

Virginia Community College Course Content Summary

Course Title: MTH 156: Elementary Geometry

Course Description

Presents the fundamentals of plane and solid geometry and introduces non-Euclidean geometries and current topics. Lecture 3 hours per week. 3 credits.

General Course Purpose

To present the fundamentals of plane and solid geometry and introduce non-Euclidean geometries and current topics while modeling sound pedagogy to support students in presenting these concepts to their own students.

Course Prerequisites/Corequisites

Prerequisite: Completion of MTE 1-9 or appropriate placement

Course Objectives

Upon completing the course, the student will be able to:

Basic Properties, Definitions, Symbols, and Proof

- Demonstrate geometric properties: intersecting lines, shortest distance between a point and a line, congruence of vertical angles, the seven basic Euclidean constructions, the polygon sum formula, the relationships between the base angles of an isosceles triangle and between its legs, intersecting planes, congruent segments, congruent angles, and congruent polygons
- Understand relevant geometry terminology
- Recognize relevant conventional geometric symbols
- Use definitions and postulates in two-column (deductive) proofs to prove basic theorems
- Apply properties learned to solve problems

Properties of Quadrilaterals, Circles, and Congruent Triangles

- Demonstrate geometric properties: relationships between sides, angles, and diagonals of parallelograms, relationships between diagonals in rhombi and in rectangles, relationships between special angles, arcs, chords, secants, and tangents in circles, and conditions sufficient to prove or dispute congruence of triangles
- Understand relevant geometry terminology
- Recognize relevant conventional geometric symbols
- Use definitions, postulates, and proven theorems to prove triangles congruent in two-column proofs
- Apply properties learned to solve problems

Transformations, Symmetry, and Area

- Demonstrate, investigate, and discover geometric properties using inductive reasoning: basic transformations including translations, rotations, reflections, two reflections over parallel lines and two reflections over intersecting lines, distances between relevant points and lines in these transformations, numbers of reflection symmetries of regular polygons and numbers and degrees of the rotational symmetries of regular polygons, formulae for the areas of parallelograms, triangles, trapezoids, and circles
- Demonstrate understanding of relevant geometry terminology
- Recognize relevant conventional geometric symbols
- Apply properties learned to solve problems

Theorem of Pythagoras, Solid Geometry, Non-Euclidean Geometries and Topology

- Demonstrate geometric properties: theorem of Pythagoras and its converse, relationships between vertices, edges, faces, bases, heights and slant heights in solids including Euler's rule, compute surface areas and volumes for solids, historical development of non-Euclidean geometries and their unique attributes and basic topological concepts including topological transformations
- Demonstrate understanding relevant geometry terminology
- Recognize relevant conventional geometric symbols

- Apply properties learned to solve problems

Major Topics to be Included

Basic Properties, Definitions, Symbols, and Proof

Properties of Quadrilaterals, Circles, and Congruent Triangles

Transformations, Symmetry, and Area

Theorem of Pythagoras, Solid Geometry, Non-Euclidean Geometries and Topology