard, 100 centimeters = 1 meter).	• Student can draw a line to match equivalent lengths (e.g., 12 inches to 1 foot).	
7. Partition lengths into equal size segments.	• Make a number line with numbers 1 inch	

	apart using 1 inch tiles.	
B. Weight: **Recognize and compare the measurable** **attributes of weight.**		
1. Use, compare, and describe differences among customary and metric units (i.e., ounces, pounds, grams, kilograms).	• Students weigh objects such as gallon of water, bag of potatoes, paint brush, glue bottle using different scales. Then student is given pictures of other objects and can tell what is the appropriate unit to measure its weight.	
2. Establish personal or common referents for units of measure to make comparisons.	• Student recognizes a can of soup is about 1 pound.	
3. Make and test predictions about weight of various objects using a scale.	• Given three objects, students will predict the order of weight from least to greatest. Confirm prediction with a scale.	
4. Use appropriate labels for answers.	• Students will write complete answers with appropriate label (e.g., ounces or pounds).	
5. Develop an understanding of equivalent relationships (16 ounces = 1 pound, 1000 grams = 1 kilogram).	• Students can draw a line to match equivalent weights (e.g., 16 ounces = 1 pound).	
C. Temperature: **Recognize and compare the measurable** **attributes of temperature.**		
1. Read a Fahrenheit and Celsius thermometer.	• "Student of the Day" checks and records the daily outside temperature to the nearest 2° using both scales.	
2. Measure, record, and graph temperature using Fahrenheit and Celsius thermometer.	• Students will record temperatures over several days and create a line graph.	
3. Establish personal or common referents for understanding different temperatures.	• Student can name an appropriate activity for 90° F (swimming); water freezes at 0° C.	
4. Use appropriate labels for answers.	• Students will write complete answers with appropriate symbol or label (e.g., ° or degrees).	
D. Time: **Recognize and compare the measurable**		

attributes of time.		
1. Use digital and analog clocks to tell time to quarter-hour, 5 minute interval, and to the minute.	• Show 5:47 on both a digital and analog clock.	
2. Describe time as A.M. or P.M., noon or midnight.	• If you are eating dinner at 5:47, is it A.M. or P.M.?	
3. Solve simple elapsed time problems to the hour and half-hour.	• If the movie starts at 5:30 and finishes at 7:00, how long is it?	
4. State equivalent relationships (24 hours = 1 day, 7 days = 1 week, 12 months = 1 year, 60 minutes = 1 hour, 30 minutes = ½ hour, 60 seconds = 1 minute).	• Student can draw lines to match equivalent times (e.g., 24 hours to 1 day).	
5. Convert the date into digits.	• May 20, 2012 = 5/20/12.	
6. Use calendar to solve problems using time intervals (e.g., days, weeks, months).	• Using the calendar, student can tell how many more days until Mary's birthday.	
7. Use appropriate labels for answers.	• Student will write complete answers using appropriate labels (e.g., minutes or hours).	
E. Money: **Recognize and compare the measurable attributes of money.**		
1. Add the total value of mixed coins (i.e., pennies, nickels, dimes, quarters, half-dollars) and dollar bills.	• Given a group of dollar bills and mixed coins, students can count, add on, and give the total amount.	
2. Write amounts of money with correct notation (i.e., using ¢, $, and decimal point).	• 46¢ = $0.46	
3. Select appropriate coins and bills for a given amount up to $10.00.	• Student can show $1.50 in a variety of ways.	
4. Make change from $1.00.	• Purchase items from classroom "store" and make change from $1.00.	
5. Solve addition and subtraction word problems involving money transactions.	• If a pencil costs 25¢ and an eraser costs17¢, how much money will you spend altogether?	
6. Use appropriate labels for answers.	• Student will write complete answers using appropriate symbol or label (e.g., $ or ¢).	

F. Capacity: **Recognize and compare the measurable attributes of capacity.**		
1. Use, compare, and describe differences among customary and metric units (cups, pints, quarts, gallons, and liters).	• Students will make lemonade using various measuring tools (e.g., cup, gallon).	
2. Establish personal or common referents for units of measure to make comparisons.	• Student recognizes a large bottle of soda is 2 liters.	
3. Develop an understanding of equivalent relationships (2 cups = 1 pint, 2 pints = 1 quart, 4 quarts = 1 gallon).	• Students will use school milk cartons to fill various containers such as quart, gallon, etc.	
4. Use appropriate labels for answers.	• Students will write complete answers using appropriate labels (e.g., cups, gallons).	

Archdiocese of Santa Fe Standard 3:   **Algebra and Problem Solving:**
Students understand patterns, relations, and functions; represent and analyze mathematical situations and structures using algebraic symbols; use mathematical models to represent and understand quantitative relationships; analyze change in various contexts; and apply and adapt a variety of appropriate strategies to solve problems. NCTM

Critical for Mastery in Grade 2

LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Variables and Expressions: **Use algebraic notation to represent and analyze situations and structures.**		
1. Find the missing number in an addition or subtraction problem.	• Student will construct and solve an open number sentence that has variables representing numbers up to 100 (e.g., 20 = ___ + 6).	

LEARNING OUTCOMES	SAMPLE ASSESSMENTS/STRATEGIES	BEST PRACTICES
2. Determine which operational symbol is missing from an equation.	• Which symbol +, -, or × makes the following number sentence true? 7 + 7 = 20 __ 6.	
B. Equation: See Number Sense (B3)		
C. Inequality: See Number Sense (A7)		
D. Patterns and Sequences: **Identify duplicate, and extend patterns and sequences.**		
1. Create and describe numeric and geometric patterns.	• Using pattern blocks, student can create an ABBC, ABBC pattern and explain why.	
2. Describe and extend numeric and geometric patterns.	• Given the numbers 205, 210, 215… the student is able to give the next few numbers and state that the rule is +5.	
E. Functions:		
No objectives		

Archdiocese of Santa Fe Standard 4:   **Geometry:**
Students analyze characteristics and properties of two-and-three dimensional geometric shapes and develop mathematical arguments about geometric relationships; specify locations and describe spatial relationships using coordinate geometry and other representational systems; apply transformations and use symmetry to analyze mathematical situations; and use visualization, spatial reasoning, and geometric modeling to solve problems. NCTM

Critical for Mastery in Grade 2

LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Geometric Terms: **Identify, name and describe a variety of geometrics terms.**		

1. Use geometric terms to identify, label, and describe geometric shapes, structures, and relationships.	• Students understand and correctly use geometric terms including parallelogram, hexagon, trapezoid, polygon, cylinder, sphere, pyramid, cube, cone, rectangular solid, angle, right angle, line, line segment, parallel, intersecting, perpendicular, symmetry, rotate, slide, flip, perimeter, and area.	
B. Identify and Classify Shapes: **Identify, classify and draw variety of geometric shapes.**		
1. Describe, compare and contrast the properties of two-dimensional figures and three-dimensional solids.	• Student will identify number of sides or angles in a polygon. • Student will identify number of vertices and faces on a rectangular prism, pyramid and cube.	
2. Predict what new shapes will be formed by combining or cutting apart existing shapes.	• Two congruent triangles can be arranged to form a parallelogram.	
3. Identify the line of symmetry for various shapes.	• Draw a line of symmetry through shapes and letters of the alphabet.	
4. Identify congruent shapes.	• Given a number of triangles, students will be able to match the two that are the same size and same shape.	
5. Identify right angles.	• Student can use corner of paper to find right angles in various shapes and letters.	
6. Locate points on a coordinate graph using ordered pairs.	• Locate points and navigate through mazes or maps.	
C. Geometric Formulas: **Begin to understand and compute geometric formulas using standard and non-standard units of measure.**		
1. Investigate the concept of perimeter and area.	• Students will use a piece of yarn to outline various shapes (perimeter). • Students will fill various shapes with one-	

	inch square tiles to determine area.	
2. Compute the perimeter of both regular and irregular figures using standard and non-standard units of measure.	• Measure sides of desk using paper clips, popsicle sticks, inches, feet, etc.	

Archdiocese of Santa Fe Standard 5:   **Data Analysis, Statistics and Probability:**
Students formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them; select and use appropriate statistical methods to analyze data; develop and evaluate inferences and predictions based on data; and understand and apply basic concepts of probability. NCTM

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LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Statistics:		
No Objectives		
B. Probability: **Understand and apply basic concepts of probability.**		
1. Form questions for investigation in probability experiments.	• Student will put a number of tiles (three different colors) in a bag and form a question (i.e., which color is s/he most likely to pick with his/her eyes closed?).	
2. Predict the likelihood of an event using terms such as possible, impossible, more/less likely, certain, etc.	• If there are three red, one yellow and six blue tiles, student will predict that blue would most likely be picked, black would be impossible, etc.	
3. Record the probability of a specific outcome for a probability situation using numbers and fractions.	• Student will observe and record that the probability of picking a blue tile is 6 out of 10 or 6/10.	
4. Recognize that results of multiple repetitions of the same probability	• Student will toss a penny ten times and record number of heads and tails tossed.	

experiment may yield different results.	Repeat experiment three times and compare results.	
C. Data Analysis: **Sort and classify objects; represent data using concrete objects, pictures and graphs and read, interpret and make comparisons from the data presented.**		
1. Form questions, use observations, interviews, and surveys to collect data using tally marks.	• Student will create a preference question (e.g., What is your favorite sport?), survey classmates and record results with tally marks.	
2. Represent data using objects, pictures, tables, pictographs, and bar graphs using a scale of 1, 2, 5, or 10.	• Students will track number of books read each month and create a bar graph using a scale of 10, a pie graph to show genre, etc.	
3. Read, interpret, and draw conclusions from data represented in a variety of formats, including charts, tables, pictographs, circle graphs, Venn diagrams, and bar graphs.	• Students can identify parts of a Venn diagram, and can state how many people have cats, how many people have dogs and how many people have both.	
4. Write sentences to describe observations and compare categories of data represented.	• Students can state how many more people have dogs than cats by comparing bar graph lengths.	

Archdiocese of Santa Fe Standard 6:   **Mathematical Processes:**
With opportunities integrated throughout the curriculum, students develop mathematical practices and processes such as solving problems, making connections, understanding multiple representations of mathematical ideas, communicating their thought processes, and justifying their reasoning appropriate to grade level. NCTM

Mathematical Processes and Practices:	Teacher Notes:
1. Students make sense of problems and persevere in solving them.	
2. Students select and use various types of reasoning and methods of proof.	
3. Students construct viable arguments and critique the reasoning of others.	
4. Students evaluate the reasonableness of predictions, estimations and solutions.	
5. Students use a variety of tools and strategies in problem solving.	
6. Students attend to accuracy and precision and proof their work.	
7. Students use a variety of mathematical representations to organize, record and communicate mathematical ideas.	
8. Students apply mathematical knowledge and skills routinely in other content areas and practical situations.	