ALGEBRA I A
CURRICULUM OUTLINE
2013 - 2014

OVERVIEW:

1. Operations with Real Numbers
2. Equation Solving
3. Word Problems
4. Inequalities
5. Graphs of Functions
6. Linear Functions
7. Scatterplots and Lines of Best Fit
8. Systems of Equations
9. Polynomial Expressions
10. Factoring
11. Rational Expressions
12. Radicals Expressions
13. Quadratic Equations and Functions
14. Probability and Statistics

OUTLINE:

Notes: Each class is 50 minutes and meets 4 times per week.
Time frames are approximate and include assessments.
Asterisks (*) indicate optional topics.

Quarter 1:

UNIT 1: OPERATIONS WITH REAL NUMBERS

1. Evaluate arithmetic expressions using order of operations with real numbers (positive and negative integers, fractions, and perfect square radicals and exponents).
2. Evaluate algebraic expressions (same as above).
3. Evaluate expressions using absolute value.
4. Compare two numbers using inequality symbols.
5. Classify numbers as Rational, Irrational, Whole, Natural, Real and/or Integers.
6. Identify and use number properties and to simplify arithmetic and algebraic expressions.
7. Use a graphing calculator to simplify arithmetic expressions.
UNIT 2:  EQUATION SOLVING  
Approx. 8 classes

1. Solve one and two step equations.
2. Solve equations with distribution.
3. Solve equations with the variable on both sides.
4. Solve equations with no solution and equations whose solutions are all real numbers.
5. Solve absolute value equations.
7. Solve fractional equations (clearing the fraction)
8. Solve for an unknown variable in a formula.

UNIT 3:  WORD PROBLEMS  
Approx. 11 classes

1. Translate verbal expressions into algebraic expressions.
2. Translate verbal equations into algebraic equations.
3. Solve word problems algebraically using one variable including, but not limited to: perimeter, consecutive integer, distance, percent change (and error), ratio, proportion, value, and age problems.

UNIT 4:  INEQUALITIES  
Approx. 4 classes

1. Graph inequalities on a number line.
2. Graph compound inequalities on a number line.
3. Solve and graph the solution to linear inequalities.
4. Solve and graph the solution to compound inequalities.
5. Solve word problems involving inequalities.

Quarter 2:

UNIT 5:  INTRODUCTION TO FUNCTIONS  
Approx. 5 classes

1. Graph ordered pairs on a coordinate plane.
2. Define relation and function.
3. Identify relations that are functions given a set of ordered pairs or a graph.
4. Identify the domain and range of a relation given the set of ordered pairs or a graph.
4. Graph simple functions, in \( y = \text{form} \), using a table of values, over a given domain, including, but not limited to, simple linear, absolute value, square root and squared functions.

5. Graph functions on a graphing calculator and use the calculator to generate a table of values.

5. Evaluate functions using function notation and write the answer as an ordered pair, both graphically and algebraically.

6. Given a function, find the value of \( x \) such that \( f(x) = k \), both graphically and algebraically.

7. Write a linear function to represent a real situation, given a verbal description.

8. Identify the independent and dependent variables in a real relationship.

UNIT 6: LINEAR FUNCTIONS

Approx. 9 classes

1. Calculate the slope of a line given two points.
2. Calculate the slope of horizontal and vertical lines.
3. Determine if a given point is on a line, given its graph or equation.
4. Graph lines given the equation in slope-intercept form, standard form or point-slope form.
5. Find the \( x \)- and \( y \)-intercepts given the equation of a line in any form.
6. Write the equation of a line given its graph.
7. Compare the slopes of lines given their graphs.
8. Rewrite the equation of a line in standard, point-slope or slope-intercept form.
9. Write the equation of a line given two points or one point and the slope.
10. Identify if two lines are parallel, perpendicular, or neither given their equations.
11. Write the equation of a line given a point on the line and an equation of a line parallel or perpendicular to that line.

UNIT 7: APPLICATIONS OF LINEAR FUNCTIONS

Approx. 5 classes

1. Identify the strength and direction the relationship between two variables.
2. Given a situation identify the independent and dependent variable.
3. Given a graph of an application of a linear function, find the slope and give a verbal interpretation in the context of the problem.
4. Create a scatterplot given a set of bivariate data by hand and on the graphing calculator.
   Discuss scaling the \( x \) and \( y \)-axis, labeling the \( x \) and \( y \)-axis, and titling.
5. Analyze a scatterplot for direction, correlation, strength, and outliers.
6. Find the line of best fit using the graphing calculator.
6. Use the line of best fit to make predictions (interpolation and extrapolation) and graph the line on the scatterplot.

UNIT 8: SYSTEMS OF EQUATIONS
Approx. 8 classes

1. Solve systems of equations by graphing manually and with the graphing calculator (include systems that result in parallel and coinciding systems).
2. Solve systems of equations by substitution.
3. Solve systems of equations by elimination.
4. Solve applications of systems of linear equations including simple two variable problems (ex. perimeter), value problems, and comparing two cost equations modeled by linear functions.
5. Graph linear inequalities on a plane.
6. Graph a system of linear inequalities and shade the solution set.

Quarter 3:

UNIT 9: POLYNOMIALS
Approx. 8 classes

1. Simplify algebraic expression using exponent rules.
   • Multiply and divide powers with like bases.
   • Raise a power to a power.
   • Raise a number or variable to the zero power.
   • Raise a number or a variable or a fraction to a negative power.
   • Raise a product or quotient of variables to a power.
2. Rewrite numbers written in scientific notation into standard form and vice versa.
3. Add, subtract, multiply and divide numbers written in scientific notation, with and without a calculator.
4. Use polynomial vocabulary to:
   • Identify monomials, binomials, trinomials, and higher degree polynomials;
   • Identify the degree of a polynomial and classify the polynomial by degree;
   • Identify leading terms and coefficients;
   • Arrange polynomials in standard form (descending order).
4. Add monomial expressions by combining like terms.
5. Add and subtract polynomials.
6. Multiply a binomial by a polynomial; including products that result in a difference of squares and perfect square trinomials.
7. Multiply polynomials.
UNIT 10: FACTORING                      Approx. 10 classes

1. Identify the GCF of two numbers and two monomials.
   Factor a polynomial using the GCF.
5. Factor binomials that are differences of perfect squares.
6. Factor by grouping.
7. Factor trinomials with a leading coefficient equal to one.
8. Factor trinomials with a leading coefficient not equal to one.
   Factor by grouping.
   Factor fourth quadratic types.
10. Solve quadratic equations that are factorable using the methods learned.
11. Solve factorable quadratic word problems.

UNIT 11: RATIONAL EXPRESSIONS          Approx. 9 days

1. Divide rational expressions with factors that cancel.
2. Identify the restrictions of a rational expression.
3. Multiply and divide rational expressions.
4. Add and subtract rational expressions with like denominators.
5. Add and subtract rational expressions with unlike denominators.
7. Distinguish among rational expressions, rational equations, and rational functions.
8. Solve rational equations.
9. Solve problems that involve direct and inverse variation.
10. Solve work problems that involve rational equations (e.g. work problems).

UNIT 12: RADICAL EXPRESSIONS           Approx. 9 days

1. Evaluate radical expressions that are perfect squares, cubes, and higher degrees
   (including expressions with negative, fractional, and decimal radicands).
2. Simplify radical expressions that are not perfect squares.
3. Simplify simple higher index radical expressions with numeric radicands.
4. Add, subtract, multiply, and divide radical expressions.
5. Simplify radical expressions that require rationalizing the denominator including
   multiplying by the conjugate.
6. Simplify radical expressions with algebraic radicands.
7. Distinguish among radical expressions, radical equations and radical functions.
8. Solve radical equations and check for extraneous solutions.
10. Solve basic right triangles and applications of right triangles using the Pythagorean Theorem, including those that result in radical answers.

UNIT 13: QUADRATIC EQUATIONS AND FUNCTIONS
Approx. 9 days

1. Write a quadratic equation in standard form.
2. Review solving factorable quadratic equations and quadratic equations with no linear term.
3. Solve quadratic equations by completing the square.
4. Solve quadratic equations using the quadratic formula (and derive the QF) for equations with real solutions.
5. Graph quadratic functions in standard form both manually and with the graphing calculator.
6. Find the axis of symmetry and the vertex given the function in standard form.
7. Find the x-intercepts of a factorable quadratic function and locate them on the graph.
8. Identify how the leading coefficient affects the shape of the parabola. (positive/negative and greater/less than one).

UNIT 14: PROBABILITY AND STATISTICS
Approx. 6 days

1. Apply the counting principle, permutations, combinations, and tree diagrams to find the sample space of a random event.
2. Find the probability of a simple event.
3. Find the probability of two events happening at the same time with and without replacement. (A and B)
4. Find the probability of A or B for mutually exclusive events.
5. Create a dot plot given a set of quantitative data and analyze for shape skewing and outliers.
6. Create a histogram both manually and with a calculator.
7. Find the mean, median, and range for a set of data.
8. Find the quartiles and percentiles for a given value in a set of data.
9. Create a box plot both manually and with a calculator.