

**MASCONOMET REGIONAL SCHOOL DISTRICT
CURRICULUM GUIDE**

COURSE NAME:	<u>Algebra I</u>	DEPARTMENT:	<u>Mathematics</u>
COURSE NUMBER:	<u>1184</u>	GRADE LEVEL(S):	<u>8</u>
PHASE:	<u>Standard / CP</u>	YEAR:	<u>X</u>
		TRIMESTER	<u></u>

I. Course Description:

Algebra I offers a standards based, integrated curriculum that incorporates topics described in the learning standards for students in grade 8 found in the Massachusetts Curriculum Frameworks in Mathematics (©2011) within the study of algebra. In particular, students develop a more formal understanding of families of functions. They learn to recognize the type of function from its graph or equation and they explore intercepts and rate of change with a focus on equations of lines. They extend their understanding of exponents and begin to see the relationship between exponents and roots.

During the course students learn to solve a wide range of equations in one variable. In addition, they begin to consider how to solve systems of two linear equations in two variables. Various problem solving strategies are emphasized throughout the course. Students will improve their ability to discuss and illustrate strategies used to solve multi step problems using tables, graphs and symbolic representations. Considerable time is spent writing about their approach to problem solving.

II. Central Objectives:

At the end of the course students will be able to:

- A. Describe and represent relationships with models, tables, graphs and rules, using sentences and algebraic expressions to explore the interrelationships of these representations.
- B. Analyze functional relationships of linear equations and inequalities in two variables as well as problems that give rise to such algebraic sentences.
- C. Use patterns and functions to represent and solve problems.
- D. Understand and apply the concepts of variable, expression and equation.
- E. Analyze graphs and tables to identify properties of relationships.
- F. Know and apply algebraic procedures for solving equations and inequalities.
- G. Model real world phenomena with a variety of functions.
- H. Construct, read and interpret tables, charts and graphs.

III. Curriculum Frameworks Standards for Mathematical Practice:

The primary goal of school mathematics programs is to assist students in becoming mathematically proficient. Mathematically proficient students are able to:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.

- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

IV. Curriculum Frameworks Standards for Mathematics Content in Grade 8:

The Number System:

Students will:

- Know numbers that cannot be expressed as the ratio of two integers are called irrational numbers.
- Know that rational numbers have decimal expansions that eventually repeat.
- Convert the decimal expansion that eventually repeats into the ratio of two integers.
- Use rational approximations of irrational numbers to compare the size of irrational numbers.
- Locate irrational numbers approximately on a number line diagram.

Expressions and Equations:

Students will:

- Know and apply the properties of integer exponents to generate equivalent numerical expressions.
- Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ or $x^3 = p$ where p is a positive rational number.
- Evaluate square roots of small perfect squares and cube roots of small perfect cubes.
- Know that $\sqrt{2}$ is irrational.
- Use scientific notation to estimate very large or very small quantities.
- Perform operations on numbers expressed in scientific notation.
- Interpret scientific notation that has been generated by technology.
- Graph proportional relationships.
- Interpret the unit rate as the slope of the graph.
- Compare two different proportional relationships represented in different ways.
- Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane.
- Derive the equation $y = mx$ for a line through origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .
- Solve linear equations in one variable with rational number coefficients including equations whose solution requires expanding expressions using the distributive property and collecting like terms.
- Give examples of linear equations with one solution, infinitely many solutions or no solutions.

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- Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs.
- Solve systems of two linear equations in two variables algebraically.
- Estimate solutions of systems of two linear equations in two variables by graphing the equations.
- Solve real world and mathematical problems leading to two linear equations in two variables.

Functions:

Students will:

- Understand that a function is a rule that assigns to each input exactly one output
- Understand that the graph of a function is the set of ordered pairs consisting of an input and its corresponding output.
- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in a table or by verbal descriptions).
- Interpret equations of the form $y = mx + b$ as defining a linear function whose graph is a straight line.
- Give examples of functions that are not linear.
- Construct a function to model a linear relationship in two variables.
- Determine the rate of change and the initial value of the function from a description of a relationship or from two x, y values.
- Interpret the rate of change and the initial value of a linear function in terms of the situation it models and in terms of its graph or table of values.
- Describe qualitatively the functional relationship between two quantities by analyzing a graph.
- Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

V. **Major Activities:**

- Lecture and class discussion to explain concepts and processes.
- Individual and group work to practice skills presented in class, to apply them to various problem-solving situations and to develop the ability to work cooperatively in such situations.
- Student assignments to develop proficiency in those skills and processes presented and practiced in class.
- Group and individual investigations related to understanding and applying the concepts in the central objectives.
- Independent projects such as reports and computer work may be presented by students.
- Assessments will require students to apply the knowledge they have learned and synthesize information and apply that knowledge to approach the mastery level.

VI. General Expectations:

Textbook:

This textbook will be covered at all times. Your name and your teacher's name should be written in ink in the space provided inside the front cover. Please do not write in the text. It is your responsibility to take care of the text assigned you (reminder: replacement cost is \$84.00).

Materials:

- A notebook with class notes, handouts and assessed work
- A bound graph notebook for homework
- Scientific calculator
- Pencils with erasers

Homework:

Homework is a key component of the course and therefore assigned daily. Students are required to show evidence of attempting each problem and show the work necessary to arrive at each solution. Error analysis is an important part of your learning process. Students are encouraged to use their resources including class notes and examples and their textbook while doing their homework.

Attendance:

Follow the procedures outlined in the Calendar Handbook.

Tardiness:

Students who arrive late to class without an acceptable pass as determined by the teacher will be subject to detention.

Make-up Work:

Work missed due to a one-day absence will be completed no later than the end of the second day back. Work missed due to an absence of more than one day will be completed by a mutually agreed upon date. It is the student's responsibility to find out what work was missed. Failure to make up work will result in a zero for the given assignment, test or quiz.

Extra Help:

Extra help is available to the student Monday through Thursday from 2:20 until 2:50 in the teacher's classroom. Students are expected to arrive with specific extra help goals.

VII. Student Evaluation:

Grades are comprised of performance on:

- Tests
- Quizzes
- Graded assignments
- Daily homework

VIII. **Text:** McDougal Littell ALGEBRA I: An Integrated Approach
Ron Larson, Laurie Boswell, Timothy D. Kanold, Lee Stiff
2007: Houghton Mifflin Company: Evanston, IL

IX. **Scope and Sequence:**

CHAPTER 1: Expressions, Equations, and Functions

This chapter covers some of the prerequisite skills that students will need throughout the year.

Students will be able to:

- Write and evaluate expressions
- Use expressions to write equations and inequalities
- Represent functions as verbal rules, equations, tables and graphs

CHAPTER 2: Properties of Real Numbers

This chapter teaches how to compute with signed numbers and also reinforces their use when using the distributive property and combining like terms

Students will be able to:

- Perform operations with real numbers
- Apply properties of real numbers
- Classify and reason with real numbers

CHAPTER 3: Solving Linear Equations

This chapter introduces properties of algebra and a general strategy for solving linear equations including those with variables on both sides.

Students will be able to:

- Solve equations in one variable
- Solve proportions and percent problems
- Re-write equations of lines given in standard form in slope intercept form
- Use similar figures to solve problems
- Find percent of change

CHAPTER 4: Graphing Linear Equations and Functions

In this chapter students will graph equations in several different ways. They also interpret the meaning of slope and y-intercept in real world situations. Students also use slope to identify parallel lines. They write and graph direct variation equations and use them to solve real-world problems. Lastly they learn how to use function notation and compare families of graphs.

Students will be able to:

- Plot points in a coordinate plane
- graph linear equations using a variety of methods
- Recognize how changes in linear equations affect their graphs
- Solve real world and mathematical problems involving equations of lines

CHAPTER 5: Writing Linear Equations

In this chapter students write and graph equations of lines in slope-intercept form, standard form, and point-slope form. They also write and find equations of lines that are parallel or perpendicular to a given line. Students make scatter plots of given data and use a line of fit to model and interpret the data. They perform linear regression to find the best-fitting line for data and make predictions using the graph and the equation.

Students will be able to:

- Write and use linear equations in slope-intercept form
- Write equations of parallel lines
- Use linear models to solve problems
- Fit a line of data
- Make predictions using linear models

CHAPTER 6: Solving and Graphing Linear Inequalities

In this chapter students write, solve, and graph inequalities in one variable. They also write, solve, and graph compound inequalities. Students write, solve and graph absolute value equations and inequalities. Lastly students graph linear inequalities in two variables.

Students will be able to:

- Solve inequalities using addition, subtraction, multiplication, and division
- Solve multi-step inequalities
- Solve compound inequalities
- Solve basic absolute value equations
- Graph linear inequalities in two variables

CHAPTER 7: Systems of Equations and Inequalities (covered if time permits)

Students solve systems of linear equations using several methods. They also use real-world scenarios to write and solve systems. Students will also graph and solve systems of linear inequalities.

Students will be able to:

- Solve linear systems by graphing
- Determine if a given ordered pair is a solution to a system of two equations in two variables

CHAPTER 8: Exponents and Exponential Functions

In this chapter students learn and use properties of exponents involving products and quotients, including zero and negative exponents. They also learn to read, write, and compute with numbers in scientific notation. Students also learn to read, write, and compute with numbers in scientific notation. They also learn how to graph and write rules for exponential functions, including exponential growth and decay functions.

Students will be able to:

- Apply exponent properties to simplify expressions
- Work with numbers in scientific notation
- Write and graph exponential growth or decay functions