

Mathematics Curriculum

Seventh Grade

By the end of seventh grade students are adept at manipulating numbers and equations. They have applied and adapted a variety of appropriate strategies to solve problems. They know and use different representations of fractional numbers (fractions, decimals, and percents) and are proficient at changing from one to another. They solve percentage problems involving real world scenarios. They use ratios and proportions to solve a variety of problems. They have mastered evaluating expressions involving integers. They can solve linear equations. They can compute the perimeter, area, and volume of geometric objects. They understand properties of angles and triangles. They understand the principles of probability.

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 7

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: Understand numbers, ways of representing numbers, relationships among numbers, and number systems.		
1. Use mental math to multiply and divide decimals by powers of 10.	<ul style="list-style-type: none"> • Move the decimal to the right for multiplying by 10. Move the decimal to the left for dividing by 10. 	
2. Identify the types of real numbers (natural, whole, integer, rational, and irrational).	<ul style="list-style-type: none"> • Use a diagram to display the real numbers. 	
3. Round numbers to specific value with accuracy.	<ul style="list-style-type: none"> • Round a number to a given place. 	

4. Compare and order numbers (whole numbers, decimals, fractions and integers).	<ul style="list-style-type: none"> Connect a series of numbers in order in a “dot-to-dot” puzzle format to create a design. 	
5. Recognize prime and composite numbers.	<ul style="list-style-type: none"> Create a prime number chart for numbers 1 to 100. 	
6. Compute using order of operations.	<ul style="list-style-type: none"> Insert the correct operation symbols to generate a specific answer. 	
7. Evaluate exponents and square roots.	<ul style="list-style-type: none"> Define the square root as the inverse operation to squaring the number. 	
8. Use number lines.	<ul style="list-style-type: none"> Locate rational numbers on a number line. 	
9. Express prime factorization in exponential form.	<ul style="list-style-type: none"> Use factor trees. 	
10. Express numbers in scientific notation using positive and negative exponents.	<ul style="list-style-type: none"> Convert between standard and scientific notation. 	
11. Find the absolute value of a number.	<ul style="list-style-type: none"> Find the absolute value of a numerical expression (e.g., $-5+8 = 3$). 	
B. Addition and Subtraction: Compute fluently and make reasonable estimates.		
1. Add and subtract whole numbers and integers.	<ul style="list-style-type: none"> Balance a checking account with withdrawals and deposits. 	
2. Make reasonable estimates of the sum and difference of whole numbers.	<ul style="list-style-type: none"> Estimate the cost when shopping. 	
C. Multiplication and Division: Compute fluently and make reasonable estimates.		
1. Use and apply the divisibility rules for 2,3,4,5,6,9,10.	<ul style="list-style-type: none"> Find how many ways a group of students can be divided equally. 	
2. Find LCM and GCF.	<ul style="list-style-type: none"> Use prime factorization to determine the GCF and LCM. 	
3. Multiply and divide whole numbers by 1 to 4-digit numbers.	<ul style="list-style-type: none"> Practice traditional algorithms for multiplication and long division with accuracy. 	
4. Multiply and divide integers.	<ul style="list-style-type: none"> Multiply three or more integers 	

5. Make reasonable estimates of the product and quotient of whole numbers.	<ul style="list-style-type: none"> Estimate one person's share of the total bill at a restaurant. 	
D. Properties: Understand and the properties of addition and multiplication.		
1. Identify and use commutative, associative, distributive and identity properties of addition and multiplication.	<ul style="list-style-type: none"> Use properties to compute mentally and be able to justify each step. 	
E. Decimals/Fractions/Ratios/Percents: Understand the meaning of operations and how they relate to one another.		
1. Add, subtract, multiply and divide decimals.	<ul style="list-style-type: none"> Compute accurately with decimals in a variety of problems. 	
2. Apply concepts of fractions as a ratio and division.	<ul style="list-style-type: none"> E.g., Find the ratio of students to teachers in a school. Express the answer in different forms. 	
3. Reduce fractions to lowest terms.	<ul style="list-style-type: none"> Always have students express final answers in simplest form. 	
4. Add and subtract fractions and mixed numbers with like/unlike denominators including regrouping.	<ul style="list-style-type: none"> E.g., Find the amount of trim needed to make a border for a picture frame. 	
5. Multiply and divide fractions and mixed numbers.	<ul style="list-style-type: none"> E.g., Make 2-1/2 times a recipe that has fractional measurements of ingredients. 	
6. Convert between fractions, decimals, and percents.	<ul style="list-style-type: none"> Play a matching game where students pair up equivalent percents and decimals or decimals and fractions, etc. 	
7. Convert fractions to repeating or terminating decimals and vice versa.	<ul style="list-style-type: none"> Use division to convert fractions to decimals. 	
8. Calculate percentages and solve problems involving percents - discounts, taxes, interest, increase, decrease, etc.	<ul style="list-style-type: none"> Using sales ads, have students calculate final prices after applying discount and tax. 	
9. Use proportions to solve a variety of problems.	<ul style="list-style-type: none"> Create scale drawings using proportions. 	
10. Find unit rates.	<ul style="list-style-type: none"> Find miles per hour given a distance and time. 	

11. Solve problems using rates.	<ul style="list-style-type: none"> Plan a trip. Calculate how many gallons of gas it will take to make the trip. 	
12. Make reasonable estimates using fractions and decimals.	<ul style="list-style-type: none"> Use rounding to check work for errors. 	

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 7

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. Customary Units:		
1. Memorize the unit equivalence using the customary units in measuring length, capacity, and weight (e.g., 1 ft. = 12 in.).	<ul style="list-style-type: none"> E.g., 1 foot = 12 inches, 1 gallon = 4 quarts, 1 pound = 16 ounces. 	
2. Convert within the customary units in measuring length, capacity, weight.	<ul style="list-style-type: none"> Use unit fractions to convert from miles to inches. 	
3. Measure objects using the appropriate customary units.	<ul style="list-style-type: none"> Measure the capacity of a variety of students' water bottles. 	
4. Regroup when adding or subtracting in length, weight and capacity calculations.	<ul style="list-style-type: none"> Find the total weight of the contents of a backpack when each item is weighed separately. 	
B. Metric System:		
1. Memorize the unit equivalence in the metric system (e.g., 1 km = 1000 m).	<ul style="list-style-type: none"> 1 Kilometer = 1000 meters, 1 Liter = 1000 milliliters, 1 gram = 100 milligrams. 	
2. Convert within the metric system in measuring length, capacity and weight.	<ul style="list-style-type: none"> Use a table of metric units to help convert from centimeters to kilometers by moving the decimal five places to the left. 	
3. Measure objects using the appropriate	<ul style="list-style-type: none"> Throw a ball. Measure how far it has 	

metric units.	traveled in meters and centimeters.	
4. Approximate the relationship between customary and metric measurement systems.	<ul style="list-style-type: none"> Fill liter and quart containers using the same measuring cup. Compare the difference between the amount needed to fill the different containers. 	
5. Convert between metric and customary systems.	<ul style="list-style-type: none"> E.g., Convert degrees Celsius to Fahrenheit using a formula. 	
C. Time: Understand measurable attributes of objects, and the units, systems, and processes of appropriate measurement.		
1. Convert units of time.	<ul style="list-style-type: none"> Convert the number of minutes spent watching TV in a day to the number of hours spent in a week. 	

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 7

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: Represent and analyze mathematical situations and structures using algebraic symbols.		
1. Recognize variables, constants, and expressions.	<ul style="list-style-type: none"> Name the variables and constants in an expression in preparing to combine like 	

	terms.	
2. Recognize mathematical symbols for various operations.	<ul style="list-style-type: none"> Use multiple grouping symbols in an expression. 	
3. Translate phrases into mathematical expressions.	<ul style="list-style-type: none"> Find the variable in a word problem and write an expression for the situation. 	
4. Evaluate expressions applying the correct order of operations using substitution.	<ul style="list-style-type: none"> E.g., Evaluate $3x + c$ when $x = 4$ and $c = -2$. 	
5. Recognize and combine like terms.	<ul style="list-style-type: none"> Simplify $2x + 5 - 3x + 7$ to $-x + 12$. 	
B. Equations: Use mathematical models to represent and understand quantitative relationships.		
1. Translate sentences into mathematical equations.	<ul style="list-style-type: none"> E.g., Two less than three times the sum of a number and 4 is 10 becomes $3(x+4) - 2 = 10$. 	
2. Use variables to create and solve equations representing problem situations.	<ul style="list-style-type: none"> E.g., Using a verbal model to create an expression for the length of a rectangle is twice its width. Create an equation for the given perimeter and solve. 	
3. Solve two-step equations with one variable.	<ul style="list-style-type: none"> Solve equations that involve multiplication and addition. 	
4. Use formulas to solve problems.	<ul style="list-style-type: none"> Find the simple interest using the formula $I = prt$. 	
5. Use the coordinate plane to graph ordered pairs and linear equations.	<ul style="list-style-type: none"> Create a table of at least 4 x- and y- values for a given equation. Plot the points. 	
6. Identify the slope of a line as positive or negative.	<ul style="list-style-type: none"> Tell if the slope of a line on a graph is positive, negative, zero or undefined. 	
C. Inequalities: Represent and analyze mathematical situations and structures using algebraic symbols.		
1. Translate sentences into mathematical inequalities.	<ul style="list-style-type: none"> Write an inequality for a “a person must be at least 18 years old to vote.” 	
2. Solve one and two-step inequalities.	<ul style="list-style-type: none"> Use inverse operations to solve. Reverse the inequality sign when necessary. 	
3. Graph inequalities on a number line.	<ul style="list-style-type: none"> Use an open or solid circle. 	

D. Patterns, Sequences and Functions: Understand change in various contexts.		
1. Describe the pattern of a series of numbers or pictures.	<ul style="list-style-type: none"> Find more complex patterns. 	
2. Find the next term(s) in a series of numbers or pictures.	<ul style="list-style-type: none"> Find missing terms in a list (e.g., 2, 4, __, 16, __, __, 128). 	
3. Describe the rule used in a simple function.	<ul style="list-style-type: none"> Write the rule from a table of x and y values. 	
4. Compute the output for a given input.	<ul style="list-style-type: none"> Complete a table for a given function. 	

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 7

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: Specify locations and describe spatial relationships using coordinate geometry and other representational systems.		
1. Identify and name points, segments, lines, rays, angles and planes.	<ul style="list-style-type: none"> Given a drawing, identify and name lines, points, angles, etc. 	
2. Identify, name, and draw polygons.	<ul style="list-style-type: none"> Create a design using at least four polygons or a tessellation. 	
3. Identify the parts of a circle.	<ul style="list-style-type: none"> Draw a circle and label the parts. 	
4. Recognize vertices, edges and faces.	<ul style="list-style-type: none"> Use classroom objects (books, boxes, 	

	pyramids, cans) to count faces, edges and vertices.	
5. Identify parallel, perpendicular, and intersecting lines.	<ul style="list-style-type: none"> Use a map to identify parallel and intersecting streets. 	
6. Identify vertical, adjacent, complementary, and supplementary angles.	<ul style="list-style-type: none"> Draw examples of different types of angles. 	
7. Identify the parts of a right triangle.	<ul style="list-style-type: none"> Find hypotenuse, legs, right angle. 	
8. Identify similar and congruent figures.	<ul style="list-style-type: none"> List corresponding parts of two similar figures. 	
B. Identify and Classify Shapes: Analyze characteristics and properties of 2-D and 3-D shapes and development mathematical arguments.		
1. Classify triangles by sides and angles.	<ul style="list-style-type: none"> Sort cut out triangles according to the side lengths, then according to the angle measures. 	
2. Classify quadrilaterals.	<ul style="list-style-type: none"> Create a quadrilateral chart. 	
3. Classify three dimensional figures.	<ul style="list-style-type: none"> Use cardstock cutout patterns and have students build various solids. 	
4. Construct basic elements of geometric figures using compass, protractor, and straightedge.	<ul style="list-style-type: none"> Use compass and straight edge to draw perpendicular bisectors. 	
5. Use the properties of vertical, complementary and supplementary angles and the sum of the angles of a triangle to determine the measure of an unknown angle.	<ul style="list-style-type: none"> Find the angle measurements in a diagram. 	
C. Geometric Formulas: Use visualization, spatial reasoning, and geometric modeling to solve problems.		
1. Find the perimeter of polygons.	<ul style="list-style-type: none"> Measure the length and width of several objects. Compute the perimeter. 	
2. Find the area of squares, rectangles, parallelograms, trapezoids and triangles.	<ul style="list-style-type: none"> Use formulas to compute area. Find unknown measures when given the area. 	

3. Find the circumference and area of circles.	<ul style="list-style-type: none"> Use formulas to compute area and circumference. Use $\pi = 3.14$ and $\pi = \frac{22}{7}$ 	
4. Find the volume of rectangular prisms, cylinders, pyramids and cones.	<ul style="list-style-type: none"> Use the formula to compute volume. Express answer in cubic units. 	
5. Recognize, explain, and perform transformations that include rotation, reflection, translation and dilation.	<ul style="list-style-type: none"> Draw a figure on graph paper. Transform using translation, reflection, etc. 	
6. Use the Pythagorean Theorem.	<ul style="list-style-type: none"> Use $a^2 + b^2 = c^2$ to find the missing side of a right triangle. 	

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: Select and use appropriate statistical methods to analyze data.		
1. Find mean, median, mode and range.	<ul style="list-style-type: none"> Have students use their test scores for the grading period to find the mean, median, mode, and range. 	
2. Use measures of central tendency to interpret data.	<ul style="list-style-type: none"> Have students identify the best average from their test scores. 	
3. Recognize different types of graphs.	<ul style="list-style-type: none"> Use magazines to find different types of graphs. 	
4. Collect and use data to create an appropriate data display.	<ul style="list-style-type: none"> Survey a group of students about amount of time spent on homework each night. Create 	

	a bar and circle graph.	
5. Construct various forms of display for data sets, including stem-and-leaf plot, box-and-whisker plot, scatter plots, line graph, bar graph.	<ul style="list-style-type: none"> • Draw a variety of graphs using paper and pencil, computer software, etc. 	
B. Probability: Understand and apply basic concepts of probability.		
1. Identify outcomes, events and experiments.	<ul style="list-style-type: none"> • Drawing names from a hat, count the outcomes. 	
2. Express probabilities in fractions, decimals or percents.	<ul style="list-style-type: none"> • Find the probability of picking a consonant from a group of letters. 	
3. Determine the probability of simple and compound events.	<ul style="list-style-type: none"> • Find the probability of a coin landing on heads three times in a row. 	
4. Make predictions based on theoretical probability.	<ul style="list-style-type: none"> • Predict how many times you will get a 4 or 5 when rolling a number cube 20 times. Then roll a number cube 20 times. Compare the results. 	
C. Data Analysis: Develop and evaluate inferences and predictions that are based on data.		
1. Read information from a variety of graphs.	<ul style="list-style-type: none"> • Find information from graphs. 	
2. Draw conclusions from data on graphs.	<ul style="list-style-type: none"> • Write a paragraph about the trends shown by a graph on gas prices. 	
3. Make predictions from data on graphs.	<ul style="list-style-type: none"> • Use a graph showing gas prices for the past month. Predict next week's price. 	
4. Recognize and interpret misleading information.	<ul style="list-style-type: none"> • Know if the sample group will show bias. Is the scale used appropriate? 	

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.	