2016 -17 Scope and Sequence:	
School For Excellence	**Course:** Algebra II　　　　　　　　　　　　　**Name(s):** OWUSU　　　Grade : 11 &12
	SEPTEMBER
Essential Questions:	1) What does it mean to balance an equation? 2) What makes an equation linear? 3) How does slope contribute to the relationship expressed by a linear equation?
Focus/Unit:	Data collection and graphing of linear equations/function
Content	Scatter plot, linear graphs, slope of a line, function and relations, correlations, line of best fit, equation of a line, slope-intercept and point slope formulas, solving linear equations and functions/relations
Common Core Standards	Solving linear equation in one variable; scatter plot and trend line; lines in coordinate planes; relations and function; linear equations in two variables **Understand solving equations as a process of reasoning and explain the reasoning** **A-REI.1**44 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 give examples showing how extraneous solutions may arise. **Solve equations and inequalities in one variable**
Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)

Skills Necessary For Performance Tasks	Solving linear equation in one variable; scatter plot and trend line; lines in coordinate planes; relations and function; linear equations in two variables. Students explain how linear equations portray mathematical information. Students explain how graphs portray mathematical information/ equations.
What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be incorporated?	Graphing calculator, SMARTBoard, iPad and overhead projector. Literacy strategies, Exit slips and students will use the annotation skills to solve word problems and create images to gain insight in solving word problems.

	OCTOBER
Essential Questions:	What scales do you need to graph the data in a table? How do inequalities compare/contrast to equations? What is a system of equations? How can knowing about the intersection point help us make the decision about the problem?

Focus/Unit:	Solving linear or system of equations/inequalities algebraically and graphically.
Content	Solving system of linear equations/inequalities using tables and algebraically recognizing and obtaining the solution set. Special case: No solution set. System with one or two equations/inequalities.
Common Core Standards/Skills:	Solving linear equations/inequalities in one variable algebraically. Solving system of equations/inequalities. Linear inequalities in two variables/ Linear equations graphically

Solve systems of equations
A-REI.6[46] Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
A-REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line y = –3x and the circle $x_2 + y_2 = 3$.*
Analyze functions using different representations
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.★
c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
Translate between the geometric description and the equation for a conic section
G-GPE.2 Derive the equation of a parabola given a focus and directrix. |

Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)

Skills Necessary For Performance Tasks:	**C. Graphing 1(S.ID.7),(F.IF.I)(A.A.32&33&37) (A.G.3)**
	1. Graphing Linear Equations
	    a) Graphing a line using table of values.
	    b) Definition of a function/relation, in terms of:
	        i) Ordered pairs/ Coordinates
	        ii) Table of values
	    c) Vertical line test
	    d) Slope of a line
	        i) Slope from graph
	        ii) Slope from formula
	    e) Slope-intercept form
	    f) Equation of a line
	    g) Point-Slope Formula
	
	D. Graphing 2
	1. Graphing Linear Inequalities (A.CED.I),(A.REI.3),(A.A.21&24)
	2. Graphing systems of linear inequalities (A.CED.3),(A.REI.12),(A.G.6)

	Finding the solution set from the graph
	3. Graphing Quadratic equations/functions (A.G.8&10),(A.A.41)
	    Finding the roots from the graph and finding the axis of symmetry and coordinates of the vertex by completing squares
	    *Solving quadratic equations by factoring (A.REI.4.b)(A.APR.2)
	4. Graphing system of equations (A.REI.6),(A.G.7)

What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be incorporated?	Calculator
	NOVEMBER

Essential Questions:	How does Algebra help someone understand investment portfolios? How does the quadratic curve compare and contrast to the absolute value graph? What makes a graph exponential? How are linear functions and absolute value functions alike?
Focus/Unit:	Solving quadratic equations graphically and algebraically
Content	Graph of other functions, quadratic functions/equations, exponential, absolute value, factoring binomials and trinomials, exponential growth and decay curves
Common Core Standards/Skills:	Solving system of equations algebraically; graphing exponential equations; graphing absolute value functions; graphing system of quadratic and linear equations **Polynomial, Rational, and Radical Relationships** **Understand the relationship between zeros and factors of polynomials** **A-APR.2**[40] Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. **A-APR.3**[41] 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. **Use polynomial identities to solve problems**

	A-APR.4 Prove[42] polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x_2 + y_2)_2 = (x_2 - y_2)_2 + (2xy)_2$ can be used to generate Pythagorean triples. **Rewrite rational expressions** **A-APR.6**[43] Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system. **Understand solving equations as a process of reasoning and explain the reasoning** **A-REI.1**[44] 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 give examples showing how extraneous solutions may arise. **Solve equations and inequalities in one variable** **A-REI.4**[45] Solve quadratic equations in one variable.
Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)

Skills Necessary For Performance Tasks:	5. Graphing system of linear and Quadratic equations(A.REI.7)(F.IF.7a)
	    Identifying the points of intersection as the solution set
	6. Graphing exponential Functions /exponential equations(A.CED.I),(F.IF.7.b)
	7. Graphing Absolute Value function and evaluating absolute value expressions(F.IF.7b)
	   *** Solving Absolute value equations
	   Note-Use the graphing calculator to generate table of values before graphing .

What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be incorporated?	Calculator, SMARTboard

	DECEMBER
Essential Questions:	How do numbers help us in our everyday life? How can we identify the type of function just based upon the behavior of the output? How do we write large/small numbers in simplest forms?

Focus/Unit:	Functions and their Types , Function Notation, Inverse Function and Composition Functions
Content	Quadratic equations, Linear , Exponential etc ,algebraic fractions (addition and subtraction), factoring binomial/trinomials
Common Core Standards/S kills:	Quadratic function and parabolas **A-REI.4**[45] Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for x_2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. **Extend the properties of exponents to rational exponents.** **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**[49] Rewrite expressions involving radicals and rational exponents using the properties of exponents. **Reason quantitatively and use units to solve problems.** **N-Q.2**[50] Define appropriate quantities for the purpose of descriptive modeling. **Understand the concept of a function and use function notation** **F-IF.3**[55] 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.*

	Interpret functions that arise in applications in terms of the context **F-IF.4**[56] 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.6**[57] 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.★ _ **Analyze functions using different representations** **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.★ _ e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. **F-IF.8**[58] Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. **Build new functions from existing functions** **F-BF.4** Find inverse functions. b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain. **F-BF.5** (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet, NY State regents Practice Test

Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)
Skills Necessary For Performance Tasks:	1. Solving linear equation in one variable and translating verbal statements into algebraic expressions (A.CED.I),(A.A.I) 2. Adding and subtracting fractions with same/different denominators (A.APRI&7),(A.A13&17) 3. Solving fractional equations (A.CED.I),(A.A.25) 4. Solving literal equations 5. Solving One-step inequalities (A.CED.I) 6. Solving multi-steps inequalities (A.CED.I) 7. Multiplying and dividing Monomials (A.APR.I) 8. Scientific notation (large and small numbers) 9. Adding and subtracting polynomials (A.APR.I) 10. Solving rational equations (F.IF.7.d).(A.A15&16 11. Undefined expressions (A.A15&16) 12. Solving system of equations by elimination and substitution (A.REI.6)
What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project

What types of technology will be incorporated?	Calculators, SMARTboard

Essential Questions:	How are data classified?
Focus/Unit:	Probability/Statistics
Content	Set Theory, subsets, sample space union /intersection or complement, conditional probability, construct and interpret two-way frequency table, categorizing data

Common Core Standards/Skills:	**Understand independence and conditional probability and use them to interpret data** **S-CP.1** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions intersections, or complements of other events ("or," "and," "not").★ _ **S-CP.2** Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.★ _ **S-CP.3** Understand the conditional probability of *A* given *B* as *P(A and B)/P(B)*, and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.★ _ **S-CP.4** Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*★ _ **S-CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*★ _ **Use the rules of probability to compute probabilities of compound events in a uniform probability model** **S-CP.6** Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.★ _ **S-CP.7** Apply the Addition Rule, P(*A* or *B*) = P(*A*) + P(*B*) – P(*A* and *B*), and interpret the answer in terms of the model.★ _
Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)

Skills Necessary For Performance Tasks:	1. Set theory (S.CP.I)
	2. Set-builder notation (A.A.29)
	3. Roster form
	4. Interval form
	5. Venn diagram
	6. Operation of sets
	    Union (A.A.31)
	    Intersection (A.A.31)
	    Complement (A.A.30)

What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be incorporated?	Graphing calculator, SMARTBoard, Computers for research

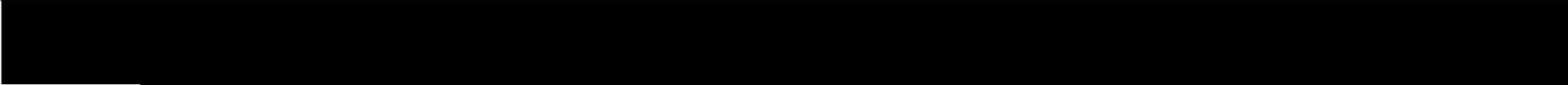|	FEBRUARY
Essential Questions:	Why numbers are important and what led us to the number systems?
Focus/Unit:	Real and Imaginary Numbers/ Complex Numbers
Content	Rational, Irrational, Imaginary, Real, and Complex Numbers
Common Core Standards	**Perform arithmetic operations with complex numbers.** **N-CN.1** Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. **N-CN.2** Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. **Use complex numbers in polynomial identities and equations.** **N-CN.7** Solve quadratic equations with real coefficients that have complex solutions.

Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet, class project
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)
Skills Necessary For Performance Tasks:	Addition and Subtraction of Polynomials, Multiplying Binomials
What specific literacy strategies will be used?	Exit Slip, Vocabulary Words,
What examples of art will be used?	Create Mathematical Images & Unit Project

What types of technology will be incorporated?	Calculator, SMARTboard, overhead projector

	MARCH
Essential Questions:	What is the tallest building in NYC? How can you calculate the height of a tall building?
Focus/Unit:	Right triangle trigonometry and Pythagorean theorem **Trigonometric Functions**
Content	Pythagorean rule, measurement of angles, right triangle, two legs (opposite and adjacent) hypotenuse, Trigonometric ratios (sine, cosine, and tangent), angle of elevation/depression

Common Core Standards/Skills:	Right triangle trigonometry and Pythagorean theorem **Extend the domain of trigonometric functions using the unit circle** **F-TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. **F-TF.2**[47] Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. **Model periodic phenomena with trigonometric functions** **F-TF.5**[48] Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★ _ **Prove and apply trigonometric identities** **F-TF.8** Prove the Pythagorean identity $\sin^2(\Theta) + \cos^2(\Theta) = 1$ and use it to find $\sin(\Theta)$, $\cos(\Theta)$, or $\tan(\Theta)$ given $\sin(\Theta)$, $\cos(\Theta)$, or $\tan(\Theta)$ and the quadrant of the angle **Extend the domain of trigonometric functions using the unit circle** **F-TF.3** (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number. **Prove and apply trigonometric identities** **F-TF.9** (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)

Skills Necessary For Performance Tasks:	Pythagorean rule and Trigonometry (F.TF.3),(A.2.A.57&58)
What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be incorporated?	Calculator, SMARTboard, overhead projectors
	APRIL

Essential Questions:	What do we mean by real numbers? What do we mean by imaginary numbers? What are the square roots of negative numbers?
Focus/Unit:	Complex numbers
Content	The meaning of i, complex numbers and conjugates, operations of complex numbers, real and imaginary numbers, corporate functions and inverse functions, exponential equations and logarithmic equations, logarithmic laws, simplifying complex fractions (rational expression).Radical equations **Complex Numbers and Transformations**
Common Core Standards/Skills:	Complex numbers and conjugates, the meaning of i, operations with complex numbers/fractions. **Perform arithmetic operations with complex numbers.** **N-CN.3** (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. **Represent complex numbers and their operations on the complex plane.** **N-CN.4** (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. **N-CN.5** (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,* $(-1 + \sqrt{3}\,i)_3 = 8$ *because* $(-1 + \sqrt{3}\,i)$ *has modulus 2 and argument 120°* **N-CN.6** (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)
Skills Necessary For Performance Tasks:	1. Complex numbers (N.CN.2&3) 2. Composition function (F.BF.I.c&F.BF.4.b)
What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas

What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be incorporated?	graphing calculator and SMARTboard
	MAY
Essential Questions:	What is the nature of sea waves? What is the best unit of angle measurement?

Focus/Unit:	Trigonometry and Trigonometric graphs
Content	Pythagorean rule and trigonometric identities, conversion of degrees to radians, area of scalene triangle, the sine and cosine laws, trigonometric graphs, Pythagorean identity, **Trigonometry**
Common Core Standards/Skills:	Trigonometric equations and identities, circular functions, sine and cosine graphs **Extend the domain of trigonometric functions using the unit circle** **F-TF.3** (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number. **F-TF.4** (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. **Model periodic phenomena with trigonometric functions** **F-TF.6** (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. **F-TF.7** (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.⋆ **Prove and apply trigonometric identities** **F-TF.9**$_{70}$ (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems. **Apply trigonometry to general triangles** **G-SRT.9** (+) Derive the formula $A = 1/2\ ab$ sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. **G-SRT.10** (+) Prove the Laws of Sines and Cosines and use them to solve problems. **G-SRT.11** (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)
Skills Necessary For Performance Tasks	1. Pythagorean rule and Trigonometry (F.TF.3),(A.2.A.57&58) 2. Conversion of degrees to Radians (.M.2)F.TF..I), (A2 3. The sine Law (G.SRT.10) 4. Finding area of scalene triangle and its applications 5. The cosine lawG.SRT.110), (A2.A.73&74)
What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be	graphing calculator, SMARTboard

incorporated?	

	JUNE
Essential Questions:	What is the largest digit of counting numbers? What patterns do numbers have?
Focus/Unit:	Probability and Statistics
Content	Sigma Notation or Summation Numbers and their sequence, series, binomial theorem, standard deviations and variance

Common Core Standards/Skills:	Binomial theorem/probability formula, sequence , series and statistics **Use the rules of probability to compute probabilities of compound events in a uniform probability model** **S-CP.8** (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.★ **S-CP.9** (+) Use permutations and combinations to compute probabilities of compound events and solve problems.★ _ **Calculate expected values and use them to solve problems** **S-MD.1** (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.★ _ **S-MD.2** (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.★ _
Ongoing Formative Assessments:	Quizzes + Chapter Tests + Exit Slip + Unit Packet
Summative Assessment:	End of Unit Exam & State Assessment (NY Regents)
Skills Necessary For Performance Tasks	1. Binomial Theorem (A.APR.5) 2. Trigonometric equations (A2.A.68) 3. Solving Quadratic equations by other methods (Completing the squares and Formula), Discriminant Formula, Nature of quadratic roots.(A.REI.b),(A2.A.2)

What specific literacy strategies will be used?	Exit Slip, Vocabulary Words, Explaining Formulas
What examples of art will be used?	Create Mathematical Images & Unit Project
What types of technology will be incorporated?	Graphing calculator, SMARTboard