Mathematics Curriculum

Pre-Kindergarten/Kindergarten

By the end of kindergarten students can use the numbers 0-50 through writing, counting, representing quantities, and comparing sets. They can model and represent simple addition and subtraction situations. They can work with numbers 0-50 to develop a foundation for understanding place value. They can identify, describe, compare, and classify objects using measurable attributes such as size and shape. They can identify and create shapes, as well as repeat and compose simple patterns.

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 K

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: **Represent, compare, and order whole numbers and sets.**		
1. Count to 100 by ones, fives and tens.	• Orally count to 100. • Use number line and assist class as they count by ones, fives, and tens.	
2. Count backwards from 20.	• Given a set of 20 cheerios, student counts backwards as s/he eats one at a time.	
3. Read/Write/Model numbers 0 – 50.	• Represent a given number with blocks or similar objects.	
4. Demonstrate one to one correspondence (by saying number names in standard order, pairing each object with one and only one number name) for numbers 0 – 50.	• One at a time, drop small objects into an empty coffee can. Have students close eyes and count while listening to sound of each object dropping into the can. Extend by asking other students to report the number	

	of sounds they heard.	
5. Recognize how many objects are in a small group (less than or equal to five) without counting.	• Show a dot plate for about three seconds and then ask, "How many dots did you see?" Have students draw a picture of the dot pattern.	
6. Estimate quantities of objects up to 20.	• Show students a jar with up to 20 objects and ask them, "How many objects are inside?" After recording their estimates, count the number of objects and label the jar.	
7. Work with objects to develop a foundation for understanding place value of ones and tens.	• Use popsicle sticks and cups as visual for place value. Using a stick to represent "one" and a bundle of ten sticks to represent "ten," have students model a given number. Extend to calendar, and have students count the days of school and represent the number with popsicle sticks in ones and tens.	
8. Compare and order sets of objects and whole numbers to 20 using terms "greater than," "less than," and "equal to."	• Separate colored links into groups and determine which group has more.	
9. Use symbols <, >, and =.	• Use "alligator's mouth" picture to show the alligator always looks at and eats the greater number.	
10. Identify ordinal numbers from 1^{st} to 10^{th}.	• Have students stand in line and identify their place with ordinal number.	
B. Addition and Subtraction: Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.		
1. Develop fluency in adding and subtracting through 10.	• Call out numbers between 0 and 10. Students respond by saying how many more are needed to make 10. (Same process can be followed using student white boards or Smart Board).	
2. Use concrete objects to solve problems with sums and differences up to 10.	• Solve addition and subtraction word problems by using manipulatives, number	

	lines, money, drawings, claps, acting out situations, etc.	
3. Select operation to solve word problems using numbers 0 – 9 (orally).	• Match a given addition or subtraction number sentence to the corresponding picture.	
4. Identify symbols +, - and =.	• Students can explain that the plus symbol means "join together," the minus sign means "take away," and the equal sign means "same."	
C. Multiplication and Division		
No objectives		
D. Properties		
No objectives		
E. Decimals/Fractions/Ratios/Percents: Understand and represent whole and half, equal and unequal.		
1. Demonstrate an understanding of wholes and halves.	• Show pictures of pizzas and identify as a whole or half.	
2. Distinguish the difference between equal and unequal parts of a whole.	• Divide an object or picture into parts and identify as equal or unequal.	

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

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A. Linear: **Recognize and compare the measurable**		

attributes of length.		
1. Recognize that a single object has different attributes (e.g., length, size, weight, etc.) that can be measured in different ways.	• Identify the different measurable attributes in a variety of objects.	
2. Describe and compare objects using appropriate vocabulary (e.g., shorter, longer, taller, bigger, smaller, more, less, etc.).	• Using types of fruit, categorize as shorter, longer, bigger, smaller, etc.	
3. Use non-standard units of measurement to determine which object is longer and shorter.	• Use paper clips to measure length of yarn.	
4. Order several objects according to length.	• Put color strips in order from shortest to longest.	
B. Weight: **Recognize and compare the measureable attributes of weight.**		
1. Describe and compare objects using appropriate vocabulary (e.g., heavy, light).	• Fill six identical containers with different objects of varying weights and have children arrange the containers from heaviest to lightest.	
2. Use tools to make predictions.	• Using a balance scale, predict how many cups a container will hold and then fill it to check prediction.	
C. Temperature: **Recognize and compare the measureable attributes of temperature.**		
1. Describe and compare objects using appropriate vocabulary (e.g., hot, warm, cool, cold, etc.).	• Discuss the daily weather and have students compare to the previous day using terms hotter, colder, warmer, etc.	
D. Time: **Recognize and compare the measureable attributes of time.**		
1. Apply appropriate concepts and vocabulary (e.g., before, after, morning, afternoon, night, today, yesterday,	• Daily calendar and school schedule discussions. Play the game "Name the Day" (e.g., I am the day before Tuesday.	

tomorrow, etc.).	What's my name?).	
2. Recite the seven days of the week and the twelve months of the year.	• Orally state the days of the week.	
3. State the number of days in a week and the number of months in a year.	• Orally state numbers of days in a week and the number of months in a year.	
4. Identify the numbers 1 to 12 on a clock.	• Can point to and identify the numbers on a large clock.	
5. Identify the hour and minute hand.	• Using a large clock, students are able to identify the hour and minute hand and move them to point to specific numbers as directed.	
6. Use digital and analog clocks to tell time to the hour.	• Participate in a time telling bee using digital and analog clocks.	
E. Money: **Recognize and compare the measureable attributes of money.**		
1. Identify penny, nickel, dime, quarter, and dollar.	• Given two coins, student can select the nickel (or whatever coin is requested).	
2. Recognize the ¢ and $ symbols.	• Use newspaper or magazine to find food ads with ¢ and $ symbols.	
3. Compare prices under 50¢ using terms more or less.	• Class store.	
F. Capacity: **Recognize and compare the measureable attributes of capacity.**		
1. Describe and compare objects using appropriate vocabulary (e.g., full, empty, etc.).	• Demonstrate full, empty, and half full using containers of colored water.	

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

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A. Variables and Expressions: **Use algebraic notation to represent and analyze situations and structures.**		
1. For any number from 1 to 9, find the number that makes 10 by using objects/drawing.	• Using a ten frame, student will tell how many objects or pictures are needed to complete a group of ten.	
B. Equation		
1. See Number Sense (A6, 7, 8)		
C. Inequality		
1. See Number Sense (A6, 7, 8)		
D. Patterns and Sequences: **Identify, duplicate, and extend patterns and sequences.**		
1. Sort objects and pictures by attributes.	• Students will sort different objects (e.g., colored shapes, animals, chips, etc.) into bowls according to a stated attribute.	
2. Extend, describe, and create visual, movement, rhythmic and patterns.	• Use pattern blocks to create an ABAB pattern.	
3. Describe sorting rules.	• Play "What's My Rule?" and other games.	
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

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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. Geometric Terms: **Identify, name, and describe a variety of geometric terms.**		
1. Identify and describe plane and solid figures including circles, triangles, squares, rectangles, spheres and cubes.	• Students are given new examples of figures to identify and describe during daily calendar routine.	
B. Geometric Shapes: **Identify and classify a variety of geometric shapes.**		
1. Identify the difference between two-and three-dimensional shapes.	• Identify two-dimensional objects as "flat," and three-dimensional objects as "solid." Build two-dimensional figures using paper shapes or tangrams. Build three-dimensional objects using blocks.	
2. Select and sort shapes and objects into groups.	• Sort shapes according to number of sides or angles.	
3. Demonstrate common language of spatial sense and show examples: inside, between, about, below, behind, near to, left, right, etc.	• Create simple navigational directions (e.g., walk forward 10 steps, turn right, and walk forward 5 steps).	
C. Geometric Formulas:		
No objectives		

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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A. Statistics: No objectives		
B. Probability: **Understand and apply basic concepts of probability.**		
1. Describe events using *certain, possible, impossible, and other* basic probability terms.	• Put assorted colored socks in a bag. Show students the contents of the bag. Ask if they could reach into the bag and get a mitten. Discuss and determine possible outcomes for the situation.	
C. Data Analysis: **Sort and classify objects and represent data using concrete objects, pictures and graphs.**		
1. Collect and organize data to create class constructed tally charts, tables, and bar graphs.	• Have children stand in groups according to their birth month. Represent these groups on paper with a pictograph, tallies, tables, and bar graphs.	
2. Use graphs to answer simple questions.	• What is our favorite snack?	

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.	