

**MASCONOMET REGIONAL SCHOOL DISTRICT
CURRICULUM GUIDE**

COURSE NAME:	<u>Algebra I</u>	DEPARTMENT:	<u>Mathematics</u>		
COURSE NUMBER:	<u>1186</u>	GRADE LEVEL(S):	<u>8</u>		
PHASE:	<u>Honors</u>	YEAR:	<u>X</u>	TRIMESTER	<u></u>

I. Course Description:

Algebra I Honors is an in-depth study of Algebra to prepare students to study advanced mathematics courses in the high school. The aim is to better prepare students to move toward more independence in learning. As an algorithm is introduced, the process is stressed more than its memorization. Often more than one solution is shown, and students are encouraged to discover different strategies and methods to solve problems. The use of cooperative groups to solve challenging varieties of word problems is stressed throughout the year.

The content is structured around families of functions, focusing on linear and quadratic functions. Students learn to represent a family of functions in multiple ways – as verbal descriptions, equations, tables, and graphs. They also learn to model real-world situations using functions in order to solve problems. Equations and inequalities, graphing, informal geometry, formulas and functions, systems of equations, exponents and radicals, quadratics, proportion and rational equations are the main concepts.

II. Central Objectives:

Students will be able to:

- A. Use variables, evaluate algebraic expressions; use properties of real numbers to perform basic operations.
- B. Solve equations, inequalities, and word problems including variables on both sides.
- C. Graph and write linear equations and functions.
- D. Write and solve systems of equations in two variables.
- E. Work with exponents and graph exponential functions.

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.
- 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 at least \$80.00).

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. The concepts that will be briefly reviewed are:

- evaluating expressions
- applying the order of operations
- translating words into algebraic symbols and algebraic symbols into words
- creating and using a problem solving plan

In addition, students will be able to:

- represent functions as rules and tables
- represent functions as 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:

- represent real numbers on the number line and classify as natural, whole, integer, or rational
- compute with signed numbers
- apply the distributive property
- identify and write equivalent expressions
- add like terms with signed coefficients
- find square roots and compare 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:

- find solutions to equations
- use inverse operations to solve equations
- use properties of equality
- solve equations that are identities or that have no solution
- write ratios; write and solve proportions
- rearrange equations and formulas to solve for one variable
- solve application problems

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
- graph using intercepts
- find slope and rate of change
- graph using slope-intercept form
- model direct variation
- graph linear functions

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 and use linear equations in point-slope form
- write and use linear equations in standard form
- write equations of parallel and perpendicular lines
- fit a line of data
- predict with 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 absolute value equations
- solve absolute value inequalities
- graph linear inequalities in two variables

CHAPTER 7: Systems of Equations and Inequalities

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, substitution, or elimination
- solve linear systems with no solution or infinitely many solutions
- solve systems of linear inequalities

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 involving products and quotients
- define and use zero and negative exponents
- use scientific notation
- write and graph exponential growth or decay functions

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