**Curriculum (updated)**

**Geometry**

**Course Overview**

The course provides a thorough foundation in plane Euclidean geometry with emphasis on the formal nature of definition, the structure of knowledge, and inductive and deductive reasoning. An introduction to trigonometry through similar triangles and to analytic geometry through the co-ordinate plane is included.

**Department Standards**

Students will be able to comprehend mathematical concepts.

Students will be able to apply mathematical procedures accurately, efficiently, and appropriately.

Students will be able to formulate, represent, and solve mathematical problems.

Students will develop logical mathematical thought and precise mathematical communication.

**Benchmarks**:

Students will be able to:

understand the basic ideas and terms of Geometry;

develop logical arguments about geometric relationships;

use trigonometric relationships to determine lengths and angle measures;

apply transformations and use symmetry to analyze mathematical situations;

apply geometric principals to real-world problem solving;

recognize properties and characteristics of polygons and circles;

recognize properties and characteristics of three-dimensional solids; and

find the areas and volumes of two- and three-dimensional geometric shapes.

**Performance Indicators**

First Quarter

Students will be able to:

find and describe patterns;

use inductive reasoning to make real-life conjectures;

understand and use the basic undefined terms and defined terms;

use segment postulates and use the distance formula;

use angle postulates and classify angles;

bisect a segment and an angle;

identify vertical angles, linear pairs, complementary and supplementary angles;

find the perimeter and area of common plane figures;

recognize and analyze conditional statements;

recognize and use definitions and biconditionals;

form conclusions by applying the laws of logic;

use properties from algebra;

write reasons for steps in a proof; prove properties and theorems;

identify relationships between lines and angles;

write different types of proof;

prove and use results about parallel lines and transversals;

prove that two lines are parallel;

using properties of parallel lines;

find slopes of lines and write equations of parallel lines in the coordinate plane; and

identify and write equations of perpendicular lines in the coordinate plane.

Second Quarter

Students will be able to:

classify triangles by sides and angles;

identify congruent figures and write a congruence statement;

prove two triangles congruent using correct patterning;

apply knowledge of congruent triangles to further statements;

use properties of right, isosceles, and equilateral triangles to prove triangle congruency and calculate triangle measures;

prove triangle congruencies using the coordinate plane;

use properties of perpendicular and angle bisectors to identify and calculate measures in triangles;

identify the median and altitudes of triangles and calculate measures based on the properties;

identify the midsegment of a triangle and apply the properties of the midsegment theorem

apply inequality theorems to determine side;

lengths in triangles;

use the hinge theory to compare inequalities in two triangles;

read and write indirect proofs;

identify and categorize polygons;

identify the properties of parallelograms and apply to real life situations;

use the properties of parallelograms to prove a quadrilateral is a parallelogram;

identify special parallelograms using angle, side, and diagonal information;

apply properties of special parallelograms in real-life problems; and

identify and use the properties of trapezoids and kites.

Third Quarter

Students will be able to:

identify the three basic rigid transformations;

identify and use transformations in a plane;

use vectors to describe transformations;

identify and use glide reflections;

use transformations to classify frieze patterns;

simplify ratios and use proportions;

use properties of proportions to solve real-life problems;

identify and use similar polygons and triangles to solve problems;

use similarity theorems to prove that two triangles are similar;

use proportionality theorems to solve problems;

identify dilations and use their properties;

solve problems involving similar right triangles formed by the altitude drawn to the hypotenuse;

prove and use the Pythagorean theorem and its converse;

use side lengths to classify triangles by their angle measures;

find lengths of special right triangles;

find and use the trigonometric ratios of an acute angle;

solve a right triangle; and

find magnitude and direction of a vector.

Fourth Quarter

Students will be able to:

identify segments and lines related to circles;

identify and use properties of tangents to circles to calculate missing measures;

apply properties of chords and arcs in circles to find missing measures;

use inscribed angles in circles to solve problems;

use the properties of inscribed polygons to solve problems;

use the angles formed by tangents and chords to solve problems in geometry;

use the angles formed by lines intersecting in a circle to solve problems in geometry;

write the equation of a circle from the graph;

use the equation of a circle to draw the graph or solve problems;

find the measure of exterior and interior angles of polygons;

use the measures of interior angles of polygons to solve real-life problems;

find the area of any regular polygon;

compare the area and perimeters of similar figures to the scale factor;

use perimeters and areas of similar figures to solve problems;

calculate the circumference and arc length in a circle;

calculate the area of a sector and a circle;

find and apply geometric probability in problem solving;

use properties of polyhedra and Euler's theorem in problem solving;

find the surface area of a prism or cylinder;

find the surface area of a cone or pyramid;

find the volume of a prism or cylinder;

find the volume of a cone or pyramid; and

find the surface area and volume of a sphere.

**Assessments**

First Quarter

Daily assignments

Quizzes

Chapter Tests

Project

Second Quarter

Daily assignments

Quizzes

Chapter Tests

Project

Two hour Semester One Exam

Third Quarter

Daily assignments

Quizzes

Chapter Tests

Project

Fourth Quarter

Daily assignments

Quizzes

Chapter Tests

Project

Two hour Semester Two Exam

**Core Topics**

First Quarter

Basics of geometry

Reasoning and proof

Applications of parallel and perpendicular lines

Second Quarter

Congruent triangles

Properties of triangles

Polygons and quadrilaterals

Third Quarter

Transformations

Similarity in triangles and other polygons

Right triangles and trigonometry

Fourth Quarter

Geometry in a circle

Areas of polygons and circles

Surface areas and volumes of solids

**Specific Content**

First Quarter

Patterns and Inductive Reasoning

Points, lines and planes

Defined terms and definitions

Segments and their measures

Angles and their measures

Segment and angle bisectors

Vertical angles and linear pairs

Review of perimeter, circumference and area

Conditional statements

Definitions and biconditional statements

Symbolic notation, deductive reasoning and laws of logic

Reasoning with properties from algebra

Proving statements about segments and angles

Relationships between lines and angles

Types of proof and perpendicular lines

Parallel lines and transversals

Proving lines are parallel

Properties of parallel lines

Parallel lines in the coordinate plane

Perpendicular lines in the coordinate plane

Second Quarter

Classification of triangles

Congruency in triangles

Proving triangles congruent

Properties of congruent triangles

Properties of special triangles

Coordinate proofs

Properties of special lines in triangles

Midsegment theorem

Triangle inequalities

Indirect Proofs

Properties of polygon in general, and quadrilaterals specifically

Special quadrilaterals

Third Quarter

Rigid motion in a plane

Transformations in a plane

Vectors and translations

Glide reflections and compositions

Frieze pattern classifications

Ratio and proportion

Problem solving with proportions

Similar polygons and triangles

Proving triangles are similar

Proportions and similar triangles

Dilations

Similar right triangles

The Pythagorean theorem and the converse of the Pythagorean theorem

Special right triangles

Trigonometric ratios

Solving right triangles

Vectors and their sum

Fourth Quarter

Lines and segments in circles

Arcs of circles

Angle relations in circles

Equations of circles

Angle measures in polygons

Areas of regular polygons

Perimeters and areas of similar figures

Circumference and arc length in circles

Areas of circles and sectors

Geometric probability

Properties of polyhedra

Surface area of prisms and cylinders

Surface area of pyramids and cones

Volume of prisms and cylinders

Volume of cones and pyramids

Surface area and volume of a sphere

**Resources**

Textbook: *Geometry* by Larson, Boswell, Stiff published by McDougal Littell

Geometer's Sketchpad

SMART Board construction tools