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.

High School Algebra 1
July 2014

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Curriculum Map for High School Algebra 1</th></tr>
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<tr><th>Standards</th><th>Content</th><th>Skills</th><th>Assessment</th><th>Gospel Values</th></tr>
<tr><td colspan="5">This curriculum map reflects the general expectations of student learning in Algebra 1 at the high school level. Each school will determine the course-specific expectations based on the level of the course or courses offered. Schools will also determine the sequence in which the various topics are taught within the specific course.</td></tr>
<tr><td>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. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.

N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

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. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.

A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.</td>
<td>Real Numbers

Variables and Expressions

Order of Operations

Algebraic Expressions</td>
<td>Compare, classify, and order real numbers and demonstrate an understanding of absolute value (using a number line).

Translate verbal phrases into algebraic expressions, equations or inequalities.

Interpret and evaluate algebraic expressions using order of operations.

Simplify and evaluate algebraic expressions.</td>
<td>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
Projects
Homework
Classwork
Student presentations
Observation of student work
Critical thinking activities
Performance Tasks
Online Programs
Class participation
Mid-term exams
Final exams</td>
<td>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.</td></tr>
</table>

Archdiocese of Newark Catholic Schools Curriculum Map for High School Algebra 1				
First Marking Period				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values**
A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	**Properties of Addition, Multipli-cation & Equality**	Identify and apply the properties of real numbers.		
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. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	**Linear Equations**	Select the correct inverse operations in proper sequence for solving linear equations. Recognize when an equation has one solution, infinite solutions, or no solution. Check the accuracy of a solution by substituting in the original equation.		
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.2 Solve simple rational and radical equations in one variable, and	**Literal Equations**	Solve literal equations for a given variable. Rewrite a formula to solve for any one of its variable components.		

Archdiocese of Newark Catholic Schools
Curriculum Map for High School Algebra 1

First Marking Period

Standards	Content	Skills	Assessment	Gospel Values
give examples showing how extraneous solutions may arise. A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. A.CED.4: See page 2				
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.	**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.		
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*.	**Word Problems**	Develop strategies to solve real-life word problems. Check the solution in the original conditions of the problem.		

Archdiocese of Newark Catholic Schools
Curriculum Map for High School Algebra 1

Second Marking Period

Standards	Content	Skills	Assessment	Gospel Values
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.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For 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. 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.	**Linear Inequalities** **Compound Inequalities**	Write and solve linear inequalities and apply these skills to solving real-life problems. Write and solve compound inequalities and apply these skills to solving real-life problems.	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 Projects Homework Classwork Student presentations Observation of student work Critical thinking activities Performance Tasks Online Programs Class participation Mid-term exams Final exams	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
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Second Marking Period

Standards	Content	Skills	Assessment	Gospel Values
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.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*. F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*	**Relations and Functions**	Identify when a relation is a function. Determine whether a relation is a function when given its graph by means of the vertical line test. Define a function's domain and range and organize this data in table form. Rewrite a two-variable equation in function form.		

Archdiocese of Newark Catholic Schools
Curriculum Map for High School Algebra 1

Second Marking Period

Standards	Content	Skills	Assessment	Gospel Values
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.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). 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.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	**Graphs of Linear Equations**	Graph linear equations and understand the significance of the slope and intercept points of these graphs. Identify and graph ***x***- and ***y***-intercepts. Determine direction of a line from the slope. Identify slope from a graph and calculate using two points.		

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Second Marking Period

Standards	Content	Skills	Assessment	Gospel Values
F.IF.4 See page 5 *F.IF.5 See page 5* 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. F.IF.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. F.IF.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	**Rate of Change/ Slope**	Use slope to determine average rate of change in application problems. Interpret the slope (rate of change) and intercept (constant term) of a linear model in the context of the data in real world problems.		

Archdiocese of Newark Catholic Schools Curriculum Map for High School Algebra 1				
Second Marking Period				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values**
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.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. 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*.	**Direct Variation**	Write and solve linear equations that use direct variation.		
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*.	**Absolute Value Equations**	Write and solve absolute value equations.		

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Second Marking Period

Standards	Content	Skills	Assessment	Gospel Values
F.IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.				
A.CED.1 See page 8 A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For 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.	**Graphs of Linear Inequalities**	Graph linear inequalities and understand the significance of the slope and intercept points of these graphs.		

Third Marking Period

Standards	Content	Skills	Assessment	Gospel Values
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*. 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.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*.	**Writing Linear Equations**	Write an equation of a line given slope and any point on the line, or, any two points on the line.	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 Projects Homework Classwork Student presentations Observation of student work Critical thinking activities Performance Tasks Online Programs Class participation Mid-term exams Final exams	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.

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Third Marking Period

Standards	Content	Skills	Assessment	Gospel Values
F.BF.1 Write a function that describes a relationship between two quantities. F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.	**Forms of Linear Equations**	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 from one form of a linear equation to another form.		
G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	**Parallel and Perpendicular Lines**	Define parallel and perpendicular slopes. Write equations for parallel and perpendicular lines.		

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Third Marking Period				
Standards	**Content**	**Skills**	**Assessment**	**Gospel Values**
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.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. 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. 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.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).	**Systems of Linear Equations**	Solve systems of linear equations both graphically and algebraically; choose the best method given the system. Understand the various types of solutions: one solution, infinite solutions, or no solution.		

Third Marking Period

Standards	Content	Skills	Assessment	Gospel Values
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 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.				
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. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. A.SSE.3c Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	**Laws of Exponents**	Simplify exponential expressions using the properties of exponents. Recognize different types		

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Third Marking Period

Standards	Content	Skills	Assessment	Gospel Values
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, and multiply polynomials.	**Polynomial Operations** *(excluding division)*	of polynomials and write them in standard form. Classify each type of polynomial expressions by degree and number of terms. Simplify polynomial expressions. Add, subtract, multiply polynomial expressions.		
A,CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*.	**Systems of Linear Inequalities**	Solve systems of linear inequalities graphically.		

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Fourth Marking Period

Standards	Content	Skills	Assessment	Gospel Values
A.SSE.2 Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* 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.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines. A.SSE.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. A.REI.4a 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. A.REI.4b 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	*Items marked with an asterisk (*) are considered optional.* **Factoring** **Solving Quadratic Equations by Factoring**	*Items marked with an asterisk (*) are considered optional.* Find the greatest common factor of a polynomial. Factor polynomials completely using various methods. 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 Projects Homework Classwork Student presentations Observation of student work Critical thinking activities Performance Tasks Online Programs Class participation Mid-term exams Final exams	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.

Fourth Marking Period

Standards	Content	Skills	Assessment	Gospel Values
equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.				
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. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.*	**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**	Simplify square roots. Multiply, add, and subtract radicals		
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, and multiply polynomials.	****Division of Polynomials***	*Divide polynomials using long division		
A.REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	****Solving Rational Equations***	*Apply appropriate skills to solve rational equations and check solutions.		