Paulsboro Schools

Curriculum

<Algebra I>

Grade 9

June 2010

*** For adoption by all regular education programs as specified and for adoption or adaptation by all Special Education Programs in accordance with Board of Education Policy.**

Board Approved: September 2012

PAULSBORO SCHOOL DISTRICT

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Paulsboro Schools

Mission

The mission of the Paulsboro School District is to provide each student the educational opportunities to assist in attaining their full potential in a democratic society. Our instructional programs will take place in a responsive, community based school system that fosters respect among all people. Our expectation is that all students will achieve the New Jersey Core Curriculum Content Standards (NJCCCS) at every grade level.

INTRODUCTION, PHILOSOPHY OF EDUCATION, AND EDUCATIONAL GOALS

Introduction/philosophy: MATHEMATICS

Paulsboro Schools are committed to providing all students with a quality education resulting in life-long learners who can succeed in a global society. As students begin their mathematics education in Paulsboro, classroom instruction will reflect the best thinking of the day. Children will engage in a wide variety of learning activities designed to develop their ability to reason and solve complex problems. Calculators, computers, manipulatives, technology, and the Internet will be used as tools to enhance learning and assist in problem solving. Group work, projects, literature, and interdisciplinary activities will make mathematics more meaningful and aid understanding. Classroom instruction will be designed to meet the learning needs of all children and will reflect a variety of learning styles.

Paulsboro Schools are committed to providing all students with the opportunity and the support necessary to learn significant mathematics with depth and understanding. This curriculum guide is designed to be a resource for staff members and to provide guidance in the planning, delivery, and assessment of mathematics instruction.

Educational Goals: MATHEMATICS

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various information from a variety of media sources.

New Jersey State Department of Education
Core Curriculum Content Standards

A note about <Mathematics> Standards and Cumulative Progress Indicators:

The New Jersey Core Curriculum Content Standards for **<Mathematics>** were revised in **2009**. The Cumulative Progress Indicators (CPI's) referenced in this curriculum guide refer to these new standards and may be found in the Curriculum folder on the district servers. A complete copy of the new Core Curriculum Content Standards for Mathematics may also be found at:

http://www.nj.gov/education/aps/cccs/

<Algebra I>

Scope and Sequence / Curriculum MAP

<table>
<tr><th colspan="2">Quarter I</th></tr>
<tr><td>Big Idea: Order of Operations
a. Students will solve algebra problems that contain multiple steps in the correct order.
a. Operations with negative numbers.
b. Distinguish when order of operations is appropriate.
c. Laws of exponents</td><td>Big Idea: Data Analysis
b. Students will read, analyze and create several different types of data graphs.
a. Bar Graphs
b. Line Plot
c. Box Plot
d. Circle Graph
e. Measures of Central Tendency.</td></tr>
<tr><td>Big Idea: Proportions
c. Students will create, solve, and explain the results of proportions in respect to real world situations
a. Random Sampling- Population Estimating
b. Percent Problems</td><td>Big Idea: Solving Linear Equations
d. Students will solve linear equations in several different forms.
a. One Step
b. Two Step
c. Variables on Both Sides
d. Fractional Equations</td></tr>
<tr><td>Big Idea: Graphing Linear Equations
e. Students will graph and analyze linear equations in several different forms.
a. Slope
b. Midpoint
c. Distance Formula
d. Pythagorean Theorem
e. Equation of a line – Slope Intercept Form, Point Slope Form, Standard Form</td><td></td></tr>
</table>

<table>
<tr><th colspan="2">Quarter II</th></tr>
<tr>
<td>Big Idea: Direct Variation
f. Students will identify and explain direct variation in several forms
a. Direct Variation from graphs
b. Direct Variation from tables
c. Direct Variation from word problems…i.e. create table then analyze</td>
<td>Big Idea: Scatter Plot – Line of Best Fit
g. Students will create and analyze Scatter Plots including using a Line of Best Fit to predict data.
a. Create Scatter Plot from data
b. Find Line of best Fit
c. Use equation of Line of Best Fit to predict data</td>
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<tr>
<td>Big Idea: Absolute Value
h. Students will know the definition of, how to solve, and how to graph Absolute Value equations.
a. Solve One and Two Step absolute value equations
b. Graph Linear Absolute Value equations</td>
<td>Big Idea: Systems of Linear Equations
i. Students will comprehend and solve systems of linear equations using various methods
a. Solve systems using Substitution Method
b. Solve systems using Elimination Method
c. Solve systems using Graphing Method</td>
</tr>
<tr>
<td>Big Idea: Inequalities
j. Students will solve and graph linear inequalities.
a. Solve Linear inequalities
b. Graph Linear inequalities
c. Solve systems of Linear Inequalities</td>
<td>Big Idea: Word Problems
k. Students will learn several different methods for solving standardized test type questions in open-ended form
a. Use of data graphs/tables to solve word problems
b. Use of manipulation of equations to solve word problems
c. Use of the concept of inequalities to solve word problems</td>
</tr>
</table>

Quarter III

Big Idea: Functions

XII. Students will be able to learn about function notation and vocabulary.

a. Definition
b. Notation
c. Vertical Line Test
d. Graphs- Domain, Range
e. Exponentials

Big Idea: Quadratic Functions

XIII. Students will learn strategies for solving quadratic equations.

a. Definition
b. Equation
    a. Vertex
    b. Intercepts
    c. Solutions
    d. General Form
c. Factoring
d. Quadratic Formula

Big Idea: Law of Exponents

XIV. Students will be able to use properties of exponents to rewrite expressions.

a. Addition, Subtraction, Multiplication, Division, Negative, Zero
b. Simplifying Exponent**s**

Quarter IV

Big Idea: Operations with Polynomials

XV. students will learn how to use the rules of polynomials to simplify.

a. Simplifying – Addition, Subtraction, Multiplication, Division
b. Simplifying with Factoring

Big Idea: Irrational Numbers/ Radicals

XVI. students will learn methods to simplify radicals.

a. Addition, Subtraction, Multiplication, Division with radicals
b. Simplifying Radicals

Big Idea: Transformations

XVII. Students will learn to change or transform graphs by moving, flipping, shrinking or stretching.

a. Linear Equations
b. Absolute Value Equations
c. Quadratic Equations
d. Exponential Equations

Big Idea: Probability

XVII. Students will learn methods of calculating probability.

a. Combinations
b. Permutations
c. Cards, Dice, Geometric, Coins
d. Counting Theory
e. "Trees"
f. Simple Probability with and without replacement

Suggested days of Instruction	Curriculum Management System **Subject/Grade Level:** **Grade 9 – Algebra I**	**Big Idea: Order of Operations** **Topic: Order of Operations** **Goal 1: The student will be able to perform operations with real numbers, evaluate expressions with variables, and simplify algebraic expressions.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	7.NS.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. **7.NS.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.** **7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers.**	**Enduring Understandings** • Add, Subtract, Multiply, and Divide positive and negative real numbers. • Students should comprehend rules; some may need to use a number line. **Essential Questions** • *Does order matter when we add, subtract, multiply, or divide, will I get the same answer?* • *Does it matter if I deposit money in my checking account before I write the checks out?* • *Why do we need an order of operations?* • *What does it mean to distribute, how does that translate mathematically? What about negative signs?* • *What is a like term? What is a coefficient?* • *What is an exponent? What does it mean to have the same base?* • What does it mean to have a negative exponent?	• **Assessment Model/Learning Activities** • *A submarine is currently 100 feet under water (sea level). To avoid collisions with the ocean floor and other marine vessels, the submarine made the following movements: first it moved 20 feet up, then 50 feet deeper, then 40 feet deeper, then 20 feet up, then surfaced. How far did the submarine have to travel from its last depth to get to the surface?* • *What is a variable?* • Evaluate 8x + 4 if x = -3 • $\frac{2 \bullet 3 - 1}{4(6 - 8 \bullet 3)} - 7^2 + -3^3 + (-2)^4$ • Simplify 2(3x -4) • Simplify 2 + 3(2x + 8) • Simplify 2 – (x + 4) • Simplify $(a^2)^3$ • Simplify $a^2 * a^3$ • Simplify $2x^5 + 3x^5 + 5x^3$ • Simplify $(2x^3y)^2$

Suggested days of Instruction	Curriculum Management System **Subject/Grade Level:** **Grade 9 – Algebra I**	**Big Idea: Order of Operations** **Topic: Order of Operations** **Goal 1: The student will be able to perform operations with real numbers, evaluate expressions with variables, and simplify algebraic expressions.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
			• **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic:** Data Analysis **Goal 2:** The student will be able to create, analyze, and describe several different types of data graphs.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	S-ID.1. Represent data with plots on the real number line (dot plots, histograms, and box plots). S-ID.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.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). S-ID.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	**Enduring Understandings** • Students use data to draw bar graphs, line graphs, and double line graphs. • Students plot points in scatter plot, introduce positive, negative, and no correlation • Students make formulas to find the sum of a set of numbers or find the average of a set of numbers using cell numbers **Essential Questions** • *What statistical techniques can be used to organize, display, and compare sets of data?* • *How does the data displayed tell a story? How can I determine what happened by reading the graph?* • What are measures of central tendency and why do we use them? What is the best measure of central tendency for a given set of data?	• **Learning Activities** **PROJECT IDEA:** Friend Survey Students must ask 50 people a question. (favorite color, type of food, etc.) After recording the answers, students must use Excel, or another spreadsheet program to display the data and form a graph. (Or students search for statistics on the internet or in media center.) **Assessment Model** • Classroom Survey: Have students write as many x's on a sheet of paper as they can in 60 seconds, all students must use their right hand. Then repeat, this time all students must use their left hand. Plot results on board to demonstrate scatter plot and trend line • Sketch a graph of a transportation scenario: A commute home from school combines walking with taking the subway. Use Time and Total Distance as your axes. • When taking a field trip, 150 students are attending the field trip plus 15 chaperones. If each bus holds 80 passengers, how many busses are needed? • *Five houses on my street have been sold in the last two months. They have sold for the following prices: $450,000, $480,000, $465,000, $440,000, and $625,000. Is the average the best way to describe the houses market value*

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic:** Data Analysis **Goal 2:** The student will be able to create, analyze, and describe several different types of data graphs.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
			• **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic:** Proportions **Goal 3:** Students will create, solve, and explain the results of proportions in respect to real world situations.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **7.RP.2. Recognize and represent proportional relationships between quantities.** **7.RP.3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.**	**Sample Conceptual Understandings** • Students will solve simple proportions in fraction form. • Students will set up proportions given a real world situation. • Students will write different forms of proportions i.e. 4:1 or 4 to 1 • Students will write and solve proportions dealing with percents. **Essential Questions** • When is it appropriate to use proportions to solve a word problem? • When calculating problems with percents, is it always advantageous to use proportional representation.	**Assessment Model/Learning Activities** • A shirt is 10% off the original price of $50. What is the reduced price of the shirt • $\frac{3}{4} = \frac{x}{10}$ • A pair of pants is regularly priced at $125 is on sale for $75…what is the percent off for this pair of pants. **Project Idea** • Students can take an ad from the local newspaper and evaluate the sale price versus the original price…students could be given a sample amount of money and made up coupons and asked to evaluate if it's better to use a coupon or take the sale price. • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 9 - Algebra I**	**Topic:** Proportions **Goal 3:** Students will create, solve, and explain the results of proportions in respect to real world situations.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
			• Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic:** Linear Equations **Goal 4:** Students will solve linear equations in several different forms	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-SSE.1. Interpret expressions that represent a quantity in terms of its context. **A-SSE.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.** **A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.** **A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.** **A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise** **A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.** **A-CED1 Create equations and inequalities in one variable and use them to solve problems**	**Enduring Understandings**: • Always undo the addition or subtraction first, then the multiplication or division • Focus on writing equations from word problems and using tables to solve problems • The rules for solving a linear equation do not change in respect to the number of steps required to solve. **Essential Questions:** • *How are English and algebra related? How can I write an equation from a word problem?* • I can solve these problems in my head. How do I use algebra to solve equations? What does it mean to use the opposite operation? • *How do I get all of the variables together when they are on both sides of the equation?*	**Assessment Model/Learning Activities** • *If you have $28 in your wallet, and you want to purchase a jacket for $43, how much more money do you need? 28 + x = 43* • Solve x – 3 = 5 • Solve: x + 5 = 11 • Solve -4x = 28 • Solve $\frac{x}{3} = -39$ • Solve 5x + 3(x + 4) = 28 • Solve 18y + 13 = 12y – 25 • Solve 6y – (3y – 6) = -14 – 3y • *Sam travels the same distance to work every day, but he goes different speeds each day depending on the traffic. Sam knows there is an equation D=rt that he can figure out the time it is going to take him each day, but he doesn't want to have to solve it every day, is there a way to change the formula so that it says t= and gives him the time right away when he evaluates with his distance and his rate for that day?* • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic:** **Linear Equations** **Goal 4:** **Students will solve linear equations in several different forms**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
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Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic:** Graphing Linear Equations **Goal 5:** Students will graph and analyze linear equations in several different forms	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **F-IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.** **F-IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.** **F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.** **F-BF.1. Write a function that describes a relationship between two quantities.**	**Enduring Understandings:** • Vertical Line Test • Determine from a Table of Values whether a set of data is a function or a relation. • Looking at a graph: identify the "U" shape of a parabola – quadratic equation; "V" shape of an absolute value equation; and the line of a linear equation • Given the equation y = 2x – 5, students make a table of at least 3 values and graph in a coordinate plane. • Review x-axis, y-axis, origin, quadrants • Given a graph, students identify rise and run, to form slope fraction. Emphasize simplest form of a fraction • Identify that a horizontal line has zero slope, and a vertical line has an undefined slope or no slope • Given two points on a line, students use the equation $\frac{y_2 - y_1}{x_2 - x_1}$, to find the slope of the line. Emphasize the meaning of the sub numbers to identify the point; it is not for an operation. • Identify y = mx + b, have students graph and discover the slope and y-intercept • Emphasize that slope moving up and right is the same as down and left (+/+ and -/-)	**Assessment Model/Learning Activities** • *You have $20 and need to purchase a shirt and a pair of shorts. The shirt is $18, and the shorts are $16. You have to decide which one to purchase. Which one do you choose? Would you always make the same decision? A function must always make the same decision. A relation can pick between two things.* • Given the equation y = 2x – 5, students make a table of at least 3 values and graph in a coordinate plane • Given the equation y = 2x – 5, graph without making a table of values • Given the equation $y = \frac{1}{2}x + 3$, graph using slope-intercept form. • Find slope of (3,2) and (5, 1). • Find x if m = 2 given (3, 2) and (5, x)

Suggested days of Instruction	**Curriculum Management System** **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic: Graphing Linear Equations** **Goal 5: Students will graph and analyze linear equations in several different forms**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) The student will be able to:	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*). **F-IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes** **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** **F-IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions)**	• And slope moving up and left is the same as down and right (+/- and -/+) **Essential Questions:** • What is the difference between a function and a relation? • *What does the graph of a line look like? An absolute value? A quadratic equation* • *How can I use a scatter plot to predict future values? Why do some scatterplots have an upward trend, some have a downward trend, and some have no relation at all?* • *How does a line represent an equation?* • *What is a rate of change, how is it represented in an equation? What is slope?* • *Now that I know the slope of a line, how can I find the slope by looking at an equation? What does the rest of the information in the equation mean?* • *If there is a y-intercept, is there also an x-intercept? Is it as easy to find as the y-intercept? What is an intercept?* •	• **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic: Direct Variation** **Goal 6** : Students will identify and explain direct variation in several forms.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	F-BF.1. Write a function that describes a relationship between two quantities. **F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.**	**Enduring Understandings** • Describe the relationship between two variables. • Understand that as *x* increases, *y* increases and as *x* decreases, *y* decreases • Express Direct Variation as an equation • For an equation of the form y = kx, multiplying x by some fixed amount also multiplies y by the SAME FIXED AMOUNT **Essential Questions** • What is direct variation • What can direct variation tell us about two variables • How can direct variation be used in a real world situation.	• **Assessment Model/Learning Activities** • If y varies directly as x and y = 8 when x = 12, find k and write an equation that expresses this variation. • If y varies directly as x and y = 24 when x = 16, find y when x = 12. **Project Idea** • Students could poll the amount of students out of uniform on a given day in each of the seasons in the school year (fall, winter, spring). The students could compare their results and find if there was a relationship between temperature and the amount of students out of uniform. • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **9 - Algebra I**	**Topic: Scatter Plot – Line of Best Fit** **Goal 7: Students will create and analyze Scatter Plots including using a Line of Best Fit to predict data.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	S-ID.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. **S-ID.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related** **S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.** **S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.** **S-ID.9. Distinguish between correlation and causation**	**Enduring Understandings** • Looking at a scatter plot, identify the positive, negative, or no correlation. • Discuss situational correlation such as: number of people wearing coats vs. temperature; number of people at the beach vs. temperature; amount of free time vs. number of classes taken; shoe size vs. grades earned • Given the graph of a line, find the slope and y-intercept of a line, and write the equation **Essential Questions** • When is it appropriate to use a line of best? • How many data points are needed to make a line of best fit, does more data mean more accuracy.	• **Assessment Model/Learning Activities** • For any given set of data… 1. Are variables X and Y related? 2. Are variables X and Y linearly related? 3. Are variables X and Y non-linearly related? 4. Does the variation in Y change depending on X? 5. Are there outliers? • Write the equation of the line going through the points: (3, 5) and (-4, -9), Students must know to find the slope first, then pick one of the points to find the equation as in 5.3 **Project Idea** • Students can take graphs from "the weather channel" website and plot the temperatures versus the day of the month. The students could make a line of best fit to predict the temperature for the next few days. When finished the students could discuss if their results are relevant…"Will the temp go up or are the seasons change"…in other words situational correlation. •

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **9 - Algebra I**	**Topic: Scatter Plot – Line of Best Fit** **Goal 7: Students will create and analyze Scatter Plots including using a Line of Best Fit to predict data.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
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Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 9 - Algebra I**	**Topic: Absolute Value** **Goal 8: Students will know the definition of, how to solve, and how to graph Absolute Value equations.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.** **A-REI.11. Explain why the *x*-coordinates of the points where the graphs of the equations *y* = *f*(*x*) and *y* = *g*(*x*) intersect 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.**	**Enduring Understandings** • Absolute Value is always positive WITHIN the absolute value. • The graph of an absolute value function will produce a "V" shape. • To solve absolute value equations, the ABS Value symbols count as parenthesis. • The rules to solve absolute value inequalities do not change from that of normal inequalities. **Essential Questions** • Does the absolute value have a real world application • How many solutions are there to an absolute value equation.	• **Assessment Model/Learning Activities** • $\|x - 2\| = 8$ • $\|x + 5\| = 4$ • $\|2x + 5\| = 9$ • $\|1 - 2x\| < 9$ • $\|1 - 2x\| > 9$ **Project Idea** • Have students line up on the football field at the 50 yrd line. Throw passes to students running in both directions. Treat the football field as a number line with midfield at zero. Calculate the distance traveled by students in both directions. Explain how distance can never be negative other than to denote direction. • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic: Systems of Linear equations** **Goal 9: Students will demonstrate their knowledge and solve systems of linear equations as well as explain their results.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-REI.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. **A-REI.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.** **A-REI.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.**	**Enduring Understandings** • Introduce systems of linear equations (linear systems). • Solve systems by graphing; discuss how to identify the answers on a graph. Students may need a reminder of how a line is connected to an equation (the points are the solutions to the equation). • Practice writing equations from word problems: admission prices, coin problems, age problems, etc. • For students who have difficulty understanding: lay the linear system with sheets of paper taped to the board such as: $\begin{cases} y = x+1 \\ 2x+y=-2 \end{cases}$, have each part of the equations written on a separate piece of paper: y, =, x + 1, 2, x, +y, =, -2. (you should have 8 sheets of paper) have students restate what substitution means. Then take the pieces of paper and move them to other locations based on the equals signs. Such as: in the first equation, lift the x+1 and place it on top of the y since they are equal. Then since both y's must be equal, place the x + 1 on top of the y in the other equation. • Discussion: now that we know three ways to solve a linear system, which one is the best?	• **Assessment Model/Learning Activities** • How many solutions are there in each of the following linear systems: $A)\begin{cases} -2x+4y=1 \\ 3x-6y=9 \end{cases}$ $B)\begin{cases} 2x-2y=4 \\ -x+y=-2 \end{cases}$ $C)\begin{cases} 5x+3y=17 \\ x-3y=-2 \end{cases}$ • *The summer is coming, and you have been rewarded a $250 shopping spree in a store. All shirts in the store are $15 and all shorts are $18. How many shirts and shorts could you get during the shopping spree if you know that you want at least 5 shirts and at least 3 pairs of shorts? How many different combinations could you get?* • Solve by Graphing: $\begin{cases} y<2 \\ y \geq x-2 \end{cases}$ Solve by Graphing: $\begin{cases} x>0 \\ -x+3y \leq 6 \\ y>x \end{cases}$

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 9 - Algebra I**	Topic: Systems of Linear Equations Goal 9: Students will demonstrate their knowledge and solve systems of linear equations as well as explain their results	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-REI.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. **A-REI.11. Explain why the *x*-coordinates of the points where the graphs of the equations *y* = *f*(*x*) and *y* = *g*(*x*) intersect are the solutions of the equation *f*(*x*) = *g*(*x*); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f*(*x*) and/or *g*(*x*) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions**	**Essential Questions** • What real world concepts are entailed within systems of equations. • How do you determine what method is best for solving systems. • Is one way "better" than another way.	**Project Idea** • Use string to make a coordinate plane on an open field. Have two students represent one equation…while two other students represent a second equation. 4 students will also work on paper. The students representing the two equations will walk along their line until they meet…they will check their answers with the students doing the work on paper. • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 9 - Algebra I**	**Topic: Inequalities** **Goal 10: Students will solve and graph linear inequalities.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.**	**Enduring Understandings** • Discuss: Open Circle - not equal to the number (excluded). Closed Circle - can be equal to the number (included). • Emphasize rule: when multiplying or dividing by a negative number, you must switch inequality sign • Introduce writing absolute value inequalities from word problems • Compare shading above and below to greater than or less than. Many students will need to plug in a point to check (0,0 is the easiest point, if it is not on the line **Essential Questions** • *In algebra we have used many variables, equations with one and 2 variables, can we use two variables in inequalities, how is that represented in a graph?* • *How is graphing inequalities different from graphing linear equations? What are they used for?*	• **Assessment Model/Learning Activities** • Solve and graph: $3 < 3x - 9 \leq 21$ • Graph and discuss differences $5 < x$ and $x < 10$ $5 < x$ and $x > 10$ $5 < x$ or $x < 10$ $5 < x$ or $x > 10$ • Solve and graph $3<2x + 1$ or $10>2x - 1$ • *The TV ratings for the Super Bowl indicate that 72% of all people living in the U.S. were watching the Super Bowl, and that the results were accurate ±3%. What does ±3% mean?* • Graph: $y > -3x + 5$, give 5 values that make the equation true. **Project Ideas** Students determine the expenses of making cookies and determine a selling price to earn a profit. Students work in partners and determine the type of cookie they want to make. They must calculate the expenses: ingredients, time, permit (make one cost for all students $25), and calculate the income. Then, make a report using tables and graphs to model expenses and income as functions of number of batches sold and find the break-even point (when they start making a profit). Extend the reports by surveying friends, neighbors and cookie manufacturers.

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 9 - Algebra I**	**Topic: Word Problems/Open Ended Problems** **Goal 11: The students will display several methods for attacking open ended problems and the use of visual manipulative to organize work.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **A-CED.1. Create equations and inequalities in one variable and use them to solve problems.**	**Enduring Understandings** • Word problems can be done even when limited prior knowledge is available • Writing skills are extremely important and must be reviewed to achieve a high level of success. • Visual representations of a students work can achieve points on open ended problems…i.e. Venn Diagrams, Tables, Graphs… **Essential Questions** • What mathematical discipline is referred to in the open ended problem, and how can that information be used to solve the problem. • What method is the individual students best, how can that be applied to all word problems.	• **Assessment Model/Learning Activities** • A plane takes 6 hours to fly from San Francisco to New York, and 5 hours to return back. The airplane's airspeed is 550 miles per hour, from New York to San Francisco. The reason why it takes the airplane longer to go West than East is because of a wind with constant wind speed. What is the speed of wind. • A freight train leaves a station travelling at 30 mph A passenger train leaves 1 hours later travelling at 50 mph. At what time will the passenger train overtake the freight train? • If 4 apples and 2 oranges equals $1 and 2 apples and 3 orange equals $0.70, how much does each apple and each orange cost? There are no quantity discounts. • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System **Subject/Grade Level:** **Grade 9 - Algebra I**	**Big Idea: Functions** **Topic: Definitions, Notations, Vertical Line Test, Graphs – Domain, Range** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 12: Students will be able to: write definitions, evaluate functions, check for a function using vertical line test, graph functions and identify domain and range, do the same for exponential functions.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*). **F-IF.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.**	**Essential Questions:** How can one identify a function? How do I determine the domain and range of a function? What does the graph of an absolute value look like? **Enduring Understandings:** Describe read and interpret graphs of real-world situations using the terms linear, nonlinear, increasing, decreasing, rate of change, continuous, and discrete. Learn how to determine whether a relationship is a function. Learn the absolute-value and squaring functions	**NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, *it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses*).** **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.** **Learning Activities / Assessment Models:** Write the definition of a function? Evaluate f(x) = 3x -2 : for x = 1 For the given graph use the vertical line test to check for a function. For the given graph identify the domain and range. Graph f(x)= $\lvert x + 2 \rvert$, identify the vertex and the line of symmetry • **Additional Resources:**

<table>
<tr><td rowspan="5">Suggested days of Instruction</td><td rowspan="4">Curriculum Management System
<u>Subject/Grade Level</u>:
Grade 9 - Algebra I</td><td colspan="2">Big Idea: Functions</td></tr>
<tr><td colspan="2">Topic: Definitions, Notations, Vertical Line Test, Graphs – Domain, Range</td></tr>
<tr><td colspan="2"><u>Overarching Goals:</u>
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.</td></tr>
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<tr><td>Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)
The student will be able to:</td><td>Essential Questions, Enduring Understandings,
Sample Conceptual Understandings</td><td>Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model</td></tr>
<tr><td></td><td></td><td></td><td><u>Discovering Algebra An Investigative Approach</u>: Key Curriculum Press; 2007
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</table>

Suggested days of Instruction	Curriculum Management System Subject/Grade Level: **Grade 9- Algebra I**	**Big Idea: Quadratic Functions** **Topic: Definitions, Equation, Factoring, and Quadratic Formula** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 13: The student will be able to graph and analyze quadratic functions, identify the vertex, intercepts, and write the general form of a quadratic.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. **F-LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).**	**Essential Questions:** What is the quadratic formula? How do I factor an equation? What is the vertex and line of symmetry? **Enduring Understandings:** Compare features of parabolas to their quadratic equations Learn strategies for solving quadratic equations Learn how to combine and factor polynomials	**NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, *it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses*).** **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.** **Learning Activities / Assessment Models:** Graph the function $y = x^2 + 3$ Identify the vertex and the line of symmetry Write the quadratic equation as $ax^2 + bx + c = 0$ • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators

Suggested days of Instruction	Curriculum Management System Subject/Grade Level: **Grade 9 - Algebra I**	**Big Idea: Functions** **Topic: Definitions, Notations, Vertical Line Test, Graphs – Domain, Range** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 12: Students will be able to: write definitions, evaluate functions, check for a function using vertical line test, graph functions and identify domain and range, do the same for exponential functions.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
			• Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System **Subject/Grade Level:** **Grade 9- Algebra I**	**Big Idea: Law of Exponents** **Topic: simplifying exponents** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 14: The student will be able to rewrite an expression with exponents.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	8.EE.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. **A-SSE3c. Use the properties of exponents to transform expressions for exponential functions**	**Essential Questions:** What is the value of anything to the 0 power? How do I write a number in scientific notation? How can I tell that the real-world model is an exponential equation? **Enduring Understandings:** Use properties of exponents to rewrite expressions Write numbers in scientific notation Model real-world data with exponential equations	**NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, *it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses*).** **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.** **Learning Activities / Assessment Models:** Re-write 2^{-3} using a positive exponent Write 34,000,000,000 in scientific notation Write an equation to model the growth of an initial deposit of $250 in a savings account that pays 4.25% annual interest. • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments

Suggested days of Instruction	Curriculum Management System Subject/Grade Level: **Grade 9- Algebra I**	**Big Idea: Law of Exponents** **Topic: simplifying exponents** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 14: The student will be able to rewrite an expression with exponents.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
			• Compass Odyssey Learning Path • TI- 84 Calculators • Punchline Algebra 2nd edition • Algebra I An Integrated Approach: Heath; 1998 • Larson Algebra I: Holt McDougal; 2009

Suggested days of Instruction	Curriculum Management System Subject/Grade Level: **Grade 9- Algebra I**	**Big Idea: Operations with Polynomials** **Topic: Simplifying Polynomials** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 15: The student will be able to add, subtract, multiply and divide polynomials; simplify by factoring.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	A-APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials **A-APR.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.**	**Essential Questions:** What is the rule for multiplying and dividing monomials? How do you factor a polynomial? **Enduring Understandings:** Use rules of exponents to evaluate monomials and polynomials. Evaluate polynomials by factoring.	**NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, *it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses*).** **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.** **Learning Activities / Assessment Models:** **Simplify $2x^3y^4 \times 3x^4y$** **Simplify $\frac{10x^3y^2z}{5xyz}$** Evaluate $x^2 + 10x + 25$ • **Additional Resources:** • Discovering Algebra An Investigative Approach: Key Curriculum Press; 2007 • Quarterly Assessments • Compass Odyssey Learning Path • TI- 84 Calculators

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<tr><td colspan="2">Topic: Simplifying Polynomials</td></tr>
<tr><td colspan="2"><u>Overarching Goals:</u>
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
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The student will be able to:</td><td>Essential Questions, Enduring Understandings,
Sample Conceptual Understandings</td><td>Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model</td></tr>
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</table>

Suggested days of Instruction	Curriculum Management System Subject/Grade Level: **Grade 9 - Algebra I**	**Big Idea: Irrational Numbers/Radicals** **Topic: Simplifying Radicals and Irrational Numbers** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 16: The student will be able to add, subtract, multiply and divide with radicals; simplify radicals and irrational numbers.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	8.NS.1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	**Essential Questions:** How do you evaluate radicals using mathematical operations? How are property rules applied to simplify radicals? How are property rules applied to simplify irrational numbers? **Enduring Understandings:** Evaluate radicals using mathematical operations. Use property rules to simplify radicals. Use property rules to simplify irrational numbers.	**NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, *it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses*).** **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.** **Learning Activities / Assessment Models:** **Evaluate $\sqrt{3} + \sqrt{3} = 2\sqrt{3}$** Evaluate $\sqrt{4} * \sqrt{5} = \sqrt{20}$ Simplify $\sqrt{12} = \sqrt{4 * 3} = -/+2\sqrt{3}$

<table>
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<u>Subject/Grade Level</u>:
Grade 9 - Algebra I</td><td colspan="2">Big Idea: Irrational Numbers/Radicals</td></tr>
<tr><td colspan="2">Topic: Simplifying Radicals and Irrational Numbers</td></tr>
<tr><td colspan="2"><u>Overarching Goals:</u>
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(3) Investigate, research, and synthesize various information from a variety of media sources.</td></tr>
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<u>Subject/Grade Level</u>:
Grade 9- Algebra I</td><td colspan="2">Big Idea: Transformations</td></tr>
<tr><td colspan="2">Topic: Linear, Absolute Value, Quadratic, and Exponential Equations</td></tr>
<tr><td colspan="2"><u>Overarching Goals:</u>
(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.
(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
(3) Investigate, research, and synthesize various information from a variety of media sources.</td></tr>
<tr><td colspan="2"><u>Goal 17:</u> The student will be able to describe transformations of linear, absolute, quadratic, and exponential equations</td></tr>
<tr><td>Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's)
The student will be able to:</td><td>Essential Questions, Enduring Understandings, Sample Conceptual Understandings</td><td>Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model</td></tr>
<tr><td></td><td>F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.</td><td>Essential Questions:
How does a graph change when a number is added to the original equation?
How do you compare the graphs and describe the changes?

Enduring Understandings:
Learn to change or transform graphs by moving, flipping, shrinking or stretching
Write a new equation to describe the changed or transformed graph
Model real-world data with equations of transformations</td><td>NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.
Learning Activities / Assessment Models:
Graph the following equations on the same axis and describe the changes. y= x and y= x-1
Show a classmate how you can transform a single parent function into a whole family of functions.
Explain how you can write a function for a graph by identifying the transformations.

• <u>Additional Resources:</u>
• <u>Discovering Algebra An Investigative Approach</u>: Key Curriculum Press; 2007
• Quarterly Assessments
• Compass Odyssey Learning Path</td></tr>
</table>

Suggested days of Instruction	Curriculum Management System Subject/Grade Level: **Grade 9- Algebra I**	**Big Idea: Probability** **Topic: Combinations, Permutations, Cards/Dice/Geometric/Coins, Counting Theory, "Trees", Simple Probability with and without replacement** **Overarching Goals:** **(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.** **(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.** **(3) Investigate, research, and synthesize various information from a variety of media sources.** **Goal 18: The student will be able to determine the expected value of a random event.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions, Enduring Understandings, Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	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.9. Use permutations and combinations to compute probabilities of compound events and solve problems.**	**Essential Questions:** What is the difference between permutations and combinations? When do I use the counting theory? How do replacements affect my end result? **Enduring Understandings:** Learn about randomness and the definitions of probability Create and interpret relative frequency graphs Learn methods of calculating probabilities	**NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, *it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses*).** **Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.** **Learning Activities / Assessment Models:** **What is the theoretical probability of rolling a 6?** **Given 4 shirts and 3 pairs of pants, how many outfits can be created?** **How many different ways can president and vice president be selected from a group of 20 kids?**

<table>
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• Compass Odyssey Learning Path
• TI- 84 Calculators
• <u>Punchline Algebra</u> 2nd edition
• <u>Algebra I An Integrated Approach</u>: Heath; 1998
• <u>Larson Algebra I</u>: Holt McDougal; 2009</td></tr>
</table>

Algebra I

COURSE BENCHMARKS

1. The student will be able to perform operations with real numbers, evaluate expressions with variables, and simplify algebraic expressions..
2. The student will be able to create, analyze, and describe several different types of data graphs
3. Students will create, solve, and explain the results of proportions in respect to real world situations.
4. Students will solve linear equations in several different forms
5. Students will graph and analyze linear equations in several different forms
6. Students will identify and explain direct variation in several forms
7. Students will create and analyze Scatter Plots including using a Line of Best Fit to predict data.
8. Students will know the definition of, how to solve, and how to graph Absolute Value equations
9. Students will demonstrate their knowledge and solve systems of linear equations as well as explain their results
10. Students will solve and graph linear inequalities
11. The students will display several methods for attacking open ended problems and the use of visual manipulative to organize work
12. Students will be able to: write definitions, evaluate functions, check for a function using vertical line test, graph functions and identify domain and range
13. The student will be able to graph and analyze quadratic functions, identify the vertex, intercepts, and write the general form of a quadratic.
14. The student will be able to rewrite an expression with exponents.
15. The student will be able to add, subtract, multiply and divide polynomials; simplify by factoring.
16. The student will be able to add, subtract, multiply and divide with radicals; simplify radicals and irrational numbers.
17. The student will be able to describe transformations of linear, absolute, quadratic, and exponential equations.
18. The student will be able to determine the expected value of a random event.