

Topics of Geometry A and B

DESCRIPTION OF COURSE

The Topics of Geometry courses offer the student the opportunity to develop a basic foundation in geometric topics. It may help develop mathematical skills necessary for success in college preparatory courses. Basic geometric topics are explored. Activities stress problem solving without formal proofs. This course may satisfy the geometry requirement for some two-year vocational or technical colleges

CONTENT STRAND:

Functions and Algebra
Numbers and Operations
Geometry and Measurement

PROCESS STRAND:

Problem Solving, Reasoning, and Proof
Communication, Connections, and Representation

MAJOR STEMS

Point, line, and planes
Length, deductive reasoning
Number line, coordinate plane, midpoint
Congruence, reflection, vertical, complementary, and supplementary angles
Classify triangles, congruent triangles
Isosceles and equilateral triangles, points of concurrency
Parallel, oblique, and skew lines, angles relationships with parallel lines,
triangle angle sum
Quadrilaterals
Ratio, proportion, similar triangles
Similar right triangles, Pythagorean Theorem, special right triangles, right
triangle trigonometry
Polygons
Area
Circles
Surface area and volume (optional)

COURSE CONTENT COMPETENCIES:

1. Demonstrates conceptual understanding of the real number system
2. Demonstrates understanding of the relative magnitude of real numbers
3. Accurately solves problems
4. Uses a variety of mental computation strategies to solve problems
5. Makes estimates
6. Applies properties of numbers and field properties
7. Makes and defends conjectures, constructs geometric arguments, used

- geometric properties, or used theorems to solve problems
8. Applies the concept of congruency
 9. Applies concepts of similarity; uses the ratios of the sides of special right triangles
 10. Solves problems involving perimeter, circumference, or area
 11. Uses units of measure appropriately
 12. Solves problems on and off the coordinate plane
 13. Demonstrates conceptual understanding of spatial reasoning and visualization
 14. Demonstrates conceptual understanding of algebraic expressions
 15. Demonstrates conceptual understanding of equality

COURSE PROCESS COMPETENCIES:

1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content
2. Students will communicate their understanding of mathematics
3. Students will create and use representations to communicate mathematical ideas and to solve problems
4. Students will recognize, explore and develop mathematical connections

Geometry and Measurement Strand– Stem 1

Point, line, and planes

Topics	Make and interpret geometric drawings using the correct notation. Use the definitions for points, lines, and planes
Competencies	<ol style="list-style-type: none"> 1. Uses a variety of mental computation strategies to solve problems 2. Makes estimates 3. Demonstrates conceptual understanding of spatial reasoning and visualization
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Identify geometric shapes in nature and man-made objects • Recognize and use symmetry, translations, rotations, and reflections • Know and use the geometric definitions involving points lines, planes, and angles • Use the correct notation for points, lines, planes, rays, segments, and angles • Sketch and label points, lines, planes, rays, segments, and angles • Identify relationships between parallel, perpendicular, and intersecting lines
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Numbers and Operations, and Geometry and Measurement Strand– Stem 2

Length, deductive reasoning

Topics	<p>Make and interpret geometric drawings using the correct notation. Measures distance with both English and metric systems, and use a protractor to draw and measure angles. Recognize and use symmetry, translations, rotations, and reflections. Identify angles as right, acute, straight, or obtuse. Copy angles and segments with a compass and straight edge.</p>
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Uses units of measure appropriately 7. Demonstrates conceptual understanding of spatial reasoning and visualization 8. Demonstrates conceptual understanding of algebraic expressions 9. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Recognize and use symmetry, translations, rotations, and reflections • Copy segments with compass and straight-edge • Measure segments in English and metric units • Choose the appropriate units of measure • Find the midpoint and length of segments • Draw segments with a given length • Measure angles with a protractor • Draw angles with a given measure • Identify angles as right, straight, acute, or obtuse • Identify the parts of conditional statement • Write the converse and contrapositive of a conditional statement • Write a conditional statement from a non-conditional statement
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 3

Number line, coordinate plane, midpoint

Topics	Bisect segments with compass and straight edge and mira. Solve problems with length, midpoint and bisection.
Competencies	<ol style="list-style-type: none">1. Demonstrates conceptual understanding of the real number system2. Demonstrates understanding of the relative magnitude of real numbers3. Accurately solves problems4. Uses a variety of mental computation strategies to solve problems5. Makes estimates6. Uses units of measure appropriately7. Solves problems on and off the coordinate plane8. Demonstrates conceptual understanding of spatial reasoning and visualization9. Demonstrates conceptual understanding of algebraic expressions10. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none">• Make geometric drawings• Bisect segments with compass and straight-edge and Mira• Bisect angles with compass and straight-edge• Solve problems with length, and midpoint
Process Skills	<ol style="list-style-type: none">1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content2. Students will communicate their understanding of mathematics3. Students will create and use representations to communicate mathematical ideas and to solve problems4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 4

Congruence, reflection, vertical, complementary, and supplementary angles

Topics	<p>Recognize and use symmetry, translations, rotations, and reflections. Know, identify and use the relationships with complementary, supplementary, linear pairs, straight and vertical angles to solve problems. Identify and use perpendicular and intersecting lines. Bisect angles with compass and straight edge or mira.</p>
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Uses units of measure appropriately 7. Demonstrates conceptual understanding of spatial reasoning and visualization 8. Demonstrates conceptual understanding of algebraic expressions 9. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Recognize and use symmetry, translations, rotations, and reflections • Identify relationships between, perpendicular and intersecting lines • Use relationships among complementary, supplementary, straight, linear pairs and vertical angles • Copy angles with compass and straight-edge • Identify angles as complementary, supplementary, straight, adjacent, vertical, or linear pairs • Use and identify relationships among complementary, supplementary, straight, adjacent, vertical, or linear pairs to find angle measures
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 5

Classify triangles, congruent triangles

Topics	Identify triangles by sides and angles. Copy triangles using compass and straight edge. Demonstrate how triangles are congruent by 5 different congruence theorems or postulates. Identify the parts of right, and isosceles triangles.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 7. Applies the concept of congruency 8. Uses units of measure appropriately 9. Demonstrates conceptual understanding of spatial reasoning and visualization 10. Demonstrates conceptual understanding of algebraic expressions 11. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Identify triangles by both sides and angles • Copy triangles with compass and straight-edge • Demonstrate how two triangles are congruent by 5 different congruence theorems • Identify the parts of a right triangle, and an isosceles triangle
Process Skills	<ol style="list-style-type: none"> 5. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 6. Students will communicate their understanding of mathematics 7. Students will create and use representations to communicate mathematical ideas and to solve problems 8. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and

Measurement Strand– Stem 6

Isosceles and equilateral triangles, points of concurrency

Topics	Use the properties of special triangle to find the length of the sides and its angles. Find and use the properties of the special points inside a triangles.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 7. Applies the concept of congruency 8. Solves problems involving perimeter, circumference, or area 9. Uses units of measure appropriately 10. Demonstrates conceptual understanding of spatial reasoning and visualization 11. Demonstrates conceptual understanding of algebraic expressions 12. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Use the properties of special triangles to find length of the sides • Find the special centers fo a triangle (orthocenter, circumcenter, centroid, and incenter) • Demonstrate how two triangles are congruent by 5 different congruence theorems
Process Skills	<ol style="list-style-type: none"> 9. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 10. Students will communicate their understanding of mathematics 11. Students will create and use representations to communicate mathematical ideas and to solve problems 12. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 7

Parallel, oblique, and skew lines, angles relationships with parallel lines, triangle angle sum

Topics	Identify and use the relationships between skew, parallel, perpendicular, and intersecting lines. Construct parallel and perpendicular lines with a compass and straight edge or mira. Identify and use the relationships of angles formed by set of lines crossed by a transversal to solve problems. Use the side and angle relationships in one or two triangles to compare various sides and angles.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 7. Applies the concept of congruency 8. Uses units of measure appropriately 9. Demonstrates conceptual understanding of spatial reasoning and visualization 10. Demonstrates conceptual understanding of algebraic expressions 11. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Identify relationships between parallel, perpendicular and intersecting lines • Classify and use relationships among parallel, perpendicular, and skew lines • Solve problems involving parallel and perpendicular lines • Use the side and angle relationships with one and two triangles to compare various sides and angles • Identify the relationship and names for angles formed by two lines crossed by a transversal • Construct two parallel lines with a compass and straight-edge • Use the properties of angles and parallel lines to find angle measures
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 8

Quadrilaterals

Topics	Name, define, and classify types of quadrilaterals. Use the properties of special quadrilaterals to solve problems.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Applies properties of numbers and field properties 7. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 8. Applies the concept of congruency 9. Solves problems involving perimeter, circumference, or area 10. Uses units of measure appropriately 11. Demonstrates conceptual understanding of spatial reasoning and visualization 12. Demonstrates conceptual understanding of algebraic expressions 13. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Name, define and classify types of quadrilaterals (kite, trapezoid, parallelogram, rectangle, square, and rhombus) • Use the properties of special quadrilaterals to find angle measure and length
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and

Measurement Strand– Stem 9

Ratio, proportion, similar triangles

Topics	Calculate square roots and round to a given decimal place. Solve problems using proportions, ratios, scale factors, both with similar triangles and word problems. Determine whether two triangles are similar.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 7. Applies the concept of congruency 8. Applies concepts of similarity; uses the ratios of the sides of special right triangles 9. Solves problems involving perimeter, circumference, or area 10. Uses units of measure appropriately 11. Solves problems on and off the coordinate plane 12. Demonstrates conceptual understanding of spatial reasoning and visualization 13. Demonstrates conceptual understanding of algebraic expressions 14. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Calculate square roots and round to a given decimal place • Solve proportions • Use ratios, scale factors and proportions found in the lengths of the sides of similar figures • Determine whether two triangles are similar by similarity theorems • Solve problems using ratios, scale factors, and proportions
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 10

Similar right triangles, Pythagorean Theorem, special right triangles, right triangle trigonometry

Topics	Use the Pythagorean Theorem and the converse to identify a triangle as right, acute, or obtuse. Find the geometric mean of two numbers. Use the properties of special right triangles to solve problems. Use the properties of similar right triangles and proportion to solve problems.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Applies properties of numbers and field properties 7. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 8. Applies the concept of congruency 9. Applies concepts of similarity; uses the ratios of the sides of special right triangles 10. Solves problems involving perimeter, circumference, or area 11. Uses units of measure appropriately 12. Demonstrates conceptual understanding of spatial reasoning and visualization 13. Demonstrates conceptual understanding of algebraic expressions 14. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Use the properties of special right triangles (30°-60°-90° and 45°-45°-90°) to find length of the sides • Use the Pythagorean Theorem and its converse to solve problems • Use the properties of similar right triangles and proportion to solve problems • Find the geometric mean of two numbers • Use sine, cosine, and tangent to solve right triangles
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 11

Polygons

Topics	Classify a polygon by the number of sides. Classify a polygon as equilateral, equiangular, or regular. Find the sum of all interior, or exterior angles of a polygon. Find the measure of each interior or exterior angle of a regular polygon. Find the sum of all the diagonals of a polygon.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 7. Applies the concept of congruency 8. Applies concepts of similarity; uses the ratios of the sides of special right triangles 9. Solves problems involving perimeter, circumference, or area 10. Uses units of measure appropriately 11. Solves problems on and off the coordinate plane 12. Demonstrates conceptual understanding of spatial reasoning and visualization 13. Demonstrates conceptual understanding of algebraic expressions 14. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Classify a polygon by number of sides • Classify a polygon as equilateral, equiangular, or regular • Find the sum of all interior and exterior angles of a polygon • Find the sum of all diagonals of a polygon • Find the measure of each interior and exterior angle in a regular polygon • Given the sum of interior or exterior, or the measure of each interior or exterior find the number of sides
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 12

Area

Topics	Find the perimeter and area of various polygons.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 7. Applies the concept of congruency 8. Applies concepts of similarity; uses the ratios of the sides of special right triangles 9. Solves problems involving perimeter, circumference, or area 10. Uses units of measure appropriately 11. Solves problems on and off the coordinate plane 12. Demonstrates conceptual understanding of spatial reasoning and visualization 13. Demonstrates conceptual understanding of algebraic expressions 14. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Find the perimeter and area of various polygons • Find the area of polygons by using the various formulas (triangle, rectangle, square, parallelogram, kite, rhombus, trapezoid) • Find the area of an irregular shape
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 13

Circles

Topics	Find the circumference, area, length of an arc, and area of a sector of a circle. Identify chords, secants, tangents, radii, and arcs of a circle. Identify arcs as major, minor or semicircles. Find the measure of angles formed by lines in a circle.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 7. Applies the concept of congruency 8. Solves problems involving perimeter, circumference, or area 9. Uses units of measure appropriately 10. Demonstrates conceptual understanding of spatial reasoning and visualization 11. Demonstrates conceptual understanding of algebraic expressions 12. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Find the circumference and area of a circle • Find the length of an arc • Find the area of a sector • Identify chords, secants, tangents, radii, and arcs • Find the measure of an arc • Use the relationships among chords, secants, tangents and arc to find angle and arc measures • Find the measure of central angles • Identify major arcs, minor arcs and semicircles • Find and solve problems with the measure of angles formed by two radii, two secants, two tangents, two chords, a secant and a chord, a secant and a tangent, or a tangent and a chord.
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections

Functions and Algebra, Numbers and Operations, and Geometry and Measurement Strand– Stem 14

Surface area and Volume (optional)

Topics	Classify various polyhedrons. Find the surface area, lateral area and volume of right prisms, cylinders, pyramids, cones, and spheres.
Competencies	<ol style="list-style-type: none"> 1. Demonstrates conceptual understanding of the real number system 2. Demonstrates understanding of the relative magnitude of real numbers 3. Accurately solves problems 4. Uses a variety of mental computation strategies to solve problems 5. Makes estimates 6. Applies properties of numbers and field properties 7. Makes and defends conjectures, constructs geometric arguments, used geometric properties, or used theorems to solve problems 8. Applies the concept of congruency 9. Solves problems involving perimeter, circumference, or area 10. Uses units of measure appropriately 11. Demonstrates conceptual understanding of spatial reasoning and visualization 12. Demonstrates conceptual understanding of algebraic expressions 13. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> • Make geometric drawings • Make three dimensional geometric drawings • Identify various polyhedrons • Find the surface area, lateral area, and volume of various right polyhedrons
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content 2. Students will communicate their understanding of mathematics 3. Students will create and use representations to communicate mathematical ideas and to solve problems 4. Students will recognize, explore and develop mathematical connections