Geometry
Course Outcome Summary
Riverdale High School

Information

Course Title: Geometry
Credits: 1
Contact Hours: 178
Instructional Area: Mathematics
Instructional Level: Adult High School
Organization: Riverdale High School
Department: Mathematics
Developer(s): Mary Ann Carmody
Development Date: 07/08/2009

Types of Instruction

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<th>Contact Hours</th>
<th>Outside Hours</th>
<th>Credits</th>
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<td>Teacher Directed Instruction</td>
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<td>Cooperative Learning Groups and presentations</td>
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Target Population

Four-year college or vocational/technical bound students.

Description

Students in this course will develop their discovery, conjecture and logical reasoning skills. Topics covered include the following essential geometric concepts: congruence, similarity, perpendicular and parallel lines, special quadrilaterals and their properties, right triangle trigonometry, circle relationships, polygons, surface area and volume of 3 dimensional solids and coordinate/transformational geometry. Fundamentals of deductive and inductive logic are presented using mathematical proofs, geometric proofs and real-world problem solving as tools.

Prerequisites

1. Successful completion of Algebra I or teacher recommendation.
2. Recommendation of instructor.

Textbooks


Supplies

1. 1 per student TI-83+ or newer graphics calculator. Manufacturer: Texas Instruments. Price: $103.50. Source: student provided/school rental. Required.

2. 1 per student Notetaking Guide. Manufacturer: Holt McDougal-A Houghton Mifflin Co. Price:


**General Education Outcomes**

A. Use and interpret common mathematical symbols and concepts  
B. Make logical decisions using critical thinking and problem solving skills.  
C. Communicate clearly.  
D. Apply problem solving steps  
E. Perform computations using appropriate methods  
F. Demonstrate knowledge and application of formulas  
G. Demonstrate knowledge and application of measurement  

**Core Abilities**

A. Use technology appropriately.  
B. Apply effective problem solving strategies.  
C. Communicate clearly and effectively.  
D. Show respect for diversity.  
E. Acquire the capacity and motivation for life-long learning.  
F. Achieve desired results by interpreting and executing instructions, plans, models, and diagrams.  
G. Develop numerical and logical reasoning skills.  
H. Use problem solving skills and the the application of mathematical concepts in solving real world situations.  
I. Demonstrate a sense of personal, social, professional, and work ethics.

**Competencies, Linked Exit Learning Outcomes, and Performance Standards**

**Describe and measure geometric figures.**

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<th>Properties</th>
<th>Domain: Cognitive</th>
<th>Level: Comprehension</th>
<th>Difficulty: Low</th>
<th>Importance: Essential</th>
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**Linked External Standards**

WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts  
WI.MA.C.12.4 Use the two-dimensional rectangular coordinate system and algebraic procedures to describe and characterize geometric properties and relationships such as slope, intercepts, parallelism, and perpendicularity  
WI.MA.D.12.2 Select and use tools with appropriate degree of precision to determine measurements directly within specified degrees of accuracy and error (tolerance)
WI.MA.D.12.3 Determine measurements indirectly
WI.MA.F.12.4 Model and solve a variety of mathematical and real-world problems by using algebraic expressions, equations, and inequalities

Performance Standards

Students will demonstrate competency:

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter One.

Student performance will be successful when:

- Learner correctly identifies, labels and classifies points, lines, planes, angles and polygons.
- Learner correctly measures segments in the coordinate plane using the distance and midpoint formula.
- Learner memorizes and correctly applies the appropriate perimeter and area formulas for common shapes (squares, rectangles, triangles and circles).
- Learner constructs copies of angles and segments as well as the bisector of an angle or segment.
- Learner correctly differentiates between the meaning and use of the terms equality and congruency.
- Learner accurately calculates the measure of an angle with protractor and through the use of angle pair relationships.

Learning objectives

What you will learn as you master the competency:

a. Identify points, lines and planes.
b. Employ the Ruler Postulate and Segment Addition Postulate to identify congruent segments.
c. Apply Midpoint and Distance Formulas.
d. Apply the Protractor Postulate and the Angle Addition Postulate in the measurement and classification of angles.
e. Construct copies of angles and segments,
f. Construct the bisector of an angle or segment.
g. Describe angle pairs relationships.
h. Classify polygons.
i. Determine the perimeter/circumference and area of squares, rectangles,
triangles and circles through the application of the appropriate formula.

2. **Apply inductive reasoning and deductive reasoning in the writing of geometric proofs.**

**Properties**
- **Domain:** Cognitive
- **Level:** Application
- **Difficulty:** High
- **Importance:** Essential

**Linked External Standards**
- WI.MA.B.12.4 Select and use appropriate procedures in problem solving situations involving the application of different number systems (natural, integers, rational, and real)
- WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
- WI.MA.C.12.3 Present convincing arguments by means of demonstration, informal proof, counter-examples, or any other logical means
- WI.MA.E.12.2 Organize and display data from statistical investigations
- WI.MA.F.12.4 Model and solve a variety of mathematical and real-world problems by using algebraic expressions, equations, and inequalities

**Performance Standards**

*Students will demonstrate competency:*
- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Two.

*Student performance will be successful when:*
- Learner correctly differentiates between inductive and deductive reasoning.
- Learner memorizes the correct form of a proof, using postulates, theorems, and definitions.
- Learner manufactures a correct two-column of segment or angle relationships.
- Learner correctly reasons in two-column format from an algebraic expression to its solution.
- Learner manufactures a correct paragraph proof of segment or angle relationships.
- Learner proves statements wrong using a counterexample.
Learning objectives
What you will learn as you master the competency:

a. Employ inductive reasoning in formulating a conjecture based on observed patterns
b. Analyze conditional statements.
c. Apply deductive reasoning in the use of the Law of Detachment and the Law of Syllogism,
d. Match the point, line, plane postulates with diagrams exhibiting one or more of the postulates.
e. Reason using the Algebraic Properties (Equality, Distributive, Reflexive, Symmetric, and Transitive).
f. Prove statements about the equivalence/congruence of segments or angles using two-column proof.
g. Prove and apply numerically as well as in other proofs the Right Angles Congruence, Congruent Supplements, Congruent Complements, and Vertical Angles Congruence Theorems.
h. Employ the Linear Pair Postulate numerically and in proofs.

3. Apply properties of parallel and perpendicular lines.

Properties
Domain: Cognitive
Level: Application
Difficulty: Medium
Importance: Important

Linked External Standards
WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
WI.MA.C.12.3 Present convincing arguments by means of demonstration, informal proof, counter-examples, or any other logical means
WI.MA.C.12.4 Use the two-dimensional rectangular coordinate system and algebraic procedures to describe and characterize geometric properties and relationships such as slope, intercepts, parallelism, and perpendicularity

Performance Standards
Students will demonstrate competency:

o On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
o Without the use of the textbook while taking quizzes and chapter tests.
o Without the use of the notebook while taking chapter tests.
o With a textbook provided for daily work.
o With the use of a graphic calculator.
o In classroom or computer lab under the guidance of the teacher.
o Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
o By the end of Chapter Three.

Student performance will be successful when:
Learning objectives
What you will learn as you master the competency:

a. Define skewed lines, parallel lines and parallel planes and identify such relationships in two- and three- dimensions.
b. Identify parallel and perpendicular lines using the Parallel and Perpendicular Postulates.
c. Identify angles formed by a transversal cutting two or more coplanar planes.
d. Identify corresponding, alternate interior, alternate exterior, and consecutive interior angles.
e. Determine the numerical solution to angle problems involving parallel lines using the Corresponding Angles Postulate, Alternate Interior Angle Theorem, Alternate Exterior Angles Theorem. and Consecutive Interior Angles Theorem.
f. Label lines as having negative, positive, zero and undefined slope.
g. Determine the slopes of lines in a coordinate plane.
h. Apply the Slopes of Parallel Lines and Slopes of Perpendicular Lines Postulates in identifying parallel lines and perpendicular lines.
i. Write in slope-intercept form the equation of a line.
j. Graph the equation of a line.
k. Prove and apply theorems about perpendicular lines.

4. Prove relationships using angle measures.

Properties
Domain: Cognitive
Level: Analysis
Difficulty: High
Importance: Essential

Linked External Standards
WI.MA.A.12.1 Use reason and logic
WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
WI.MA.C.12.3 Present convincing arguments by means of demonstration, informal proof, counter-examples, or any other logical means

Performance Standards
Students will demonstrate competency:
o On daily work, quizzes, chapter tests, notebook (notetaking
guide/journal entries), performance based tasks/projects, and computer lab activities.

- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Three.

**Student performance will be successful when:**

- Learner uses the angle pairs formed by lines and a transversal to correctly prove in two-column format that the lines are parallel.
- Learner uses right angles formed by intersecting lines to correctly prove in two-column format that the lines are perpendicular.

**Learning objectives**

**What you will learn as you master the competency:**

a. State the Corresponding Angles Converse Postulate and the Alternate Interior Angles Converse, Alternate Exterior Angles Converse and Consecutive Interior Angles Converse Theorems.

b. Determine whether sufficient information is present in order to classify lines as parallel.

c. Prove two or more lines are parallel using the Corresponding Angles Converse Postulate, the Alternate Interior Angles Converse Theorem, the Alternate Exterior Angles Converse Theorem and/or the Consecutive Interior Angles Converse Theorem.

5. **Classify triangles by sides and angles.**

**Properties**

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<td>Difficulty:</td>
<td>Low</td>
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**Linked External Standards**

WI.MA.C.12.4 Use the two-dimensional rectangular coordinate system and algebraic procedures to describe and characterize geometric properties and relationships such as slope, intercepts, parallelism, and perpendicularity

**Performance Standards**

**Students will demonstrate competency:**

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
In classroom or computer lab under the guidance of the teacher.

Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.

By the end of Chapter Four.

*Student performance will be successful when:*

- learner correctly identifies or draws a designated triangle type.
- learner memorizes and accurately applies the triangle sum properties in solving for missing angle values.
- learner correctly matches corresponding sides and/or angles of congruent figures.

**Learning objectives**

*What you will learn as you master the competency:*

a. Define and accurately draw scalene, isosceles, equilateral, acute, right, obtuse, and equiangular triangles.

b. Apply numerically the Triangle Sum Theorem, Exterior Angle Theorem, and the Corollary to the Triangle Sum Theorem.

c. Identify the corresponding angles and/or corresponding sides of congruent triangles based on the markings in a diagram or a congruence statement.

d. Solve numerically for missing sides or angles using the properties of congruent figures.

6. **Prove triangles are congruent.**

**Properties**

- Domain: Cognitive
- Level: Analysis
- Difficulty: High
- Importance: Essential

**Linked External Standards**

- WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
- WI.MA.C.12.3 Present convincing arguments by means of demonstration, informal proof, counter-examples, or any other logical means

**Performance Standards**

*Students will demonstrate competency:*

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.

- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Four.
Student performance will be successful when:

- learner verbalizes triangle congruence theorems without losing the basic reasoning.
- learner applies the correct triangle congruence theorem given general information.
- learner composes a triangle congruence proof in a logical sequence based on previous examples.

Learning objectives

What you will learn as you master the competency:

a. Prove triangles are congruent through the use of the Third Angles Theorem and/or the Properties of a Congruent Triangle (Reflexive, Symmetric, and Transitive).

b. State and apply the SSS Congruence Postulate, the SAS Congruence Postulate, the HL Congruence Theorem, the ASA Congruence Postulate, or the AAS Congruence Theorem in informally determining the congruence of two triangles.

c. Prove triangles are congruent through the use of the SSS Congruence Postulate, the SAS Congruence Postulate, the HL Congruence Theorem, the ASA Congruence Postulate, or the AAS Congruence Theorem.

d. Apply the Corresponding Parts of Congruent Triangles Theorem in proving designated segments/angles to be congruent.

e. Verify triangles are congruent by using the Base Angles Theorem and the Converse of the Base Angles Theorem.

f. Use triangle congruence postulates in real-life problems.

Investigate congruence transformations.

Properties

- Domain: Cognitive
- Level: Analysis
- Difficulty: Medium
- Importance: Important

Linked External Standards

WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts.

WI.MA.C.12.4 Use the two-dimensional rectangular coordinate system and algebraic procedures to describe and characterize geometric properties and relationships such as slope, intercepts, parallelism, and perpendicularity.

Performance Standards

Students will demonstrate competency:

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.

By the end of Chapter Four.

Student performance will be successful when:

- learner correctly identifies congruence transformation from diagram.
- learner correctly uses coordinate notation to either perform or describe a congruence transformation.

**Learning objectives**

**What you will learn as you master the competency:**

a. Identify the congruence transformations of translation, reflection, and rotation.

b. Describe a translation or reflection with coordinate notation.

c. Draw the translation or reflection image of a shape given coordinate notation.

8.

**Apply properties of special segments in triangles and use inequalities to compare two triangles.**

**Properties**

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

**Linked External Standards**

WI.MA.C.12.4 Use the two-dimensional rectangular coordinate system and algebraic procedures to describe and characterize geometric properties and relationships such as slope, intercepts, parallelism, and perpendicularity

**Performance Standards**

**Students will demonstrate competency:**

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Five.

Student performance will be successful when:

- learner correctly identifies and applies the properties of bisectors, medians, altitudes and midsegments of triangles.
- learner demonstrates logical sequencing in writing coordinate and indirect proofs.

**Learning objectives**

**What you will learn as you master the competency:**
a. Identify the midsegments of a triangle.
b. Write coordinate and indirect proofs.
c. Employ the properties of the midsegments of a triangle,
d. Apply the properties of perpendicular bisectors.
e. Verify equal distances through the use of the properties of angle bisectors.
f. Implement the properties of perpendicular bisectors, angle bisectors, medians and altitudes of a triangle.

9. Verify similarity and solve geometry problems through the use of ratios, proportions and transformations.

Properties

- Domain: Cognitive
- Level: Evaluation
- Difficulty: Medium
- Importance: Important

Linked External Standards

- WI.MA.B.12.2 Compare real numbers
- WI.MA.B.12.3 Perform and explain operations on real numbers
- WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
- WI.MA.C.12.3 Present convincing arguments by means of demonstration, informal proof, counter-examples, or any other logical means

Performance Standards

Students will demonstrate competency:

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Six.

Student performance will be successful when:

- learner accurately applies proportions in solving for missing segment lengths in triangles.
- learner correctly recognizes similar triangles.
- learner verbalizes triangle similarity theorems without losing basic reasoning.
- learner applies the correct similarity theorem given general information.
- learner composes a triangle similarity proof in a logical sequence based on previous examples.
learner correctly uses coordinate notation to either perform or describe a dilation.

Learning objectives
What you will learn as you master the competency:

a. Find and simplify the ratio of two numbers.
b. Apply the properties of proportions in finding the geometric mean and solving geometry problems.
c. Identify similar polygons and apply in solving real-world problems.
d. Prove triangles to be similar through the use of the AA Similarity Postulate, the SAS Similarity Theorem and the SSS Similarity Theorem.
e. Determine segment lengths through the use of proportionality theorems.
f. Describe a dilation with coordinate notation.
g. Draw the dilation of a shape given coordinate notation.

10. Utilize the Pythagorean Theorem and its Converse, the geometric mean, the side ratios of special right triangles, and trigonometric ratios in solving right triangles.

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

Linked External Standards
- WI.MA.C.12.5 Identify and demonstrate an understanding of the three ratios used in right-triangle trigonometry (sine, cosine, tangent)
- WI.MA.D.12.3 Determine measurements indirectly
- WI.MA.F.12.4 Model and solve a variety of mathematical and real-world problems by using algebraic expressions, equations, and inequalities

Performance Standards
Students will demonstrate competency:

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Seven.

Student performance will be successful when:

- learner memorizes the Pythagorean Theorem and basic right triangle trigonometric ratios.
- learner correctly identifies triangle types through the use of the
Converse of the Pythagorean Theorem.

- learner correctly solves right triangles using the Pythagorean Theorem and right triangle trigonometric ratios.
- learner memorizes and correctly applies special right triangle side ratios.

**Learning objectives**

*What you will learn as you master the competency:*

a. Solve problems involving similar right triangles formed by the altitude drawn to the hypotenuse (geometric mean).

b. Calculate the missing sides of right triangles by using the Pythagorean Theorem.

c. Determine the lengths of a right triangle through the use of Pythagorean triples and their multiples.

d. Use the Converse of the Pythagorean Theorem and its related inequality theorems to determine whether a triangle is right, obtuse or acute.

e. Prove the Pythagorean Theorem and the Converse of the Pythagorean Theorem.

f. Determine the side lengths of special right triangles (30-60-90 and 45-45-90) and use to solve real-life problems.

g. Find the sine, cosine and tangent ratios of an acute angle.

h. Solve right triangles using the trigonometric ratios.

**11. Examine and apply polygon properties particularly those of quadrilaterals.**

*Properties*

- Domain: Cognitive
- Level: Analysis
- Difficulty: High
- Importance: Essential

*Linked External Standards*

WI.M.A.C.12.4 Use the two-dimensional rectangular coordinate system and algebraic procedures to describe and characterize geometric properties and relationships such as slope, intercepts, parallelism, and perpendicularity

*Performance Standards*

*Students will demonstrate competency:*

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Eight.
Student performance will be successful when:

- learner correctly applies Interior and Exterior Angles Theorem for polygons.
- learner accurately applies the properties of specific quadrilaterals.
- learner memorizes the quadrilateral hierarchy chart and correctly attributes inherited properties as well as properties unique to specific shape.
- learner proves a quadrilateral is a specific type of quadrilateral.

**Learning objectives**

**What you will learn as you master the competency:**

a. Identify, name, and describe polygons based on angle sum.

b. Apply the Polygon Interior Angles Theorem, the Interior Angles of a Quadrilateral Corollary and the Polygon Exterior Angles Theorem.

c. Use the properties of parallelograms in real-life situations.

d. Prove that a quadrilateral is a parallelogram using the definition, one of the Parallelogram Sufficient Conditions Theorems or coordinate geometry.

e. Use the properties of rhombuses, rectangles, and squares.

f. Apply the properties of trapezoids and kites.

g. Identify special quadrilaterals based on limited information.

h. Prove that a quadrilateral is a special type.

i. Classify quadrilaterals by their properties.

12. **Transform coordinate plane shapes through the use of coordinate rules, matrices and vectors.**

**Properties**

- Domain: Cognitive
- Level: Analysis
- Difficulty: Medium
- Importance: Useful

**Linked External Standards**

- WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
- WI.MA.C.12.2 Use geometric models to solve mathematical and real-world problems
- WI.MA.D.12.3 Determine measurements indirectly
- WI.MA.F.12.2 Use mathematical functions (e.g., linear, exponential, quadratic, power) in a variety of ways

**Performance Standards**

**Students will demonstrate competency:**

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.

- Without the use of the textbook while taking quizzes and chapter tests.

- Without the use of the notebook while taking chapter tests.

- With a textbook provided for daily work.

- With the use of a graphic calculator.
In classroom or computer lab under the guidance of the teacher.
Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
By the end of Chapter Nine.

Student performance will be successful when:
- learner accurately interprets a translation described by a vector.
- learner manually determine the sum, difference and/or product of two matrices,
- learner correctly represents and/or performs congruence transformations using matrices.
- learner memorizes the appropriate coordinate rule and transformation matrix for basic reflections and rotations.
- learner creates a tessellation employing an irregular shape.
- learner correctly notes and describes the type of symmetry a figure has.

Learning objectives
What you will learn as you master the competency:

a. Identify the parts of a vector
b. Perform translations described by a vector.
c. Add, subtract and multiply matrices.
d. Represent figures using matrices.
e. Represent and perform translations, reflections, and rotations using matrices.
f. Apply the coordinate rules for reflections (x-axis, y-axis, y=x, and y = -x and rotations (90, 180, 270 and 360 degrees)
g. Represent transformations as compositions of simpler transformations.
h. Identify and perform a glide-reflection.
i. Identify the transformations used to create and properties of a tessellation.
j. Create a tessellation through the use of a congruence transformation or composition of congruence transformations.
k. Identify the line and rotational symmetry of a figure.
l. Create a dilation through the use of either drawing tools or matrices.

Investigate the properties of circles.

Properties
Domain: Cognitive
Level: Analysis
Difficulty: Medium
Importance: Important

Linked External Standards
WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
WI.MA.D.12.2 Select and use tools with appropriate degree of precision to determine measurements directly within specified degrees of accuracy and error (tolerance)
WI.MA.D.12.3 Determine measurements indirectly

Performance Standards
Students will demonstrate competency:

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Ten.

Student performance will be successful when:

- Learner correctly identifies by name the special segments and lines that intersect a circle.
- Learner accurately applies the properties of the special segments and lines that intersect a circle.
- Learner identifies and correctly calculates the measure of the different arcs of a circle.
- Learner correctly solves for the measure of angles interior, on, or exterior to a circle.
- Learner graphs circles given the equation of the circle.
- Learner writes the equation of a circle given the center and radius.

Learning objectives

What you will learn as you master the competency:

- Identify segments and lines related to circles.
- Apply the properties of tangents to a circle.
- Identify major, minor and congruent arcs.
- Calculate the arc measures of a circle.
- Apply properties of chords of circles.
- Explore and apply inscribed angles/polygons.
- Calculate the measures of angles inside or outside a circle.
- Find segment lengths in circles.
- Draw the locus of points satisfying certain conditions.
- Write and graph equations of circles.

14. Determine the length and area of two-dimensional shapes.

Properties

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

Linked External Standards

WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
WI.MA.C.12.2 Use geometric models to solve mathematical and real-
Performance Standards
Students will demonstrate competency:

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Eleven.

Student performance will be successful when:

- Learner memorizes and correctly applies the appropriate perimeter and area formulas for basic quadrilaterals.
- Learner correctly applies ratios and proportional reasoning in finding the perimeters and areas of similar figures.
- Learner accurately applies ratio and the circumference formula in finding the arc lengths of circles.
- Learner accurately applies ratio and the circle area formula in finding the area of circle sectors.
- Learner memorizes and correctly applies the Area of a Polygon formula.

Learning objectives
What you will learn as you master the competency:

a. Calculate the areas of triangles, parallelograms, trapezoids, rhombuses and kites by applying the appropriate formula.

b. Determine the scale factor of similar two-dimensional shapes.

c. Apply ratios and proportional reasoning in finding the areas of similar figures.

d. Find the circumference and arc lengths of circles.

e. Employ the appropriate formula in finding the areas of circles and sectors of circles.

f. Calculate the area of a regular polygon.

g. Determine geometric probabilities through the use of lengths and areas.

h. Solve real-world problems through the use of the lengths, perimeters, areas, and angle measures of two-dimensional shapes.

15. Determine the surface area and volume of three-dimensional shapes.

Properties
Domain: Cognitive
Level: Application
Difficulty: High
Importance: Essential

Linked External Standards
WI.MA.C.12.1 Identify, describe, and analyze properties of figures, relationships among figures and relationships among their parts
WI.MA.C.12.2 Use geometric models to solve mathematical and real-world problems
WI.MA.D.12.3 Determine measurements indirectly

**Performance Standards**
*Students will demonstrate competency:*

- On daily work, quizzes, chapter tests, notebook (notetaking guide/journal entries), performance based tasks/projects, and computer lab activities.
- Without the use of the textbook while taking quizzes and chapter tests.
- Without the use of the notebook while taking chapter tests.
- With a textbook provided for daily work.
- With the use of a graphic calculator.
- In classroom or computer lab under the guidance of the teacher.
- Through active participation in cooperative learning activities, computer based explorations, individual work and direct instruction.
- By the end of Chapter Twelve.

**Student performance will be successful when:**

- Learner correctly identifies and constructs models of the five platonic solids.
- Learner memorizes and correctly applies the appropriate surface area formula for prisms/cylinders and pyramids/cones.
- Learner memorizes and correctly applies the appropriate volume formula for prisms/cylinders and pyramids/cones.
- Learner correctly applies Cavalieri's Principle in determining volumes of solids.
- Learner correctly applies ratios and proportional reasoning in finding the volumes of similar solids.

**Learning objectives**
*What you will learn as you master the competency:*

a. Identify the properties of polyhedra and non-polyhedra solids.
b. Classify polyhedra.
c. Employ Euler's Theorem.
d. Identify and construct the five platonic solids.
e. Calculate the surface area of prisms and cylinders.
f. Determine the surface area of pyramids and cones.
g. Calculate the volume of prisms and cylinders,
h. Determine the volume of pyramids and cones.
i. Calculate the surface area and volume of spheres.
j. Determine the scale factor of similar solids
k. Apply ratios and proportional reasoning in finding the volumes of similar figures.