

**MASCONOMET REGIONAL SCHOOL DISTRICT
CURRICULUM GUIDE**

COURSE NAME:	<u>Pre-Algebra</u>	DEPARTMENT:	<u>Mathematics</u>
COURSE NUMBER:	<u>1175</u>	GRADE LEVEL(S):	<u>7</u>
PHASE:	<u>N/A</u>	YEAR:	<u>X</u>
		TRIMESTER	<u></u>

I. Course Description:

This course offers a standards-based, integrated curriculum that incorporates topics described in the learning standards for students in grade 7 found in the Massachusetts Curriculum Frameworks in Mathematics (©2011) within a study of pre-algebra. The course provides a bridge between the computational, number based focus of elementary mathematics and the introduction of multiple uses for variables, which is central to the study of algebra. Students learn how to show relationships using variables and how to manipulate both expressions and equations involving variables. Scientific notation is introduced as an important application of decimal notation. Computation with fractions, decimals and percents is reviewed. Ratios and rates are considered and proportions are applied to a wide range of problem solving situations. Proportions are also used to investigate similarity relationships in geometry. Integers are introduced, ordering properties are considered and the basic operations are applied to them. Integers are then used to expand the student's understanding of tables, graphs and equations. Students complete their study by considering how mathematics can help represent and process data. They consider how to communicate with data and how to recognize trends within a data set.

II. Central Objectives:

Students will be able to:

- A. Write algebraic expressions to represent situations and patterns.
- B. Apply the distributive property to expand expressions and to factor out a common monomial factor.
- C. Combine like terms.
- D. Solve single variable linear equations of the form $px + q = r$ or $p x + q = r$ or $px + q = rx + s$.
- E. Solve single variable inequalities of the form $px + q < r$ or $px + q > r$ and produce a number line graph to represent the solution set.
- F. Recognize a linear relationship from a written description, a table, a graph or an equation.
- G. Plot points in the coordinate plane.
- H. Compute with signed numbers.
- I. Solve percent problems including calculating percent increase and percent decrease
- J. Understand ratios, rates and proportions and apply these concepts in problem solving situations.

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 7:

Ratios and Proportional Relationships:

Students will:

- Compute unit rates associated with ratios of fractions including quantities measured in like or different units.
- Recognize and represent proportional relationships between quantities.
- Use proportional relationships to solve multi-step ratio and percent problems.

The Number System:

Students will:

- Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers.
- Represent addition and subtraction on a horizontal or vertical number line
- Apply and extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers.
- Solve real world and mathematical problems involving the four operations with rational numbers.

Expressions and Equations:

Students will:

- Apply properties of operations as strategies to add, subtract, factor and expand linear expressions with rational coefficients.
- Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
- Solve multi-step real world and mathematical problems posed with positive and negative rational numbers in any form using tools strategically.
- Apply properties of operations to calculate with numbers in any form.
- Convert between forms of numbers as appropriate.
- Assess the reasonableness of answers using mental computation and estimation strategies.
- Use variables to represent quantities in a real world or mathematical problem.
- Construct simple equations and inequalities to solve problems by reasoning about the quantities.

- Solve word problems that give rise to equations of the form $px + q = r$ or $p x + q = r$ where p, q & r are specific rational numbers.
- Compare an algebraic solution to an arithmetic solution, identifying the sequence of operations used in each approach.
- Solve word problems leading to inequalities of the form $px + q < r$ or $px + q > r$ where p, q & r are specific rational numbers.
- Graph the solution set of these inequalities and interpret the solution in the context of the problem.
- Extend analysis of patterns to include analyzing, extending and determining an expression for simple arithmetic and geometric sequences.

Statistics and Probability:

Students will:

- Understand that statistics can be used to gain information about a population by examining a sample of the population.
- Understand that generalizations about a population from a sample are valid only if the sample is representation of that population.
- Understand that random sampling tends to produce representative samples and support valid inferences.
- Use data from a random sample to draw inferences about a population with an unknown characteristic of interest.
- Generate multiple samples of the same size to gauge the variation in estimates or predictions.
- Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
- Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
- Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring and the larger the number the greater the likelihood.
- Approximate the probability of a chance event by collecting data on the chance process that produces it and observing long run relative frequency.
- Predict the approximate relative frequency given the probability.
- Develop a probability model and use it to find the probabilities of events.
- Compare probabilities from a model to observed frequencies.
- Explain possible sources of the discrepancy if the model and observed frequencies do not agree.
- Find probabilities of compound events using organized lists, tables, tree diagrams and simulation.

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.

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 \$83.00).

Notebooks:

A notebook is a requirement for success. A three-ring binder should be used for all course materials. This should contain your class notes, your reading notes, classwork, activities and **all handouts from your teacher.** The curriculum guide is available online: www.masconomet.org.

Classwork:

You should come to class fully prepared to discuss the prior night's assignment and to ask questions about those concepts with which you are having difficulty. Being fully prepared also means that you should have your text, notebook, pencil, homework, and calculator with you for class each day.

Homework:

You are expected to complete homework assignments daily. A critical part of each assignment is reading the new material to supplement what was already discussed in class, prior to jumping into the homework problems. As you read through a section, you should take any filler notes to complement/complete what you already took for notes in class. Homework is acceptable only if your work accompanies your answer when appropriate. Should you have an incorrect answer, your work should provide you with the reason for the response you gave and lessen the chance of your making the same error again. Error analysis is an important part of your learning process.

Attendance:

Follow the procedures outlined in the Calendar Handbook.

Tardiness:

Being tardy to class will not be tolerated. Students who arrive late to class without an acceptable pass as determined by the teacher will be subject to detention on that same day.

Effort and Conduct:

Effort grades are very much based upon completion of daily assignments, attendance, and class participation. Conduct grades will depend upon cooperation, behavior, attitude, attentiveness, alertness, interest and participation exhibited in class.

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 a room to be announced. Extra help sessions hold preference over all activities (including athletics) except detention.

VII. Student Evaluation:

- Daily assignments to be evaluated in light of completeness, care of presentation and the student's ability to explain the results. Late or incomplete assignments can earn at most half credit. Generally, no credit will be given for any assignment not completed within one day of the time it was due.
- Individual and group classwork/investigations to be evaluated in light of their completeness, care of presentation, student participation in the process and the student's ability to discuss the results/conclusions.
- Frequent quizzes to assess the student's progress in achieving course objectives on a short-term basis.
- Chapter tests to assess the student's ability to synthesize several classes and achieve course objectives on a long-term basis.
- Coverage of each chapter will generally involve a chapter test and one or two quizzes and at least one graded assignment.

Text: McDougal Littell Pre – Algebra

Ron Larson, Laurie Boswell, Timothy Kanold, Lee Stiff
McDougal Littell: Evanston, IL: 2005

VIII. Scope and Sequence:

Chapter 1: Variable, Expressions, and Integers

In this chapter, students are introduced to algebraic concepts. They write and evaluate variable expressions, perform operations with integers and plot points in the coordinate plane.

Students will be able to:

- evaluate numerical expressions using order of operations
- compare and order integers
- perform the four basic operations with integers
- identify and plot points in a coordinate plane

Chapter 2: Solving Equations

Important properties of addition and multiplication are introduced and then integrated into a unit which focuses on solving equations by the use of inverse operations.

Students will be able to:

- use the distributive property to write an equivalent variable expression
- simplify expressions by use of the distributive property and combining like terms
- solve one step equations in one variable by using inverse operations: addition, subtraction or multiplication, division
- solve real-life word problems by solving one-step equations
- write equations to represent real world and mathematical problems

Chapter 3: Multi-Step Equations and Inequalities

The techniques for solving one-step equations which was developed in Chapter 2 are extended to solving multi-step equations and inequalities.

Students will be able to:

- solve two-step equations by using two inverse operations
- solve equations having like terms and parentheses
- solve equations which have the variable on both sides
- solve an inequality by applying inverse operations of addition, subtraction or multiplication, division of both positive and negative integers
- graph the solution to an inequality on a number line

Chapter 4: Factors, Fractions, and Exponents

Standard methods of factoring numbers, finding the greatest common factor and least common multiple of a pair of numbers, and simplifying fractions are reviewed and extended to the study of monomials. A study of the properties of exponents leads into looking at powers of ten and scientific notation.

Students will be able to:

- recognize prime and composite numbers
- find the prime factors of a number
- find the greatest common factor of two or more whole numbers
- multiply and divide powers of numbers
- write numbers and perform arithmetic operations in scientific notation

Chapter 5: Rational Numbers and Equations

An ability to identify rational numbers and convert between fractions and decimals leads to a study of operations with fractions and solving equations and inequalities with rational numbers.

Students will be able to:

- identify rational numbers
- express a fraction as an equivalent decimal
- express a decimal as an equivalent fraction
- perform arithmetic operations with fractions and mixed numbers
- solve equations involving rational numbers

Chapter 6: Ratio, Proportion, and Probability

This unit focuses on solving problems by setting up ratios, finding unit rates and solving proportions.

Students will be able to:

- calculate ratios and unit rates
- write and solve proportions
- find the probability that a simple chance event will occur

Chapter 7: Percents

This chapter deals with finding the percent of a number and solving problems using percents.

Students will be able to:

- use a fraction to find the percent of a number
- write a probability as a percent
- use a proportion to solve a percent problem
- use decimals to solve percent problems
- use an equation to solve a percent problem
- find the percent of change in a problem
- calculate discounts, sales tax, tips and increases as a percent

Chapter 8: Linear Functions

Selected topics from this chapter give the foundation needed to understand functions and to graph and solve linear equations.

Students will be able to:

- generate an input output table for a given rule
- graph a relation from a rule or an input output table
- calculate the slope of a line
- interpret slope as rate of change
- graph linear equations in slope-intercept form

Chapter 9: Real Numbers

Selected topics from this chapter include a study of the Pythagorean Theorem and square roots.

Students will be able to:

- use the Pythagorean Theorem to solve problems
- compare and order real numbers