

**Southwest MN Christian High School**  
**Geometry - 10th Grade**

I. **Southwest Mission Statement:** To challenge students to grow in knowing, loving, and serving God and others.

II. **Course Description:** A study of mathematics which is concerned with the properties and relations of points, lines, surfaces, and solids.

III. **Mr. John Top, [jtop@swmch.org](mailto:jtop@swmch.org)**

IV. **Instruction Philosophy:** Students will be guided to engage material with a mindset of experimentation to learn of God's creation. Instruction will involve foundational material in each lesson, alongside a display of problem-solving processes. Students will then engage the material for the purpose of mastery, along with the challenge to apply basic principles to real world application. Students will be given the opportunity to learn material through daily work, address mistakes through correction of their work, and re-work problems that were incorrect.

We will cover the lesson and work through problems together as a class. I will give you an adequate number of problems for you to practice the material for the day. You will then correct your own paper the following day, and you will hand in the corrected paper which I will score. Scores will be given based on effort, correctness, and class participation.

V. **Assessment Philosophy:** Assessment will follow the process of exploration and mastery, allowing students to display knowledge gained throughout the unit. Students will be offered differentiated levels of difficulty for assessment, with the intent to allow students to test within their skill and knowledge set, while having a system of formal assessment that is consistent for the class. Assessments will then be returned to the student for correction and mastery, emphasizing a continued pursuit for understanding the order of God's creation.

Assessments will be the way in which you show me that you've mastered the material. Daily work will be graded and scored, but daily work is essentially the way for you to practice the material in order to do well on the tests. There will occasionally be quizzes in the middle of the chapter, but primarily we will only take a test at the end of each chapter.

**VII. Items Needed**

1. Textbook
2. Pencil w/ Eraser
3. Calculator
4. Compass & Protractor
5. Notebook Paper

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**VI. Course Standards/Goals**

**1. Points and Lines (Students will...)**

- a. understand the properties of discrete, synthetic, plane coordinate and Euclidean geometries.
- b. use each geometry to model real world situations
- c. determine distance on a number line and apply the definition of distance.
- d. graph points and lines in the coordinate plane
- e. make and analyze perspective drawings
- f. recognize the need for undefined terms
- g. give the dimensions of figures and objects
- h. recognize the use of postulates in Euclidean Geometry
- i. apply the Distance Postulate properties of betweenness

**2. The Language & Logic of Geometry (Students will...)**

- a. distinguish between convex and non-convex figures
- b. use, interpret, write and evaluate conditionals while applying their properties in real situations
- c. use, interpret, write and evaluate the converse of a conditional while applying their properties in real situations.
- d. use, interpret, write and evaluate biconditionals.
- e. evaluate good definitions and apply their properties
- f. determine the union and intersection of sets
- g. draw and identify polygons and identify polygons used in the real world
- h. draw hierarchies of triangles and polygons
- i. determine whether a triangle can be formed with three sides of given lengths
- j. apply the Triangle Inequality Postulate in real situations

**3. Angles and Lines (Students will...)**

- a. draw and analyze angles
- b. use algebra to represent and find measures of angles
- c. give justifications for conclusions involving angles and lines
- d. draw rotations images and find magnitudes of rotations
- e. find the measures of central angles and the degree measures of arcs
- f. apply angle and arc measures in real situations
- g. recognize and use the postulates of equality and inequality
- h. determine angles formed by parallel, perpendicular and transversal lines.

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- i. determine the slope of a line from its equation or given two points on it
- j. determine the slope of a line perpendicular to a given line
- k. draw parallel lines, perpendicular bisectors, and perpendicular lines and apply them to real situations

**4. Reflections to Congruence (Students will...)**

- a. draw figures by applying the definition of reflection image
- b. draw reflection images of segments, angles, and polygons over a given line
- c. draw translation and glide reflection images of figures
- d. draw or identify images of figures under composites of two reflections
- e. apply the definition and properties of reflections to make & justify conclusions
- f. apply properties of reflections to obtain properties of translations, rotations, and other isometries
- g. apply the Two-Reflection Theorem for translations and rotations
- h. determine the isometry which maps one figure onto another
- i. use reflections to find a path from an object to a particular point
- j. use congruence in real situations

**5. Proofs Using Congruence (Students will...)**

- a. identify and determine measures of parts of congruent figures
- b. construct equilateral triangles and the circle through three non-collinear points
- c. find angles measures using properties of alternate interior angles while finding lengths using properties of perpendicular bisectors
- d. use the Triangle-, Quadrilateral-, and Polygon-Sum Theorems to determine angle measure.
- e. make and justify conclusions about congruent figures
- f. write proofs using the Transitive Properties of Equality or Congruence
- g. write proof arguments using properties of reflection
- h. tell whether auxiliary figures are uniquely determined
- i. use the Perpendicular Bisector Theorem in real situations
- j. know the history and impact of postulates relating to parallel lines

**6. Polygons and Symmetry (Students will...)**

- a. locate symmetry lines and centers of symmetry of geometric figures
- b. draw polygons satisfying various conditions
- c. apply theorems about isosceles triangles to find angle measures and segment lengths
- d. apply theorems about quadrilaterals to find angle measures and segment lengths
- e. apply properties of symmetry to assert and justify conclusions about symmetric figures
- f. know the properties of the various types of triangles and regular polygons

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- g. know the properties of the seven special types of quadrilaterals
- h. write proofs using properties of triangles and quadrilaterals
- i. locate and draw symmetry lines in real world designs
- j. make a schedule for a round robin tournament

**7. Triangle Congruence (Students will...)**

- a. draw triangles satisfying certain conditions and determine congruence
- b. determine measures of angles in polygons using exterior angles
- c. determine whether triangles are congruent from given information
- d. write proofs that triangles are congruent
- e. apply the triangle congruence and CPCF theorems to prove that segments or angles are congruent
- f. apply properties of parallelograms
- g. determine whether conditions are sufficient for parallelograms
- h. from given information, deduce which sides or angles of triangles are smallest or largest
- i. use theorems about triangles to explain real situations
- j. draw tessellations of real objects
- k. use theorems about parallelograms to explain real situations

**8. Perimeters and Areas**

- a. calculate perimeters of parallelograms, kites, and equilateral polygons given appropriate lengths and vice versa.
- b. describe or apply a method for determining the area of an irregularly shaped region
- c. calculate areas of squares and rectangles given relevant lengths of sides and vice versa
- d. apply the Pythagorean Theorem to calculate lengths and areas in right triangles and other figures
- e. apply the Pythagorean Converse Theorem
- f. calculate lengths and measures of arcs and the circumference of a circle given measures of relevant lengths and angles, and vice versa
- g. relate various formulas for area,
- h. apply perimeter formulas for parallelograms, kites, and equilateral polygons to real-world situations
- i. apply formulas for areas of squares and rectangles to real world situations
- j. apply formulas for the circumference and area of a circle to real situations
- k. determine the areas of triangles, quadrilaterals, and other polygons on a coordinate plane
- l. identify cultures in which the Pythagorean Theorem is known to have been studied

**9. Three-Dimensional Figures (Students will...)**

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- a. draw common 3-dimensional shapes
- b. draw plane sections of common 3-dimensional shapes
- c. give views of a figure from the top, sides, or front
- d. given appropriate lengths, calculate areas and lengths in 3-dimensional shapes
- e. from 2-dimensional views of a figure, determine the 3-dimensional figure
- f. apply the properties of planes
- g. determine symmetry planes in 3-dimensional figures
- h. recognize 3-dimensional figures in the real world
- i. apply the Four-Color Theorem to maps
- j. make a surface from a net, and vice versa
- k. interpret maps of the world

**10. Surface Areas and Volumes (Students will...)**

- a. calculate lateral areas, surface areas and volumes of cylinders and prisms from appropriate lengths, and vice versa
- b. calculate lateral areas, surface areas and volumes of pyramids and cones from appropriate lengths and vice versa
- c. calculate cube roots
- d. calculate the volume of a sphere from appropriate lengths and vice versa
- e. determine what happens to the volume of a sphere when its dimensions are multiplied by some number(s)
- f. develop formulas for specific figures from more general formulas
- g. know the conditions under which Cavalieri's Principle can be applied
- h. apply formulas for lateral and surface area of prisms, cylinders, pyramids and cones to real situations
- i. apply formulas for surface area, lateral area and volume to real situations
- j. represent products of two (or three) numbers or expressions as areas of rectangles (or volumes of boxes), and vice versa

**11. Indirect and Coordinate Proofs (Students will...)**

- a. determine the length of a segment in a coordinate plane
- b. apply the midpoint connector theorem
- c. plot points, find distances between them, and find coordinates of midpoints in 3-dimensional space
- d. follow the Law of Detachment, the Law of Transitivity, the Law of Contrapositive, and the Law of Ruling Out Possibilities to make conclusions and apply them to real situations
- e. Write the converse, inverse, or contrapositive of a conditional
- f. Write indirect proofs
- g. use coordinate geometry to deduce properties of figures and prove theorems
- h. apply the Distance Formula in real situations
- i. graph and write an equation for circle given its center and radius, and vice versa

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- j. give convenient locations for triangles and quadrilaterals in the coordinate plane

**12. Similarity (Students will...)**

- a. draw size-transformation images of figures
- b. use proportions to find missing parts in similar figures
- c. recognize and apply properties of size transformations
- d. use the fundamental theorem of similarity to find lengths, perimeters, areas, and volumes in similar figures
- e. identify and determine proportional lengths and distances in real situations
- f. apply the fundamental theorem of similarity in real situations
- g. perform and analyze size transformations on figures in the coordinate plane

**13. Similar Triangles and Trigonometry (Students will...)**

- a. find lengths in figures by applying the Side-Splitting Theorem and its converse
- b. calculate lengths using the Right-Triangle Altitude Theorem
- c. calculate lengths of sides in isosceles right triangles and in 30-60-90 triangles
- d. determine sines, cosines, and tangents of angles
- e. estimate or determine exact values of sine, cosine, and tangent ratios
- f. determine whether or not triangles are similar using the SSS, AA and SAS Similarity Theorems
- g. know the definition of sine, cosine, and tangent
- h. use the Triangle Similarity Theorems and Side-Splitting Theorem to find lengths and distances in real situations
- i. Use sines, cosines, and tangents to determine unknown lengths in real situations
- j. determine components of vectors in real situations

**14. Further Work with Circles (Students will...)**

- a. calculate lengths of chords and arcs
- b. calculate measures of inscribed angles from measures of intercepted arcs, & vice versa
- c. calculate measures of angles between chords from measures of intercepted arcs, and vice versa
- d. locate the center of a circle given sufficient information
- e. apply the secant length theorem and the tangent square theorem
- f. make deductions from properties of radii and tangents, and know sufficient conditions for radii to be perpendicular to them
- g. make deductions from properties of angles formed by chords, tangents, or secants.
- h. apply the isoperimetric theorems and the isoperimetric inequality to determine which figures have the greatest or least perimeter, surface area, or volume
- i. given the angle width of a lens and the width of an object, determine the set of points from which the object just fits in the picture

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- j. determine the maximum distance that can be seen from a particular elevation
- k. apply the isoperimetric theorems and isoperimetric inequality in real situations.

**VIII. Tests & Quizzes : Quizzes will take place occasionally throughout each chapter. Each quiz will serve as review and preparation for a test at the end of each chapter.**

**IX. Grading Components**

**Quarter**

**Daily Work            40 %**

**Assessment            60 %**

**Semester**

**Quarter 1            40 %**

**Quarter 2            40 %**

**Final Exam            20 %**

**Grading Scale**

**A                    100-97**

**A-                   96-93**

**B+                   92-88**

**B                    87-84**

**B-                   83-80**

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C+ 79-77

C 76-74

C- 73-70

D+ 69-67

D 66-64

D- 63-60

F 59-0