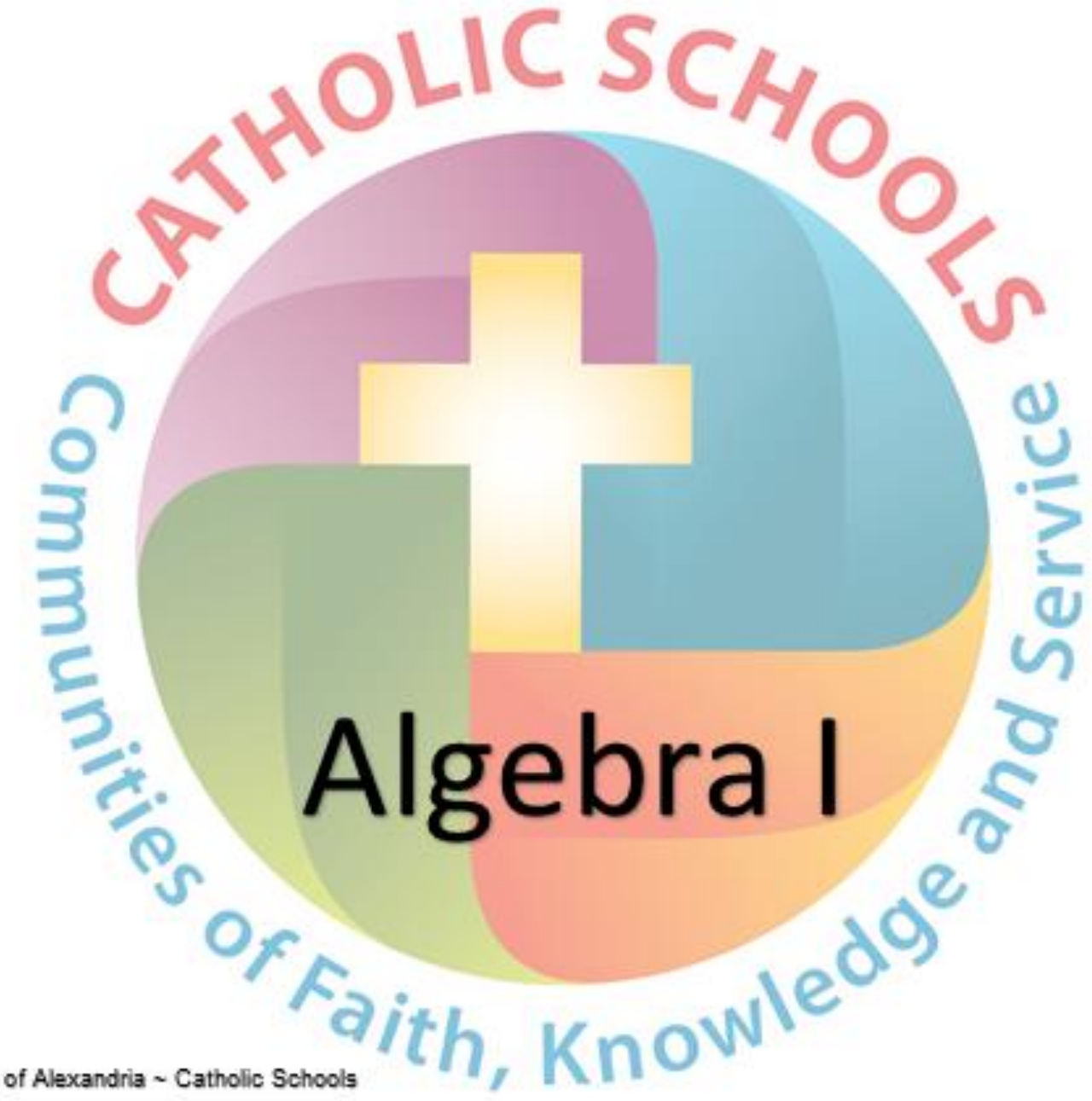

Diocese of Alexandria ~ Catholic Schools

Where faith and knowledge grow

DIOCESE OF ALEXANDRIA

As the Diocese of Alexandria seeks to provide a comprehensive learning environment, we are charged to "Teach More" by showing how all learning flows from and relates to our Creator. In this way, we will give our teaching a deeper meaning and purpose than simply the content itself. With this as our goal, the Catholic Schools Office has intertwined our selected curricular standards with the Catholic Standards developed by the Cardinal Newman Society. Through the merging of these two curricula, English Language Arts, Mathematics, Science, and Social Studies, teachers will be provided a roadmap to guide student's understanding and recognition of the relationship between learning and the connection to our God.

Thomas E. Roque, Sr.
Superintendent of Catholic Schools

DIOCESE OF ALEXANDRIA

Through comprehensive review of curricula from high performing districts throughout the United States in combination with parochial schools and Newman Cardinal Standards, the Curriculum Team for the Diocese of Alexandria has generated curricula for English Language Arts, Mathematics, Science, and Social Studies. The development of this framework is designed to guide the instructional path of teachers as they focus on the formation of their students in the areas of faith, academic excellence, responsible citizenry, and effective communication and collaboration. This process is a continuous improvement process with no defined beginning or end.

Barbara Forest, M.A.
Courtney Gistorb, M.Ed.
Denese Carter, M.Ed.
Tracy Bock, Ed.S.

Frameworks

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HOW TO USE

The frameworks are guides to instruction. The frameworks assist teachers in planning and pacing instruction. Specific dates or weeks that may be included in this document are for reference. Each school and teacher must consider the make-up of their students, focusing on the needs and strengths of each child when pacing and planning instruction.

The cycles for the year help pace instruction and ensure students have consistent coverage of the content. The duration (the suggested amount of time to spend on each cycle) does not accommodate for the scheduling of special events, inclement weather or school events. Teachers, with principal guidance, should adjust pacing as needed to accommodate for these events.

RESEARCH-BASED HIGH-YIELD PRACTICES FOR INSTRUCTION

These strategies have proven effective in affecting student learning and achievement gains. As you plan daily instruction, consider how and where to integrate these strategies into the instructional sequence. Effect size is in parentheses. Please refer to the works of John Hattie for a complete description of instructional effect size.

- Classroom Discussion/Discourse (.82)
- Teacher Clarity/making the learning visible with expectations for learning (.75)
- Reciprocal Teaching (.74)
- Feedback (.73)
- Metacognitive Strategies (.69)

Student focus Areas

Essential Questions
• *How does mathematics help us understand God's creation?* • *How does the use of math help us to understand the importance of clarity, reality and goodness?* • *How do we solve addition and subtraction sentences to solve real world problems with and without concrete objects?* • *What are the ethical, moral, and legal implications of Internet use?* • *How does the study of mathematics enable us to understand, communicate, and live Gospel values?*

Catholic School – Mathematic Standards (CS.GS)	
CS.M.712.GS.1	Demonstrate the mental habits of precise, determined, careful and accurate questioning, inquiry, and reasoning in pursuit of transcendent truths.
CS.M.712.GS.2	Develop lines of inquiry (as developmentally appropriate) to understand why things are true and why they are false.
CS.M.712.GS.3	Have faith in the glory and dignity of human reason as both a gift from God and a reflection of Him in whose image and likeness we are made.
CS.M.712.GS.4	Explain how mathematics in its reflection of the good, true, and beautiful reveals qualities of being and the presence of God.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 1 Algebra 1 **1st 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ N.Q.A.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.A.2. Define appropriate quantities for the purpose of descriptive modeling. ☐ N.Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): • Units are associated with variables in expressions and equations in context. • Quantities may be used to model attributes of real world situations. • Measurement tools have an inherent amount of uncertainty in measurement. Students are able to: • Use units to understand real world problems. • Use units to guide the solution of multi-step real world problems (e.g. dimensional analysis). • Choose and interpret units while using formulas to solve problems. • Identify and define appropriate quantities for descriptive modeling. • Choose a level of accuracy when reporting measurement quantities. Learning Goal 1: Solve multi-step problems, using units to guide the solution, interpreting units consistently in formulas and choosing an appropriate level of accuracy on measurement quantities. Develop descriptive models by defining appropriate quantities.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 1 Algebra 1 **1st 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ A.REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. ■ A.REI.A.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 select equation has a solution. Construct a viable argument to justify a solution method. ■ A.CED.A.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.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Literal equations can be rearranged using the properties of equality. Students are able to. • Solve linear equations with coefficients represented by letters in one variable. • Use the properties of equality to justify steps in solving linear equations. • Solve linear inequalities in one variable. • Rearrange linear formulas and literal equations, isolating a specific variable. Learning Goal 2. Solve linear equations and inequalities in one variable (including literal equations); justify each step in the process.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 1 Algebra 1 — **1st 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context. ■ A.SSE.A.1a. Interpret parts of an expression, such as terms, factors, and coefficients.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively.	Concept(s): No new concept(s) introduced Students are able to: • Identify different parts of an expression, including terms, factors and constants. • Explain the meaning of parts of an expression in context. Learning Goal 3: Interpret terms, factors, coefficients, and other parts of expressions in terms of a context .
■ A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions. ■ A.REI.A.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.	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Equations and inequalities describe relationships. • Equations can represent real-world and mathematical problems. Students are able to: • Identify and describe relationships between quantities in word problems. • Create linear equations in one variable. • Create linear inequalities in one variable. • Use equations and inequalities to solve real world problems. • Explain each step in the solution process. Learning Goal 4: Create linear equations and inequalities in one variable and use them in contextual situations to solve problems. Justify each step in the process and the solution.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 1 Algebra 1 **1st 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ A.CED.A.2. Create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales. ▢ N.Q.A.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.REI.D.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). [Focus on linear equations.]	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Equations represent quantitative relationships. Students are able to: • Create linear equations in two variables, including those from a context. • Select appropriate scales for constructing a graph. • Interpret the origin in graphs. • Graph equations on coordinate axes, including labels and scales. • Identify and describe the solutions in the graph of an equation. Learning Goal 5: Create linear equations in two variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 1 Algebra 1 — **1st 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.B.6a. Fit a function to the data (including the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. S.ID.B.6c. Fit a linear function for a scatter plot that suggests a linear association. ■ S.ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ■ S.ID.C.8. Compute (using technology) and interpret the correlation coefficient of a linear fit. ■ S.ID.C.9. Distinguish between correlation and causation.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Scatter plots represent the relationship between two variables. • Scatter plots can be used to determine the nature of the association between the variables. • Linear models may be developed by fitting a linear function to approximately linear data. • The correlation coefficient represents the strength of a linear association. Students are able to: • Distinguish linear models representing approximately linear data from linear. equations representing “perfectly” linear relationships. • Create a scatter plot and sketch a line of best fit. • Fit a linear function to data using technology. • Solve problems using prediction equations. • Interpret the slope and the intercepts of the linear model in context. • Determine the correlation coefficient for the linear model using technology. • Determine the direction and strength of the linear association between two variables. Learning Goal 6: Represent data on a scatter plot, describe how the variables are related and use technology to fit a function to data. Learning Goal 7: Interpret the slope, intercept, and correlation coefficient of a data set of a linear model; distinguish between correlation and causation.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 1 Algebra 1 — **1st 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ A.REI.D.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. [Focus on linear equations.]	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically.	Concept(s): • y = f(x), y=g(x) represent a system of equations. • Systems of equations can be solved graphically (8.EE.C.8). Students are able to: • Explain the relationship between the x-coordinate of a point of intersection and the solution to the equation f(x) = g(x) for linear equations y = f(x) and y = g(x). • Find approximate solutions to the system by making a table of values, graphing, and finding successive approximations. Learning Goal 8: Explain why the solutions of the equation f(x) = g(x) are the x-coordinates of the points where the graphs of the linear equations y=f(x) and y=g(x) intersect. function notation is not introduced here Learning Goal 9: Find approximate solutions of f(x) = g(x), where f(x) and g(x) are linear functions, by making a table of values, using technology to graph and finding successive approximations.

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.*

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
◎ A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. ■ A.CED.A.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.C.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.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics.	Concept(s): • Systems of equations can be solved exactly (algebraically) and approximately (graphically). Students are able to: • Identify and define variables representing essential features for the model. • Model real world situations by creating a system of linear equations. • Solve systems of linear equations using the elimination or substitution method. • Solve systems of linear equations by graphing. • Interpret the solution(s) in context. Learning Goal 1: Solve multistep contextual problems by identifying variables, writing equations, and solving systems of linear equations in two variables algebraically and graphically.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ A.REI.D.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. ■ A.CED.A.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.*	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • Model real world situations by creating a system of linear inequalities given a context. • Interpret the solution(s) in context. Learning Goal 2: Graph linear inequalities and systems of linear inequalities in two variables and explain that the solution to the system.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ F.IF.A.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.A.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • F(x) is an element in the range and x is an element in the domain. Students are able to: • Use the definition of a function to determine whether a relationship is a function. • Use function notation once a relation is determined to be a function. • Evaluate functions for given inputs in the domain. • Explain statements involving function notation in the context of the problem. Learning Goal 3: Explain the definition of a function, including the relationship between the domain and range. Use function notation, evaluate functions and interpret statements in context.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ F.LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. ○ F.LE.A.1a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. ○ F.LE.A.1b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. ○ F.LE.A.1c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • Linear functions grow by equal differences over equal intervals. • Exponential functions grow by equal factors over equal intervals. Students are able to: • identify and describe situations in which one quantity changes at a constant rate. • identify and describe situations in which a quantity grows or decays by a constant percent. • show that linear functions grow by equal differences over equal intervals. • show that exponential functions grow by equal factors over equal intervals. Learning Goal 4: Distinguish between and explain situations modeled with linear functions and with exponential functions.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ F.LE.A.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). [Algebra 1 limitation: exponential expressions with integer exponents] ■ F.IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*	MP 2 Reason abstractly and quantitatively. MP 4. Model with mathematics MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Sequences are functions, sometimes defined and represented recursively. • Sequences are functions whose domain is a subset of integers. Students are able to: • Create arithmetic and geometric sequences from verbal descriptions. • Create arithmetic sequences from linear functions. • Create geometric sequences from exponential functions. • Identify recursively defined sequences as functions. • Create linear and exponential functions given – a graph; – a description of a relationship; – a table of values. Learning Goal 5: Write linear and exponential functions given a graph, table of values, or written description; construct arithmetic and geometric sequences.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ F.BF.A.1. Write a function that describes a relationship between two quantities. 1a. Determine an explicit expression, a recursive process, or steps for calculation from a context. ■ A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context A.SSE.A.1a: Interpret parts of an expression, such as terms, factors, and coefficients. A.SSE.A.1b: 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.* [Algebra 1 limitation: exponential expressions with integer exponents]	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics	Concept(s): No new concept(s) introduced Students are able to: • Given a context, write an explicit expression, a recursive process or steps for calculation for linear and exponential relationships. • Interpret parts of linear and exponential functions in context. Learning Goal 6: Write explicit expressions, recursive processes and steps for calculation from a context that describes a linear or exponential relationship between two quantities.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ○ A.SSE.B.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%.* [Algebra 1: limit to exponential expressions with integer exponents]	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure	Concept(s): No new concept(s) introduced Students are able to: • Use the properties of exponents to simplify or expand exponential expressions, recognizing these are equivalent forms. Learning Goal 7: Use properties of exponents to produce equivalent forms of exponential expressions in one variable.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ F.IF.B.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.* [Focus on exponential functions] □ F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context. ■ F.IF.B.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*	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • Give a verbal description of a relationship, sketch linear and exponential functions. • Identify intercepts and intervals where the function is positive/negative. • Interpret parameters in context. • Determine the *practical* domain of a function. Learning Goal 8: Sketch graphs of linear and exponential functions expressed symbolically or from a verbal description. Show key features and interpret parameters in context.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* [Limit to linear and exponential] ■ F.IF.B.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.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Rate of change of non-linear functions varies. Students are able to*:* • Compare key features of two linear functions represented in different ways. • Compare key features of two exponential functions represented in different ways. • Calculate the rate of change from a table of values or from a function presented symbolically. • Estimate the rate of change from a graph. Learning Goal 9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Learning Goal 10: Calculate and interpret the average rate of change of a function presented symbolically or as a table; estimate the rate of change from a graph.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 2 Algebra 1 — **2nd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima. F.IF.C.7b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Piecewise-defined functions may contain discontinuities. • Absolute value functions are piecewise functions. Students are able to: • Graph linear, square root, cube root, and piecewise-defined functions. • Graph more complicated cases of functions using technology. • Identify and describe key features of the graphs of square root, cube root, and piecewise-defined functions. Learning Goal 11: Graph linear, square root, cube root, and piecewise-defined functions (including step and absolute value functions) expressed symbolically. Graph by hand in simple cases and using technology in more complex cases, showing key features of the graph.

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.*

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ A.APR.A.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. ■ A.SSE.A.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 $(x^2 - y^2)(x^2 + y^2)$.*	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): • Polynomials form a system analogous to the integers. • Polynomials are closed under the operations of addition, subtraction, and multiplication. Students are able to: • Add and subtract polynomials. • Multiply polynomials. • Recognize numerical expressions as a difference of squares and rewrite the expression as the product of sums/differences. • Recognize polynomial expressions in one variable as a difference of squares and rewrite the expression as the product of sums/differences. Learning Goal 1: Add, subtract, and multiply polynomials, relating these to arithmetic operations with integers. Factor to produce equivalent forms of quadratic expressions in one variable.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
A.REI.B.4. Solve quadratic equations in one variable. A.REI.B.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.B.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 equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Multiple methods for solving quadratic equations. • Transforming a quadratic equation into the form $(x - p)^2 = q$ yields an equation having the same solutions. Students are able to: • Use the method of completing the square to transform a quadratic equation in x into an equation of the form $(x - p)^2 = q$. • Derive the quadratic formula from $(x - p)^2 = q$. • Solve quadratic equations in one variable by inspection. • Solve quadratic equations in one variable by taking square roots. • Solve quadratic equations in one variable by completing the square. • Solve quadratic equations in one variable using the quadratic formula. • Solve quadratic equations in one variable by factoring. • Strategically select, as appropriate to the initial form of the equation, a method for solving a quadratic equation in one variable. • Write complex solutions of the quadratic formula in $a \pm bi$ form. • Analyze the quadratic formula, recognizing the conditions leading to complex solutions (discriminant). Learning Goal 2: Derive the quadratic formula by completing the square and recognize when there are no real solutions. Learning Goal 3: Solve quadratic equations in one variable using a variety of methods (including inspection, taking square roots, factoring, completing the square, and the quadratic formula) and write complex solutions in $a \pm bi$ form.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • Create quadratic equations in one variable. • Use quadratic equations to solve real world problems. Learning Goal 4: Create quadratic equations in one variable and use them to solve problems.
■ F.IF.B.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.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the*	MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • Interpret maximum/minimum and intercepts of quadratic functions from graphs and tables in the context of the problem. • Sketch graphs of quadratic functions given a verbal description of the relationship between the quantities. • Identify intercepts and intervals where function is increasing/decreasing • Determine the practical domain of a function. Learning Goal 5: Interpret key features of quadratic functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a quadratic function, showing key features and relating the domain of the function to its graph.

Algebra I

THE DIOCESE of ALEXANDRIA

Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
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		
☐ A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. A.SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines. A.SSE.B.3b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Alternate, equivalent forms of a quadratic expression may reveal specific attributes of the function that it defines. Students are able to: • Factor a quadratic expression for the purpose of revealing the zeros of a function. • Complete the square for the purpose of revealing the maximum or minimum of a function. Learning Goal 6: Use factoring and completing the square to produce equivalent forms of quadratic expressions in one variable that highlight particular properties such as the zeros or the maximum or minimum value of the function.
☐ F.BF.A.1. Write a function that describes a relationship between two quantities. F.BF.A.1a: Determine an explicit expression, a recursive process, or steps for calculation from a context.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concept(s): No new concept(s) introduced Students are able to: • Given a context, write explicit expressions, a recursive process or steps for calculation for quadratic relationships. Learning Goal 7: Given a context, write an explicit expression, a recursive process or steps for calculation for quadratic relationships.

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Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima. [emphasize quadratic functions] ☐ F.IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. F.IF.C.8a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. ■ F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): No new concept(s) introduced Students are able to: • Graph quadratic functions expressed symbolically. • Graph more complicated cases of quadratic functions using technology. • Identify and describe key features of the graphs of quadratic functions. • Given two quadratic functions, each represented in a different way, compare the properties of the functions. Learning Goal 8: Graph quadratic functions by hand in simple cases and with technology in complex cases, showing intercepts, extreme values and symmetry of the graph. Compare properties of two quadratic functions, each represented in a different way.

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*		
■ F.IF.B.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.LE.A.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.	MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • A quantity increasing exponentially eventually exceeds a quantity increasing quadratically. Students are able to: • Calculate the rate of change of a quadratic function from a table of values or from a function presented symbolically. • Estimate the rate of change from a graph of a quadratic function. • Analyze graphs and tables to compare rates of change of exponential and quadratic functions. Learning Goal 9: Calculate and interpret the average rate of change of a quadratic function presented symbolically or as a table. Estimate and compare the rates of change from graphs of quadratic and exponential functions.

Algebra I

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Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
◎ F.BF.B.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.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Characteristics of even and odd functions in graphs and algebraic expressions • Vertical and horizontal shifts Students are able to: • Perform transformations on graphs of linear and quadratic functions. • 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). • Identify the effect on the graph of combinations of transformations. • Given the graph, find the value of k. • Illustrate an explanation of the effects on linear and quadratic graphs using technology. • Recognize even and odd functions from their graphs and from algebraic expressions for them. Learning Goal 10: Identify the effects of transformations and combinations of transformations [$f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$] on a function; find the value of k given the graph.

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Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
A.REI.D.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.	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	Concept(s): No new concept(s) introduced Students are able to: • Approximate the solution(x) to a system of equations comprised of a linear and a quadratic function by using technology to graph the functions, by making a table of values and/or by finding successive approximations. Learning Goal 11: Find approximate solutions of f(x) = g(x), where f(x) is a linear function and g(x) is a quadratic function by making a table of values, using technology to graph and finding successive approximations.
A.APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. [Algebra 1: limit to quadratic and cubic functions in which linear and quadratic factors are available]	MP.7 Look for and make use of structure.	Concept(s): • General shape(s) and end behavior of cubic functions Students are able to: • Find the zeros of a polynomial (quadratic and cubic). • Test domain intervals to determine where f(x) is greater than or less than zero. • Use zeros of a function to sketch a graph. Learning Goal 12: Identify zeros of cubic functions when suitable factorizations are available and use the zeros to construct a rough graph of the function. (cubic functions are presented as the product of a linear and a quadratic factor)

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Unit 3 Algebra 1 — **3rd 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
◎ N.RN.B.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • The sum or product of two rational numbers is rational. • The sum of a rational number and an irrational number is irrational. • The product of a nonzero rational number and an irrational number is irrational. Students are able to: • Explain and justify conclusions regarding sums and products of two rational numbers. • Explain and justify conclusions regarding the sum of a rational and irrational number. • Explain and justify conclusions regarding the product of a nonzero rational and irrational number. Learning Goal 13: Explain and justify conclusions about sums and products of rational and irrational numbers.

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.*

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Unit 4 Algebra 1 — **4th 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
◎ S.ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • Represent data with dot plots on the real number line. • Represent data with histograms on the real number line. • Represent data with box plots on the real number line. Learning Goal 1: Represent data with plots (dot plots, histograms, and box plots) on the real number line.
◎ S.ID.A.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ◎ S.ID.A.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Appropriate use of a statistic depends on the shape of the data distribution. • Standard deviation Students are able to: • Represent two or more data sets with plots and use appropriate statistics to compare their center and spread. • Interpret differences in shape, center, and spread in context. • Explain possible effects of extreme data points (outliers) when summarizing data and interpreting shape, center and spread. Learning Goal 2: Compare center and spread of two or more data sets, interpreting differences in shape, center, and spread in the context of the data, taking into account the effects of outliers.

Algebra I

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Unit 4 Algebra 1 — **4th 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
☐ S.ID.B.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Categorical variables represent types of data which may be divided into groups. Students are able to: • Construct two-way frequency tables for categorical data. • Interpret joint, marginal and conditional relative frequencies in context. • Explain possible associations between categorical data in two-way tables. • Identify and describe trends in the data. Learning Goal 3: Summarize and interpret categorical data for two categories in two-way frequency tables; explain possible associations and trends in the data.
☐ S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.B.6a. Fit a function to the data (including the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. S.ID.B.6b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • Fit a function to data using technology. • Solve problems using functions fitted to data (prediction equations). • Interpret the intercepts of models in context. • Plot residuals of linear and non-linear functions. • Analyze residuals in order to informally evaluate the fit of linear and non-linear functions. Learning Goal 4: Fit functions to data using technology, plot residuals and informally assess the fit of linear and non-linear functions by analyzing residuals.

Algebra I

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Unit 4 Algebra 1 — **4th 9 Weeks**

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
■ F.IF.B.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.B.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.*	MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • Interpret maximum/minimum and intercepts of functions from graphs and tables in the context of the problem. • Sketch graphs of functions given a verbal description of the relationship between the quantities. • Identify intercepts and intervals where function is increasing/decreasing. • Determine the practical domain of a function. Learning Goal 5: Interpret key features of functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a function, showing key features and relating the domain of the function to its graph.

District/School Formative Assessment Plan	District/School Summative Assessment Plan
Formative assessment informs instruction and is ongoing throughout a unit to determine how students are progressing against the standards.	*Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.*

NUMBER AND QUANTITY The Real Number System (DOA.A1:N-RN)

STANDARDS		ACT Reporting Category *ACT Knowledge and Skills*
Use properties of rational and irrational numbers		
DOA.A1:N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	**Number & Quantity** **Justification and Explanation** **Modeling** Rational and Complex Numbers

NUMBER AND QUANTITY Quantities (DOA.A1:N-Q)

Reason quantitatively and use units to solve problems		
DOA.A1:N-Q.A.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.	**Number & Quantity** **Justification and Explanation** **Modeling** Rational and Complex Numbers Vectors and Matrices
DOA.A1:N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.	
DOA.A1:N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	

ALGEBRA Seeing Structure in Expressions (DOA.A1:A-SSE)

STANDARDS		ACT Reporting Category *ACT Knowledge and Skills*
Interpret the structure of expressions		
DOA.A1:A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
DOA.A1:A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.	
DOA.A1:A-SSE.A.1b	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.*	
DOA.A1:A-SSE.A.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* $(x^2 - y^2)(x^2 + y^2)$*, or see* $2x^2 + 8x$ *as* $(2x)(x) + 2x(4)$*, thus recognizing it as a polynomial whose terms are products of monomials and the polynomial can be factored as* $2x(x+4)$*.*	
Write expressions in equivalent forms to solve problems		
DOA.A1:A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity	**Algebra**

	represented by the expression.	**Justification and Explanation** **Modeling** Expressions Linear Equations
DOA.A1:A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.	
DOA.A1:A-SSE.B.3c	Use the properties of exponents to transform expressions.	
ALGEBRA Arithmetic with Polynomials and Rational Expressions (DOA.A1:A-APR)		
Perform arithmetic operations on polynomials		
DOA.A1:A-APR.A.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.	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
Understand the relationship between zeros and factors of polynomials		
DOA.A1:A-APR.B.3	Identify zeros of quadratic functions, and use the zeros to sketch a graph of the function defined by the polynomial	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
ALGEBRA Creating Equations (DOA.A1:A-CED)		
STANDARDS		**ACT Reporting Category** ***ACT Knowledge and Skills***
Create equations that describe numbers or relationships		
DOA.A1:A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions.*	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
DOA.A1:A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	
DOA.A1:A-CED.A.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.*	
DOA.A1:A-CED.A.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.*	

ALGEBRA Reasoning with Equations and Inequalities (DOA.A1:A-REI)		
Understand solving equations as a process of reasoning and explain the reasoning		
DOA.A1:A-REI.A.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.	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
Solve equations and inequalities in one variable		
DOA.A1:A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters, compound inequalities, absolute value equations, and absolute value inequalities.	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
DOA.A1:A-REI.B.4	Solve quadratic equations in one variable.	
DOA.A1:A-REI.B.4b	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as "no real solution."	

ALGEBRA Reasoning with Equations and Inequalities (DOA.A1:A-REI) cont....		
STANDARDS		**ACT Reporting Category** ***ACT Knowledge and Skills***
Solve systems of equations		
DOA.A1:A-REI.C.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.	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
DOA.A1:A-REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	
Represent and solve equations and inequalities graphically		
DOA.A1:A-REI.D.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).	**Algebra** **Justification and Explanation** **Modeling** Expressions Linear Equations
DOA.A1:A-REI.D.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.	
DOA.A1:A-REI.D.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.	
FUNCTIONS Interpreting Functions (DOA.A1:F-IF)		
STANDARDS		**ACT Reporting Category** ***ACT Knowledge and Skills***
Understand the concept of a function and use function notation		
DOA.A1:F-IF.A.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 $y = f(x)$.	**Functions** **Justification and Explanation** **Modeling** Linear Functions Function Behavior
DOA.A1:F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	
DOA.A1:F-IF.A.3	Recognize that sequences are functions whose domain is a subset of the integers. Relate arithmetic sequences to linear functions.	
Interpret functions that arise in applications in terms of the context		
DOA.A1:F-IF.B.4	For linear and quadratic functions that model 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; and end behavior.	**Functions** **Justification and Explanation** **Modeling** Linear Functions Function Behavior Quadratic & Polynomial Functions
DOA.A1:F-IF.B.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.	
DOA.A1:F-IF.B.6	Calculate and interpret the average rate of change of a linear function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	

FUNCTIONS Interpreting Functions (DOA.A1:F-IF) continued...		
STANDARDS		**ACT Reporting Category** ***ACT Knowledge and Skills***
Analyze functions using different representations		
DOA.A1:F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	**Functions** **Justification and Explanation** **Modeling** Linear Functions Function Behavior Quadratic & Polynomial Functions
DOA.A1:F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.	
DOA.A1:F-IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	
DOA.A1:F-IF.C.8a	Use the process of factoring in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	
DOA.A1:F-IF.C.9	Compare properties of two functions (linear or quadratic) each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, determine which has the larger maximum.*	
FUNCTIONS Building Functions (DOA.A1:F-BF)		
Build a function that models a relationship between two quantities		
DOA.A1:F-BF.A.1	Write a linear or quadratic function that describes a relationship between two quantities.	**Functions** **Justification and Explanation** **Modeling** Linear Functions Function Behavior Quadratic & Polynomial Functions
DOA.A1:F-BF.A.1a	Determine an explicit expression or steps for calculation from a context.	
Build new functions from existing functions		
DOA.A1:F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$ and $kf(x)$ for specific values of k (both positive and negative). Without technology, find the value of k given the graphs of linear and quadratic functions. With technology, experiment with cases and illustrate an explanation of the effects on the graphs that include cases where $f(x)$ is a linear or quadratic function.	**Functions** **Justification and Explanation** **Modeling** Linear Functions Function Behavior Quadratic & Polynomial Functions

FUNCTIONS Linear and Quadratic Models (DOA.A1:F-LE)		
STANDARDS		**ACT Reporting Category** ***ACT Knowledge and Skills***
Construct and compare linear and quadratic models and solve problems		
DOA.A1:F-LE.A.1	Distinguish between situations that can be modeled with linear functions or with another model.	**Functions** **Justification and Explanation** **Modeling** Linear Functions Function Behavior Quadratic & Polynomial Functions
DOA.A1:F-LE.A.1a	Prove that linear functions grow by equal differences over equal intervals.	
DOA.A1:F-LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	
DOA.A1:F-LE.A.2	Construct linear functions, including arithmetic sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	
DOA.A1:F-LE.A.3	Observe, using graphs and tables with technology, that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	
Interpret expressions for functions in terms of the situation they model		
DOA.A1:F-LE.B.5	Interpret the parameters in a linear or quadratic function in terms of a context.	**Functions** **Justification and Explanation** **Modeling** Linear Functions Function Behavior Quadratic & Polynomial Functions

STATISTICS and PROBABILITY Interpreting Categorical and Quantitative Data (DOA.A1:S-ID)		
STANDARDS		**ACT Reporting Category** ***ACT Knowledge and Skills***
Summarize, represent, and interpret data on a single count or measurement variable		
DOA.A1:S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) of two or more different data sets.	**Statistics and Probability** **Justification and Explanation** **Modeling** Descriptive Statistics Inferential Statistics Probability
DOA.A1:S-ID.A.3	Interpret differences in center in the context of the data sets, accounting for possible effects of extreme data points (outliers).	
Summarize, represent, and interpret data on two categorical an quantitative variables		
DOA.A1:S-ID.B.5	Summarize categorical data for two categories in two-way frequency	**Statistics and Probability**

	tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	**Justification and Explanation** **Modeling** Descriptive Statistics Inferential Statistics Probability
DOA.A1:S-ID.B.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	
DOA.A1:S-ID.B.6a	Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear models.*	
DOA.A1:S-ID.B.6c	Fit a linear function for a scatter plot that suggests a linear association.	
Interpret linear models		
DOA.A1:S-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	**Statistics and Probability** **Justification and Explanation** **Modeling** Descriptive Statistics Inferential Statistics Probability
DOA.A1:S-ID.C.9	Distinguish between correlation and causation.	