

**Geometry**  
**Southwest Wisconsin Technical College**  
**4/2/2004**

**Administrative Data**

Title - Geometry  
Developers - Peter Esser  
Development Date - 4/2/2004  
Number - 804 –110  
Organization - Southwest Wisconsin Technical College

Potential Hours of Instruction - 54  
Total Credits - 3

**Course Description**

Students taking Geometry write geometric proofs using basic established postulates and theorems. Students use properties of polygons (triangles, quadrilaterals, etc) to calculate missing dimensions. Students use ideas of similarity and congruence to calculate missing dimensions of polygons. They calculate areas of and volumes of two and three dimensional objects. Students calculate features of circles using established formulas. They calculate missing dimensions of right triangles. Students use coordinate geometry to graph and calculate features of one and two dimensional shapes.

**Target Population**

Geometry is designed for students needing a first year geometry course.

**Textbooks**

Subscription to BoxerMath Website: [www.boxermath.com](http://www.boxermath.com) Subscriptions are purchased from the Southwest Tech Bookstore. The BoxerMath material is in the form of Internet-based interactive tutorials, problem sets, and online testing.

**Supplies**

**Scientific Calculator**  
Required: Yes

**Prerequisites**

High school algebra or the equivalent

## ils

1. Identify methods of geometric proof
2. Demonstrate properties of points, lines and angles
3. Apply properties of triangles
4. Evaluate characteristics of right triangles
5. Analyze quadrilaterals and polygons
6. Establish basic properties of circles
7. Use coordinate geometry
8. Calculate features of 3 dimensional shapes
9. Examine special topics in geometry

## e Abilities

Work Productively  
Work Cooperatively  
Act Professionally  
Solve Problems  
Value Learning  
Communicate Clearly

## irse Competencies

1. Identify methods of geometric proof

### Properties

Domain : Cognitive  
Level : Synthesis  
Importance : Important  
Difficulty : High

### Criteria - Performance will be satisfactory when:

- \* Definitions match established postulates
- \* Constructions use established techniques
- \* learner chooses a valid method for solving a problem
- \* learner chooses an appropriate formula
- \* proofs show cause effect reasoning
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure

### Competence will be demonstrated:

- \* Using scientific calculator

### Learning Objectives

- \* Use fundamental geometric definitions
- \* Prove angles complementary, supplementary, and vertical angles equal
- \* Use if-then reasoning to reach conclusions
- \* Use parallel lines postulates to find missing angle measures
- \* Construct parallel lines
- \* Write a two column proof using established postulates and theorems

### Linked Core Abilities

Communicate Clearly

2. Demonstrate properties of points, lines and angles

**Properties**

Domain : Cognitive  
Level : Application  
Importance : Essential  
Difficulty : Low

**Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* Constructions use established techniques
- \* learner chooses a valid method for solving a problem
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

**Competence will be demonstrated:**

- \* Using a scientific calculator

**Learning Objectives**

- \* Define point, line, and angle
- \* Measure angles
- \* Classify angles
- \* Use vertical angles definition to determine missing angle measures
- \* Construct perpendicular lines
- \* Bisect an angle
- \* Use the postulates of equality (+, -, x, /, sub) to solve problems
- \* Use the postulates of geometry to solve problems

**Linked Core Abilities**

Solve Problems

3. Apply properties of triangles

**Properties**

Domain : Cognitive  
Level : Application  
Importance : Essential  
Difficulty : Medium

**Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* Constructions use established techniques
- \* learner chooses a valid method for solving a problem
- \* learner writes an equation representing the problem
- \* learner chooses an appropriate formula
- \* proofs show cause effect reasoning
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

**Competence will be demonstrated:**

- \* Using a scientific calculator

**Learning Objectives**

- \* Calculate missing interior or exterior angle of a triangle given the other two interior angles
- \* Classify triangles
- \* Define congruent triangles
- \* Use SSS, SAS, ASA, AAS, and HL postulates to prove triangles congruent
- \* Find corresponding parts of triangles by proving the triangles are congruent
- \* Construct a congruent triangle
- \* Construct a segment bisector
- \* Define altitude and medians of a triangle
- \* Use properties of isosceles and equilateral triangles to find missing dimensions of triangles
- \* Write two column proof using postulates and theorems involving triangles

**Linked Core Abilities**

Solve Problems

4. Evaluate characteristics of right triangles

**Properties**

Domain : Cognitive  
Level : Analysis  
Importance : Essential  
Difficulty : Medium

**Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* learner chooses a valid method for solving a problem
- \* learner writes an equation representing the problem
- \* learner chooses an appropriate formula
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

**Competence will be demonstrated:**

- \* Using a scientific calculator

**Learning Objectives**

- \* Calculate the areas of triangles
- \* Use the Pythagorean theorem to calculate the missing side of a right triangle
- \* Apply properties of 45-45-90 triangles to find missing dimensions
- \* Apply properties of 30-60-90 triangles to find missing dimensions
- \* Calculate diagonals of rectangular solids
- \* Use right triangles to find missing dimensions in right pyramids and cones
- \* Determine trigonometric ratios for various right triangles

**Linked Core Abilities**

Solve Problems

5. Analyze quadrilaterals and polygons

**Properties**

Domain : Cognitive  
Level : Application  
Importance : Essential  
Difficulty : Medium

**Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* learner chooses a valid method for solving a problem
- \* proofs show cause effect reasoning
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

**Competence will be demonstrated:**

- \* Using a scientific calculator

**Learning Objectives**

- \* Classify polygons
- \* Calculate interior and exterior angle sums of polygons
- \* Use properties of parallelograms to calculate missing dimensions
- \* Write a two-column proof to prove a figure is a parallelogram
- \* Use properties of trapezoids to calculate missing dimensions
- \* Write a two-column proof to prove a figure is a trapezoid

**Linked Core Abilities**

Solve Problems

6. Establish basic properties of circles

**Properties**

Domain : Cognitive  
Level : Application  
Importance : Essential  
Difficulty : Medium

**Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* Constructions use established techniques
- \* learner chooses a valid method for solving a problem
- \* learner chooses an appropriate formula
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

**Competence will be demonstrated:**

- \* Using a scientific calculator

### **Learning Objectives**

- \* Define basic terms regarding circles
- \* Construct a tangent to a circle
- \* Calculate central angle given the corresponding arc and vice versa
- \* Use theorems regarding central angles and arcs to find missing dimensions
- \* Use theorems regarding chords to find missing dimensions
- \* Use theorems regarding inscribed angles to find missing dimensions
- \* Apply theorems of angle, arc, and chord relationships to solve problems

### **Linked Core Abilities**

Solve Problems

## 7. Use coordinate geometry

### **Properties**

Domain : Cognitive

Level : Application

Importance : Important

Difficulty : Medium

### **Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* learner chooses a valid method for solving a problem
- \* learner writes an equation representing the problem
- \* learner chooses an appropriate formula
- \* proofs show cause effect reasoning
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

### **Competence will be demonstrated:**

- \* Using a scientific calculator

### **Learning Objectives**

- \* Plot ordered pairs on an x-y coordinate system
- \* Use an x-y coordinate graph to determine lengths of segments
- \* Find the midpoint of a segment given the coordinates of the endpoints
- \* Calculate the slope of a line
- \* Calculate the slopes of parallel and perpendicular lines
- \* Write a two column proof to determine if lines are parallel or perpendicular
- \* Graph a line given its equation

### **Linked Core Abilities**

Solve Problems

8. Calculate features of 3 dimensional shapes

**Properties**

Domain : Cognitive  
Level : Application  
Importance : Essential  
Difficulty : Medium

**Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* learner chooses a valid method for solving a problem
- \* learner chooses an appropriate formula
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

**Competence will be demonstrated:**

- \* Using a scientific calculator

**Learning Objectives**

- \* Classify spatial relationships of lines and planes
- \* Calculate surface areas and volume of rectangular solids
- \* Calculate surface areas and volume of right cylinders
- \* Calculate surface areas and volumes of regular pyramids
- \* Calculate the surface area and volumes of right circular cones
- \* Calculate surface area and volume of spheres
- \* Apply scaling factor of length of similar polygons to the scaling factors for the areas and volumes of similar solids

**Linked Core Abilities**

9. Examine special topics in geometry

**Properties**

Domain : Cognitive  
Level : Analysis  
Importance : Essential  
Difficulty : Medium

**Criteria - Performance will be satisfactory when:**

- \* Definitions match established postulates
- \* learner chooses a valid method for solving a problem
- \* learner chooses an appropriate formula
- \* learner draws an accurate diagram representing the problem
- \* learner shows steps used to solve a problem
- \* Answer includes correct units of measure
- \* Answer is within 1% of actual value
- \* Answer is stated with appropriate precision

**Competence will be demonstrated:**

- \* Using a scientific calculator

**Learning Objectives**

- \* Perform constructions
- \* Use symmetry to solve geometric problems
- \* Tessellate regular polygons
- \* Examine fractals
- \* Find locus points of an object
- \* Explain the significance of non-euclidean geometry

**Linked Core Abilities**

Solve Problems