Monroe Township Schools

Curriculum Management System

Algebra 1 A/B

Grade 9

July 2010

Board Approved: December 2010

Table of Contents

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Acknowledgments

The following individuals are acknowledged for their assistance in the preparation of this Curriculum Management System:

Monroe Township Schools

Vision, Mission, and Goals

Vision Statement

The Monroe Township Board of Education commits itself to all children by preparing them to reach their full potential and to function in a global society through a preeminent education.

Mission Statement

The Monroe Public Schools in collaboration with the members of the community shall ensure that all children receive an exemplary education by well trained committed staff in a safe and orderly environment.

Goals

Raise achievement for all students paying particular attention to disparities between subgroups.

Systematically collect, analyze, and evaluate available data to inform all decisions.

Improve business efficiencies where possible to reduce overall operating costs.

Provide support programs for students across the continuum of academic achievement with an emphasis on those who are in the middle.

Provide early interventions for all students who are at risk of not reaching their full potential.

INTRODUCTION, PHILOSOPHY OF EDUCATION, AND EDUCATIONAL GOALS

Philosophy

Monroe Township Schools are committed to providing all students with a quality education resulting in life-long learners who can succeed in a global society. The mathematics program, grades K-12, is predicted on that belief and is guided by the following six principals as stated by the National Council of Teachers of Mathematics (NCTM) in the *Principles and Standards for School Mathematics, 2000.* First, a mathematics education requires equity. All students will be given worthwhile opportunities and strong support to meet high mathematical expectations. Second, a coherent mathematics curriculum will effectively organize, integrate, and articulate important mathematical ideas across the grades. Third, effective mathematics teaching requires the following: a) knowing and understanding mathematics, students as learners, and pedagogical strategies, b) having a challenging and supportive classroom environment and c) continually reflecting on and refining instructional practice. Fourth, students must learn mathematics with understanding. A student's prior experiences and knowledge will actively build new knowledge. Fifth, assessment should support the learning of important mathematics and provide useful information to both teachers and students. Lastly, technology enhances mathematics learning, supports effective mathematics teaching, and influences what mathematics is taught.

As students begin their mathematics education in Monroe Township, 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.

In this changing world those who have a good understanding of mathematics will have many opportunities and doors open to them throughout their lives. Mathematics is not for the select few but rather is for everyone. Monroe township 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

Algebra I is the first course of the college preparatory sequence. It is designed to provide an in-depth analysis of the real world system and introduce process of algebra. Topics included are: data analysis, roots and powers, simplify mathematical expressions, linear equations, graphing linear equations, theoretical and experimental probability, linear inequalities, systems of equations and inequalities, polynomial equations, quadratic functions, graphing quadratic functions, mathematical models, functions, matrices, and solve rational equations. The A/B curriculum is designed to teach and remediate with the same instructor so as to aid students in meeting all the standards and requirements to pass the End of Course Algebra 1 Exam.

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 2002. 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://education.state.nj.us/cccs/?_standard_matrix;c=4

Algebra 1 A/B

Scope and Sequence

Quarter I

Big Idea I: Representation and Modeling with Variables

I.   Variables in Algebra
  a. Writing and Evaluating Variable Expressions
  b. Evaluating Simple Interest
II.   Expressions Containing Exponents
III.   Order of Operations
IV.   Equations and Inequalities
  a. Checking and Solving Equations
  b. Checking Solutions of Inequalities
V.   Translating Verbal Phrases to use in Algebraic Models
  a. Translating verbal phrases into Algebra
  b. Using verbal models
VI.   Functions
  a. Input-Output tables
  b. Domain and Range

Big Idea II: Equivalence

I.   Absolute Value
II.   Graphing and Comparing Real Numbers on a Number Line
III.   Addition and Subtraction of Real Numbers
IV.   Multiplication and Division of Real Numbers
V.   Distributive Property

Big Idea III: Connections and Data Analysis

I.   Construct and Interpret Data Displays
    a. Line Graph
    b. Bar Graph
    c. Box and Whisker Plots
    d. Stem and Leaf Plots
II.   Probability and Odds
    a. Experimental vs. Theoretical
    b. Combinations and Permutations
       i. Using a Graphing Calculator
III.   Measures of Central Tendency
IV.   Rates, Ratios, Proportions, Percents

Big Idea IV: Representation & Modeling

I.   One-Step Equations
II.   Multi-Step
    a. Combining like terms
    b. Distribution
    c. Multiplying by reciprocals
    d. Variables on Both Sides
    e. Rational Coefficients
    f. Reciprocal Property and Cross Products
III.   Using Linear Equations for Problem Solving
    a. Translating verbal models
    b. Drawing a diagram
    c. Using tables to solve
    d. Using graphs to solve
IV.   Transforming Formulas

Course Quarterly Benchmark Assessment: (Higher level 5-10 questions, 45 minutes)

Quarter II

Big Idea V: Linearity

I. Plotting Cartesian Coordinates
II. Scatterplots
   a. Graphing Data
III. Graphing Linear Equations
   a. Using Input-Output Table
   b. Using Intercepts
   c. Using Slope and y-intercept
   d. Horizontal and Vertical Lines
   e. Using a Graphing Calculator
IV. Solving Linear Equations Using Graphs
   a. Graphical Check for a Solution
   b. Solving an Equation Using a Graph
   c. Approximating Solutions Using a Graph
V. Functions vs. Relations
   a. Using a graph to determine
   b. Using a table to determine
   c. Vertical Line Test

Big Idea VI: Linearity

I. Slope-Intercept Form
II. Point- Slope Form
III. Writing an Equation
   a. Given two points
   b. Given a point and slope
   c. Given a point and a line parallel
   d. Given a point and a line perpendicular
IV. Converting to Standard Form
V. Reintroducing Scatterplots and Predicting with Linear Models
   a. Graphing Data
   b. Calculate Line of Best Fit by Hand
   c. Calculate Line of Best Fit with Graphing Calculator
VI. Graphing Absolute Value Equations
   a. Using Input-Output Table
   b. Using Vertex and Slope
   c. Using a Graphing Calculator

Big Idea VII: Linearity

I. Solving and Graphing Inequalities in One Variable
   a. One Step
   b. Multi Step
   c. Compound
   d. Absolute Value
II. Graphing Linear Inequalities in Two Variable
   a. Checking Solutions
   b. Using a Graphing Calculator

Big Idea VIII: Relationships

I. Solving Linear Systems
   a. Checking Validity of Solutions
     i. Substituting in values
     ii. Using a Graphing Calculator
   b. Determining the Number of Solutions
   c. By Graphing
   d. By Substitution
   e. By Elimination (Linear Combination)
II. Solving Systems of Linear Inequalities
   a. Graphing by Hand
   b. Using a Graphing Calculator
III. Applications of Linear Systems

Course Quarterly Benchmark Assessment: (Higher level 5-10 questions)

Quarter III

Big Idea IX: Relationships	Big Idea X: Representation and Modeling

I. Properties of Exponents
   a. Multiplication
   b. Power of Power
   c. Power of Product
   d. Zero and Negative Exponents
   e. Division
II. Scientific Notation
   a. Converting from Expanded Form to Scientific Notation
   b. Converting from Scientific Notation to Expanded Form
   c. Computations with Scientific Notation
III. Exponential Graphs
   a. Growth and Decay Functions and their Graphs
      i. Growth and Decay Factor
      ii. Interpreting Using Graphing Calculator
   b. Determining Domain and Range Using a Graph
   c. Compound Interest
	I. Radicals
	   a. Simplification
	   b. Multiplication
	   c. Division
	   d. Rationalizing Denominators
	   e. Addition and Subtraction of Rational Expressions
	II. Solving Radical Equations
	III. Evaluating a Discriminant
	IV. Distance Formula (Pythagorean Theorem)
	V. Graphing a Quadratic Function
	   a. Determine the Vertex and Axis of Symmetry
	   b. Using an Input-Output Table
	   c. Using a Graphing Calculator
	   d. Identify Domain and Range
	VI. Solving Quadratic Equations using the Quadratic Formula
	VII. Application of the Discriminant

	Course Quarterly Benchmark Assessment: (Higher level 5-10 questions)

Quarter IV

Big Idea XI: Representations and Modeling

VIII. Polynomial Functions
   a. Naming
   b. Addition/Subtraction
   c. Multiplication
   d. Solving in Factored Form
IX. Solving Quadratic Equations by Factoring
   a. With a Leading Coefficient of 1
   b. With a Leading Coefficient other than 1
   c. With a Greatest Common Factor
   d. Special Products
   e. Grouping
X. Finding Zeros/Intercepts of an Quadratic Equation
   a. By Solving Quadratic Equations
   b. Graphically
   c. Using a Graphing Calculator

Big Idea XII: Relationships

XI. Direct and Inverse Variation
   a. Using a Model to Solve Application Problems
      i. Using a Graphing Calculator
XII. Simplifying Rational Expressions
   a. By Factoring
   b. By Using Greatest Common Factor
   c. Finding Values Where a Rational Expression is Undefined
   d. Using Addition and Subtraction
   e. Using Multiplication and Division
XIII. Solving Rational Equations

Big Idea XIII: Connections and Extensions

XIV. Operations with Radical Expressions (Chapter 12)
XV. Pythagorean Theorem and its Converse (Chapter 12)
XVI. Identifying Patterns (External Resources – *HSPA Review Packet*)
XVII. Application Problems

Course Quarterly Benchmark Assessment: (Higher level 5-10 questions)

Algebra I Core Content Overview

Big Idea I: **Representation and Modeling**	**O1.B1** Using variables in different ways. **L1.a** Representing linear functions in multiple ways. **L1.b** Analyzing linear functions. **L1.d** Using linear models.
Big Idea II: **Equivalence**	**O1.a** Reasoning with real numbers. **O1.b** Using ratios, rates, and proportions. **D1.b** Comparing data using summary statistics. **D1.c** Evaluating data-based reports in the media. **D2.a** Using counting principles. **D2.b** Determining probability.
Big Idea III: **Connections and Data Analysis**	**O1.a** Reasoning with real numbers. **L1.a** Representing linear functions in multiple ways. **L1.b** Analyzing linear functions. **L1.d** Using linear models. **L2.a** Solving linear equation and inequalities. **L2.e** Modeling with single variable linear equations, one or two variable inequalities, or systems of equations.
Big Idea IV: **Equivalence/Representation and Modeling**	**O1.B1** Using variables in different ways. **L1.a** Representing linear functions in multiple ways. **L1.b** Analyzing linear functions. **L1.d** Using linear models.
Big Idea V: **Linearity**	**L1.a** Representing linear functions in multiple ways. **L1.b** Analyzing linear functions. **L1.d** Using linear models. **L2.c** Graphing linear functions involving absolute value. **L2.e** Modeling with single variable linear equations, one or two variable inequalities, or systems of equations.

Algebra I Core Content Overview

Big Idea VI: **Linearity**	**L2.a** Solving linear equation and inequalities. **L2.b** Solving equations involving absolute value. **L2.c** Graphing linear inequalities. **L2.e** Modeling with single variable linear equations, one or two variable inequalities, or systems of equations.
Big Idea VII: **Linearity**	**L1.b** Analyzing linear functions. **L1.d** Using linear models. **L2.c** Graphing linear functions involving absolute value. **L1.d** Using linear models. **L2.e** Modeling with single variable linear equations, one or two variable inequalities, or systems of equations.
Big Idea VIII: **Relationships**	**O1.c** Using numerical exponential expressions. **O2.a** Using algebraic exponential expressions. **N2.B1** Solving simple exponential equations.
Big Idea IX: **Relationships**	**O1.d** Using numerical radical expressions. **O2.d** Using algebraic radical expressions. **O2.b** Operating with polynomial expressions. **N1.a** Representing quadratic functions in multiple ways. **N1.c** Using quadratic models. **N2.b** Solving quadratic equations.
Big Idea X: **Representation and Modeling**	**O2.b** Operating with polynomial expressions. **O2.c** Factoring polynomial expressions. **N1.b** Distinguishing between function types. **N1.c** Using quadratic models. **N2.b** Solving quadratic equations.

Algebra I Core Content Overview	
Big Idea XI: **Representation and Modeling**	**O1.b Using ratios, rates, and proportions.** **L2.e Modeling with single variable linear equations, one or two variable inequalities, or systems of equations.**
Big Idea XII: **Relationships**	**O1.d Using numerical radical expressions.** **O2.d Using algebraic radical expressions.** **L2.e Modeling with single variable linear equations, one or two variable inequalities, or systems of equations.**
Big Idea XIII: **Connections and Extensions**	**L2.e Modeling with single variable linear equations, one or two variable inequalities, or systems of equations.** **O2.d Using algebraic radical expressions.**

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 pieces of information from a variety of media sources.**

Essential Questions

❖ How are the operations of real numbers related?

❖ How can real numbers be used to communicate ideas in the real world?

Suggested Blocks for Instruction: 6

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
1.1	• Variables can be used to describe number relationships.	• **Equations** are used to describe **patterns**. • **Operations** are used to represent verbal **models**. • **Symbols** can be manipulated using different operations to **model** and **communicate** relationships.	• Write and evaluate a variable expression. • Evaluate Simple Interest.
1.2	• Exponents are tools to model patterns.		• Evaluate and write expressions containing exponents
1.3	• Order of operations is a standardized method to evaluate expressions.	### Sample Conceptual Understandings • One room in Jean's apartment is a square measuring 12.2 feet along the base of each wall. How many square feet of wall-to-wall carpet does Jean need to carpet the room?	• Use order of operations to evaluate algebraic expressions with and without a calculator.
1.4	• Verbal sentences can be translated into mathematical sentences. • Mathematical sentences represent verbal sentences. • Solutions allow number sentences to make a true statement.	• Make a table for the powers of 8. Describe any patterns. • You are shopping for a mountain bike. A store sells two different models. The model that has steel wheel rims costs $220. The model with aluminum wheel rims costs	• Check solutions to equations and inequalities. • Use verbal and algebraic models to represent real-life situations.
1.5	• Problem solving can be achieved through a system of verbal models➜labels➜algebraic model➜solving➜and a solution check.	$480. You have a summer job for 12 weeks. You save $20 per week, which would allow you to buy the model with the steel rims. You want to know how much more	• Explain modeling using algebraic expressions.

1.7	• Functions are one-to-one and onto.
	• Functions can be represented in multiple ways to model real-life situations.
	• Domain is the set of all input values that go into a function. This results in the range – the set of all output values.
		money you would have to save each week to be able to buy the model with the aluminum wheel rims.
		  o Write a verbal model and an algebraic model for how much more money you would have to save each week.
		  o Use mental math to solve the equation. What does the solution represent?
		
		• If you place one marble in a measuring cup that contains 200 milliliters of water, the measure on the cup indicates that there is a one millimeter increase in volume. How much does the volume increase when you place from 1 to 10 marble in the measuring cup?
		  o Write an equation to represent the function.
		  o Compute an input-output table for the function with the domain 0,1,2,3,4,5,6,7,8,9,10.
		  o Describe the domains and range of the function whose values are shown in the table.
		  o Graph the data in the table. Use this graph to graph the function.
			• Identify a function.
			• Functions can be described using an input-output table, verbal description, in symbols, and a graph.
			• Describe the relationship between the domain and range of a function.

21st Century Skills

Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

➢ **Concept Activity:** *Finding Patterns* (*Chapter 1 Resource Books,* p.56)
➢ **Chapter 1 Project:** *Watch It Disappear* (*Chapter 1 Resource Books,* p.117)
➢ **11.3 Graphing Calculator Activity** (*Chapter 11 Resource Books*, p.40)

Tiered Activity Example	Big Idea #1: Tiered Example

Assessment Models	• **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.**
	
	➢ **Open-Ended Assessment:**
	   ✓ You are making candles to sell at your school's art festival. You melt paraffin wax in a cubic container. Each edge is 6 inches in length. The container is one-half full. Design a cubic candle mold that will hold all of the melted wax. Draw a diagram of the mold. Explain why your mold will hold all of the melted wax. (McDougal-Littell: Algebra 1, pg. 14)
	   ✓ *1.1 Real-Life Applications: Freshman Class Officer Duties* (*Chapter 1 Resource Books*, p.21)
	   ✓ *1.5 Real-Life Applications: Taiwan Vacation* (*Chapter 1 Resource Books*, p.76)
	➢ **Open-Ended (Formative) Assessment:**
	   ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
	   ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
	
	➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
	   ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	   ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
	   ✓ *Chapter 1: Alternative Assessment and Math Journal* (*Chapter 1 Resource Books*, p.115)

Additional Resources	• McDougal-Littell: Algebra 1 2004 • McDougal-Littell: Algebra 1 *Chapter Resource Books* • www.classzone.com

BIG IDEA II: Equivalence
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

- ❖ How are the operations of real numbers related?
- ❖ How can real numbers be used to communicate ideas in the real world?

Suggested Blocks for Instruction: 8

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
2.1	• Absolute value of a number is the distance of a value from zero on the number line. • Real numbers are all values that are found on a number line.	• Real numbers are **communication** tools that **express** important ideas. • Addition and subtraction of real numbers are directly **related** to one another. • Multiplication and division of real numbers are directly **related** to one another.	• Graph and compare real numbers using a number line. • Find the absolute value of a number. • Find the opposite value of a number.
2.2	• The sum of two positive integers is positive. • The sum of two negative integers is negative. • The sum of a positive integer and a negative integer can be positive, negative, or zero.	## Sample Conceptual Understandings • A star's brightness as it appears to a person on Earth is measured by its apparent magnitude. A bright start has a lesser apparent magnitude than a dim star.	• Add real numbers using a number line or addition rules.
2.3	• To subtract two quantities, add the opposite. The result is the difference of the two quantities.	<table><tr><th>Star</th><th>Magnitude</th></tr><tr><td>Canopus</td><td>-0.72</td></tr><tr><td>Altair</td><td>0.77</td></tr><tr><td>Sirius</td><td>-1.46</td></tr><tr><td>Vega</td><td>0.03</td></tr></table>	• Subtract real numbers using the subtraction rule.
2.5	• When multiplying, if the signs of two factors are the same, the product will be positive. If the signs of two factors are different, the product will be negative.	○ Which star looks the brightest? ○ Which star looks the dimmest?	• Multiply real numbers using properties of multiplication.

2.6	• The distributive property is used when a factor is multiplied by a polynomial and the factor must be distributed to each term in a polynomial. • Like terms in an expression have the same variable raised to the same power. • Constant terms are terms without a variable.	o Which star looks dimmer than Altair? • In a game that decides the high school football championship, your team needs to gain 14 years to score a touchdown and win. Your team's final four plays result in a 9-yard gain, a 5-yard loss, a 4-yard gain, a 5-yard gain as time runs out. Use a number line to model the gains and losses and explain whether your team won.	• Use the distributive property to multiply a factor and a polynomial.
2.7	• The product of a nonzero number and its reciprocal is 1. • To divide, multiply dividend by the reciprocal of the divisor. • Division by zero is undefined.	• You and a friend decide to leave a 15% tip for restaurant service. You compute the tip T as $T = 0.15C$, where C represents the cost of the meal. Your friend claims that an easier way to mentally compute the tip is to calculate 10 % of the cost of the meal plus one half of 10% of the cost of the meal. o Write an equation that represents your friend's method of computing the tip. o Simplify the equation. o Will both methods give the same results? Explain.	• Divide real numbers.

21st Century Skills

Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

✓ **2.3 Visual Approach Lesson Opener** (*Chapter 2 Resource Books*, p.42)
✓ **11.4 Activity Lesson Opener** (*Chapter 11 Resource Books*, p.56)
✓ **11.6 Activity Lesson Opener** (*Chapter 11 Resource Books*, p.81)
✓ **11.3 Graphing Calculator Activity** (*Chapter 11 Resource Books*, p.40)

Tiered Activity Example	Big Idea #2: Tiered Example

Assessment Models	• **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.**
	
	➢ **Open-Ended Assessment:**
	    ✓ ***2.2 Real-Life Applications: Stockholders*** (*Chapter 2 Resource Books*, p.36)
	    ✓ ***2.5 Real-Life Applications: Hot-Air Balloons*** (*Chapter 2 Resource Books*, p.78)
	➢ **Open-Ended (Formative) Assessment:**
	    ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
	    ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
	➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
	    ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	    ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.

Additional Resources	• McDougal-Littell: Algebra 1 2004 • McDougal-Littell: Algebra 1 *Chapter Resource Books* • www.classzone.com

BIG IDEA III: Connections and Data Analysis
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

- ❖ How can odds and probability help to analyze information to interpret data?
- ❖ How can you use data displays in the real world?
- ❖ Describe the relationship between mean, median, mode, and outliers.

Suggested Blocks for Instruction: 10

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
1.6	• Data is information, fact, or numbers that describe something. • Tables and graphs are used to organize data.	• Graphs represent **data** in an organized manner to help **analyze** information. • Mean, median, and mode are **measures** of **central tendency** of a data set.	• Use a table to organize data into meaningful groupings. • Make and interpret a bar graph. • Make and interpret a line graph.
2.8	• Probability of an event is the likelihood that the event will occur. • $0 \leq P(x) \leq 1$ • The odds of an event are the ratio of the number of favorable outcomes divided by the number of unfavorable outcomes. • Experimental Probability uses	• Probability is used to **analyze** information and **interpret** significance. • Ratios are used to make **inferences** about large population using small samples. • Percents are used to **analyze** and **compare** data from graphs. • Unit rates are **factors** that help to **model** and **scale** proportions to desired quantities.	• Find the probability of an event and determine its likelihood. • Find the odds of an event. • Calculate theoretical probability of an event. • Calculate experimental probability of an event.
3.8	• A unit rate is a rate per one given unit.	**Sample Conceptual Understandings** • The table shows the number of commercial television stations for different years. Make a line graph of the data. Discuss what the line graph shows.	• Use rates and ratios to model and solve real-life problems. • Use percents to solve real-life problems.
6.6	• A stem and leaf plot is used to organize data.		• Make and use a stem-and-leaf plot to put data in order. • Find the mean, median, and mode of data.

6.7	• A Box and whisker plot is a data display that divides a set of data into four parts. • The median separates the set into two halves (50%). • The first quartile is the median of the lower half (25%) and the third quartile is the median of the upper half (75%) of the data. If a measure of position is shared between two data entries, the average is taken to represent that position. In that case, those two averaged data entries are included in calculating the quartiles.	<table><tr><td>Year</td><td>1991</td><td>1992</td><td>1993</td><td>1994</td><td>1995</td><td>1996</td></tr><tr><td>Number of Stations</td><td>1098</td><td>1118</td><td>1137</td><td>1145</td><td>1161</td><td>1174</td></tr></table> • Suppose you randomly choose a marble from a bag holding 11 green, 4 blue, and 5 yellow marbles. Use probability *and* odds to express how likely it is that you choose a yellow marble. If you find one (probability or odds) easier to understand or more useful than the other, explain why. • You are conducting a survey on the use of air-plane phones. You survey 320 adults and find that 288 of them never made a phone call from an airplane. If you surveyed 3500 adults, how many of them would you predict *have* made a phone call from an airplane? Explain. • If someone said that the mean age of everyone in your algebra class is about 16 ½ years old, do you think the age of the teacher was included in the calculation? Explain why or why not. • Draw a box-and-whisker plot to organize data. • Read and interpret a box-and-whisker plot.

21st Century Skills

Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

✓ *Cooperative Learning Activity* (*Chapter 1 Resource Books*, p.90)
✓ *Activity Lesson Opener* (*Chapter 6 Resource Books*, p.94)
✓ *11.4 Activity Lesson Opener* (*Chapter 11 Resource Books*, p.56)
✓ *11.6 Activity Lesson Opener* (*Chapter 11 Resource Books*, p.81)
✓ *11.3 Graphing Calculator Activity* (*Chapter 11 Resource Books*, p.40)

Tiered Activity Example	Big Idea #3: Tiered Example

Assessment Models	• **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.**
	
	 ➤ **Open-Ended Assessment:**
	  ✓ *Interdisciplinary Application* (*Chapter 2 Resource Books*, p.120)
	  ✓ *Real-Life Application: Skyscrapers*(*Chapter 3 Resource Books*, p.118)
	  ✓ *Real Life Application:* **Good Health and Test Scores** (*Chapter 6 Resource Books*, p.102)
	
	 ➤ **Open-Ended (Formative) Assessment:**
	  ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
	  ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
	
	 ➤ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
	  ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	  ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
	  ✓ *Alternative Assessment and Math Journal Multistep Problem (#2 only)*(*Chapter 6 Resource Books*, p.112)

Additional Resources	• McDougal-Littell: Algebra 1 2004 • McDougal-Littell: Algebra 1 *Chapter Resource Books* • www.classzone.com

BIG IDEA IV: Representation and Modeling

Transfer

Students will be able to independently use their learning to…

<<Question that encompasses an entire big idea>>
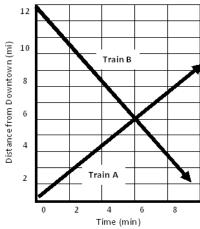
Essential Questions

- ❖ How are equations useful in everyday life?
- ❖ How is an equation that has no solution different than an equation that is an identity?
- ❖ How can drawing diagrams, using a table, and using a graph can be useful problem solving tools?
- ❖ How are formulas similar and different to equations?
- ❖ Why are ratios useful for architectural design?
- ❖ How do percentages relate to you?

Suggested Blocks for Instruction: 14

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
3.1	• A linear equation is when the variable is raised to the first power and does not occur in a denominator, inside a square root symbol, or inside an absolute value symbol. • Inverse operations are operations that undo each other, which help to isolate the variable on one side of the equation. • The goal of solving a linear equation is isolating the variable on one side of the equation.	• Equations **model** patterns that occur in real life problems and are used to **solve** for unknown quantities. • Diagrams help to **model** problems and draw conclusions. • A graph and its equation are in an **interdependent** relationship. • Formulas are direct **representations** of real life applications that help to **solve** for an unknown quantity.	• Solve linear equations using addition and subtraction.
3.2	• Dividing by a number is the equivalent to multiplying by its reciprocal.	**Sample Conceptual Understandings** • The table shows the number of Digital Versatile Disc (DVD) players sold in the first ten month after their release in 1997.	• Solve linear equations using multiplication and division.
3.3	• To solve a multi-step equation, first simplify both sides of the equation and then use inverse operations to		• Use two or more transformations to solve an equation. • Combine like terms in an equation.

	isolate the variable.	**Month / Cumulative Sales / Sales Equation / Monthly Sales** table	
3.4	• An identity is an equation that is true for all values of the variable. • Some linear equations have no solution.		• Translate word problems (verbal models) into equations. • Collect variables on both sides of the equation.
3.5	• Graphs are the visualization of equations.		• Draw diagrams to problem solve. • Use graphs and tables to gather and/or check answers.
3.6	• Round-off error is a consequence of rounded solutions.		• Find exact and approximate solutions of equations that contain decimals.
3.7	• A formula is an algebraic equation that relates two or more real-life quantities. • Function form is when a variable is isolated on one side of the formula.		• Solve a formula for one of its variables. • Rewrite an equation in function form.
11.1	• A proportion is an equation that states two ratios are equal.		• Use the reciprocal property to solve proportions for unknown quantities. • Use the cross product property to solve proportions for unknown quantities.
11.2	• Percents can be described using percentages, decimals, or ratios.		• Use equations to solve problems involving percents.

Middle column (detailed):

Month	Cumulative Sales	Sales Equation	Monthly Sales
March	5,828	----------------------	5,828
April	13,198	$5,828 + x = 13,198$	
May	22,254		
June	31,580		
July	40,972		
Aug.	51,401		
Sept.	68,702		
Oct.	83,494		
Nov.	108,897		
Dec.	158,068		

o For each month, write a sales equation relating cumulative and monthly sales. Let x represent the number of players sold that month.

o Solve your sales equations to fill in the monthly sales column.

o Suppose a DVD player manufacturer started an advertising campaign in September. Use your table to Judge the campaign's effect on sales. Write a brief report explaining whether the campaign was successful.

• Write and solve an equation to find your average speed on a trip from St. Louis to Dallas. You drove 630 miles in 10 ½ hours.

• Two student volunteers are stuffing envelopes for a local food pantry. The mailing will be sent to 560 possible contributors. Luis can stuff 160 envelopes per hour and Mei can stuff 120 envelopes per hour.

    o Working alone, what fraction of the job can Luis complete in one hour? In t hours? Write the fraction in lowest terms.

    o Working alone, what fraction of the job can Luis complete in t hours?

    o Write an expression for the fraction of the job that Luis and Mei can complete in t hours if they work together.

    o To find how long it will take Luis and Mei to complete the job if they work together, you

can set the expression you wrote in part (c) equal to 1 and solve for t. Explain why this will work.
  - How long will it take Luis and Mei to complete the job if they work together? Check your solution.
- Train A leaves the downtown station for the other end of the line at 55 mi/h. Train B leaves the other end of the line on a parallel route and heads downtown at 65 mi/h.
  - Use the graph to tell how many minutes it will be before the trains pass one another.

  - Write and solve an equation to check your answer.
- Suppose another town has 15,860 people aged 25 years or older that 7581 of these people have completed at least 4 years of college. Explain how you can find out whether the number of college graduates in that town is typical for a town of that size.

- You are shopping and find a coat that is on sale for

30% off. It is regularly prices at $80. Your friend tells you that she saw the same coat that she saw the same coat for $80 in another store, but it was 20% off plus an additional 10% off. Will you save by going to the other store? Explain why or why not.

21ˢᵗ Century Skills

Creativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration
Information Literacy	Media Literacy	ICT Literacy
Life and Career Skills	Technology Based Activities	

- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

- ➢ **3.1 Activity Lesson Opener** (*Chapter 3 Resource Books*, p.13)
- ➢ **3.3 Application Lesson Opener**(*Chapter 3 Resource Books*, p.37)
- ➢ **11.1 Application Lesson Opener**(*Chapter 11 Resource Books*, p.12)

Tiered Learning Activity	Big Idea #4: Tiered Example

Assessment Models

- • **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 parenthese*s).**
- • **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.**

- ➢ **Open-Ended Assessment:**
  - ✓ **3.1 Real-Life Application: College Football Stadiums** (*Chapter 3 Resource Books*, p.20)
  - ✓ **3.2 Interdisciplinary Application: Pony Express**(*Chapter 3 Resource Books*, p.32)
  - ✓ **3.4 Real-Life Application: Recycling** (*Chapter 3 Resource Books*, p.62)
  - ✓ **3.5 Real-Life Application: Tunnels**(*Chapter 3 Resource Books*, p.76)
  - ✓ **3.6 Interdisciplinary Application: Magnification**(*Chapter 3 Resource Books*, p.105)
  - ✓ **11.2 Interdisciplinary Application: Markup and Cost**(*Chapter 11 Resource Books*, p.34)
- ➢ **Open-Ended (Formative) Assessment:**
  - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
  - ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
- ➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*

	✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
	✓ **Chapter 3: Project: Ice Rescue** (*Chapter 1 Resource Books*, p.130)
	✓ **Chapter 11 Project: Miniature Room** (*Chapter 11 Resource Books*, p.129)
Additional Resources	 • McDougal-Littell: Algebra 1 2004 • McDougal-Littell: Algebra 1 *Chapter Resource Books* • www.classzone.com

BIG IDEA V: Linearity
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

- ❖ How is a scatterplot useful in making predictions?
- ❖ How is a line a useful tool for interpreting data?
- ❖ Describe an occupation in which slope plays an important role.

Suggested Blocks for Instruction: 10

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
4.1	• A coordinate plane is formed by two real number lines that intersect at the origin,(0,0). • Each point in the plane corresponds to an ordered pair, (x, y). • A scatterplot is a graph of ordered data pairs on a coordinate plane that allow analysis between two quantities.	• Scatterplot enable **analysis** of **patterns** and the **relationship** between two quantities by yielding a visual representation of data. • Real life situations can be **modeled** using an equation. • Equations can be used to **describe** real life situations to form **predictions**.	• Plot points in a coordinate plane. • Draw a scatter plot and make predictions.
4.2	• A point is on the graph of an equation if it satisfies the statement when the values are substituted in.	**Sample Conceptual Understandings** • The table below shows the number of rolls developed for the United States media at the Winter Olympics. | Number of years since 1980, t	4	8	12	14	18
---	---	---	---	---	---
Rolls of film, f	48,200	53,750	60,500	67,500	75,000		• Graph a linear equation using a table or a list of values. • Graph horizontal and vertical lines. • Describe the situation presented using a graph of the data.
4.3	• The y-intercept is the value of y when $x = 0$. • The x-intercept is the value of x when $y = 0$.	o Construct a scatter plot of the data. Describe the pattern of the number of rolls of film developed for the Winter Olympics from 1984 to 1998.	• Find the intercepts of a graph of a linear equation. • Use intercepts to make a quick graph of a linear equation. • Draw appropriate scales.

4.4	• The ratio "rise to run" describes the steepness of a slope.
	• The slope of a non-vertical line is the number of units the line rises or falls for each unit of horizontal change from left to right.
	• A vertical slope is undefined.
	• Rate of change compares two different quantities that are changing.
		○ Predict the number of rolls of film that will be developed for the Winter Olympics in the year 2002. Explain how you made your prediction.
		• Use a table of values to graph the equation:
		• $y = -2x + 5$.
		• Your school drama club is putting on a play next month. By selling tickets for the play, the club hopes to raise $600 for the drama fund for new costumes, scripts, and scenery for future plays. Let x represent the number of adult tickets they sell at $8 each, and let y represent the number of student tickets they sell at $5 each.
		  ○ Write a linear function to model the situation.
		  ○ Graph the linear function.
		  ○ What is the x-intercept? What does it represent in this situation?
		  ○ What are three possible number of adult and student tickets to sell that will make the drama club reach its goal?
		• Draw a ramp and label its rise and run. Explain what is meant by the slope of the ramp.
		• The volume V of blood pumped from your heart each minute varies directly with your pulse rate p. Each time your heart beats, it pumps approximately 0.06 liter of blood.
		  ○ Find an equation that relates V and p.
		  ○ Take your pulse and find out how much blood your heart pumps per minute.
		• Graph the situation: You start from home and drive 55 miles per hour for 3 hours, where d is your distance from home.
			• Find the slope of a line using two of its points.
			• Interpret slope using real life contexts.

4.6	• Slope intercept is of the form $y = mx + b$ where m is the slope and b is the y-intercept.		• Graph a linear equation in slope-intercept form. • Graph and interpret equations in slope-intercept form that model real life situations. • Identify parallel lines.
4.7			• Solve a linear equation graphically. • Use a graphing calculator to approximate a solution.
4.8	• A relation is any set of ordered pairs. • A relation is a function of the horizontal axis variable if and only id no vertical line passes through two or more points on the graph. • $f(x)$ is called function notation.		• Identify when a relation is a function graphically and looking at sets of ordered pairs.

21st Century Skills		
Critical Thinking and Problem Solving	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Media Literacy	*Media Literacy*	*ICT Literacy*
Technology Based Activities	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

➢ *4.1 Graphing Calculator Activity*(*Chapter 4 Resource Books*, p.15)
➢ *4.1 Activity Lesson Opener* (*Chapter 4 Resource Books*, p.12)
➢ *4.7 Graphing Calculator Lesson Opener* (*Chapter 4 Resource Books*, p.98)
➢ *4.8 Application Lesson Opener* (*Chapter 4 Resource Books*, p.111)

Tiered Learning Activity	Big Idea V: Tiered Example

Assessment Models	• **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.**
	
	➢ **Open-Ended Assessment:**
	  ✓ **4.1 *Interdisciplinary Application: Mammals*** (*Chapter 4 Resource Books*, p.22)
	  ✓ **4.4 *Interdisciplinary Application: Minimum Wage***(*Chapter 4 Resource Books*, p.62)
	  ✓ **4.5 *Real-Life Application: Gasoline Prices*** (*Chapter 4 Resource Books*, p.74)
	  ✓ **4.6 *Interdisciplinary Application: Mount Everest*** (*Chapter 4 Resource Books*, p.92)
	➢ **Open-Ended (Formative) Assessment:**
	  ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
	  ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
	➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
	  ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	  ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
	  ✓ ***Chapter 4: Alternative Assessment and Math Journal***(*Chapter 4 Resource Books*, p.128)
	  ✓ ***Chapter 4 Project: Carnival Time***(*Chapter 4 Resource Books*, p.131)

Additional Resources

- McDougal-Littell: Algebra 1 2004
- McDougal-Littell: Algebra 1 *Chapter Resource Books*
- www.classzone.com

BIG IDEA VI: Linearity

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 pieces of information from a variety of media sources.

Essential Questions

- ❖ How is a linear model used to approximate a real life situation?
- ❖ Explain how to use a linear model to make predictions from given data.
- ❖ Describe the differences between parallel and perpendicular lines.
- ❖ How do the different forms of linear functions and the concept of slope help solve real world situations?

Suggested Blocks for Instruction: 14

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
5.1	• Slope-intercept form of the equation of the line is: $y = mx + b$. • A linear model is a linear function that is used to model a real-life situation. • When a linear model is used to approximate a situation, slope models the rate of change and y-intercept is the initial amount or the fixed amount.	• Equations describe the **relationship** between a dependent and an independent variable. • Best-fit line represents the **relationship** between two variables. • Point-intercept form, point-slope form, and standard form are interdependently **related**. ## Sample Conceptual Understandings	• Use the slope-intercept form to write an equation of a line. • Write an equation of a line from a graph. • Model a real life situation with a linear function.
5.2	• Parallel lines have the same slope. • "If and only if" is a bi-conditional statement that means if $a \leftrightarrow b$ *then a implies b and b implies a* .	• A rental company charges a flat fee of $30 and an additional $.25 per mile to rent a moving van. Write an equation to model the total charge y (in dollars) in terms of x, the number of miles driven. • The cost of a taxi ride is an initial fee plus $1.50 for each mile. Your fare for 9 miles is $15.50. Write an equation that models the total cost y of a taxi ride in terms of the number of miles x. How much is the initial fee?	• Use slope and any point on a line to write an equation of the line. • Use a linear model to make predictions about a real-life situation.
5.3	• The slope of a line can be found using two points on the line. • The product of a number and its multiplicative inverse, its reciprocal, is equal to -1. • Perpendicular lines are two lines that intersect at a 90° angle. • Perpendicular lines have slopes that are opposite reciprocals.	• Write an equation in slope-intercept form of the line that passes through the points: $(1,4), (5,-1)$. • A mountain climber is scaling a 300-foot cliff at a constant rate. The climber starts at the bottom at 12:00 PM by 12:30 PM, the climber has moved 62 feet up the cliff. Write an	• Write an equation of a line given two points on the line.

5.4	• The best-fitting line is a line that models the trend through a set of data points. • Correlation is a number , r satisfying $-1 \le r \le 1$ that indicates the strength of the best fit line. • Positive correlation is data that has a trend line with a positive slope. • Negative correlation is data that has a trend line with a negative slope. • No correlation is data that cannot be modeled by a trend line.	equation that gives the distance d (in feet) remaining in the climb in terms of the time t (in hours). What is the slope of the line? At what time will the mountain climber reach the top of the cliff? • Write the equation in standard form of the line that passes through the given point and has the given slope: $(-8,3,), m = 2$. • Graph $y = |x - 1| + 2$ using an input output table. Describe the graph.	• Find a linear equation that approximates a set of data points manually. • Find a linear equation that approximates a set of data points using a graphing calculator. • Determine whether there is a positive or negative or no correlation in a set of data.
5.5	• The point-slope form of the equation of the non-vertical line that passes through a given point (x_1, y_1) with a slope of m is: $y - y_1 = m(x - x_1)$.		• Use the point-slope form to write an equation of a line. • Use the point-slope form to model a real life situation.
5.6	• The standard form of the equation is $Ax + By = C$ where $A \ne 0$ and $B \ne 0$. • Standard form linear equations can be useful for modeling situations involving a combination of items.		• Write a linear equation in standard form. • Use the standard form of an equation to model real-life situations.
6.4 Extension	• The vertex of an absolute value equation, $y = a|x - h| + k$ is the point (h, k).		• Graph absolute value equations using an input-output table. • Graph absolute value equations using a vertex and slope. • Graph absolute value equations using a graphing calculator. ***External Resources required***

21st Century Skills

Critical Thinking and Problem Solving	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Media Literacy	*Media Literacy*	*ICT Literacy*
Technology Based Activities	*Technology Based Activities*	

- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

- **Algebra: Real-Life Investigations in a Lab Setting** – Leah P. McCoy, http://faculty.catawba.edu/costerhus/additionalbackgroundclassactivities/algebralab.pdf (Reprinted from Barbara Moses, ed., *Algebraic Thinking, Grades K-12: Readings from NCTM's School-Based Journals and Other Publications* (Reston, Va.: National Council of Teachers of Mathematics, 2000), pp. 202-5.
- *5.1 Graphing Calculator Lesson Opener*(*Chapter 5 Resource Books*, p.12)
- *5.2 Activity Lesson Opener*(*Chapter 5 Resource Books*, p.24)
- *5.4 Application Lesson Opener*(*Chapter 5 Resource Books*, p.52)
- *5.4 Cooperative Learning Activity* (*Chapter 5 Resource Books*, p.60)

Tiered Learning Activity	Big Idea #6: Tiered Example

Assessment Models

- **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 parenthese*s).**
- **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.**

  - **Open-Ended Assessment:**
    - ✓ *5.1 Interdisciplinary Application: Break-Even Analysis* (*Chapter 5 Resource Books*, p.19)
    - ✓ *5.2 Real-Life Application: Sports Participation* (*Chapter 5 Resource Books*, p.32)
    - ✓ *5.3 Interdisciplinary Application: Bald Eagles*(*Chapter 5 Resource Books*, p.46)
    - ✓ *5.5 Interdisciplinary Application: Advertising*(*Chapter 5 Resource Books*, p.73)
    - ✓ *5.6 Real-Life Application: Saving Money*(*Chapter 5 Resource Books*, p.90)
  - **Open-Ended (Formative) Assessment:**
    - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
    - ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
  - **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
    - ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
    - ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.

Additional Resources

- McDougal-Littell: Algebra 1 2004
- McDougal-Littell: Algebra 1 *Chapter Resource Books*
- www.classzone.com

BIG IDEA VII: Linearity
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

❖ Describe the relationship between solving a system of linear equations graphically or algebraically.

❖ What are some strategies useful in determining which method is best to use when solving systems of equations?

❖ How is the system of linear equations helpful in the real-world?

❖ Explain how to use equations or a graph to determine if a system of equations has one solution, no solution, or many solutions.

❖ How is the solution of a system of linear inequalities similar and different to the solution of a system of linear equations?

Suggested Blocks for Instruction: 14

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
6.1	• The inequality symbol is reversed when both sides of an inequality are multiplied or divided by a negative number. • The graph of a linear inequality in one variable is the set of points on a number line that represent all solutions of the inequality. • Solid dot represents inclusion of the point and an empty circle represents the exclusion of the point.	• Linear inequalities **describe** a range of possible **solutions** to a situation. ## Sample Conceptual Understandings • After two games of bowling, Brenda has a total score of 475. To win the tournament, she needs a total score of 684 or higher. Let x represent the score she needs for her third game to win the tournament. Write an inequality for x. What is the lowest score she can get for her third game and win the tournament? • Write an inequality for the values of x. $$Area > 36 \; square \; meters$$	• Write linear inequalities. • Graph linear inequalities in one variable. • Solve one-step linear inequalities.
6.2	• $x > n$ means x is more than n. • $x < n$ means x is less than n. • $x \geq n$ means x is at least n. • $x \leq n$ means x is at most n.		• Solve multi-step linear inequalities. • Use linear inequalities to model and solve real-life problems.
6.3	• A compound inequality consists of two inequalities connected by "*and*" or "*or*".		• Write, solve, and graph compound inequalities. • Model a real life situation with a compound inequality.

6.4	• $\lvert x \rvert = a \rightarrow x = a \ or -a$
	• Absolute value are grouping symbols.
	• $\lvert x \rvert > a \rightarrow x > a \ or \ x < -a$
	• $\lvert x \rvert \geq a \rightarrow x \geq a \ or \ x \leq -a$
	  o "Less th**AND**"
	• $\lvert x \rvert < a \rightarrow x > a \ and \ x < -a$
	• $\lvert x \rvert \leq a \rightarrow x \geq a \ and \ x \leq -a$
	  o "great**OR**"
		
		x
		9 m
		
		• On your basketball team, the starting players' scoring averages are between 8 and 22 points per game. Write an absolute value inequality describing the scoring averages for the players.
			• Solve absolute-value equations.
			• Solve absolute value inequalities.

6.5	• An ordered pair, (x, y) is a solution of a linear inequality if the inequality is true when the values of x and y are substituted into the inequality.	• You have \$12 to spend on fruit for a meeting. Grapes cost \$1 per pound and peaches cost \$1.50 per pound. Let x represent the number of pounds of grapes you can buy. Write and graph an inequality to model the amounts of grapes and peaches you can buy.	• Graph a linear inequality in two variables. • Check solutions of a linear inequality. • Model a real-life situation using a linear inequality in two variables.

21st Century Skills

Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

- ✓ **6.1 Application Lesson Opener**(*Chapter 6 Resource Books*, p.12)
- ✓ **6.2 Visual Approach Lesson Opener**(*Chapter 6 Resource Books*, p.24)
- ✓ **6.3 Activity Lesson Opener**(*Chapter 6 Resource Books*, p.36)

Tiered Activity Example	Big Idea #7: Tiered Example

Assessment Models	• **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.**
	
	➢ **Open-Ended Assessment:**
	   ✓ *6.1 Real-Life Application: Golf*(*Chapter 6 Resource Books*, p.19)
	   ✓ *6.2 Interdisciplinary Application: People in Flight*(*Chapter 6 Resource Books*, p.31)
	   ✓ *6.3 Real-Life Application: The Value and Cost of Education*(*Chapter 6 Resource Books*, p.45)
	   ✓ *6.4 Real-Life Application: Compact Disc (CD) Players* (*Chapter 6 Resource Books*, p.60)
	   ✓ *6.5 Interdisciplinary Application: Japan* (*Chapter 6 Resource Books*, p.73)
	➢ **Open-Ended (Formative) Assessment:**
	   ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
	   ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
	
	➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
	   ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	   ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
	   ✓ ***Chapter 6 Project: Dinosaur Activity*** http://www.mathwarehouse.com/algebra/linear_equation/linear-inequality.php

Additional Resources	• McDougal-Littell: Algebra 1 2004 • McDougal-Littell: Algebra 1 *Chapter Resource Books* • www.classzone.com

BIG IDEA VIII: Relationships
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

❖ Describe the relationship between solving a system of linear equations graphically or algebraically.

❖ What are some strategies useful in determining which method is best to use when solving systems of equations?

❖ How is the system of linear equations helpful in the real-world?

❖ Explain how to use equations or a graph to determine if a system of equations has one solution, no solution, or many solutions.

❖ How is the solution of a system of linear inequalities similar and different to the solution of a system of linear equations?

Suggested Blocks for Instruction: 10

KNOW	UNDERSTAND	DO
Students will know that:	*Students will understand that:*	*Students will be able to:*
7.1 • A solution of a system of linear equations in two variables is an ordered pair, (x, y), that satisfies each equation in the system. • A solution of a linear system is the intersection point of the two lines.	• A solution of a system of linear equations **models** a unique **outcome** for two real-life situations. • Systems of linear equations **model** real life situations to make **predictions** given certain conditions. • Systems of linear inequalities **model** all possible **outcomes** for two or more real-life situations. ## Sample Conceptual Understandings	• Solve a system of linear equations by graphing on a coordinate plane. • Solve a system of linear equations by graphing on a graphing calculator. • Check the intersection point to verify it is a solution of the system. • Model a real-life problem using a linear system.
7.2 • When using substitution, you will get the same solution whether you solve for y first or x first. • You should begin by solving for the variable that is easier to isolate.	• You do 4 loads of laundry each week at a launderette where each load costs $1.25. You could buy a washing machine that costs $400. Washing 4 loads at home will cost about $1 per week for electricity. How many loads of laundry must you do in order for the costs to be equal? • You exercised on a treadmill for 1.5 hours. You ran at a rate of 5 miles per hour, then you sprinted at a rate of 6	• Use substitution to solve a linear system.
7.3 • Linear combination of two equations is an equation obtained by adding one of the equations (or a multiple of one of the equations) to the other equation.		• Use linear combinations to solve a system of linear equations.

7.4	• Graphing is a useful method for approximating a solution, checking the reasonableness of a solution, and providing a visual model. • Substitution is a useful method when one of the variables has a coefficient of 1 or -1. • Linear combination is a useful method when none of the variables has a coefficient of 1 or -1. • To avoid fractional or decimal coefficients, multiply the equation by a constant first before solving.	miles per hour. If the treadmill monitor says that you ran and sprinted 7 miles, how long did you run at each speed? • You have a necklace and a matching bracelet with 2 types of beads. There are 30 small beads and 6 large beads on the necklace. The bracelet has 10 small beads and 2 large beads. The necklace weighs 3.6 grams and the bracelet weighs 1.2 grams. If the chain has no significant weight, can you find the weight of one large bead? Explain. • A monthly magazine is hiring reporters to cover school events and local events. In each magazine, the managing editor wants at least 4 reporters covering local news and at least 1 reporter covering school news. The budget allows for not more than 9 different reporters' articles to be in one magazine. Graph the region that shows the possible combinations of local and school events covered in the magazine.	• Choose the best method to solve a system of linear equations.
7.5	• A solution to a system of linear equations is the intersection of the two lines. • A solution to a system of linear equations that are parallel, has no intersection, thus has no solution. • A solution to a system of linear equations that turns out to be the same line, has infinite intersections, thus has infinitely many solutions.		• Identify linear systems as having one solution, no solution, or infinitely many solutions.
7.6	• Two or more linear inequalities form a system of linear inequalities. • A solution of a system of linear inequalities is an ordered pair that is a solution of each inequality in the system. • The graph of a system of linear inequalities is the graph of all solutions that satisfy the system. • A solid line is used when the inequality is composed of the symbols: $\leq\ or\ \geq$. • A dotted line is used when the inequality is composed of the symbols: $<\ or\ >$.		• Solving a system of linear inequalities by graphing using a coordinate plane. • Solving a system of linear inequalities by graphing using a graphing calculator. • Use a system of linear inequalities to model a real-life situation.

21st Century Skills		
Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

- ✓ **7.4 Cooperative Learning Activity** (*Chapter 7 Resource Books*, p.60)
- ✓ **7.5 Graphing Calculator Lesson Opener** (*Chapter 7 Resource Books*, p.66)

Tiered Activity Example	Big Idea #8: Tiered Example

Assessment Models

- • **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.**

  - ➢ **Open-Ended Assessment:**
    - ✓ **7.1 Real-Life Application: Newspaper Routes**(*Chapter 7 Resource Books*, p.21)
    - ✓ **7.2 Interdisciplinary Application: Amphibians**(*Chapter 7 Resource Books*, p.34)
    - ✓ **7.3 Real-Life Application: The Juan Fernandez Islands** (*Chapter 7 Resource Books*, p.46)
    - ✓ **7.3 Math and History Application** (*Chapter 7 Resource Books*, p.47)
    - ✓ **7.4 Interdisciplinary Application: Brass Instruments**(*Chapter 7 Resource Books*, p.61)
    - ✓ **7.5 Interdisciplinary Application: Four Corners in Allegheny National Forest** (*Chapter 7 Resource Books*, p.76)
  - ➢ **Open-Ended (Formative) Assessment:**
    - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
    - ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
  - ➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
    - ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
    - ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
    - ✓ **Chapter 7: Alternative Assessment and Math Journal**(*Chapter 7 Resource Books*, p.102)
    - ✓ **Chapter 7 Project: Going Up** (*Chapter 7 Resource Books*, p.105)

Additional Resources

- McDougal-Littell: Algebra 1 2004
- McDougal-Littell: Algebra 1 *Chapter Resource Books*
- www.classzone.com

BIG IDEA IX: Relationships
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

❖ Explain why it is essential to have a like base in order to use any of the exponential properties.

❖ Describe a real-life situation that might require using exponents.

❖ Explain why scientific notation may be particularly useful in certain occupations.

❖ How does exponential growth and decay apply to you and your future?

Suggested Blocks for Instruction: 12

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
8.1	• To multiply powers having the same base, add the exponents. • To find the power of a power, multiply the exponents. • To find a power of product, find the power of each factor and multiply.	• Exponential functions model percentages of change over time. • Exponential functions **model** real-life applications and are used to make **predictions**. • Scientific notation is an efficient method of **representing** and **calculating** very large and very small numbers.	• Use properties of exponents to multiply exponential expressions. • Use powers to model real-life problems.
8.2	• A non-zero number to the zero power is 1. • $a^{-n} = \frac{1}{a^n}; a \neq 0$ • Exponential function is of the form: $y = a \cdot b^x$.	**Sample Conceptual Understandings** • You are offered a job that pays $2x$ dollars or 2^x dollars for x hours of work. Assuming you must work at least 2 hours, which method of payment would you choose? Explain your reasoning.	• Evaluate powers that have zero and negative exponents. • Graph exponential functions using an input-output table.
8.3	• Quotient of powers property states to divide powers having the same base, subtract exponents. • Power of a quotient property states to find the power of the quotient, find the power of the numerator and the power of the denominator and divide.	• Sketch the graphs of $y = 2^x$ and $y = \left(\frac{1}{2}\right)^x$. How are the graphs related? • The racing shells (boats) used in rowing competition usually have 1,2,4, or 8 rowers. Top	• Use the division properties of exponents to evaluate powers and simplify expressions. • Use the division properties of exponents to find a probability.

8.4	• Scientific notation is of the form $c \times 10^n$ where $1 \le c < 10$ and n is an integer.	speeds for racing shells in the Olympic 2000-meter races can be modeled by $y = 16.3(1.0285)^n$ where s is the speed in kilometers per hour and n is the number of rowers. Use the model to estimate the ratio of the speed of an 8-rower shell to the speed of a 2-rower shell. • The distance between the ninth "planet" Pluto and the sun is of 5.9×10^9 kilometers. Light travels at a speed of about 3.0×10^5 kilometers per second. How long does it take light to travel from the Sun to Pluto.	• Use scientific notation to represent numbers. • Rewrite from scientific notation into decimal form. • Rewrite from decimal form into scientific notation. • Computing with scientific notation by hand. • Computing with scientific notation by hand using a calculator. • Use scientific notation to describe real-life situations.

8.5	• Exponential growth is when a quantity grows by the same percent in each unit of time and is of the form:
	$$y = C(1 + r)^t$$
	• Exponential growth models have a variable used as an exponent. Their value will eventually change much more rapidly than those of linear models.
		• The population of 30 mice is released in a wildlife region. The population doubles each year for 4 years. What is the population after 4 years.
		• Each year in the month of March, the NCAA basketball tournament is held to determine the national champion. At the start of the tournament there are 64 teams, and after each round, one half of the remaining teams are eliminated.
		   o Write an exponential decay model showing the number of teams N left in the tournament after round t.
		   o How many teams remain after 3 rounds? 4 rounds?
			• Write and use models for exponential growth.
			• Graph models for exponential growth.

8.6	Exponential growth is when a quantity decreases by the same percent in each unit of time and is of the form: $$y = C(1 - r)^t$$ • A quantity that decreases by a factor less than 1 can be modeled by an exponential equation that represents exponential decay.		• Write and use models for exponential decay. • Graph a model for exponential decay.

21st Century Skills		
Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120

❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

➢ **8.4 Application Lesson Opener**(*Chapter 8 Resource Books*, p.55)
➢ **8.4 Cooperative Learning Activity**(*Chapter 8 Resource Books*, p.63)
➢ **8.5 Application Lesson Opener** (*Chapter 8 Resource Books*, p.70)
➢ **8.6 Cooperative Learning Activity**(*Chapter 8 Resource Books*, p.94)

Tiered Activity Example	Big Idea #9: Tiered Example

Assessment Models

- **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.**

  ➢ **Open-Ended Assessment:**
    ✓ **8.1 Real Life Application: Telephone Numbers** (*Chapter 8 Resource Books*, p.21)
    ✓ **8.2 Interdisciplinary Application: Carbon 14 Dating** (*Chapter 8 Resource Books*, p.35)
    ✓ **8.3 Real Life Application: Internet Usage** (*Chapter 8 Resource Books*, p.49)
    ✓ **8.4 Interdisciplinary Application: Sahara Desert** (*Chapter 8 Resource Books*, p.64)
    ✓ **8.5 Real Life Application: Investing for College** (*Chapter 8 Resource Books*, p.79)
    ✓ **8.6 Real Life Application: Record Albums** (*Chapter 8 Resource Books*, p.95)
  ➢ **Open-Ended (Formative) Assessment:**
    ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
    ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
  ➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
    ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
    ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
    ✓ **Chapter 8: Alternative Assessment and Math Journal**(*Chapter 8 Resource Books*, p.107)
    ✓ **Chapter 8 Project: City Growth** (*Chapter 8 Resource Books*, p.109)

Additional Resources

- McDougal-Littell: Algebra 1 2004
- McDougal-Littell: Algebra 1 *Chapter Resource Books*
- www.classzone.com

BIG IDEA X: Representation and Modeling
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

- ❖ How are perfect squares and square roots related?
- ❖ Explain how quadratic equations can be used to model real-life situations.
- ❖ How are the coefficients of a quadratic equation and its graph related?
- ❖ How is the quadratic formula more useful in solving quadratic equations than solving using radicals to solve?
- ❖ Describe the relationship between the quadratic formula, the discriminant, and the number of solutions.

Suggested Blocks for Instruction: 24

KNOW	UNDERSTAND	DO
Students will know that:	*Students will understand that:*	*Students will be able to:*
9.1 • If $b^2 = a$, the b is the square root of a. • All positive real numbers have two square roots: a positive and negative square root. The positive square root is called the principle square root. • The number or expression inside a radical symbol $(\sqrt{})$ is the radicand. • The square root of a negative number is undefined. • Numbers whose square roots are integers or quotients of integers are called perfect squares.	• Quadratic equations are used in physics to **model** paths of objects through the air (with little air resistance). • The quadratic formula, the discriminant, and the number of solutions are in an interdependent **relationship**. ## Sample Conceptual Understandings • The sales S (in millions of dollars) of computer software in the United States from 1990 to 1995 can be modeled by $S = 61.98t^2 + 1001.15$, where t is the number of years since 1990. Use this model to estimate the year in which sales of computer software will be $7200 million.	• Evaluate and approximate square roots. • Solve quadratic equation by finding square roots.

	• An irrational number is a number that cannot be written as the quotient of two integers. • A radical expression involves square roots. • $\pm a$ means $+a$ and $-a$. • A quadratic equation is an equation that can be written in the following standard form: $ax^2 + bx + c = 0$ $where$ $a \neq 0$. • a is the leading coefficient. • When $b = 0$ the quadratic equation is of the form $ax^2 + c = 0$. o If $d > 0$, then $x^2 = d$ has two solutions: $x = \pm\sqrt{d}$. o If $d = 0$, then $x^2 = d$ has one solution: $x = 0$. o If $d < 0$, then $x^2 = d$ has no real solution. •	• Find the area of the given figure. • Suppose a table-tennis ball is hit in such a way that its path can be modeled by $h = -4.9t^2 + 2.07t$, where h is the height in meters above the table and t is the time in seconds. o Estimate the maximum height reached by the table-tennis ball. o About how many seconds did it take for the table tennis ball to reach its maximum height after its initial bounce? o About how many seconds did it take for the table-tennis ball to travel from the initial bounce to land on the other side of the net?	
9.2	• The product property states that the square root of a product equals the product of the square roots of the factors. $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ where $a \geq 0$ and $b \geq 0$ • The quotient property states that the square root of a quotient equals the quotient of the square roots of the numerator and denominator. $\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$ where $a \geq 0$ and $b \geq 0$	• The number of recreational vehicles (RVs) sold in the Unites States from 1985 to 1991 can be modeled by $N = -9.5t^2 + 48.9t + 343.5$, where N represents the number of vehicles sold (in thousands) and t represents the number of years since 1985. o Sketch a graph of the model for positive values of x and y. o Use the graph to estimate a positive root of the equation $0 = -9.5t^2 + 48.9t + 343.5$. o According to the model, in what year will the number of RVs sold in the Unites States drop to 0?	• Use properties of radicals to simplify radicals. • Use quadratic equations to model real-life problems.

9.3	• You can predict the shape of the graph of $y = ax^2 + bx + c$, if it opens up or down, and its general position by examining $a, b, and\ c$. • The shape of a quadratic function is called a parabola. • The vertex is the highest point of a parabola that opens up or the lowest point of a parabola that opens down. • The vertex of the equation $y = ax^2 + bx + c$ can be found: Vertex = $\left(-\frac{b}{2a}, f(x)\right)$ • The line that passes through the vertex that divides the parabola into two symmetric parts is called the axis of symmetry: $x = -\frac{b}{2a}$.	○ Do you think the prediction is realistic? What factors might explain a decrease or an increase in the number of sales of recreational vehicles? • A falcon dives toward a pigeon on the ground. When the falcon is at a height of 1000 feet, the pigeon sees the falcon, which is diving at 220 feet per second. Estimate the time the pigeon has to escape. • You see a firefighter aim a fire hose from 4 feet above the ground at a window that is 26 feet above the ground. The equation $h = -0.01d^2 + 1.06d + 4$ models the path of the water when h equals the height in feet. Estimate, to the nearest whole number, the possible horizontal distances d (in feet) between the firefighter and the building.	• Sketch the graph of a quadratic function using a coordinate plane. • Sketch the graph of a quadratic function using a graphing calculator. • Use quadratic models in real-life situations.
9.5	• The quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, can be used to solve for the roots of any quadratic equation in standard form $ax^2 + bx + c = 0$.		• Use the quadratic formula to solve a quadratic equation.
9.6	• The discriminant, $b^2 - 4ac$, is a part of the quadratic formula that helps to determine the number of roots or solutions in a quadratic equation. ○ If $b^2 - 4ac > 0$, the equation has two solutions. ○ If $b^2 - 4ac = 0$, the equation has one solution. ○ If $b^2 - 4ac < 0$, the equation has no real solutions.		

21st Century Skills

Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

	Learning Activities

✓ **9.3 Graphing Calculator Lesson Opener** (*Chapter 9 Resource Books*, p.37)
✓ **9.3 Graphing Calculator Activity** (*Chapter 9 Resource Books*, p.40)
✓ **9.4 Visual Approach Lesson Opener** (*Chapter 9 Resource Books*, p.55)
✓ **9.6 Activity Lesson Opener** (*Chapter 9 Resource Books*, p.85)

Tiered Activity Example	[Big Idea #10: Tiered Example](#)

Assessment Models

- **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.**

  ➢ **Open-Ended Assessment:**
  - ➢ **9.1 Interdisciplinary Application: Right Circular Cylinder** (*Chapter 9 Resource Books*, p.20)
  - ➢ **9.2 Interdisciplinary Application: Centripetal Acceleration** (*Chapter 9 Resource Books*, p.32)
  - ➢ **9.3 Real Life Application: Ballet Recital**(*Chapter 9 Resource Books*, p.40)
  - ➢ **9.4 Interdisciplinary Application: Air Pollution** (*Chapter 9 Resource Books*, p.65)
  - ➢ **9.5 Interdisciplinary Application: Current in Electric Circuit** (*Chapter 9 Resource Books*, p.79)
  - ➢ **9.6 Real Life Application: Factory Sales** (*Chapter 9 Resource Books*, p.92)
  ➢ **Open-Ended (Formative) Assessment:**
  - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
  - ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
  ➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
  - ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
  - ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
  - ✓ **Chapter 9: Alternative Assessment and Math Journal**(*Chapter 9 Resource Books*, p.133)
  - ✓ **Chapter 9 Project: Light Square**(*Chapter 9 Resource Books*, p.135)
  - ✓ **Parachute Jump** *http://www.activemath.com/pdf/differentiated_sample.pdf*

Additional Resources

- McDougal-Littell: Algebra 1 2004
- McDougal-Littell: Algebra 1 *Chapter Resource Books*
- www.classzone.com

BIG IDEA XI: Representations and Modeling

Curriculum Management System

Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

❖ Describe the relationship between the different methods of multiplying polynomials and the distributive property.

❖ Why can't you solve for the zeros of a polynomial if the polynomial equation is set equal to anything other than zero?

❖ Describe the relationship between factoring a polynomial and multiplying polynomials.

Suggested Blocks for Instruction: 20

KNOW	UNDERSTAND	DO
Students will know that:	*Students will understand that:*	*Students will be able to:*
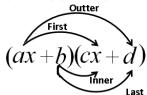
10.1
 • When adding or subtracting polynomials, combine like terms.
 • The degree of a polynomial is the highest exponent.
 • The leading coefficient is the number next to the variable with the highest exponent.
 • A polynomial named by the number of terms is as follows:
    o Degree = 0 → constant
    o Degree = 1 → linear
    o Degree = 2 → quadratic
    o Degree = 3 → cubic
    o Degree = 4 → quartic
    o Degree=5 → quintic
 • A term is called a monomial, involving multiplication between constants which can be multiplied by variables.
	• The factors and x-intercepts of a polynomial are directly **related**.
	 • Multiplying polynomials and factoring polynomials are reverse **processes** of each other.
	
	 ## Sample Conceptual Understandings
	 • You plan to build a house that is 1 ½ times as long as it is wide. You want the land around the house to be 20 feet wider than the width of the house, and twice as long as the length of the house.
	
	 o Write an expression for the area of the land surrounding
		• Add and subtract polynomials.
		 • Use polynomials to model real-life situations.

- A polynomial named by the number of terms is as follows:
  - one term is called a monomial
  - two terms is called a binomial
  - three terms is called a trinomial

the house.
- If $x = 30$ feet, what is the area of the house? What is the area of the entire property?
- An investment of P dollars that gains r percent of its value in one year is worth $P(1 + r)$ at the end of that year. An investment that loses r percent of its value in one year is worth $P(1 - r)$ at the end of that year.
  - Write a model for the value of an investment P that loses r percent one year, then gains r percent the following year.
  - According to the model, did the investment increase or decrease in value? By how much?
  - If the investment gains r percent the first year and loses r percent the second year, what is the increase or decrease in the value of the investment?
- You sell hot dogs for $1.00 each at your concession stand at a baseball park and have about 200 customers. You want to increase the price of a hot dog. You estimate that you will lose three sales for every $.10 increase. The following equation models your hot dog sales revenue R, where n is the number of $.10 increases.

Concession stand revenue model: $R = (1 + 0.01n)(200 - 3n)$

  - To find your revenue from hot dog sales, you multiply the price of each hot dog sold by the number of hot dogs sold. In the formula above, what does $1 + 0.1n$ represent? What does $200 - 3n$ represent?
  - How many times would you have to raise the price by $.10 to reduce your revenue to zero? Make a graph to help find your answer.
  - Decide how high you should raise the price to make the most money. Explain how you got your answer.
- Consider a circle whose radius is greater than 9 and whose area is given by $A = \pi(x^2 - 18x + 81)$. Use

- Multiply two polynomials.
- Use polynomial multiplication in real-life situations.

- FOIL is a double distributing method of multiplication for two binomials $(ax + b)(cx + d)$:

- Multiplying vertically follows the traditional $(multi\text{-}digit)$ x $(multi\text{-}digit)$ number pattern.
- Multiplying horizontally follows the distributive pattern where each term in the polynomial on the left is distributed to each term in the polynomial to the right.
- The box method is a visual method that organizes the multiplication of a $(polynomial)$ x $(polynomial)$ $(ax + b)(cx + d)$.

	ax	$+b$
cx	$(ax)(cx)$	$(+b)(cx)$
$+d$	$(ax)(+d)$	$(+b)(+d)$

10.3	• Sum and difference pattern: $$(a+b)(a-b) = a^2 - b^2$$ • Square of a binomial pattern: $$(a+b)^2 = a^2 + 2ab + b^2$$ $$(a-b)^2 = a^2 - 2ab + b^2$$	factoring to find an expression for the radius of the circle. • Solve by factoring, finding the square roots, or by using the quadratic formula: $9x^2 - 19 = -3$.	• Use special product patterns for the product of a sum and a difference, and for the square of a binomial.
10.4	• A polynomial is in factored form if it is written as the product of two or more linear factors. • Zero product property states that if $ab = 0$ then $a = 0$ or $b = 0$. • The zeros of a polynomial are the x - intercepts of the graph.	• An object is propelled from the ground with an initial upward velocity of 224 feet per second. Using the vertical motion equation $h = 16t^2 - vt$, will the object reach a height of 784 feet? If it does, how long will it take the object to reach that height? Solve by factoring. • Using the vertical motion equation $h = 16t^2 - vt$, you toss a tennis ball from a height of 96 feet with an initial velocity of 16 feet per second. How long will it take for the tennis ball to reach the ground?	• Solve a polynomial equation in factored form. • Relate factors and x-intercepts.
10.5	• Deciding whether a trinomial can be factored with the use of the discriminant. • A polynomial equation must be set equal to zero in order to solve for the zeros.		• Factor a quadratic expression of the form: $x^2 + bx + c$. • Solve quadratic equations by factoring.
10.6	• A polynomial expression is a sum of terms. • A polynomial equation is an equation made up of a sum of terms.		• Factor a quadratic expression of the form: $ax^2 + bx + c$. • Solve quadratic equations by factoring.
10.7	• Difference of two squares pattern $$a^2 - b^2 = (a+b)(a-b)$$ • Perfect square trinomial pattern $$a^2 + 2ab + b^2 = (a+b)^2$$ $$a^2 - 2ab + b^2 = (a-b)^2$$		• Use special product patterns to factor quadratic polynomials. • Solve quadratic equations by factoring.
10.8	• Greatest common factor is the common factor of all the terms. • A polynomial is prime if it is not the product of polynomials having integer coefficients. • To factor a polynomial completely write as the product of monomial factors or prime factors with at least two terms. • Factoring by grouping is a useful strategy for a polynomial with 4 terms.		• Use the distributive property to factor a polynomial. • Solve quadratic equations by factoring.

21st Century Skills		
Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
- ❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

- ➢ *10.1 Application Lesson Opener (Chapter 10 Resource Books, p.13)*
- ➢ *10.2 Graphing Calculator Activity (Chapter 10 Resource Books, p.27)*
- ➢ *10.3 Application Lesson Opener (Chapter 10 Resource Books, p.40)*
- ➢ *10.3 Cooperative Learning Activity (Chapter 10 Resource Books, p.47)*
- ➢ *10.5 Activity Lesson Opener (Chapter 10 Resource Books, p.68)*
- ➢ *10.7 Activity Lesson Opener (Chapter 10 Resource Books, p.95)*

Tiered Activity Example	Big Idea #11: Tiered Example

Assessment Models	• **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.**
	
	➣ **Open-Ended Assessment:**
	  ➣ *10.1 Interdisciplinary Application: Stained Glass*(*Chapter 10 Resource Books*, p.21)
	  ➣ *10.2 Real Life Application: Cutting the Lawns*(*Chapter 10 Resource Books*, p.35)
	  ➣ *10.3 Interdisciplinary Application: Pythagoras* (*Chapter 10 Resource Books*, p.48)
	  ➣ *10.4 Real Life Application: Track and Field*(*Chapter 10 Resource Books*, p.62)
	  ➣ *10.5 Interdisciplinary Application: Marching Bands* (*Chapter 10 Resource Books*, p.75)
	  ➣ *10.6 Interdisciplinary Application: The Art of Africa* (*Chapter 10 Resource Books*, p.89)
	  ➣ *10.7 Real Life Application: Manufacturing* (*Chapter 10 Resource Books*, p.105)
	  ➣ *10.8 Real Life Application: Playgrounds* (*Chapter 10 Resource Books*, p.117)
	➣ **Open-Ended (Formative) Assessment:**
	  ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
	  ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
	
	➣ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
	  ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	  ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
	  ✓ *Chapter 10: Alternative Assessment and Math Journal*(*Chapter 10 Resource Books*, p.127)
	  ✓ *Chapter 10 Project: Is this Realistic?*(*Chapter 10 Resource Books*, p.129)

Additional Resources	• McDougal-Littell: Algebra 1 2004 • McDougal-Littell: Algebra 1 *Chapter Resource Books* • www.classzone.com

BIG IDEA XII: Relationships
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions
❖ Describe a real life situation that has a model that varies inversely and directly.

❖ Explain the difference between a rational expression and a fraction.

Suggested Blocks for Instruction: 14

KNOW	UNDERSTAND	DO
Students will know that:	*Students will understand that:*	*Students will be able to:*
11.3 • Direct variation is when the variable x and y vary directly if for a constant k; $\frac{y}{x} = k$ or $y = kx$; $k \neq 0$ • Inverse variation is when the variable x and y vary inversely if for a constant k; $xy = k$ or $y = \frac{k}{x}$; $k \neq 0$. • k is the constant of variation.	• Inverse and direct variation model real-life **patterns** to make **predictions**. • Rational expressions are used to model real-life situations and can be used to make **predictions**. ### Sample Conceptual Understandings • Decide if the data in the table show direct or inverse variation. Write an equation that relates the variables. <table><tr><td>**x**</td><td>1</td><td>3</td><td>5</td><td>10</td><td>0.5</td></tr><tr><td>**y**</td><td>5</td><td>15</td><td>25</td><td>50</td><td>2.5</td></tr></table> • You are designing a game for a school carnival. Players will drop a coin into a basin of water, trying to hit a target on the bottom. The water is kept moving randomly, so the coin is equally likely to land anywhere. You use a rectangular basin twice as long as it is wide. You place the blue rectangular target an equal distance from each end. o Express the two dimensions of the target in	• Use direct and inverse variation. • Use direct and inverse variations to model real-life situations.

11.4	• A rational number is a number that can be written as the quotient of two integers. • A fraction whose numerator, denominator, or both numerator and denominator are nonzero polynomials is a rational expression. • A rational expression is simplified if its numerator and denominator have no factors in common (other than ± 1). • Simplifying fractions: Let a, b, c be nonzero numbers. $$\frac{ac}{bc} = \frac{a \cdot c}{b \cdot c} = \frac{a}{b}$$	terms of the variables x and y. ○ Write a model that gives the probability that the coin will land on the target. • Simplify: $\frac{4x}{3} \cdot \frac{1}{x}$ • Find an expression for the perimeter of the rectangle: $$\frac{2x - 5}{x - 2}$$ $$\frac{x^2 - 3}{x - 2}$$ • After 50 times at bat, a major league baseball player has a batting average of 0.160. How many consecutive hits must the player get to raise his batting average to 0.250?	• Simplify a rational expression.
11.5	• To multiply rational expressions, let a, b, c be nonzero polynomials, multiply the numerators and denominators: $$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$ • To divide rational expressions, let a, b, c be nonzero polynomials, multiply by the reciprocal of the divisor: $$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$$		• Multiply and divide rational expressions. • Use rational expressions as real-life models.

11.6	• To add with a like denominator, add the numerators and keep the denominators the same: $$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$ • To subtract with a like denominator, subtract the numerators and keep the denominators the same: $$\frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$$ • The least common denominator (LCD) that you use is the least common multiple of the original denominators.		• Add and subtract rational expressions that have like denominators. • Add and subtract rational expressions that have unlike denominators.
11.8	• A rational equation is an equation that contains rational expressions. • Cross multiplication can only be used when each side of the equation is a single fraction.		• Solve rational equations.

21st Century Skills

Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120
❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

✓ **11.4 Activity Lesson Opener** (*Chapter 11 Resource Books*, p.56)
✓ **11.6 Activity Lesson Opener** (*Chapter 11 Resource Books*, p.81)
✓ **11.3 Graphing Calculator Activity** (*Chapter 11 Resource Books*, p.40)
✓ **11.3 Graphing Calculator Activity** (*Chapter 11 Resource Books*, p.40)

Tiered Activity Example	Big Idea XII: Tiered Example

Assessment Models	• **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.**
	
	 ➢ **Open-Ended Assessment:**
	     ➢ ***11.3 Real Life Application: Light Bulbs*** (*Chapter 11 Resource Books*, p.49)
	     ➢ ***11.4 Interdisciplinary Application: Social Studies*** (*Chapter 11 Resource Books*, p.63)
	     ➢ ***11.5 Interdisciplinary Application: Health*** (*Chapter 11 Resource Books*, p.76)
	     ➢ ***11.6 Real Life Application: Television*** (*Chapter 11 Resource Books*, p.89)
	     ➢ ***11.8 Interdisciplinary Application: Medicine and Children*** (*Chapter 11 Resource Books*, p.117)
	 ➢ **Open-Ended (Formative) Assessment:**
	     ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
	     ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*
	
	 ➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
	     ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
	     ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.
	 ➢ ***Chapter 11: Alternative Assessment and Math Journal*** (*Chapter 11 Resource Books*, p.127)

Additional Resources	• McDougal-Littell: Algebra 1 2004 • McDougal-Littell: Algebra 1 *Chapter Resource Books* • www.classzone.com

BIG IDEA XIII: Connections and Extensions
Curriculum Management System
Algebra 1 A/B : Grade 9

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 pieces of information from a variety of media sources.

Essential Questions

❖ Explain how drawing a diagram, using a table, and using a graph can help with problem solving in the real world?

Suggested Blocks for Instruction: 10

	KNOW	UNDERSTAND	DO
	Students will know that:	*Students will understand that:*	*Students will be able to:*
12.2	• The distributive property is used to simplify the sums and differences of radical expressions when the expressions have the same radicand. The expressions $a + \sqrt{b}$ and $a - \sqrt{b}$ are conjugates.	• Drawing a diagram, using a table, and using a graph model real life situations to help **demonstrate** reasoning and **model** the situation.	• Add, subtract, multiply, and divide radical expressions. • Use radical expressions in real life situations.
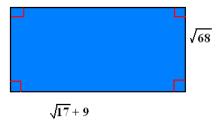
12.5	• The Pythagorean Theorem states: if a triangle is a right triangle, then the sum of the squares of the lengths of the legs a and b equals the square of the length of the hypotenuse c. $$a^2 + b^2 = c^2$$ • Converse of the Pythagorean Theorem states: If a triangle has side lengths $a, b,$ and c such that, $a^2 + b^2 = c^2$, then the triangle is a right triangle.	**Sample Conceptual Understandings** • At Barton High School, 45 students are taking Japanese. The number has been increasing at a rate of 3 students per year. The number of students taking German is 108 and has been decreasing at a rate of 4 students per year. At these rates, when will the number of students taking Japanese equal the number taking German? Write and solve an equation to answer the question. Check your answer with a table or graph. • Find the area: • You are surveying a triangular-shaped piece of land. You have measured and recorded two lengths on a plot plan. What is the length of the property along the street? 	• Use the Pythagorean Theorem and its converse. Use the Pythagorean Theorem and its converse in real-life problems.
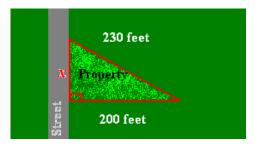
21st Century Skills		
Creativity and Innovation	*Critical Thinking and Problem Solving*	*Communication and Collaboration*
Information Literacy	*Media Literacy*	*ICT Literacy*
Life and Career Skills	*Technology Based Activities*	

❖ http://www.p21.org/index.php?option=com_content&task=view&id=57&Itemid=120

❖ http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Learning Activities

✓ **12.5 Visual Approach Lesson Opener** (*Chapter 12 Resource Books*, p.67)

Tiered Activity Example	Big Idea #13: Tiered Example

Assessment Models

- **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.**

  ➢ **Open-Ended Assessment:**
    ➢ **12.2 Real Life Application: Plywood** (*Chapter 12 Resource Books*, p.33)
    ➢ **12.5 Real Life Application: Kites** (*Chapter 12 Resource Books*, p.76)
  ➢ **Open-Ended (Formative) Assessment:**
    ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. *(Synthesis, Analysis, Evaluation)*
    ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.*(Synthesis, Analysis, Evaluation)*

  ➢ **Summative Assessment:** Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. *(Synthesis, Analysis, Evaluation)*
    ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
    ✓ Students will be given a chapter test that provides a review of the concepts and skills in the chapter.

Additional Resources

- McDougal-Littell: Algebra 1 2004
- McDougal-Littell: Algebra 1 Chapter Resource Books
- www.classzone.com

Algebra 1 A/B
COURSE BENCHMARKS

1. The student will be able to understand that **equations** are used to describe **patterns**, **operations** are used to represent verbal **models** and **symbols** can be manipulated using different operations to **model** and **communicate** relationships.
2. The student will be able to understand that real numbers are **communication** tools that **express** important ideas with addition and subtraction of real numbers are directly **related** to one another and multiplication and division of real numbers are directly **related** to one another.
3. The student will be able to understand that graphs are used to represent **data** in an organized manner to help **analyze** information using the mean, median, and mode as **measures** of **center** of a data set. Percents and probability are used to **analyze** information and **interpret** significance and ratios are used to make **inferences** about large population using small samples. Unit rates are **factors** that help to **model** and **scale** proportions to desired quantities.
4. The student will be able to understand that equations **model** patterns that occur in real life problems and are used to **solve** for unknown quantities and formulas are direct **representations** of real life applications that help to **solve** for an unknown quantity. Diagrams help to **model** problems and draw conclusions. A graph and its equation are in an **interdependent** relationship.
5. The student will be able to understand that scatterplots enable **analysis** of **patterns** and the **relationship** between two quantities by yielding a visual representation of data. Real life situations can be **modeled** using an equation. Equations can be used to **describe** real life situations to form **predictions**.
6. The student will be able to understand that inverse and direct variation model real-life **patterns** to make **predictions**. Equations describe the **relationship** between a dependent and an independent variable. Best-fit line represents the **relationship** between two variables. Point-intercept form, point-slope form, and standard form are interdependently **related**.
7. The student will be able to understand that linear inequalities **describe** a range of possible **solutions** to a situation.
8. The student will be able to understand that a solution of a system of linear equations **models** a unique **outcome** for two real-life situations. Systems of linear equations **model** real life situations to make **predictions** given certain conditions. Systems of linear inequalities **model** all possible **outcomes** for two or more real-life situations.
9. The student will be able to understand that exponential functions model percentages of change over time. Exponential functions **model** real-life applications and are used to make **predictions**. Scientific notation is an efficient method of **representing** and **calculating** large numbers.
10. The student will be able to understand that quadratic equations are used in physics to **model** paths of objects through the air (with little air resistance). The quadratic formula, the discriminant, and the number of solutions are in an interdependent **relationship**.
11. The student will be able to understand that the factors and x-intercepts of a polynomial are directly **related** and multiplying polynomials and factoring polynomials are reverse **processes** of each other.
12. The student will be able to understand that inverse and direct variation model real-life **patterns** to make **predictions** and rational expressions are used to **model** real-life situations and can be used to make **predictions**.
13. The student will be able to understand that drawing a diagram, using a table, and using a graph, model real life situations to help **demonstrate** reasoning and **model** the situation.

BIG IDEA I: Tiered Assignment

Algebra 1

1.5 Tiered Activity

Name: _____

Date: _____

Block: _____

■ **Taiwan Vacation**

Window on China, or Xiao Ren Gwo (roughly translated as Little People World), is a special attraction located in Taiwan, Republic of China. This amusement park's actual location is 53 kilometers (or 33 miles) southwest of Taipei, the capital of Taiwan, in the city of Lungtan (near Taiyuan). Visitors who come to Window On China have an opportunity to view 100 miniature reproductions of many famous Chinese attractions from both mainland China and Taiwan, including the Great Wall of China and the Forbidden City. There are also additional miniature kingdoms containing many other famous structures from around the world. These reproductions are on a scale of 1:25, and are so detailed that it is difficult to distinguish between photos of the actual and miniature structures. Even the bushes and trees are created to scale. In addition to the miniature kingdoms, the park contains a classical Chinese garden, a restaurant, and an arcade area with games for kids. The following prices for the park are in Taiwanese currency (New Taiwan-NT-Dollars).

Regular Prices	Group Admissions	After 3:00 PM
Adults: 590 NT	500 NT	420 NT
Students: 500 NT	420 NT	420 NT
Senior/Children: 350 NT	300 NT	420 NT

In Exercises 1–5, use the above pricing information as well as the following information.

The Chen family had a reunion and decided to visit Window On China. Their total entrance fee was 8180 NT dollars. Be sure to use verbal models to write your algebraic equations.

1. If there were 7 adults and 3 children, how many "student" Chens made the trip according to their total entrance fee? Assume the Chens arrived before 3:00 PM.

2. If they qualified for the group rate, how many "student" Chens were present?

3. Use the data from Exercise 1 to determine how much could have been saved if the Chens arrived after 3:00 PM.

4. Use the data from Exercise 2 to determine how much could have been saved if the Chens arrived after 3:00 PM.

5. If the exchange rate for NT to U.S. dollars is 32:1, how much money in U.S. dollars did the Chens spend on entrance fees for Window On China? (Use the data from Exercise 1 and round your answer to the nearest cent.)

Algebra 1

Name: _____

Date: _____

1.5 Tiered Activity

Block: _____

⚠ **Taiwan Vacation**

Window on China, or Xiao Ren Gwo (roughly translated as Little People World), is a special attraction located in Taiwan, Republic of China. This amusement park's actual location is 53 kilometers (or 33 miles) southwest of Taipei, the capital of Taiwan, in the city of Lungtan (near Taiyuan). Visitors who come to Window On China have an opportunity to view 100 miniature reproductions of many famous Chinese attractions from both mainland China and Taiwan, including the Great Wall of China and the Forbidden City. There are also additional miniature kingdoms containing many other famous structures from around the world. These reproductions are on a scale of 1:25, and are so detailed that it is difficult to distinguish between photos of the actual and miniature structures. Even the bushes and trees are created to scale. In addition to the miniature kingdoms, the park contains a classical Chinese garden, a restaurant, and an arcade area with games for kids. The following prices for the park are in Taiwanese currency (New Taiwan-NT-Dollars).

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The Chen family had a reunion and decided to visit Window On China. Their total entrance fee was 8180 NT dollars. Be sure to use verbal models to write your algebraic equations.

1. If there were 7 adults and 3 children, how many "student" Chens made the trip according to their total entrance fee? Assume the Chens arrived before 3:00 PM.

Write a Verbal Model: _____

Algebraic
Let x = number of adults and y = number of children.

Evaluate

2. If they qualified for the group rate, how many "student" Chens were present?

Write a Verbal Model: _____

Algebraic
Let x = number of adults and y = number of children.

Evaluate

3. Use the data from Exercise 1 to determine how much could have been saved if the Chens arrived after 3:00 PM.

Write a Verbal Model for after 3:00 PM: _____

Algebraic for 3:00 PM
Let x = number of adults and y = number of children.

Evaluate for 3:00 PM

Calculate Savings

4. Use the data from Exercise 2 to determine how much could have been saved if the Chens arrived after 3:00 PM.
Let x = number of adults and y = number of children.

Evaluate for 3:00 PM

Calculate Savings

5. If the exchange rate for NT to U.S. dollars is 32:1, how much money in U.S. dollars did the Chens spend on entrance fees for Window On China? (Use the data from Exercise 1 and round your answer to the nearest cent.)

What is the ratio of NT to U.S. Dollars?_____

Convert your answer to Exercise 1 to U.S. Dollars

Algebra 1   Name: _____
                                                    Date: _____
1.5 Tiered Activity   Block: _____

⊚ **Taiwan Vacation**

Window on China, or Xiao Ren Gwo (roughly translated as Little People World), is a special attraction located in Taiwan, Republic of China. This amusement park's actual location is 53 kilometers (or 33 miles) southwest of Taipei, the capital of Taiwan, in the city of Lungtan (near Taiyuan). Visitors who come to Window On China have an opportunity to view 100 miniature reproductions of many famous Chinese attractions from both mainland China and Taiwan, including the Great Wall of China and the Forbidden City. There are also additional miniature kingdoms containing many other famous structures from around the world. These reproductions are on a scale of 1:25, and are so detailed that it is difficult to distinguish between photos of the actual and miniature structures. Even the bushes and trees are created to scale. In addition to the miniature kingdoms, the park contains a classical Chinese garden, a restaurant, and an arcade area with games for kids. The following prices for the park are in Taiwanese currency (New Taiwan-NT-Dollars).

Regular Prices	*Group Admissions*	*After 3:00 PM*
Adults: 590 NT	500 NT	420 NT
Students: 500 NT	420 NT	420 NT
Senior/Children: 350 NT	300 NT	420 NT

In Exercises 1–5, use the above pricing information as well as the following information.

The Chen family had a reunion and decided to visit Window On China. Their total entrance fee was 8180 NT dollars. Be sure to use verbal models to write your algebraic equations.

1. If there were 7 adults and 3 children, how many "student" Chens made the trip according to their total entrance fee? Assume the Chens arrived before 3:00 PM.

Verbal

+   **=**

Algebraic
Let x = number of adults and y = number of children.

+   **=**

Evaluate

2. If they qualified for the group rate, how many "student" Chens were present?

Verbal

	+		**=**		

Algebraic
Let x = number of adults and y = number of children.

	+		**=**		

Evaluate

3. Use the data from Exercise 1 to determine how much could have been saved if the Chens arrived after 3:00 PM.

Answer from Exercise 1: _____

Verbal for After 3:00 PM

	+		**=**		

Algebraic for After 3:00 PM
Let x = number of adults and y = number of children.

	+		**=**		

Evaluate for After 3:00 PM

Evaluate the difference between your answer for Exercise 1 and if they arrived after 3:00 PM.

4. Use the data from Exercise 2 to determine how much could have been saved if the Chens arrived after 3:00 PM.

Answer from Exercise 2: _____

Verbal for After 3:00 PM

	+		**=**	

Algebraic for After 3:00 PM
Let x = number of adults and y = number of children.

	+		**=**	

Evaluate for After 3:00 PM

Evaluate the difference between your answer for Exercise 2 and if they arrived after 3:00 PM.

5. If the exchange rate for NT to U.S. dollars is 32:1, how much money in U.S. dollars did the Chens spend on entrance fees for Window On China? (Use the data from Exercise 1 and round your answer to the nearest cent.)

Write the exchange rate for NT to U.S. dollars as a fraction:_____

Answer in NT from Exercise 1: _____

Use the exchange rate to convert from NT to U.S dollars:

Answer in U.S. Dollars _____

BIG IDEA II: Tiered Assignment

Algebra 1   Name: _____
                                                       Date: _____

2.2 Tiered Activity   Block: _____

◨ Stockholders

Stock is a right of ownership in a corporation. The stock is divided into a certain number of shares, and the corporation issues stockholders one or more stock certificates to show how many shares they hold.

Stockholders may sell their stock whenever they want to, unless the corporation has some special rule to prevent it. Prices of stock change according to general business conditions and the earnings and future prospects of the corporation. If the business is doing well, stockholders may be able to sell their stock for a profit. If the business is not doing well, stockholders may have to take a loss.

Stock is often traded under a contract called an option. An option allows the holder (owner) to buy or sell a certain amount of stock at a specific price within a designated time period. For example, an investor may believe that corn will increase in value. The investor can buy an option for corn at $2.22 with a call date of March 10th. Corn is currently on the market at $2.10. If the value of the corn stock rises above the price set ($2.22) by the option, the holder will profit. If the value of corn does not exceed the value of $2.22 by March 10th, the holder will lose their investment.

In Exercises 1-6, use the following information.
You decide to give the stock market a try. You buy one share in a company. You follow the stock market for five days, watching your specific company.

1. Over the five-day period your stock does the following: gains 2 cents, loses 10 cents, gains 3 cents, gains 5 cents, and loses 4 cents. Find your net profit or loss for this five-day period.

2. You paid $8.54 for your share. After the five-day period, how much is your share worth?

3. As you look back over the five-day period, when would have been the best time for you to sell? (When would you have made the greatest profit from selling your share?)

4. Suppose you do not sell your share and watch the market for another five day period. The results are: loses 3 cents, gains 5 cents, gains 7 cents, loses 2 cents, and gains 9 cents. Find the net profit or loss for this five-day period.

5. Using your answer from Exercise 2, find the value of your share after the ten-day period.

6. After the ten-day period, did you make a profit or suffer a loss? How much?

Algebra 1   Name: _____
                                                 Date: _____
2.2 Tiered Activity   Block: _____

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In Exercises 1-6, use the following information.
You decide to give the stock market a try. You buy one share in a company. You follow the stock market for five days, watching your specific company.

1. Over the five-day period your stock does the following: gains 2 cents, loses 10 cents, gains 3 cents, gains 5 cents, and loses 4 cents.
   a. **Circle one:**
      When we hear the word "GAIN", we think of **[positive numbers] [negative numbers]**.
   b. **Circle one:**
      When we hear the word "LOSE", we think of **[positive numbers] [negative numbers]**.

   c. Find your net profit or loss for this five-day period.

2. You paid $8.54 for your share. After the five-day period, how much is your share worth?

3. As you look back over the five-day period, when would have been the best time for you to sell? List the profit of your stock for each day and pick the day that you have the made the most money.
   a. Day 1:_____
   b. Day 2:_____
   c. Day 3: _____
   d. Day 4: _____
   e. Day 5: _____

4. Suppose you do not sell your share and watch the market for another five day period. The results are: loses 3 cents, gains 5 cents, gains 7 cents, loses 2 cents, and gains 9 cents. Find the net profit or loss for this five-day period. **Calculate the "profit" over the next five days.**

5. Find the value of your share after the ten-day period.
   a. **What was your "profit" from the first five day period in Exercise 2? _____**
   b. **What was your profit from the second five day period in Exercise 4? _____**
   c. **Find the sum of your answers from Exercise 2 and Exercise 4.**

6. After the ten-day period, did you make a profit or suffer a loss? How much?

   a. <u>**Circle One**</u>:
      If you made a profit, should your ending worth be a **[positive number] [negative number].**

   b. **What was the starting value of your stock?_____**

   c. How much of a profit/loss did your stock take?

Algebra 1   Name: _____
                                            Date: _____
2.2 Tiered Activity   Block: _____

◉ Stockholders

Stock is a right of ownership in a corporation. The stock is divided into a certain number of shares, and the corporation issues stockholders one or more stock certificates to show how many shares they hold.

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In Exercises 1-6, use the following information.
You decide to give the stock market a try. You buy one share in a company. You follow the stock market for five days, watching your specific company.

1. Over the five-day period your stock does the following: gains 2 cents, loses 10 cents, gains 3 cents, gains 5 cents, and loses 4 cents.
   a. **Circle one:**
      When we hear the word "GAIN", we think of [positive numbers] [negative numbers].
   b. **Circle one:**
      When we hear the word "LOSE", we think of [positive numbers] [negative numbers].

   c. Write a number that represents the number of the profit or loss for each day.
      a. Day 1:_____
      b. Day 2:_____
      c. Day 3: _____
      d. Day 4: _____
      e. Day 5: _____

   d. Find your net profit or loss for this five-day period by adding together your profits and losses over the five days.

2. You paid $8.54 for your share. After the five-day period, how much is your share worth?
   a. **How much money did you pay for the share? _____**
   b. **Did you make or lose money in part d)? _____**
   c. **Add together your starting amount and your answer from part d).**

3. As you look back over the five-day period, when would have been the best time for you to sell? List the "profit" of your stock for each day and pick the day that you have the made the most money.

    a. Day 1:_____

    b. Day 2:_____

    c. Day 3: _____

    d. Day 4: _____

    e. Day 5: _____

4. Suppose you do not sell your share and watch the market for another five day period. The results are: loses 3 cents, gains 5 cents, gains 7 cents, loses 2 cents, and gains 9 cents. Find the net profit or loss for this five-day period. **Calculate the "profit" over the next five days.**

5. Find the value of your share after the ten-day period.

    a. What was your "profit" from the first five day period in Exercise 2? _____

    b. What was your profit from the second five day period in Exercise 4? _____

    c. Find the sum of your answers from Exercise 2 and Exercise 4.

6. After the ten-day period, did you make a profit or suffer a loss? How much?

  a. **Circle One**:

    If you made a profit, should your ending worth be a **[positive number] [negative number].**

    b. **How much of a profit/loss did your stock take?**

        i. What was the starting value of your stock? _____

        ii. What is the ending value of your stock? _____

        iii. Find the difference of your starting and ending value of the stock. Is it a gain or loss? Why?

BIG IDEA III: Tiered Assignment

Algebra 1

Name: _____

Date: _____

2.8 Tiered Activity

Block: _____

◘ Voting Rights

HISTORY Voting is a method by which groups of people make decisions. In many countries, people vote to choose their leaders and to decide public issues. Citizens of democratic countries consider voting one of their chief rights because it allows them to choose who will govern them.

Since the 1800's, democratic nations have extended suffrage (the right to vote) to many people. The Constitution of the United States has been amended several times for this purpose. Women were not allowed to vote in most states until the ratification of the 19th Amendment in 1920. In 1971, the 26th Amendment lowered the voting age to 18 for all state and national elections.

Female Voters

Age	Population	Number registered
18 to 20 years old	5,413,000	2,625,000
21 to 24 years old	6,964,000	3,681,000
25 to 44 years old	42,388,000	27,153,000
45 to 64 years old	27,776,000	20,662,000
65 years and older	18,480,000	13,867,000

In Exercises 1-7, use the table above that shows the number of females of voting age and the number of these females that are registered to vote according to their ages.

1. Find the probability that a female from the 45–64 age group is a registered voter.

2. Find the probability that a female from the 18–20 age group is *not* a registered voter.

3. Find the probability that a female registered voter chosen at random is 25 to 44 years old.

4. Find the probability that a female registered voter chosen at random is not 21 to 24 years old.

5. Find the odds of randomly choosing a female registered voter that is 65 years and older.

6. Find the odds of randomly choosing a female registered voter that is 25 to 64 years old.

7. Find the odds of randomly choosing a female ages 21 to 24 years old that is not a registered voter.

Algebra 1   Name: _____

2.8 Tiered Activity   Date: _____

                                             Block: _____

⚠ Voting Rights

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65 years and older	18,480,000	13,867,000

In Exercises 1-7, use the table above that shows the number of females of voting age and the number of these females that are registered to vote according to their ages.

1. Find the probability that a female from the 45–64 age group is a registered voter.

    a.   **Number of Females that are registered to vote in 45-64 age group: _____**

    b.   **Number of Females 45 to 64 years old : _____**

    c.   **Divide a) and b) to find the probability of a female aged 45 to 64 is registered to vote: _____**

2. Find the probability that a female from the 18–20 age group is *not* a registered voter.

    a.   **Number of Females that are registered to vote in 18-20 age group: _____**

    b.   **Number of Females 18 to 20 years old : _____**

    c.   **Number of Females that are <u>NOT</u> registered to vote in 18-20 age group: _____**

    d.   **Divide c) and b) to find the probability of a female aged 18 to 20 is <u>NOT</u> registered to vote:**

       _____

3. Find the probability that a female registered voter chosen at random is 25 to 44 years old.

4. Find the probability that a female registered voter chosen at random is not 21 to 24 years old.

5. Find the odds of randomly choosing a female registered voter that is 65 years and older.

$$odds = \frac{favorable\ outcomes}{unfavorable\ outcomes}$$

6. Find the odds of randomly choosing a female registered voter that is 25 to 64 years old.

7. Find the odds of randomly choosing a female ages 21 to 24 years old that is not a registered voter.

Algebra 1

2.8 Tiered Activity

Name: _____

Date: _____

Block: _____

◉ Voting Rights

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45 to 64 years old	27,776,000	20,662,000
65 years and older	18,480,000	13,867,000

In Exercises 1-7, use the table above that shows the number of females of voting age and the number of these females that are registered to vote according to their ages.

1. Find the probability that a female from the 45–64 age group is a registered voter.
   a. **Number of Females that are registered to vote in 45-64 age group: _____**

   b. **Number of Females 45 to 64 years old : _____**

   c. **Divide a) and b) to find the probability of a female aged 45 to 64 is registered to vote: _____**

2. Find the probability that a female from the 18–20 age group is *not* a registered voter.
   e. **Number of Females that are registered to vote in 18-20 age group: _____**

   f. **Number of Females 18 to 20 years old : _____**

   g. **Number of Females that are <u>NOT</u> registered to vote in 18-20 age group: _____**

   h. **Divide c) and b) to find the probability of a female aged 18 to 20 is <u>NOT</u> registered to vote:**

   _____

3. Find the probability that a female registered voter chosen at random is 25 to 44 years old.
   a. **Number of Females that are in the 25 – 44 age group: _____**

   b. **Number of Females total: _____**

   c. **Divide a) and b) to find the probability that a female is aged 25 to 44: _____**

4. Find the probability that a female registered voter chosen at random is not 21 to 24 years old.

    a. **Number of Females that are in the 21 – 24 age group: _____**

    b. **Number of Females that are <u>NOT</u> in the 21 – 24 age group: _____**

    c. **Number of Females total: _____**

    d. **Divide b) and c) to find the probability of a female not aged 21 to 24 years old:_____**

5. Find the odds of randomly choosing a female registered voter that is 65 years and older.

$$odds = \frac{favorable\ outcomes}{unfavorable\ outcomes}$$

    a. **Number of Females that are 65 years or older age group: _____**

    b. **Number of Females that are <u>NOT</u> in the 65 years or older age group: _____**

    c. **The odds of randomly choosing a female registered voter that is 65 years or older: _____**

6. Find the odds of randomly choosing a female registered voter that is 25 to 64 years old.

$$odds = \frac{favorable\ outcomes}{unfavorable\ outcomes}$$

    a. **Number of Females that are in the 25 to 64 age group that is a registered voter: _____**

    b. **Number of Females that are <u>NOT</u> registered to vote in the 25 to 64 years age group: _____**

    c. **The odds of randomly choosing a female registered voter that is 25 to 64 years age: _____**

7. Find the odds of randomly choosing a female ages 21 to 24 years old that is **<u>NOT</u>** a registered voter.

$$odds = \frac{favorable\ outcomes}{unfavorable\ outcomes}$$

    d. **Number of Females that are in the 21 to 24 age group that are not registered to vote: _____**

    e. **Number of Females that are in the 21 to 24 age group that are registered to vote: _____**

    f. **The odds of randomly choosing a female ages 21 to 24 years old that is <u>NOT</u> a registered voter:**

    _____

BIG IDEA IV: Tiered Assignment

Algebra 1

Name: _____

Date: _____

3.5 Tiered Activity

Block: _____

◨ Tunnels

A tunnel is a passage or roadway used for various purposes, including highway traffic, railroads, and subways. Although ancient civilizations used tunnels to carry water for irrigation or for drinking, the advent of the railroad and the motor vehicle marked a widespread expansion in the number and the length of tunnels.

Historically, tunnel building has been a long and dangerous endeavor, often claiming many lives in the process. Modern tunneling advancements, however, have not only increased the efficiency of construction, but have also greatly improved worker safety. Improved boring and drilling machines like the rock drill and the mole now allow a tunnel to be driven 4 or 5 times faster than with older techniques. In addition, lining tunnels with concrete or plastic sealers minimizes the danger of leaking water, which can cause delays, equipment damage, and even collapse.

Boring Brothers, Inc. has a contract to dig a tunnel through a mountain to accommodate the construction of a major highway. Crew A starts at the west end and digs at a rate of 9 meters per day. Crew B starts at the east end two days after Crew A and digs at a rate of 12 meters per day.

In Exercises 1–4, use the information above.

1. Let x be the number of days Crew A has been digging. Write an expression for the number of meters Crew A has dug after x days.

2. In terms of x, how many days has Crew B been digging? Write an expression for the number of meters Crew B has dug in this number of days.

3. Write and solve an equation to find how many days it will take for both crews to dig the same number of meters.

4. The total length of the tunnel is to be 2118 meters. Write an equation stating this fact. Then solve the equation to find how many days it takes to dig the tunnel from the time Crew A starts.

Algebra 1   Name: _____
                                             Date: _____
3.5 Tiered Activity   Block: _____

⚠ Tunnels

A tunnel is a passage or roadway used for various purposes, including highway traffic, railroads, and subways. Although ancient civilizations used tunnels to carry water for irrigation or for drinking, the advent of the railroad and the motor vehicle marked a widespread expansion in the number and the length of tunnels.

Historically, tunnel building has been a long and dangerous endeavor, often claiming many lives in the process. Modern tunneling advancements, however, have not only increased the efficiency of construction, but have also greatly improved worker safety. Improved boring and drilling machines like the rock drill and the mole now allow a tunnel to be driven 4 or 5 times faster than with older techniques. In addition, lining tunnels with concrete or plastic sealers minimizes the danger of leaking water, which can cause delays, equipment damage, and even collapse.

Boring Brothers, Inc. has a contract to dig a tunnel through a mountain to accommodate the construction of a major highway. Crew A starts at the west end and digs at a rate of 9 meters per day. Crew B starts at the east end two days after Crew A and digs at a rate of 12 meters per day.

In Exercises 1–4, use the information above.

1. Let x be the number of days Crew A has been digging. Write an expression for the number of meters Crew A has dug after x days.

2.

    a. In terms of x, how many days has Crew B been digging?

    b. Write an expression for the number of meters Crew B has dug in this number of days.

3. Write and solve an equation to find how many days it will take for both crews to dig the same number of meters.

Number of days it will take Crew A to dig	**=**	Number of days it will take Crew B to dig

4. The total length of the tunnel is to be 2118 meters. Write an equation stating this fact. Solve the equation to find how many days it takes to dig the tunnel from the time Crew A starts.

Number of days it will take Crew A to dig	**+**	Number of days it will take Crew B to dig	**=**	Total length dug

86

Algebra 1

Name: _____

Date: _____

3.5 Tiered Activity

Block: _____

◉ Tunnels

A tunnel is a passage or roadway used for various purposes, including highway traffic, railroads, and subways. Although ancient civilizations used tunnels to carry water for irrigation or for drinking, the advent of the railroad and the motor vehicle marked a widespread expansion in the number and the length of tunnels.

Historically, tunnel building has been a long and dangerous endeavor, often claiming many lives in the process. Modern tunneling advancements, however, have not only increased the efficiency of construction, but have also greatly improved worker safety. Improved boring and drilling machines like the rock drill and the mole now allow a tunnel to be driven 4 or 5 times faster than with older techniques. In addition, lining tunnels with concrete or plastic sealers minimizes the danger of leaking water, which can cause delays, equipment damage, and even collapse.

Boring Brothers, Inc. has a contract to dig a tunnel through a mountain to accommodate the construction of a major highway.

In Exercises 1–4, use the information above.

Crew A starts at the west end and digs at a rate of 9 meters per day.
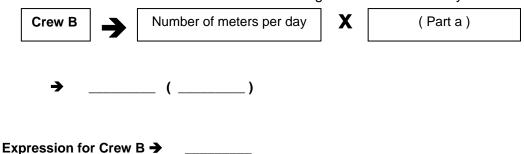
1. Let x be the number of days Crew A has been digging. Write an expression for the number of meters Crew A has dug after x days.

| Crew A | ➡ | Number of Meters | **X** | Number of Days |

➡ _____ x _____

Expression for Crew A ➡   _____

Crew B starts at the east end two days after Crew A and digs at a rate of 12 meters per day.
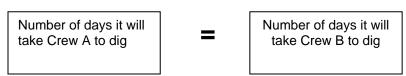
2.
a. In terms of x, how many days has Crew B been digging?

Days of Crew B digging	➜	Number of days of Crew A	―	Number of days less than Crew A

b. Write an expression for the number of meters Crew B has dug in this number of days.

Crew B	➜	Number of meters per day	**X**	(Part a)

➜ _____ (_____)

Expression for Crew B ➜ _____

3. Write and solve an equation to find how many days it will take for both crews to dig the same number of meters.

Number of days it will take Crew A to dig	**=**	Number of days it will take Crew B to dig

4. The total length of the tunnel is to be 2118 meters. Write an equation stating this fact. Solve the equation to find how many days it takes to dig the tunnel from the time Crew A starts.

Number of days it will take Crew A to dig	**+**	Number of days it will take Crew B to dig	**=**	Total length dug

BIG IDEA V: Tiered Assignment

Algebra 1

Name: _____

Date: _____

4.2 Tiered Activity

Block: _____

◼ Community Service

Community service has become a significant part of high school education. In California, a group called Youth Community Service has been created to connect service to the academic curriculum of nine local schools. Activities include tutoring, service immersion projects, and partnerships with community- based organizations. Some of the benefits for student participants include an increased sense of self-esteem, increased interest in school, cross-cultural opportunities and training, enhanced academic and social skills, and a place to address important issues.

In Exercises 1–6, use the following information.

A school district encourages students to get involved in the community by offering credits for community service hours. The school district offers 0.25 credits for each 45 hours of service. Some examples of how these hours can be earned include volunteering at local senior citizen retirement centers, working with the school's custodial staff, and cleaning up local parks.

Devón is a freshman who would like to earn a full credit of service by the time he graduates by volunteering to work at a senior citizen retirement center and with the school's custodial staff. An algebraic model for the number of hours worked during his freshman year is $x + y = 45$ where x is the number of hours he worked at the senior citizen retirement center and y is the number of hours he worked at school with the custodial staff.

1. Rewrite the equation $x + y = 45$ in function form.

2. Use the equation in function form from Exercise 1 to make a table of values for $x = 5,\ x = 15,\ x = 25,\ x = 35$ and $x = 45$.

3. Use the table of values from Exercise 2 to graph the equation.
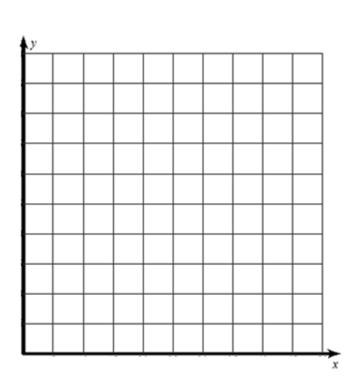
4. Devón ends up working twice as many hours at the senior center than with the school's custodial staff. If he worked a total of 45 hours, how many were spent with the custodial staff?
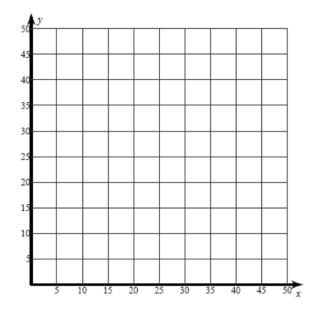
5. Devón decides to spend all of his 45 hours working with the school's custodial staff his sophomore year. Write an equation that models his hours worked.

6. Graph your equation from Exercise 5. What type of line is this?

Algebra 1

4.2 Tiered Activity

Community Service

Community service has become a significant part of high school education. In California, a group called Youth Community Service has been created to connect service to the academic curriculum of nine local schools. Activities include tutoring, service immersion projects, and partnerships with community- based organizations. Some of the benefits for student participants include an increased sense of self-esteem, increased interest in school, cross-cultural opportunities and training, enhanced academic and social skills, and a place to address important issues.

In Exercises 1–6, use the following information.

A school district encourages students to get involved in the community by offering credits for community service hours. The school district offers 0.25 credits for each 45 hours of service. Some examples of how these hours can be earned include volunteering at local senior citizen retirement centers, working with the school's custodial staff, and cleaning up local parks.

Devón is a freshman who would like to earn a full credit of service by the time he graduates by volunteering to work at a senior citizen retirement center and with the school's custodial staff. An algebraic model for the number of hours worked during his freshman year is $x + y = 45$ where x is the number of hours he worked at the senior citizen retirement center and y is the number of hours he worked at school with the custodial staff.

1. Rewrite the equation $x + y = 45$ in function form ($y = mx + b$).

2. Use the equation in function form from Exercise 1 to make a table of values for $x = 5$, $x = 15$, $x = 25$, $x = 35$ and $x = 45$.

x	$x + y = 45$	y	(x, y)

3. Use the table of values from Exercise 2 to graph the equation.
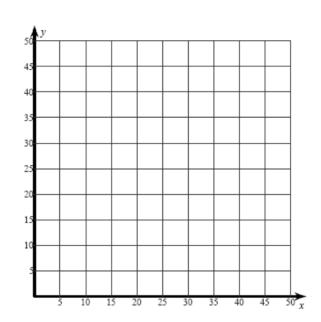
4. Devón ends up working twice as many hours at the senior center than with the school's custodial staff. If he worked a total of 45 hours, how many were spent with the custodial staff?

    a. Let the number of hours spent with the custodial staff be represented by x.

    b. Write an algebraic expression to represent the number of hours at the senior center in terms of x.

    c. Write an equation to solve for x.

5. Devón decides to spend all of his 45 hours working with the school's custodial staff his sophomore year.

    a. If Devón is working all 45 hours at the school's custodial staff, how many hours is he working with the senior center?

    b. Plug this into the equation: $x + y = 45$

    c. Write an equation that models his hours worked.

6. Graph your equation from Exercise 5. What type of line is this?

92

Algebra 1

Name: _____

Date: _____

4.2 Tiered Activity

Block: _____

⊙ Community Service

Community service has become a significant part of high school education. In California, a group called Youth Community Service has been created to connect service to the academic curriculum of nine local schools. Activities include tutoring, service immersion projects, and partnerships with community- based organizations. Some of the benefits for student participants include an increased sense of self-esteem, increased interest in school, cross-cultural opportunities and training, enhanced academic and social skills, and a place to address important issues.

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Devón is a freshman who would like to earn a full credit of service by the time he graduates by volunteering to work at a senior citizen retirement center and with the school's custodial staff. An algebraic model for the number of hours worked during his freshman year is $x + y = 45$ where x is the number of hours he worked at the senior citizen retirement center and y is the number of hours he worked at school with the custodial staff.

1. Rewrite the equation $x + y = 45$ in function form ($y = mx + b$).

$y = $ _____

2. Use the equation in function form from Exercise 1 to make a table of values for $x = 5, \ x = 15, \ x = 25, \ x = 35$ and $x = 45$.

x	$y = $ _____	y	(x, y)
5	45 − 5 = 35	35	(5,35)
15			
25			
35			
45			

3. Use the table of values from Exercise 2 to graph the equation.

4. Devón ends up working twice as many hours at the senior center than with the school's custodial staff. If he worked a total of 45 hours, how many were spent with the custodial staff?

    a. Let the number of hours spent with the custodial staff be represented by x.

| 2 | X | Hours spent with custodial staff | = | Hours spent with senior center |

_____X_____= hours spent with senior center

_____ = hours spent with senior center

    b. Write an equation to solve for x.

| Hours spent with custodial staff | + | Hours spent with senior center | = | Total Hours Worked |

_____ + _____ = _____

5. Devón decides to spend all of his 45 hours working with the school's custodial staff his sophomore year.

    a. If Devón is working all 45 hours at the school's custodial staff, how many hours is he working with the senior center?

    b. Plug this into the equation: $x + y = 45$

    c. Write an equation that models his hours worked.

    $y = $ _____

6. Graph your equation from Exercise 5. What type of line is this? What does it represent?
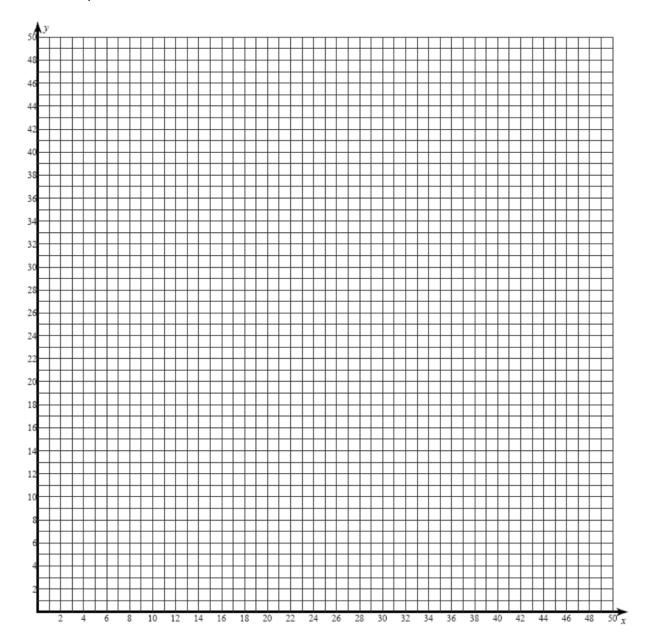
BIG IDEA VI: Tiered Assignment

Algebra 1

5.1 Tiered Activity

Name: _____
Date: _____
Block: _____

◼ Break-Even Analysis

One of the most important aspects of business management is determining the price a company will charge for goods and services. Companies will often choose to price products to maximize profits. Another consideration is the cost associated with developing the good or service. One tool used by managers to analyze costs is break-even analysis.

A break-even analysis will determine the quantity of a product that must be sold before the seller begins to make a profit. The analysis takes into consideration variable costs and fixed costs. Variable costs change with the quantity of product produced while fixed costs remain constant. Examples of fixed costs are rent, insurance, administrative salaries, and equipment. Some variable costs are production worker's wages, material expense, and utilities expense.

By graphing both a revenue line and a cost line, a company can then determine a break-even point. This occurs when the revenue and cost lines intersect. This intersection point will be the quantity needed to at least cover costs of production. Any greater quantity will then start generating a profit.

In Exercises 1–4, use the following information.
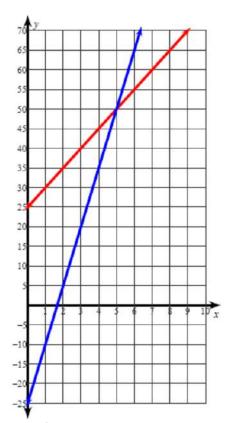A store can purchase T-shirts for $5 each. It has fixed costs of $25. Each T-shirt is sold for $15.

1. Write two linear equations: one equation for cost and one equation for revenue.

2. Label your axes. Graph both the cost line and the revenue line. **Be careful of the scale**.

3. Determine the break-even point. _____

4. Interpret what this point means in the context of the problem.

   _____

   _____

5. If the store wants to make a profit of $70, how many T-shirts must it sell?
a. Label this point on your **graph**.
b. Solve **algebraically** using your equation.

In Exercises 5–7, use the following information.
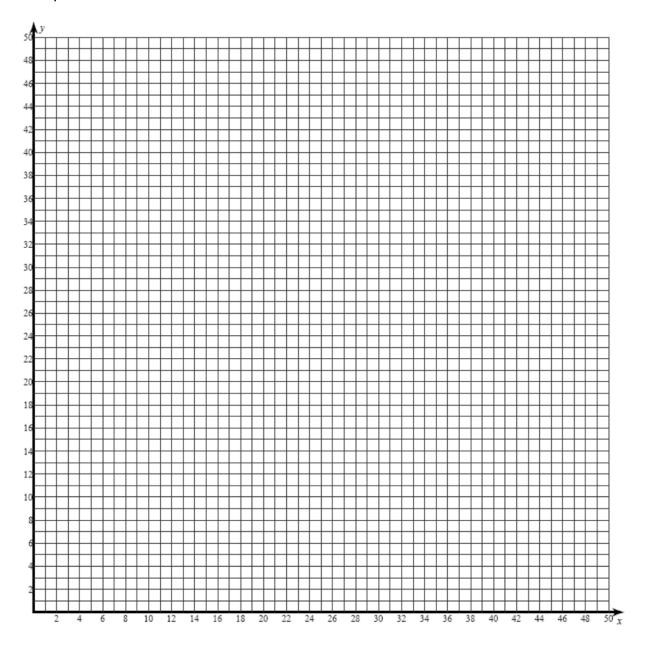A hotdog stand can purchase hotdogs for $0.30 each and buns for $0.20 each. It has fixed costs of $20. Each hotdog is sold for $1.

   6. Write two linear equations: one equation for cost and one equation for revenue.

   7. Graph both the cost and revenue lines.

8. Determine the break-even point._____

9. What does the "break – even" point mean in the context of the problem?
_____
_____

Algebra 1

Name: _____
Date: _____
Block: _____

5.1 Tiered Activity

⚠ Break-Even Analysis

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In Exercises 1–4, use the following information.
A store can purchase T-shirts for $5 each. It has fixed costs of $25. Each T-shirt is sold for $15.

1. Write two linear equations: one equation for cost and one equation for revenue.

   a. What does x represent in each equation?
   _____

   b. What does y represent in each equation?
   _____

   c. **Cost**: _____

   d. **Revenue**: _____

2. Label your axes. Graph both the cost line and the revenue line. **Be careful of the scale**.

3. Determine the break-even point (the point where both lines intersect). _____
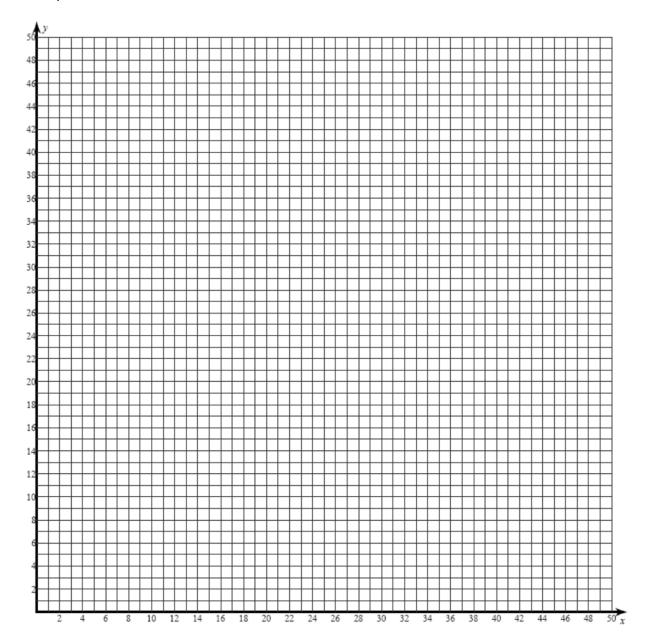
4. Interpret what this point means in the context of the problem. (Think: what does y represent at that particular x value.)

_____

_____

_____

5. If the store wants to make a profit of $70, how many T-shirts must it sell?

a. Label this point on your **graph**. (Think: are they giving you the value of x or y here?)

b. Solve **algebraically** using your **revenue** equation.

c. Check if your answer to parts (a) and (b) match.

In Exercises 5–7, use the following information.

A hotdog stand can purchase hotdogs for $0.30 each and buns for $0.20 each. It has fixed costs of $20. Each hotdog is sold for $1.

6. Write two linear equations: one equation for cost and one equation for revenue.

a. What does x represent in each equation? _____

b. What does y represent in each equation? _____

c. If the buns have to be sold together, how much does it cost the hotdog stand to sell one hamburger?

d. Cost: _____

e. Revenue: _____

7. Graph both the cost and revenue lines.

8. Determine the break-even point._____

9. What does the "break – even" point mean in the context of the problem?

_____
_____

Algebra 1

Name: _____

Date: _____

5.1 Tiered Activity

Block: _____

◉ Break-Even Analysis

One of the most important aspects of business management is determining the price a company will charge for goods and services. Companies will often choose to price products to maximize profits. Another consideration is the cost associated with developing the good or service. One tool used by managers to analyze costs is break-even analysis.

A break-even analysis will determine the quantity of a product that must be sold before the seller begins to make a profit. The analysis takes into consideration variable costs and fixed costs. Variable costs change with the quantity of product produced while fixed costs remain constant. Examples of fixed costs are rent, insurance, administrative salaries, and equipment. Some variable costs are production worker's wages, material expense, and utilities expense.

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In Exercises 1–4, use the following information.
A store can purchase T-shirts for $5 each. It has fixed costs of $25. Each T-shirt is sold for $15.

1. Write two linear equations: one equation for cost and one equation for revenue. Let x represent the number of T-shirts and y represent the associated money.

   a. Write an algebraic equation to represent **Cost** using the model below:

| Total | = | Price store is charged per T-shirt | x | Number of T-shirts | + | Fixed Cost |

_____= _____ X _____ + _____

Cost: _____

   b. Write an algebraic equation to represent **Revenue** (store profit) using the model below:

| Total Revenue | = | Store price charged per T-shirt | x | Number of T-shirts | − | Fixed Cost |

_____= _____ X _____ − _____

Revenue:_____

2. Label your axes with the appropriate variables. *Be careful of the scales used.* The equations of both the cost and the revenue are graphed below. Label the line that represents the **cost** as **Cost** and the line that represents the **revenue** as **Revenue**.

3. Determine the break-even point (the point where both lines intersect). _____

4. Interpret what this point means in the context of the problem. (Think: what does x represent and what does y represent. What does it mean to break even?)

_____

_____

_____

5. If the store wants to make a profit of $70, how many T-shirts must it sell?

a. Label this point on your **graph**. (Think: are they giving you the value of x or y here?)

b. Solve **algebraically** using your **revenue** equation.

Revenue equation: _____

Plug in given information: _____

Solve:

c. Check if your answer to parts (a) and (b) match.

In Exercises 5–7, use the following information.

A hotdog stand can purchase hotdogs for $0.30 each and buns for $0.20 each. It has fixed costs of $20. Each hotdog is sold for $1.

6. Write two linear equations: one equation for cost and one equation for revenue.

    a. What does x represent in each equation? _____

    b. What does y represent in each equation? _____

    c. If the buns have to be sold together, how much does it cost the hotdog stand to sell one hamburger?

Total Cost of one hamburger	=	Price store is charged per hamburger	+	Price store is charged per bun

_____ = _____ + _____

Cost per one hamburger and bun: _____

    c. Write an algebraic equation to represent **Cost** using the model below:

Total	=	Price store is charged per one hamburger	x	Number of hamburgers	+	Fixed Cost

_____ = _____ X _____ + _____

Cost: _____

    d. Write an algebraic equation to represent **Revenue** using the model below:

Total Revenue	=	Stand price per one hamburger	x	Number of hamburgers	–	Fixed Cost

_____ = _____ X _____ – _____

Revenue: _____

7. Graph both the cost and revenue lines.

8. Determine the break-even point._____

9. What does the "break – even" point mean in the context of the problem?

_____

_____

BIG IDEA VII: Tiered Assignment

Algebra 1

Name: _____

Date: _____

Block: _____

6.1 Tiered Assignment

◼ Golf

Although many people credit the Scottish people for developing the modern game of golf, it has been traced back to ancient China. Wherever it may have begun, it is now a tremendously popular sport, and many schools are adding golf teams to their sport rosters.

The game of golf is played in two basic formats – match play and stroke play. During match play, a golfer wins the hole by hitting the ball in the cup with the fewest number of strokes. If both golfers make the same score on a hole, that hole is said to be halved. In stroke play, the golfer with the lowest number of strokes for the entire round of golf wins.

A handicap in golf is the number of strokes above par a player is hitting on average. Handicap is a method of equalizing competition by allowing a certain number of strokes to a golfer competing against a more skillful golfer. The handicap is computed from a golfer's previous scores.

In Exercises 1 and 2, use the following information.
To qualify for the high school golf team, members must have a handicap of 20 or less.

1. Let h represent a high school golf team member's handicap. Write an inequality for h.

2. Graph the inequality.

In Exercises 3 and 4, use the following information.
During a golf tournament, the leader was hitting an average of 90 strokes or less.

3. Let s represent the leader's average score. Write an inequality for s.

4. Graph the inequality.

In Exercises 5 and 6, use the following information.
In order to stay on the golf team, members agree to spend at least 12 hours practicing their shots.

5. Let h represent the number of hours team members spend practicing their shots. Write an inequality for h.

6. Graph the inequality.

Algebra 1

Name: _____
Date: _____
Block: _____

6.1 Tiered Assignment

⚠ Golf

Although many people credit the Scottish people for developing the modern game of golf, it has been traced back to ancient China. Wherever it may have begun, it is now a tremendously popular sport, and many schools are adding golf teams to their sport rosters.

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In Exercises 1 and 2, use the following information.
To qualify for the high school golf team, members must have a handicap of **20 or less**.

1. Let h represent a high school golf team member's handicap. Write an inequality for h.

2. Graph the inequality.

⟵———————————————————⟶

In Exercises 3 and 4, use the following information.
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4. Graph the inequality.

⟵———————————————————⟶

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⟵———————————————————⟶

Algebra 1

Name: _____
Date: _____
Block: _____

6.1 Tiered Assignment
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In Exercises 1 and 2, use the following information.
To qualify for the high school golf team, members must have a handicap of **20 or less**.

1. Let h represent a high school golf team member's handicap. Write an inequality for h.

Write a verbal statement:

Golf Team Member's Handicap		Handicap Limit

Think:
- What needs to be less: The limit or the handicap the team receives?
- Can the handicap the team receives **include** or **be** the handicap limit?

Write an inequality: _____

2. Graph the inequality. Does your graph make sense?

In Exercises 3 and 4, use the following information.

During a golf tournament, the leader was hitting an average of **90 strokes or less**.

    3. Let s represent the leader's average score. Write an inequality for s.

Write a verbal statement:

Leader's Average Score		Average Limit
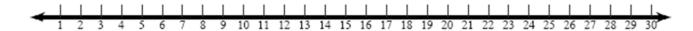
Think:
- What needs to be less: The leader's average or the average limit?
- Can the leader's average **include** or **be** the average limit?

Write an inequality: _____

    4. Graph the inequality. Does your graph make sense?

In Exercises 5 and 6, use the following information.

In order to stay on the golf team, members agree to spend **at least 12 hours** practicing their shots.

    5. Let h represent the number of hours team members spend practicing their shots. Write an inequality for h.

Write a verbal statement:

Number of Hours Team Practices Shot		Minimum Hours of Practice
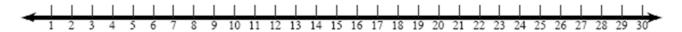
Think:
- What needs to be more: The number of hours the team practices their shot or the minimum hours of practice?
- Can the number of hours the team practices the shot **include** or **be** the minimum hours?

Write an inequality: _____

    6. Graph the inequality. Does your graph make sense?

BIG IDEA VIII: Tiered Assignment
[Back to Big Idea VIII]

Algebra 1   Name: _____

                                                 Date: _____

7.1 Tiered Activity   Block: _____

▣ Newspaper Routes

Newspapers are publications devoted chiefly to presenting and commenting on the news. Newspapers provide an excellent means of keeping well informed on current events. They also play a vital role in shaping public opinion.

Newspapers have certain advantages over the other major news media. They can cover more news and in much greater detail, than can television and radio newscasts. Newspapers are the major source of local news. The United States has about 1500 daily newspapers and 8000 weekly and semiweekly newspapers. The total circulation of daily papers in the United States is about 57 million and the total Sunday circulation is about 61 million.

In Exercises 1-5, use the following information.

You are about to start working for the newspaper publisher. You are offered two routes to deliver papers. Route 1 has 16 current customers and has about 3 new subscriptions a month. Route 2 is a newer route, and only has 10 current customers, but is gaining about 5 new subscriptions per month.

1. For each newspaper route, write a linear model to represent the total number of subscriptions.

2. Graph the linear equations. Label your axes and your lines with its respective route number.

3. Using your graph, estimate when the two routes will have the same number of customers. Label this point on your graph and explain what the point represents in context.

4. Using your graph, determine which route will have more customers after:

    a. 2 months?

    b. After 7 months?

5. You plan on delivering papers for at least a year. The more newspapers you deliver, the more money you make. Which route would you choose to deliver newspapers? Explain.

In Exercises 6 and 7, use the following information.
One year after your first day of delivering newspapers, the publisher decides to split your route in half.

6. Using your graph, find how many newspapers you will be delivering after one year. Mark this point on your graph and label. Explain what this point means in context.

7. How many newspapers will you be delivering after your route is split in half?

Algebra 1

Name: _____

Date: _____

7.1 Tiered Activity

Block: _____

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1. For each newspaper route, write a linear model to represent the total number of subscriptions.

   a. What does **x** represent? _____
      What does **y** represent? _____

   b. **Route 1:** _____

      Route 2: _____

2. Graph the linear equations. Label your axes and your lines with its respective route number.

3. Using your graph, estimate when the two routes will have the same number of customers.

   a. Label this point on your graph.

   b. Explain what the point represents in context.

x represents _____

y represents _____

The point represents:
_____
_____

111

4.
  a. Which axis represents the months you work on the newspaper route? _____

  b. Using your graph, determine which route will have more customers after:

    1) 2 months?

    2) After 7 months?

5. You plan on delivering papers for **at least a year**. The more newspapers you deliver, the more money you make. Which route would you choose to deliver newspapers? Explain.

In Exercises 6 and 7, use the following information.
One year after your first day of delivering newspapers, the publisher decides to split your route in half.

6. Using your graph, find how many newspapers you will be delivering **after one year**.
  a. Mark this point on your graph and label.

  b. Explain what this point means in context.
    _____
    _____

7. How many newspapers will you be delivering after your route is **split in half**? (*Hint*: *If you split your route in half, you will deliver half the papers you would have usually delivered.*)

Algebra 1

Name: _____

Date: _____

7.1 Tiered Activity

Block: _____

◉ Newspaper Routes

Newspapers are publications devoted chiefly to presenting and commenting on the news. Newspapers provide an excellent means of keeping well informed on current events. They also play a vital role in shaping public opinion.

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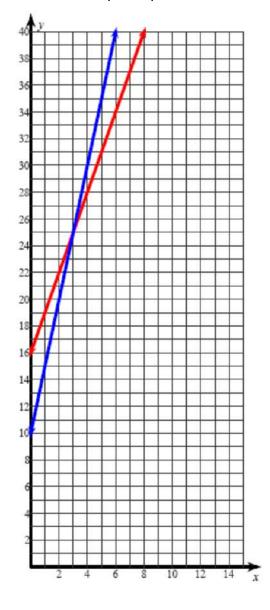
    a. What does *x* represent? _____
        What does *y* represent? _____

    b. **Route 1:** _____

        Route 2: _____

2. Label your axes and the lines graphed with its respective route number.

3. Using your graph, estimate when the two routes will have the same number of customers.

    a. Label this point on your graph.

    b. Explain what the point represents in context.

x represents _____

y represents _____

The point represents:

_____

_____

4.
   a. Which axis represents the months you work on the newspaper route? _____

   b. Using your graph, determine which route will have more customers after:

      1) 2 months?

      2) After 7 months?

5. You plan on delivering papers for **at least a year**. The more newspapers you deliver, the more money you make. Which route would you choose to deliver newspapers? Explain.

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One year after your first day of delivering newspapers, the publisher decides to split your route in half.

6. Using your graph, find how many newspapers you will be delivering **after one year**.
     a. Mark this point on your graph and label.

     b. Explain what this point means in context.
       _____
       _____

7. How many newspapers will you be delivering after your route is **split in half**? (*Hint*: *If you split your route in half, you will deliver half the papers you would have usually delivered.*)

BIG IDEA IX: Tiered Assignment

Algebra 1

Name: _____

Date: _____

8.4 Tiered Activity

Block: _____

◼ Sahara Desert

GEOGRAPHY   The Sahara, a region in northern Africa, is the world's largest desert. It extends 16,896,000 feet from the Atlantic Ocean to the Red Sea and 5,808,000 feet from the Atlas Mountains to the Mediterranean Sea, an area roughly equal to that of the United States. In addition to spreading over all of the Western Sahara and Egypt, the Sahara includes parts of Morocco, Algeria, Tunisia, Libya, Sudan, Chad, Niger, Mali, and Mauritania.

Although most people think of the desert as a desolate expanse of sand, sand covers only about 15% of the Sahara. Plateaus of rock, areas of gravel, mountains, and oases make up the majority of the landscape. The 2 million people who inhabit the Sahara are mainly nomads with herds of sheep and goats that use camels to travel between the major oases for water, supplies, and trade.

In Exercises 1-5, use the information above.

1. Rewrite the length and width of the Sahara in scientific notation.

2. Use your answers from Exercise 1 to find the approximate area of the Sahara in square feet.

3. Find the area of the Sahara that is covered with sand.

4. Assume that the average depth of the sand is 200 feet. The volume of the sand is equal to the area of sand times its depth. Find the volume of the sand in cubic feet.

5. A grain of sand has a volume of about 1.3×10^{-9} cubic foot. Use your answer from Exercise 4 to estimate how many grains of sand are in the Sahara Desert.

Algebra 1

Name: _____

Date: _____

8.4 Tiered Activity

Block: _____

⚠ Sahara Desert

GEOGRAPHY   The Sahara, a region in northern Africa, is the world's largest desert. It extends **16,896,000 feet from the Atlantic Ocean to the Red Sea** and **5,808,000 feet from the Atlas Mountains to the Mediterranean Sea**, an area roughly equal to that of the United States. In addition to spreading over all of the Western Sahara and Egypt, the Sahara includes parts of Morocco, Algeria, Tunisia, Libya, Sudan, Chad, Niger, Mali, and Mauritania.

Although most people think of the desert as a desolate expanse of sand, sand covers only about 15% of the Sahara. Plateaus of rock, areas of gravel, mountains, and oases make up the majority of the landscape. The 2 million people who inhabit the Sahara are mainly nomads with herds of sheep and goats that use camels to travel between the major oases for water, supplies, and trade.

In Exercises 1-5, use the information above.

1. Rewrite the length and width of the Sahara in scientific notation.

   Length: _____

   Width: _____

2. Use your answers from Exercise 1 to find the approximate area of the Sahara in square feet. ($A = l \cdot w$)
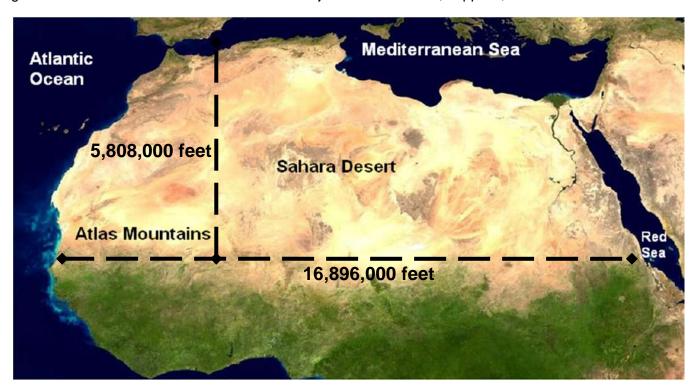
3. Find the area of the Sahara that is covered with sand.
   Recall: 15% of the area of the Sahara Desert is covered with sand.

4. Assume that the average depth of the sand is 200 feet. The volume of the sand is equal to the area of sand times its depth. Find the volume of the sand in cubic feet.

$$Volume = length \times width \times depth$$

5. A grain of sand has a volume of about 1.3×10^{-9} cubic foot. Use your answer from Exercise 4 to estimate how many grains of sand are in the Sahara Desert.

$$Number\ of\ grains\ of\ sand = total\ volume\ of\ sand \div volume\ of\ grain\ of\ sand$$

Algebra 1   Name: _____

                                          Date: _____

8.4 Tiered Activity   Block: _____

◉ Sahara Desert

GEOGRAPHY   The Sahara, a region in northern Africa, is the world's largest desert. It extends **16,896,000 feet from the Atlantic Ocean to the Red Sea** and **5,808,000 feet from the Atlas Mountains to the Mediterranean Sea**, an area roughly equal to that of the United States. In addition to spreading over all of the Western Sahara and Egypt, the Sahara includes parts of Morocco, Algeria, Tunisia, Libya, Sudan, Chad, Niger, Mali, and Mauritania.

Although most people think of the desert as a desolate expanse of sand, sand covers only about 15% of the Sahara. Plateaus of rock, areas of gravel, mountains, and oases make up the majority of the landscape. The 2 million people who inhabit the Sahara are mainly nomads with herds of sheep and goats that use camels to travel between the major oases for water, supplies, and trade.

In Exercises 1-5, use the information above.

1.   Rewrite the length and width of the Sahara in scientific notation.

   Length: _____

   Width: _____

2.   Use your answers from Exercise 1 to find the approximate **area** of the Sahara in square feet.
Approximate Area = length × width

               = _____ **x** _____

               = _____

3. Find the area of the Sahara that is covered with sand.

Recall: 15% of the area of the Sahara Desert is covered with sand.

You found the **Total Area** in Exercise 2.

Area of the Area Covered with Sand $= 15\% \times$ *Total Area*

= _____ x _____

= _____

4. Assume that the average depth of the sand is 200 feet. The volume of the sand is equal to the area of sand times its depth. Find the volume of the sand in cubic feet.

You found the **Area of the Sand** in Exercise 3.

Volume of Sand $=$ *Depth* $\times$ *Area of Sand*

= _____ x _____

= _____

5. A grain of sand has a volume of about 1.3×10^{-9} cubic foot.

You found the **Volume of the Sand Area** in Exercise 4.

Grains of Sand $=$ *Volume of Sand Area* $\div$ *Volume of Grain of Sand*

= _____ $\div$ _____

= _____

Algebra 1

Name: _____

Date: _____

9.6 Tiered Activity

Block: _____

◨ Factory Sales

You and your friend want to start a small business dealing with pagers. You want to know if this is a reasonable business or a risky business adventure. To find this out, you decide to find the factory sales (in millions of dollars) of pagers from 1990 to 1996. In 1990 there were $118 million in factory sales and in 1996 there were $370 million in factory sales.

You decide that for the business to prosper there should be about $500,000,000 in factory sales of pagers. The equation $S = 5.4t^2 + 8.3t + 122.5$ models the pager factory sales, where S is the sales (in millions of dollars) and t is the year with representing 1990.

In Exercises 1-3, use the information above.

1. Using the equation, $S = 5.4t^2 + 8.3t + 122.5$ the number $500,000,000 in factory sales would correspond to an S-value of 500. Why?

   _____

   _____

2. Substitute the S-value in **Exercise 1** in the equation and rewrite the equation in standard form.

3.

   a. Use the discriminant to decide if the equation you found in **Exercise 2** has a solution.

   b. Will this business be risky or not?

   _____

   _____

   _____

In Exercises 4 and 5, use the following information.

You and your friend are also considering a business repairing laserdisc players. The factory sales of laserdisc players from 1990 to 1996 can be modeled by the equation $S = -5.3t^2 + 34.25t + 61.4$ where S is the sales (in millions of dollars) and t is the year with representing 1990.

4. You decide that for the business to be successful there has to be about $120,000,000 in factory sales of laserdisc players. Substitute the corresponding S-value in the equation $S = -5.3t^2 + 34.25t + 61.4$ and rewrite the equation in standard form.

5. Decide whether the business will be successful.

_____
_____
_____
_____
_____
_____

Algebra 1

Name: _____
Date: _____
Block: _____

9.6 Tiered Activity

⚠ Factory Sales

You and your friend want to start a small business dealing with pagers. You want to know if this is a reasonable business or a risky business adventure. To find this out, you decide to find the factory sales (in millions of dollars) of pagers from 1990 to 1996. In 1990 there were $118 million in factory sales and in 1996 there were $370 million in factory sales.

You decide that for the business to prosper there should be about $500,000,000 in factory sales of pagers. The equation $S = 5.4t^2 + 8.3t + 122.5$ models the pager factory sales, where S is the sales (**in millions of dollars**) and t is the year with representing 1990.

In Exercises 1-3, use the information above.

1. Using the equation, $S = 5.4t^2 + 8.3t + 122.5$ the number $500,000,000 in factory sales would correspond to an S-value of 500. Why?

   _____

   _____

2. Substitute the S-value 500 from **Exercise 1** in the equation $S = 5.4t^2 + 8.3t + 122.5$ and rewrite the equation in standard form $ax^2 + bx + c = 0$.

3.
   a. Find the **discriminant** to decide if the equation you found in **Exercise 2** has a solution.

      Discriminant = _____
      Number of Solutions? _____

   b. Will this business be risky or not?

      _____

      _____

In Exercises 4 and 5, use the following information.

You and your friend are also considering a business repairing laserdisc players. The factory sales of laserdisc players from 1990 to 1996 can be modeled by the equation $S = -5.3t^2 + 34.25t + 61.4$ where S is the sales (in millions of dollars) and t is the year with representing 1990.

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    Substitute the corresponding S-value in the equation $S = -5.3t^2 + 34.25t + 61.4$ and rewrite the equation in standard form $ax^2 + bx + c = 0$.

5.
    a. Find the **discriminant** to decide if the equation you found in **Exercise 2** has a solution.

        Discriminant = _____

        Number of Solutions? _____

6. Decide whether the business will be successful.

    _____
    _____
    _____

Algebra 1

Name: _____
Date: _____
Block: _____

9.6 Tiered Activity

⦿ Factory Sales

You and your friend want to start a small business dealing with pagers. You want to know if this is a reasonable business or a risky business adventure. To find this out, you decide to find the factory sales (in millions of dollars) of pagers from 1990 to 1996. In 1990 there were $118 million in factory sales and in 1996 there were $370 million in factory sales.

You decide that for the business to prosper there should be about $500,000,000 in factory sales of pagers. The equation $S = 5.4t^2 + 8.3t + 122.5$ models the pager factory sales, where S is the sales (**in millions of dollars**) and t is the year with representing 1990.

In Exercises 1-3, use the information above.

1. Using the equation, $S = 5.4t^2 + 8.3t + 122.5$ the number $500,000,000 in factory sales would correspond to an S-value of 500. Why?

   _____

   _____

2. We will substitute the S-value 500 from **Exercise 1** in the equation $S = 5.4t^2 + 8.3t + 122.5$. Rewrite the equation in standard form $ax^2 + bx + c = 0$.

$$500 = 5.4t^2 + 8.3t + 122.5$$

3.

   a. Find the **discriminant** $\left(D = b^2 - 4ac\right)$ to decide if the equation you found in **Exercise 2** has a solution.

   Discriminant = _____
   Number of Solutions? _____

   b. Will this business be risky or not?

   _____

   _____

   _____

In Exercises 4 and 5, use the following information.

You and your friend are also considering a business repairing laserdisc players. The factory sales of laserdisc players from 1990 to 1996 can be modeled by the equation $S = -5.3t^2 + 34.25t + 61.4$ where S is the sales (in millions of dollars) and t is the year with representing 1990.

4. You decide that for the business to be successful there has to be about **$120,000,000** in factory sales of laserdisc players.

   a. What is the S-value of **$120,000,000**? _____

   b. Substitute the corresponding S-value in the equation $S = -5.3t^2 + 34.25t + 61.4$
   .

   c. Rewrite the equation in standard form $ax^2 + bx + c = 0$.

5.
   a. Find the **discriminant** $\left(D = b^2 - 4ac\right)$ to decide if the equation you found in
   Exercise 2 has a solution.

   Discriminant = _____
   Number of Solutions? _____

6. Decide whether the business will be successful.

   _____
   _____
   _____

Algebra 1

Name: _____

Date: _____

10.2 Tiered Activity

Block: _____
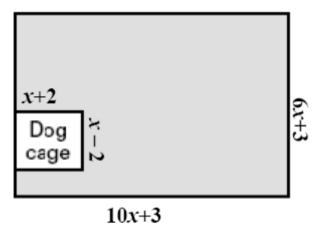
▣ Cutting the Lawn

Cutting lawns is a popular summer job.   It is a great way to earn money and to help others in your community.

Your neighbor asks you to cut her lawn.   Her yard is $(6x+3)$ feet wide and $(10x+3)$ feet long. A section of the yard is in for her dog. The dog cage is $(x-2)$ feet wide and $(x+2)$ feet long.

1.   Write a polynomial expression that represents the total area of the yard. Give your answer as a trinomial.

2.   Write a polynomial expression that represents the area of the dog cage. Give your answer as a binomial.

3. Write a polynomial expression that represents the area of the lawn that you will mow. Give your answer as a binomial.

4. Complete the table.

x (feet)	6	9	12
Total area of yard (square feet)			
Area of dog cage (square feet)			
Area of lawn mowed (square feet)			

5. When x is doubled from 6 to 12, do the areas also double? Explain.

_____

_____

_____

Algebra 1

Name: _____
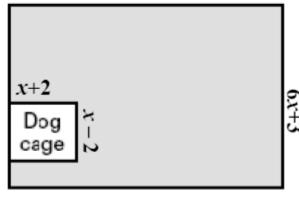Date: _____
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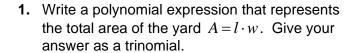
10.2 Tiered Activity

⚠ Cutting the Lawn

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Your neighbor asks you to cut her lawn. Her yard is $(6x+3)$ feet wide and $(10x+3)$ feet long. A section of the yard is in for her dog. The dog cage is $(x-2)$ feet wide and $(x+2)$ feet long.

$x+2$

Dog cage $\;x-2$

$10x+3$

$6x+3$

1. Write a polynomial expression that represents the total area of the yard $A = l \cdot w$. Give your answer as a trinomial.

2. Write a polynomial expression that represents the area of the dog cage $A = l \cdot w$. Give your answer as a binomial.

3. Write a polynomial expression that represents the area of the lawn that you will mow. Give your answer as a binomial.

*Remember you must **remove** the dog cage from the area of the yard to get the area you must mow.*

4. Complete the table.

x (feet)	6	9	12
Total area of yard (square feet)			
Area of dog cage (square feet)			
Area of lawn mowed (square feet)			

5. When x is doubled from 6 to 12, do the areas also double? Explain.

_____

_____

_____

Algebra 1

Name: _____

Date: _____

10.2 Tiered Activity

Block: _____

◉ Cutting the Lawn

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Your neighbor asks you to cut her lawn. Her yard is $(6x+3)$ feet wide and $(10x+3)$ feet long. A section of the yard is in for her dog. The dog cage is $(x-2)$ feet wide and $(x+2)$ feet long.

$x+2$

Dog cage

$x-2$

$6x+3$

$10x+3$

1. Write a polynomial expression that represents the total area of the yard. Give your answer as a trinomial.

| Area of Lawn | = | Length | X | Width |

$$= \quad (\qquad) \quad X \quad (\qquad)$$

FOIL ➜

Area of the Yard= _____

2. Write a polynomial expression that represents the area of the dog cage $A = l \cdot w$. Give your answer as a binomial.

| Area of Dog Cage | = | Length | X | Width |

$$= \quad (\qquad) \quad X \quad (\qquad)$$

FOIL ➜

Area of the Dog Cage = _____

3. Write a polynomial expression that represents the area of the lawn that you will mow. Give your answer as a binomial.

*Remember you must **remove** the dog cage from the area of the yard to get the area you must mow.*

Area of Mowed Area	=	Area of Yard	–	Area of Dog Cage

$$= \quad (\qquad\qquad) - (\qquad\qquad)$$

Area of the Mowed Area = _____

4. Complete the table.

x (feet)	6	9	12
Total area of yard (square feet)			
Area of dog cage (square feet)			
Area of lawn mowed (square feet)			

5. When x is doubled from 6 to 12, do the areas also double? Explain.

_____
_____
_____

BIG IDEA XII: Tiered Assignment

[Back to Big Idea XII]

Algebra 1

Name: _____

Date: _____

11.4 Tiered Activity

Block: _____

▣ Social Studies

To study medicine, a student begins with a four year college degree, followed by four more years of study at a medical school. Students must successfully pass all courses to graduate with either a Doctor of Medicine (MD) degree or a Doctor of Osteopathy (DO) degree. After graduation from medical school, a doctor must work for at least a year as a hospital intern with experienced doctors. To specialize in a particular field, a doctor must train for three years as a resident. In the United States, a doctor must obtain a license to practice medicine. To become licensed, a doctor must have a MD or a DO degree from an approved school and must pass a state medical board examination. To work in different states, a doctor has to obtain a license from each state.

There are many medical specialty fields, including cardiology, emergency medicine, family practice, and psychiatry. Orthopedics treats disorders of the bones and muscles. This also includes a broad range of medical problems, including fractures, injuries to tendons and ligaments, and joint replacements including the hip and knee. Another medical specialty is pediatrics which treats all aspects of a child's physical and emotional development. This also includes preventive health care, parent education, and immunizations

In Exercises 1–7, use the following information.

The total number of physicians (in thousands) in the United States can be modeled by $D = \dfrac{620.9 + 7.9t}{1 - 0.01t}$

where *t* is the number of years since 1990.

1. Find the total number of physicians in the United States in 1990, 1993, and 1996.

2. The number of orthopedic surgeons (in thousands) in the United States can be modeled by $D = \dfrac{14.7 + 0.25t}{1 - 0.01t}$ where *t* is the number of years since 1990. Find the total number of orthopedic surgeons in the United States in 1990, 1993, and 1996.

3. The number of pediatric doctors (in thousands) in the United States can be modeled by

$$D = \frac{26.9 + 0.48t}{1 - 0.03t}$$ where t is the number of years since 1990. Find the total number of

pediatric doctors in the United States in 1990, 1993, and 1996.

4. Use the verbal model to write an algebraic expression to find the percent of physicians who were orthopedic surgeons in the United States.

| Number of Orthopedic Surgeons | $\div$ | Total Number of Physicians | $\times 100$ |

5. Use your algebraic expression to find the percent of physicians who were orthopedic surgeons in 1999.

6. Write an algebraic expression to find the percent of physicians who are pediatric doctors in the United States.

7. Use your algebraic expression to find the percent of physicians who were pediatric doctors in 1999.

Algebra 1

Name: _____

Date: _____

11.4 Tiered Activity

Block: _____

⚠ Social Studies

To study medicine, a student begins with a four year college degree, followed by four more years of study at a medical school. Students must successfully pass all courses to graduate with either a Doctor of Medicine (MD) degree or a Doctor of Osteopathy (DO) degree. After graduation from medical school, a doctor must work for at least a year as a hospital intern with experienced doctors. To specialize in a particular field, a doctor must train for three years as a resident. In the United States, a doctor must obtain a license to practice medicine. To become licensed, a doctor must have a MD or a DO degree from an approved school and must pass a state medical board examination. To work in different states, a doctor has to obtain a license from each state.

There are many medical specialty fields, including cardiology, emergency medicine, family practice, and psychiatry. Orthopedics treats disorders of the bones and muscles. This also includes a broad range of medical problems, including fractures, injuries to tendons and ligaments, and joint replacements including the hip and knee. Another medical specialty is pediatrics which treats all aspects of a child's physical and emotional development. This also includes preventive health care, parent education, and immunizations

In Exercises 1–7, use the following information.

The total number of physicians (in thousands) in the United States can be modeled by $D = \dfrac{620.9 + 7.9t}{1 - 0.01t}$ where **t** is the number of years since 1990.

1. Find the total number of physicians in the United States in 1990, 1993, and 1996.

1990: $t =$ ➔

1993: $t =$ ➔

1996: $t =$ ➔

2. The number of orthopedic surgeons (in thousands) in the United States can be modeled by

$$D = \frac{14.7 + 0.25t}{1 - 0.01t}$$ where t is the number of years since 1990. Find the total number of orthopedic surgeons in the United States in 1990, 1993, and 1996.

1990: $t =$ ➔

1993: $t =$ ➔

1996: $t =$ ➔

3. The number of pediatric doctors (in thousands) in the United States can be modeled by

$$D = \frac{26.9 + 0.48t}{1 - 0.03t}$$ where t is the number of years since 1990. Find the total number of pediatric doctors in the United States in 1990, 1993, and 1996.

1990: $t =$ ➔

1993: $t =$ ➔

1996: $t =$ ➔

4. Use the verbal model to write an algebraic expression to find the percent of physicians who were orthopedic surgeons in the United States.

| Number of Orthopedic Surgeons | $\div$ | Total Number of Physicians | $\times 100$ |

5. Use your algebraic expression to find the percent of physicians who were orthopedic surgeons in 1999.

Number of physicians in 1999 =

Number of orthopedic surgeons in 1999=

6. Write an algebraic expression to find the percent of physicians who are pediatric doctors in the United States.

7. Use your algebraic expression to find the percent of physicians who were pediatric doctors in 1999.

Number of physicians in 1999 = _____

Number of pediatric doctors in 1999=_____

Algebra 1

Name: _____
Date: _____

11.4 Tiered Activity

Block: _____

◉ Social Studies

To study medicine, a student begins with a four year college degree, followed by four more years of study at a medical school. Students must successfully pass all courses to graduate with either a Doctor of Medicine (MD) degree or a Doctor of Osteopathy (DO) degree. After graduation from medical school, a doctor must work for at least a year as a hospital intern with experienced doctors. To specialize in a particular field, a doctor must train for three years as a resident. In the United States, a doctor must obtain a license to practice medicine. To become licensed, a doctor must have a MD or a DO degree from an approved school and must pass a state medical board examination. To work in different states, a doctor has to obtain a license from each state.

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In Exercises 1–7, use the following information.

The total number of physicians (in thousands) in the United States can be modeled by $D = \dfrac{620.9 + 7.9t}{1 - 0.01t}$

where **t** is the number of years since 1990.

   1. Find the total number of physicians in the United States in 1990, 1993, and 1996.

1990: $t =$_____   ➔ $D = \dfrac{620.9 + 7.9t}{1 - 0.01t}$

1993: $t =$_____   ➔ $D = \dfrac{620.9 + 7.9t}{1 - 0.01t}$

1996: $t =$_____   ➔ $D = \dfrac{620.9 + 7.9t}{1 - 0.01t}$

2. The number of orthopedic surgeons (in thousands) in the United States can be modeled by $D = \dfrac{14.7 + 0.25t}{1 - 0.01t}$ where t is the number of years since 1990. Find the total number of orthopedic surgeons in the United States in 1990, 1993, and 1996.

1990: $t =$_____ $\rightarrow D = \dfrac{14.7 + 0.25t}{1 - 0.01t}$

1993: $t =$_____ $\rightarrow D = \dfrac{14.7 + 0.25t}{1 - 0.01t}$

1996: $t =$_____ $\rightarrow D = \dfrac{14.7 + 0.25t}{1 - 0.01t}$

3. The number of pediatric doctors (in thousands) in the United States can be modeled by $D = \dfrac{26.9 + 0.48t}{1 - 0.03t}$ where t is the number of years since 1990. Find the total number of pediatric doctors in the United States in 1990, 1993, and 1996.

1990: $t =$_____ $\rightarrow D = \dfrac{26.9 + 0.48t}{1 - 0.03t}$

1993: $t =$_____ $\rightarrow D = \dfrac{26.9 + 0.48t}{1 - 0.03t}$

1996: $t =$_____ $\rightarrow D = \dfrac{26.9 + 0.48t}{1 - 0.03t}$

4. Use the verbal model to write an algebraic expression to find the percent of physicians who were orthopedic surgeons in the United States.

Number of Orthopedic Surgeons	$\div$	Total Number of Physicians	$\times 100$

Let x represent the number of orthopedic surgeons and let y represent the number of physicians.

5. Use your algebraic expression to find the percent of physicians who were orthopedic surgeons in 1999.

a. **Number of physicians in 1999** =_____

$$\textbf{1999:}\ \ t=\underline{\hspace{2cm}} \quad \rightarrow D=\frac{620.9+7.9t}{1-0.01t}$$

b. **Number of orthopedic surgeons in 1999**=_____

$$\textbf{1999:}\ \ t=\underline{\hspace{2cm}} \quad \rightarrow D=\frac{14.7+0.25t}{1-0.01t}$$

c. Calculate the percentage using your answer from #4.

141

6. Write an algebraic expression to find the percent of physicians who are pediatric doctors in the United States.

| Number of Pediatric Doctors | ÷ | Total Number of Physicians | $\times 100$ |

Let *z* represent the number of pediatric doctors and let *y* represent the number of physicians.

7. Use your algebraic expression to find the percent of physicians who were pediatric doctors in 1999.

a. **Number of physicians in 1999** =_____

1999: $t =$_____ ➔ $D = \dfrac{620.9 + 7.9t}{1 - 0.01t}$

b. **Number of pediatric doctors in 1999** =_____

1999: $t =$_____ ➔ $D = \dfrac{26.9 + 0.48t}{1 - 0.03t}$

c. Calculate the percentage using your answer from #6.

142

BIG IDEA XIII: Tiered Assignment

Algebra 1

Name: _____

Date: _____

12.5 Tiered Activity

Block: _____

▣ Kites

A kite is an object that is flown in the air at the end of a piece of string. The name comes from a graceful and soaring bird called a kite. Paper, cloth, plastic, and nylon are some of the materials from which kites are made. Kites are made in hundreds of sizes, shapes, and colors.
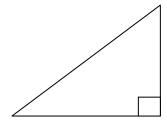
Kites are the oldest form of aircraft. They probably originated in China more than 2000 years ago. The Chinese military attached bamboo pipes to the kites. As the kites flew over the enemy, wind passed through the pipes, causing a whistling sound. The noise caused the enemy to panic and run. In 1752, Benjamin Franklin conducted the most famous kite experiment in history. A bolt of lightning struck a pointed wire fastened to the kite and traveled down the wet string to a key, causing a spark. In 1847, a kite helped pull a cable across the Niagara River between the United States and Canada. The cable was part of the river's first suspension bridge.

In Exercises 1-3, use the following information.

You and your friend each have a kite that you are going to fly. You have 150 feet of string and your friend has 100 feet of string.

1. You want to find how high your kite is in the air. First, you let the kite go as high as it can (until you run out of string). Next, you have your friend stand directly underneath your kite and you find that the distance between the two of you is 120 feet. Use the Pythagorean Theorem to find the height of your kite.

2. Your friend is flying her kite using only part of the string. You find that the distance between the two of you is 40 feet. You estimate that the height of the kite is 50 feet. Find the length of the string used by your friend.

3. Using your answer in *Exercise 2*, find the length of the string not used by your friend.

4. You see a woman flying a stunt kite with plastic hooks 140 feet up the string. She maneuvers the kite to pick up a stuffed toy monkey with the plastic hooks. She then drops the monkey. You estimate that the monkey fell 80 feet. Find the distance between the woman and where the monkey landed.

Algebra 1

Name: _____
Date: _____

12.5 Tiered Activity

Block: _____

⚠ Kites

A kite is an object that is flown in the air at the end of a piece of string. The name comes from a graceful and soaring bird called a kite. Paper, cloth, plastic, and nylon are some of the materials from which kites are made. Kites are made in hundreds of sizes, shapes, and colors.

Kites are the oldest form of aircraft. They probably originated in China more than 2000 years ago. The Chinese military attached bamboo pipes to the kites. As the kites flew over the enemy, wind passed through the pipes, causing a whistling sound. The noise caused the enemy to panic and run. In 1752, Benjamin Franklin conducted the most famous kite experiment in history. A bolt of lightning struck a pointed wire fastened to the kite and traveled down the wet string to a key, causing a spark. In 1847, a kite helped pull a cable across the Niagara River between the United States and Canada. The cable was part of the river's first suspension bridge.

In Exercises 1-3, use the following information.

You and your friend each have a kite that you are going to fly. You have 150 feet of string and your friend has 100 feet of string.

1. You want to find how high your kite is in the air. First, you let the kite go as high as it can (until you run out of string). Next, you have your friend stand directly underneath your kite and you find that the distance between the two of you is 120 feet. Use the Pythagorean Theorem $a^2 + b^2 = c^2$ to find the height of your kite.

        Recall: You have 150 feet of string.

2. Your friend is flying her kite using only part of her string. You find that the distance between the two of you is 40 feet. You estimate that the height of the kite is 50 feet. Find the length of the string used by your friend.

3. Using your answer in *Exercise 2*, find the length of the string **not used** by your friend.

Recall: Your friend has 100 feet of string.

4. You see a woman flying a stunt kite with plastic hooks 140 feet up the string. She maneuvers the kite to pick up a stuffed toy monkey with the plastic hooks. She then drops the monkey. You estimate that the monkey fell 80 feet. Find the distance between the woman and where the monkey landed.

Algebra 1

Name: _____

Date: _____

12.5 Tiered Activity
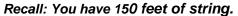
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◉ Kites

A kite is an object that is flown in the air at the end of a piece of string. The name comes from a graceful and soaring bird called a kite. Paper, cloth, plastic, and nylon are some of the materials from which kites are made. Kites are made in hundreds of sizes, shapes, and colors.
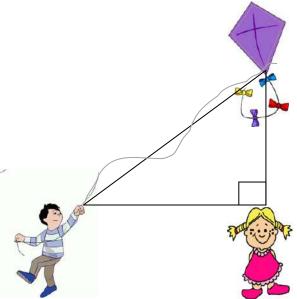
Kites are the oldest form of aircraft. They probably originated in China more than 2000 years ago. The Chinese military attached bamboo pipes to the kites. As the kites flew over the enemy, wind passed through the pipes, causing a whistling sound. The noise caused the enemy to panic and run. In 1752, Benjamin Franklin conducted the most famous kite experiment in history. A bolt of lightning struck a pointed wire fastened to the kite and traveled down the wet string to a key, causing a spark. In 1847, a kite helped pull a cable across the Niagara River between the United States and Canada. The cable was part of the river's first suspension bridge.

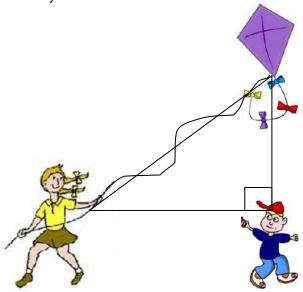**In Exercises 1-3, use the following information.**

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4. You see a woman flying a stunt kite with plastic hooks 140 feet up the string. She maneuvers the kite to pick up a stuffed toy monkey with the plastic hooks. She then drops the monkey. You estimate that the monkey fell 80 feet. Find the distance between the woman and where the monkey landed.