

## Masconomet Regional High School Curriculum Guide

**COURSE TITLE:** Geometry

**COURSE NUMBER:** 1131

**DEPARTMENT:** Mathematics

**GRADE LEVEL(S) & PHASE:** 9, H

**LENGTH OF COURSE:** Full Year

### **Course Description:**

This course is a rigorous approach to the study of a geometric mathematical system. It is designed for a student with a strong mathematical background and ability. It is assumed that such a student possesses much factual knowledge of elementary geometry as well as facility in elementary algebra. The scope of the course is primarily Euclidian, supplemented by sections in elementary logic and in solid and coordinate geometry. Proof is emphasized in the first semester and algebra is used throughout the year to enhance the geometric setting.

### **Objectives:**

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

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

- A. Identify figures using properties of sides, angles and diagonals
- B. Identify a figure's type(s) of symmetry
- C. Draw congruent and similar figures using a compass, straightedge, protractor, and other tools such as computer software
- D. Recognize and solve problems involving angles formed by transversals of coplanar lines
- E. Identify and determine the measure of central and inscribed angles and their associated major and minor arcs
- F. Apply congruence and similarity correspondences and properties of the figures to find missing parts of geometric figures and provide logical justifications for conclusions drawn
- G. Solve triangle problems using the triangle angle sum property and/or the Pythagorean Theorem
- H. Use properties of special right triangles (30 – 60 – 90 or 45 – 45 – 90) to solve problems
- I. Calculate midpoints of segments, slopes of lines and distances between points using rectangular coordinates and apply the results to the solution of problems
- J. Find linear equations that represent lines either perpendicular or parallel to a given line through a given point
- K. Draw the results and interpret the transformations on figures in the coordinate plane (translations, reflections, rotations, dilations) and apply transformations to the solutions of problems
- L. Use vertex edge graphs to model and solve problems
- M. Calculate perimeter, circumference and area of common geometric figures such as parallelograms, trapezoids, triangles and circles
- N. Find the lateral area, total surface area and volume of prisms, pyramids, cylinders, cones and spheres
- O. Relate changes in the measurement of one attribute of an object to changes in other attributes

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

### **Materials and Activities:**

**Text(s):** Geometry

By: Ron Larson, Laurie Boswell, Timothy D. Kanold, Lee Stiff  
McDougal Littell: Evanston, IL: 2007

Students are expected to have and use a scientific calculator in class and when doing assignments.

- 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.

### **Scope and Sequence:**

At the end of chapter 1, students will be able to:

- Name, describe, and draw models for points, lines, and planes and use these terms to define some basic relationships
- Use segment postulates to identify congruent segments
- Find the length of segments in the coordinate plane
- Name, measure and classify angles
- Use special angle relationships to find angle measures
- Classify polygons

- Find the perimeter of polygons
- Find the area of rectangles and triangles
- Find the circumference and area of circles

At the end of chapter 2, students will be able to:

- Describe patterns and use inductive reasoning
- Write definitions as conditional statements
- Use deductive reasoning to form a logical argument
- Use postulates involving points, lines and planes
- Use algebraic properties in logical arguments
- Write proofs using geometric theorems
- Use properties of special pairs of angles

At the end of chapter 3, students will be able to:

- Identify angle pairs formed by three intersecting lines
- Use angles formed by parallel lines and transversals
- Use angle relationships to prove that lines are parallel
- Find and compare slopes of lines
- Find equations of lines
- Find the distance between a point and a line

At the end of chapter 4, students will be able to:

- Classify triangles and find the measure of their angles
- Identify congruent figures
- Use side lengths to prove triangles are congruent (SSS congruence)
- Use side lengths and angles to prove triangles are congruent (SAS and HL congruence)
- Use two angles and a side to prove triangles are congruent (ASA and AAS congruence)
- Use congruent triangles to prove corresponding parts of triangles are congruent
- Use theorems about isosceles and equilateral triangles
- Use a vector to translate a figure
- Find the image of a figure under a given translation
- Reflect a figure with respect to any line
- Rotate a figure about a point
- Perform combinations of two or more transformations
- Identify line and rotational symmetry of a figure

At the end of chapter 5, students will be able to:

- Use properties of midsegments
- Use perpendicular bisectors to solve problems
- Use angle bisectors to find distance relationships
- Use medians and altitudes of triangles
- Find possible side lengths of a triangle
- Use inequalities to make comparisons between two triangles

At the end of chapter 6, students will be able to:

- Solve problems by writing and solving proportions
- Use proportions to solve geometry problems
- Identify and perform dilations
- Use proportions to identify similar polygons
- Use the AA similarity theorem
- Use the SSS and SAS similarity theorems
- Use proportions with a triangle or parallel lines

At the end of chapter 7, students will be able to:

- Use the Pythagorean Theorem to find side lengths in right triangles
- Use the converse of the Pythagorean Theorem to determine if a triangle is a right triangle

- Use properties of the altitude of a right triangle
- Use the relationships among the sides in special right triangles (30 – 60 – 90 and 45 – 45 – 90)

At the end of chapter 8, students will be able to:

- Find angle measures in polygons
- Find angle and side measures in parallelograms
- Use properties to identify parallelograms
- Use properties of rectangles, rhombuses and squares
- Use properties of trapezoids and kites
- Identify special quadrilaterals

At the end of chapter 11, students will be able to:

- Find areas of triangles and parallelograms
- Find areas of other types of quadrilaterals
- Use ratios to find areas of similar figures
- Find arc length and other measures
- Find area of circles and sectors of circles
- Find areas of regular polygons inscribed in circles
- Use lengths and areas to find geometric probabilities

At the end of chapter 12, students will be able to:

- Identify solids and their parts (vertices, edges, faces)
- Find the surface area of prisms and cylinders
- Find the surface area of cones and pyramids
- Find the volume of prisms and cylinders
- Find the volume of cones and pyramids
- Find the surface areas and volumes of spheres
- Use properties of similar solids as they relate to surface areas and volumes

At the end of chapter 10, students will be able to:

- Use properties of a tangent to a circle
- Use angle measures to find arc measures
- Use relationships among arcs and chords in a circle
- Use inscribed angles of circles
- Find the measures of angles inside and outside of a circle
- Find segment lengths in circles
- Write equations of circles in the coordinate plane

***The sequence of topics is subject to change so that students have appropriate preparation for each aspect of the Architecture Project.***

**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.
- 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.
- Semester exam in January.
- Architecture project as culminating experience for course. Students work on this throughout second semester as their final exam.
- Assessments designed to determine how the student has met the Academic Expectations relating to effective communication, mathematical competency and problem solving skills.