

Lake Zurich High School Mathematics Department

CP - Geometry

Course Description

Prerequisites: Algebra I
Open To: 10, 11, 12
Credit: 1 unit
Level: College Prep

This course offers a practical setting in which to use algebra. The course develops skills in the area of formal proof, parallel lines, perpendicularity, polygons, similarity, Pythagorean applications, circles, area and volume. This course prepares the student for Algebra II.

Textbook

Title:	Geometry for Enjoyment and Challenge
Publisher:	McDougal Littell, Houghton Mifflin
Author(s)	Rhoad, Milauskas, Whipple
Copyright date:	2004 Impression
ISBN number:	(0-866-09965-4) (978-0-866-09965-3)

Course Objectives

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

1. prove a mathematical statement by drawing conclusions from given facts.
2. understand the concept of congruent figures.
3. solve probability problems.
4. apply the concept of perpendicularity and parallelism.
5. use the properties of quadrilaterals.
6. apply Pythagorean principles on right triangles.
7. solve angle and segment measurements on polygons and circles.
8. determine the area and volume of plane and solid figures.
9. solve problems involving coordinate geometry.
10. write and solve equations using ratio and proportion.
11. prove triangles similar and use the concept of similarity to establish relative size of segments and angles.
12. use the three basic trigonometric ratios to write and solve equations.

Course Syllabus

1st Semester

Chapter	Topic
1	Introduction to Geometry
2	Basic Concepts and Proofs
3	Congruent Triangles
4	Lines in the Plane
5	Parallel Lines and Related Figures
7	Polygons

2nd Semester

Chapter	Topic
8	Similar Polygons
9	The Pythagorean Theorem / Basic Trig ratios
10	Circles
11	Area
12	Surface Area and Volume

Chapter and Unit Objectives

CHAPTER 1 Introduction to Geometry

1. Recognize points, lines, line segments, rays, angles and triangles
2. Measure segments and angles and classify angles by size
3. Name the parts of a degree
4. Recognize collinear points and betweenness
5. Correctly interpret geometric diagrams
6. Write simple two-column proofs
7. Identify bisectors and trisectors of angles and segments
8. Write paragraph proofs
9. Recognize that geometry is based on a deductive structure
10. Identify undefined terms, postulates and definitions
11. Understand the characteristics and applications of theorems
12. Recognize conditional statements and the negation, the converse, the inverse, and the contrapositive of a statement
13. Use the chain rule to draw conclusions
14. Solve probability problems

Chapter 2 Basic Concepts and Proofs

1. Recognize the need to clarity and conclusion in proofs
2. Understand the concept of perpendicularity
3. Recognize complementary and supplementary angles
4. Prove angles congruent by means of four new theorems
5. Apply the addition properties of segments and angles
6. Apply the subtraction properties of segments and angles
7. Apply the multiplication and division properties of segments and angles
8. Apply the transitive and substitution properties
9. Recognize opposite rays
10. Recognize vertical angles

Chapter 3 Congruent Triangles

1. Understand the concept of congruent figures
2. Accurately identify the corresponding parts of figures
3. Identify included angles and included sides
4. Apply the SSS, SAS, ASA postulates
5. Apply the principle of CPCTC
6. Recognize some basic properties of circles
7. Apply the formulas for the area and the circumference of a circle
8. Identify medians of triangles
9. Identify altitudes of triangles
10. Understand why auxiliary line are used in some proofs
11. Write proofs involving steps beyond CPCTC
12. Use overlapping triangles in proofs
13. Name the various types of triangles and their parts
14. Apply theorems relating the angle measures and side lengths of triangles
15. Use the HL postulate

Chapter 4 LINES IN THE PLANE

1. Apply the midpoint formula
2. Organize information in, and draw diagrams for, problems presented in words
3. Apply one way of proving that two angles are right angles
4. Recognize the relationship between equidistance and perpendicular bisection
5. Recognize planes
6. Recognize transversals
7. Identify the pairs of angles formed by a transversal
8. Recognize parallel lines
9. Understand the concept of slope
10. Relate the slope of a line to its orientation in the coordinate plane
11. Recognize the relationships between the slopes of parallel and perpendicular lines
12. Draw lines that represent the solutions of equations
13. Write equations that correspond to non-vertical lines
14. Write equations that correspond to vertical and horizontal lines
15. Identify various forms of linear equations

Chapter 5 PARALLEL LINES AND RELATED FIGURES

1. Apply the Exterior Angle Inequality Theorem
2. Use various methods to prove lines parallel
3. Apply the Parallel Postulate
4. Identify pairs of angles formed by a transversal cutting parallel lines
5. Apply six theorems about parallel lines
6. Solve crook problems
7. Recognize polygons
8. Understand how polygons are named
9. Recognize convex polygons
10. Recognize diagonals of polygons
11. Identify special types of quadrilaterals
12. Identify some properties of parallelograms, rectangles, kites, rhombuses, squares, and isosceles trapezoids
13. Prove that a quadrilateral is a parallelogram

Chapter 7 Polygons

1. Apply theorems about the interior angles, exterior angles, and midlines of triangles
2. Apply the No-Choice Theorem and the AAS Theorem
3. Use some important formulas that apply to polygons
4. Recognize regular polygons
5. Use a formula to find the measure of an exterior angle of an equiangular polygon

Chapter 8 SIMILAR POLYGONS

1. Recognize and work with ratios and proportions.
2. Apply the product and ratio theorems.
3. Calculate geometric mean.
4. Identify the characteristics of similar figures
5. Use several methods to prove triangles similar.
6. Use the concept of similarity to establish the congruence of angles and the proportionality of segments.
7. Apply the theorems frequently used to establish proportionality.

Chapter 9 THE PYTHAGOREAN THEOREM

1. Simplify radical expressions and solve quadratic equations.
2. Begin solving problems involving circles.
3. Identify the relationships between the parts of a right triangle when an altitude is drawn to a hypotenuse.
4. Use the Pythagorean Theorem and its converse.
5. Use the distance formula to compute lengths of segments in the coordinate plane.
6. Recognize groups of whole numbers known as Pythagorean triples.
7. Apply the Principle of the Reduced Triangle.
8. Identify the ratio of side lengths in a 30 - 60 - 90 triangle.
9. Identify the ratio of side lengths in a 45 - 45 - 90 triangle.
10. Apply the Pythagorean Theorem to solid figures.
11. Understand the three basic trigonometric relationships.
12. Use the trigonometric ratios to solve right triangles.

Chapter 10 CIRCLES

1. Identify the characteristics of circles, chords, and diameters.
2. Recognize special relationships between congruent chords of a circle.
3. Identify different types of arcs, determine the measure of an arc, and recognize congruent arcs.
4. Relate congruent arcs, chords, and central angles.
5. Identify secant and tangent lines and segments.
6. Distinguish between two types of tangent circles.
7. Recognize common internal and common external tangents.
8. Determine the measures of central, inscribed, tangent-chord, chord-chord, secant-secant, secant-tangent, and tangent-tangent angles.
9. Recognize congruent inscribed and tangent-chord angles.
10. Determine the measure of an angle inscribed in a semicircle.
11. Apply the relationship between the measures of a tangent-tangent angle and its minor arc.
12. Recognize inscribed and circumscribed polygons.
13. Apply the relationship between opposite angles of an inscribed quadrilateral.
14. Identify the characteristics of an inscribed parallelogram.
15. Apply the three power theorems.
16. Determine circle circumference and arc length.
17. Write an equation for a circle given its center and radius, and vice versa.

Chapter 11 AREA

1. Find the areas of rectangles and squares.
2. Use the basic properties of area.
3. Find the areas of parallelograms.
4. Find the areas of triangles.
5. Find the areas of trapezoids.
6. Use the measure of a trapezoid's median to find its area.
7. Find the areas of kites.
8. Find the areas of equilateral triangles.
9. Find the areas of other regular polygons.
10. Find the areas of circles.
11. Find the areas of sectors.
12. Find the areas of segments.

Chapter 12 SURFACE AREA AND VOLUME

1. Find the surface areas of prisms.
2. Find the surface areas of pyramids.
3. Find the surface areas of circular solids.
4. Find the volumes of right rectangular prisms.
5. Find the volumes of other prisms.
6. Find the volumes of cylinders.
7. Use the area of a prism's or a cylinder's cross section to find the solid's volume.
8. Find the volumes of Pyramids.
9. Find the volumes of cones.
10. Solve problems involving cross sections of pyramids and cones.
11. Find volumes of Sphere.