Archdiocese of Newark Catholic Schools

Curriculum Mapping

Curriculum mapping is a process that helps schools and districts/dioceses determine the "agreed-upon" learning for all students. Curriculum mapping was undertaken in the Archdiocese of Newark in order to ensure that a consistent, clearly articulated curriculum infused with Gospel values is being provided to all students in our schools. The curriculum maps for the Catholic schools of the Archdiocese of Newark identify the content to be taught and skills to be mastered at each grade level.

The expertise and experience of the educators within our schools is the main source for determining the content and skills students will be expected to master. The Archdiocesan curriculum maps are developed through a collaborative process which involves individual teacher contributions, small group sessions and larger group meetings. Relevant educational standards, including those proposed by content area experts, the New Jersey Core Curriculum Content Standards, and the Common Core State Standards, are used as a resource in the curriculum mapping process. The resulting consensus maps reflect the collective thinking of classroom teachers based on their observation of student learning and their knowledge of educational practice and research. The Archdiocesan curriculum maps include teacher generated ideas for the infusion of Gospel values and faith connection activities.

While the curriculum maps clearly articulate the expected learning for all students, individual teachers have the flexibility to teach the content and skills in their own manner by:

- utilizing their own particular strengths and teaching style
- addressing the varying learning needs of their students
- determining the order in which the content and skills are presented within a marking period
- including additional content and skills once students have met the learning expectations identified in the curriculum map

Administrators at all levels will maintain the responsibility to ensure that teachers are following the curriculum maps and that appropriate teaching is being conducted. This will be done through a combination of classroom observations, faculty meetings, professional development opportunities and teacher evaluations, as well as by using various measurement tools, including but not limited to in-class and standardized testing. The Archdiocesan curriculum maps will help ensure the academic excellence that is integral to the mission of our Catholic schools and will provide educators and parents with a clear understanding of the learning expectations at each grade level.

Algebra I
July 2014

Archdiocese of Newark Catholic Schools
Curriculum Map for Mathematics
Grade 8 Algebra 1

First Trimester: September-November

Standards	Content	Skills	Assessment	Gospel Values & Faith Connections
N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. N.Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.S2 Select and apply the properties of operations, such as commutative, associative, distributive, and identity, to simplify and evaluate numerical expressions.	**Real Numbers** **Properties of Real Numbers** **Distributive Property**	Compare, classify, and order real numbers. Demonstrate understanding by using a number line. Identify and apply the properties of real numbers. Recall from memory the properties of real numbers. Discuss the use and application of the Distributive Property. Apply the Distributive Property.	Student learning will be assessed on a continual basis using various types of formal and informal assessments. A list of possible assessment methods is provided below: Tests Quizzes Student generated work Basic fact quizzes Projects Cross-curriculum projects Critical thinking questions Problem-solving relay races Graded and ungraded recitations Speed tests of mental math STEM projects Games/contests Mid-chapter tests Interactive whiteboard activities Online Programs Class participation	Gospel values should be evident in the classroom environment and referenced and reinforced throughout the curriculum. **Gospel Values** Community Compassion Faith in God Forgiveness Hope Justice Love Peace Respect For Life Service Simplicity Truth Teachers will also highlight elements of Catholic identity that can be related to topics in the Math curriculum.

Archdiocese of Newark Catholic Schools
Curriculum Map for Mathematics
Grade 8 Algebra 1

First Trimester: September-November

Standards	Content	Skills	Assessment	Gospel Values & Faith Connections
A.SSE.1 Interpret expressions that represent a quantity in terms of its context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity.	**Variables and Expressions**	Translate verbal phrases into algebraic expressions, equations and inequalities. Identify and combine like terms. Simplify and evaluate numerical expressions.		
6.EE.2C Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *Example: Use the formulas V = s3 and A = 6s2 to find the volume and surface area of a cube with sides of length s = 1/2.*	**Order of Operations**	Interpret and evaluate algebraic expressions using the order of operations.		
A.SSE.2 Use the structure of an expression to identify ways to rewrite it.	**Algebraic Expressions**	Translate algebraic expressions. Simplify and evaluate algebraic expressions. Rewrite algebraic expressions.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra 1				
First Trimester: September-November				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. A.REI.11 Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect	**Equations** • linear • literal • absolute value	Solve multi-step equations. Solve equations with variables on both sides. Recognize when an equation has one solution, infinite solutions, or no solution. Rewrite a formula to solve for any one of its variable components. Check the accuracy of a solution by substituting it in the original equation. Write and solve absolute value equations. Create equations.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra 1				
First Trimester: September-November				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, (e.g., using technology to graph the functions, make tables of values, or find successive approximations.) Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. 7.RP.2 Recognize and represent proportional relationships between quantities. a) Decide whether two quantities are in a proportional relationship e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b) Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c) Represent proportional relationships by equations. 7.RP.3 Use proportional relationships to solve multi-step ratio and percent problems. *Examples: Simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent of change (increase and decrease), percent error.*	**Ratios, Proportions, Percents**	Use formulas, proportions, and percents to solve real-life problems. Recognize a proportion and successfully apply the cross-product property to solve.		

Archdiocese of Newark Catholic Schools
Curriculum Map for Mathematics
Grade 8 Algebra 1

First Trimester: September-November

Standards	Content	Skills	Assessment	Gospel Values & Faith Connections
A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *Example: Represent inequalities describing nutritional and cost constraints on combinations of different foods.* A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. 6.NS.6C Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	**Inequalities** • simple • linear **Word problems: Strategies & Applications**	Solve multi-step inequalities. Solve inequalities with variables on both sides. Write and solve simple linear inequalities. Check the accuracy of a solution by substituting in the original equation. Graph linear inequalities and understand the significance of the slope and intercept points of these graphs. Develop and apply strategies to solve real-life word problems.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra 1				
First Trimester: September-November				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. F.IF.8b Use the properties of exponents to interpret expressions for exponential functions. N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.				

Archdiocese of Newark Catholic Schools
Curriculum Map for Mathematics
Grade 8 Algebra I

Second Trimester: December-February

Standards	Content	Skills	Assessment	Gospel Values & Faith Connections
8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. 8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). 8.F.3 Interpret the equation $f(x) = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear. 8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. 8.F.5 Describe qualitatively the functional relationship between two	**Relations and Functions**	Identify when a relation is a function and include the vertical line test. Define a function's domain and range and organize this data in table form. Compare properties of two functions. Write, rewrite and build functions. Graph absolute value functions. Find the inverse of linear functions. Interpret functions. Construct linear, quadratic, and exponential functions.	Student learning will be assessed on a continual basis using various types of formal and informal assessments. A list of possible assessment methods is provided below: Tests Quizzes Student generated work Basic fact quizzes Projects Cross-curriculum projects Critical thinking questions Problem-solving relay races Graded and ungraded recitations Speed tests of mental math STEM projects Games/contests Mid-chapter tests Interactive whiteboard activities	Gospel values should be evident in the classroom environment and referenced and reinforced throughout the curriculum. **Gospel Values** Community Compassion Faith in God Forgiveness Hope Justice Love Peace Respect For Life Service Simplicity Truth Teachers will also highlight elements of Catholic identity that can be related to topics in the Math curriculum.

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. A.SSE.2 Use the structure of an expression to identify ways to rewrite it. F.BF.1Write a function that describes a relationship between two quantities. a) Determine an explicit expression, a recursive process, or steps for calculation from a context. b) Combine standard function types using arithmetic operations. F.BF.3 Identify the effect on the graph of replacing *f(x)* by *f(x) + k*, *k f(x)*, *f(kx)*, and *f(x + k)* for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.			Online Programs Discussion and class participation	

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
F.BF.4 Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *Example: f(x) =2x3 for x > 0 or f(x) = (x+1)/(x-1) for x ≠ 1.* F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context.				

Archdiocese of Newark Catholic Schools
Curriculum Map for Mathematics
Grade 8 Algebra I

Second Trimester: December-February

Standards	Content	Skills	Assessment	Gospel Values & Faith Connections
A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. F.IF.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input x. The graph of *f* is the graph of the equation y = *f(x)*. F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.	**Writing, Graphing and Forms of Linear Equations** • *slope-intercept* • *point-slope* • *standard* • *parallel lines* • *perpendicular lines* • *intercepts* • *distance and midpoint*	Graph linear equations. Write and graph forms of linear equations and understand the significance of the slope and intercept points of these graphs. Identify and graph x and y intercepts. Use formulas to determine: slope, point-slope, and slope-intercept. Use formulas to determine distance and midpoint. Compare and contrast graphs of parallel and perpendicular lines. Define parallel and perpendicular slopes. Write equations for parallel and perpendicular lines.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
		Differentiate the various forms of linear equations: Slope-Intercept, Standard, Point-Slope. Choose the most appropriate form of a linear equation given the problematic situation. Transform linear equations from one form to another form.		
A.REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	**Compound and Absolute Value Equations and Inequalities**	Write, solve, and graph compound and absolute value linear equations and inequalities. Solve systems of linear inequalities.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
8.EE.8 Analyze and solve pairs of simultaneous linear equations. a) Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b) Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. c) Solve real-world and mathematical problems leading to two linear equations in two variables. *Example: Given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* A.REI.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions (*substitution and elimination*).	**Systems of Linear Equations and Linear Inequalities**	Solve systems of linear equations and inequalities both graphically and algebraically; choose the best method given the system. Understand the various types of solutions: one solution, infinite solutions, or no solution.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. A.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or*	**Rate of change/slope**	Determine direction of a line from the slope. Identify slope from a graph and calculate using two points. Use slope to determine average rate of change in application problems.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
negative; relative maximums and minimums; symmetries; end behavior; and periodicity. F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. 8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions. b) Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.				

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
c) Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). A.SSE.3c Use the properties of exponents to transform expressions for exponential functions.	**Direct Variation** **Laws of Exponents**	Write and solve linear equations that use direct/inverse variation. Simplify exponential expressions using the properties/laws of exponent. Transform expressions to exponential functions using properties/laws of exponents		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Second Trimester: December-February				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
A.APR.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, multiply, and divide polynomials. F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. F.IF.8b Use the properties of exponents to interpret expressions for exponential functions. N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	**Polynomials** • classification • operations • special products **Word Problems: Strategies & Applications**	Recognize different types of polynomials and write them in standard form. Classify each type of polynomial expression by degree and number of terms. Simplify polynomial expressions. Add, subtract, and multiply polynomial expressions. Understand the process for division of polynomial expressions. Develop and apply strategies to solve real-life word problems.		

Archdiocese of Newark Catholic Schools
Curriculum Map for Mathematics
Grade 8 Algebra I

Third Semester: March-June

Standards	Content	Skills	Assessment	Gospel Values & Faith Connections
A.SSE.2 Use the structure of an expression to identify ways to rewrite it. A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a) Factor a quadratic expression to reveal the zeros of the function it defines. b) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. A.REI.4 Solve quadratic equations in one variable. a) Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form	**Factoring** **Quadratic Equations** • **formula** • **factoring** • **completing the square**	Find the greatest common factor of a polynomial. Factor polynomials completely using various methods. Quadratic equations Solve quadratic equations by means of factoring and zero-product property. Check all solutions.	Student learning will be assessed on a continual basis using various types of formal and informal assessments. A list of possible assessment methods is provided below: Tests Quizzes Student generated work Basic fact quizzes Projects Cross-curriculum projects Critical thinking questions Problem-solving relay races Graded and ungraded recitations Speed tests of mental math STEM projects Games/contests Mid-chapter tests Interactive whiteboard activities Online Programs	Gospel values should be evident in the classroom environment and referenced and reinforced throughout the curriculum. **Gospel Values** Community Compassion Faith in God Forgiveness Hope Justice Love Peace Respect For Life Service Simplicity Truth Teachers will also highlight elements of Catholic identity that can be related to topics in the Math curriculum.

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Third Semester: March-June				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ b) Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.			Discussion and class participation	
N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.	**Rational Expressions**	Simplify rational expressions using factoring. Add, subtract, multiply, and divide rational expressions.		
N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**Radicals**	Identify and evaluate radical whole number expression. Simplify, multiply, rationalize, add, and subtract radicals.		

Archdiocese of Newark Catholic Schools Curriculum Map for Mathematics Grade 8 Algebra I				
Third Semester: March-June				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values & Faith Connections**
A.APR. 1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, multiply, and divide polynomials	**Division of Polynomials**	Divide polynomials using long division.		
F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. F.IF.8b Use the properties of exponents to interpret expressions for exponential functions.	**Solving rational equations**	Apply appropriate skills to solve rational equations and check solutions. Simplify, multiply, rationalize, add, and subtract radicals. **Enrichment: Use of graphing calculator*		
N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	**Word Problems: Strategies & Applications**	Develop strategies to solve word problems with real world applications.		