

Masconomet Regional High School Curriculum Guide

COURSE TITLE: Making Connections in Math

COURSE NUMBER: 1521

DEPARTMENT: Mathematics

GRADE LEVEL(S) & PHASE: 10, CP

LENGTH OF COURSE: One Semester

Course Description:

This course is designed to provide additional preparation for the mathematics portion of the Massachusetts Comprehensive assessment system. Each unit will focus on a specific set of learning standards as identified in the Mathematics Curriculum Framework. Every unit will address problem solving, communication, reasoning and making connections as the skills essential for the development of mathematical competence. Rather than introduce new content, this course will allow students to recognize the relationship between the skills and concepts they know and the intent of the question they are being asked.

The course will be graded on a Pass/Fail. Although the credit counts in fulfilling general graduation requirements, it does not satisfy the graduation requirement in mathematics. Instruction will tend to be tailored to the needs of the students.

Objectives:

(These are adapted from the Massachusetts Mathematics Curriculum Framework – November 2000)

At the end of the course, students should be able to:

- A. Apply number sense to estimate appropriate responses accurately.
- B. Apply number sense to carry out computations accurately with paper and pencil as well as appropriate technology.
- C. Understand the various number systems and apply basic concepts of number theory.
- D. Represent and explore finite systems in mathematics.
- E. Recognize and represent patterns using a wide range of tools.
- F. Understand and apply the concepts of variable, expression and equation.
- G. Translate among tabular, symbolic and graphical representations of functions.
- H. Develop spatial skills using two and three-dimensional models.
- I. Explore and describe transformations of geometric figures.
- J. Use tables, charts and graphs to organize, represent and interpret data systematically.
- K. Use experiments and simulations to estimate probabilities.

These objectives address the Academic Expectations relating to effective communication, mathematical competency and problem solving skills.

Materials and Activities:

Text(s): Prepare for MCAS Mathematics – Grade 10

By: Joseph R. Davis

Willow Tree Publishing: Whitinsville, MA: 2005

Christopher Gordon Publishing: Norwood, MA: 2006

Students are expected to have and use a graphing calculator in class and when doing assignments. Parents may request that their child borrow a school owned calculator for the year.

- Discovery activities to introduce the central concepts of each unit and to provide hands-on experience concerning the usefulness of these concepts.
- 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.
- Group and individual investigations related to understanding and applying the concepts in the central objectives.
- Projects, reports and computer work may be presented by students, either individually or as a group.
- Review of prior year MCAS examples.

Scope and Sequence:

Note: **The units in this course do not need to be covered in a particular order.**

Different classes will be covering different units at the same time.

All units may not be covered in the course.

Unit 1: Number Sense:

At the end of this unit, the student should be able to:

- Identify the properties of operations on real numbers including:
 - ⇒ Associative property
 - ⇒ Commutative property
 - ⇒ Distributive property
 - ⇒ Existence of identity element for addition
 - ⇒ Existence of identity element for multiplication
 - ⇒ Existence of inverse element for addition
 - ⇒ Existence of inverse element for multiplication
 - ⇒ Existence of the n th roots of positive real numbers for any positive integer n
 - ⇒ Inverse relationship between the n th root and the n th power of a positive real number
- Use the properties of operations on real numbers including:
 - ⇒ Associative property
 - ⇒ Commutative property
 - ⇒ Distributive property
 - ⇒ Existence of identity element for addition
 - ⇒ Existence of identity element for multiplication
 - ⇒ Existence of inverse element for addition
 - ⇒ Existence of inverse element for multiplication
 - ⇒ Existence of the n th roots of positive real numbers for any positive integer n
 - ⇒ Inverse relationship between the n th root and the n th power of a positive real number
- Simplify numerical expressions including those involving positive exponents and/or the absolute value
- Apply such simplification in the solution of problems
- Find the approximate value for solutions to problems involving square roots and cube roots without the use of a calculator
- Use estimation to judge the reasonableness of results of computation
- Use estimation to judge the reasonableness of solutions to problems involving real numbers
- Identify numbers as rational or irrational

Unit 2: Patterns, Relations and Algebra

At the end of this unit, the student should be able to:

- Describe a wide variety of patterns including iterative, recursive, linear, quadratic and exponential functional relationships
- Complete a wide variety of patterns including iterative, recursive, linear, quadratic and exponential functional relationships
- Extend a wide variety of patterns including iterative, recursive, linear, quadratic and exponential functional relationships
- Analyze a wide variety of patterns including iterative, recursive, linear, quadratic and exponential functional relationships
- Generalize a wide variety of patterns including iterative, recursive, linear, quadratic and exponential functional relationships
- Create a wide variety of patterns including iterative, recursive, linear, quadratic and exponential functional relationships
- Demonstrate an understanding of the relationship between various representations of a line
- Determine a line's slope and intercepts from its graph
- Determine a line's slope and intercepts from a linear equation that represents the line
- Find a linear equation describing a line from a graph
- Find a linear equation describing a line from a geometric description of the line – by using the point-slope or slope intercept formulas
- Explain the significance of a positive, negative, zero or undefined slope
- Add, subtract, multiply polynomials
- Divide a polynomial by a monomial
- Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and combining terms
- Demonstrate facility in symbolic manipulation of polynomial and rational expressions by factoring
- Demonstrate facility in symbolic manipulation of polynomial and rational expressions by identifying and canceling common factors in rational expressions
- Demonstrate facility in symbolic manipulation of polynomial and rational expressions by applying the properties of positive integer exponents

- Find solutions to quadratic equations with real roots by factoring, completing the square, or using the quadratic formula
- Demonstrate an understanding of the equivalence of the methods used to solve quadratic equations
- Solve equations and inequalities including those involving absolute value of linear expressions
- Apply the processes of solving equations and inequalities to the solution of problems
- Solve everyday problems that can be modeled using linear, reciprocal, quadratic or exponential functions
- Apply appropriate tabular, graphical or symbolic methods to the solution of problems modeled by linear, reciprocal, quadratic or exponential functions
- Solve problems involving compound interest, direct variation and inverse variation
- Solve everyday problems that can be solved using systems of linear equations or inequalities
- Apply algebraic and graphical methods to solving systems of linear equations or inequalities
- Solve mixture, rate and work problems

Unit 3: Geometry and Measurement

At the end of this unit, the student should be able to:

- Identify figures using properties of sides, angles and diagonals
- Identify the figure's type(s) of symmetry
- Draw similar and congruent figures using a compass, straightedge, protractor and other tools
- Make conjectures about methods of construction
- Justify conjectures about construction by logical arguments
- Recognize and solve problems involving angles formed by transversals of coplanar lines
- Identify and determine the measure of central and inscribed angles and their associated minor and major arcs
- Recognize and solve problems associated with radii, chords, and arcs within or on the same circle
- Apply congruence, similarity and correspondence properties of figures to find missing parts
- Provide logical justification for congruence, similarity and correspondence properties of figures
- Solve simple triangle problems using the triangle angle sum property and/or the Pythagorean theorem
- Use the properties of special right triangles to solve problems
- Use rectangular coordinates to calculate midpoints of segments, slopes of lines and segments, and distances between two points
- Apply the results of calculating midpoints, slopes and distances to the solution of problems
- Find linear equations that represent lines either parallel or perpendicular to a given line and through a point
- Draw the results of a given transformation of a figure in the coordinate plane
- Interpret transformations of figures in the coordinate plane
- Apply transformations to the solution of problems
- Demonstrate the ability to visualize solid objects
- Recognize projections and cross sections of solid objects
- Use vertex-edge graphs to model and solve problems
- Calculate perimeter or circumference of common geometric figures
- Calculate area of common geometric figures
- Given the formula, calculate the lateral area of prisms, pyramids, cylinders and cones
- Given the formula, calculate the surface area of prisms, pyramids, cylinders, cones and spheres
- Given the formula, calculate the volume of prisms, pyramids, cylinders, cones and spheres
- Relate changes in the measurement of one attribute of an object to changes in other attributes
- Describe the effect of approximate error and rounding in measurements

Unit 4: Data Analysis, Statistics and Probability

At the end of this unit, the student should be able to:

- Select an appropriate graphical representation for a set of data
- Create an appropriate graphical representation for a set of data
- Interpret an appropriate graphical representation for a set of data
- Use appropriate statistics to communicate information about a set of data
- Use appropriate statistics to compare different sets of data
- Approximate a line of best fit for a set of data
- Describe and explain how the relative sizes of a sample and the population affects the validity of predictions from a set of data

Assessment:

- 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.
- Assessments designed to determine how the student has met the Academic Expectations relating to effective communication, mathematical competency and problem solving skills.

Revised 07/09