CALVERT™ HOMESCHOOL

CURRICULUM CATALOG

Analytic Geometry

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Analytic Geometry Course Overview

Analytic Geometry is a full year high school mathematics course intended for the student who has successfully completed Coordinate Algebra. This course is designed to prepare students for college-level and real-world mathematical reasoning. The concepts covered in this course integrate the topics of Advanced Algebra, Geometry, Trigonometry, and Statistics. Throughout the course, students will explore higher order strategies necessary for analyzing multi-level linear, quadratic and polynomial functions and equations, investigate geometric proofs involving similarity and congruence in triangles and quadrilaterals as well as special angle relationships formed by parallel lines and transversals. Students are exposed to several branches of mathematics and will explore ways in which each one can be used as a mathematical model in understanding the world.

- **Similarity, Congruence, Proofs: Part I:** Student will identify different types of angles and solve for missing angle measures, as well as use corresponding parts of congruent triangles to prove triangles are congruent using different postulates and theorems.
- **Similarity, Congruence, Proofs: Part II:** Student will use properties of parallelograms to prove statements involving triangles, rectangles, rhombus, trapezoids, as well as state key properties of similarity, and use facts about similarity to calculate side measures of similar polygons.
- **Right Triangle Trigonometry:** Student will express trigonometric functions as ratio of a given angle, and use a table of sine, cosine, or tangent values to solve for a missing value, and use the inverse trigonometric functions (sin-1, cos-1, and tan-1) to find unknown angle measurements in right triangles.
- **Circles and Volume:** Student will identify, define, and calculate measures of the parts of a circle, or measures of different forms created by lines intersecting with a circle, as well as finding the surface area and volume of different conic sections.
- **Extending the Number System:** Student will add, subtract, and multiply polynomials, and perform long division of polynomials, factor trinomials using the difference of two squares, the difference of two cubes, and perfect square trinomials, and perform operations with complex numbers including using FOIL to multiply, divide, and find multiplicative inverses using complex conjugates.
- **Quadratic Functions Part I:** Student will solve quadratic equations by factoring, using the quadratic formula, or by completing the square, and find the discriminant of a quadratic equation and use it to determine what kinds of solutions a quadratic equation has.
- **Quadratic Functions Part II:** Student will write a linear equation in slope-intercept form, identify the slope and y-intercept of a line from the given equation, and graph a line using the slope and y-intercept, and find the common difference of an arithmetic sequence, and extend it to the nth term.
- **Modeling Geometry:** Student will find properties and measures of shapes using the coordinate plane, and know properties of triangles, use the standard and general form of the circle formula to solve problems in the coordinate plane, and derive and apply the equation, find the directrix, the focus, and graph a parabola.
- **Applications of Probability:** Student will determine the theoretical probability of a single event, compound events, independent events, and mutually exclusive events, and explain the concept of conditional probability as found in everyday situations.

Analytic Geometry

Unit 1: Similarity, Congruence, Proofs: Part I

Assignments

1. Course Overview
2. Angle Definitions
3. Angle Measurement
4. Angle Relationship Definitions
5. Angle Relationship Theorems (1)
6. Angle Relationship Theorems (2)
7. Quiz 1: Angles
8. Basic Properties of Parallels
9. Transversals and Angles
10. Transversal and Angle Proofs (1)
11. Transversal and Angle Proofs (2)
12. Transversal and Angle Proofs (3)
13. Quiz 2: Transversals and Angles
14. Introduction: Isometry
15. Transformation: Reflection
16. Transformation: Translation
17. Transformation: Rotation
18. Quiz 3: Transformations
19. Defining Congruent Triangles
20. Proving Congruent Triangles (1)
21. Proving Congruent Triangles (2)
22. Proving Congruent Triangles (3)
23. Proving Right Triangles Congruent
24. Quiz 4: Congruent Triangles
25. Test
26. Alternate Test*

Analytic Geometry

Unit 2: Similarity, Congruence, Proofs: Part II

Assignments

1. Parallelogram Theorems (1)
2. Parallelogram Theorems (2)
3. Triangles in Parallelogram Proofs
4. Parallelograms: Rectangles
5. Parallelograms: Rhombus
6. Parallelograms: Trapezoids
7. Quiz 1: Parallelograms
8. Transformation: Dilation
9. Definition of Similarity
10. Similarity Theorems
11. Similarity Proofs
12. Similar Polygon Theorems
13. Segments in Triangle Theorems
14. Similar Right Triangles
15. Similar Triangles and the Pythagorean Theorem
16. Quiz 2: Similar Triangles
17. Construction: Copying Figures
18. Construction: Bisecting Figures
19. Construction: Perpendiculars
20. Construction: Parallels
21. Constructing Inscribed Shapes
22. Test
23. Alternate Test*

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Unit 3: Right Triangle Trigonometry

Assignments

1. Trigonometry: Sine
2. Trigonometry: Cosine
3. Trigonometry: Tangent
4. Using Similar Triangles in Indirect Measurement
5. Quiz 1: Trigonometry
6. Using Trigonometry in Indirect Measurement
7. Using SOHCAHTOA in Trigonometry
8. Finding the Values of Trigonometric Functions
9. Law of Sines
10. Quiz 2: Using Trigonometry
11. Test
12. Alternate Test*

Analytic Geometry

Unit 4: Circles and Volume

Assignments

1. Circle Characteristics
2. Tangents
3. Arcs
4. Chords
5. Circle Theorems 1
6. Circle Theorems 2
7. Quiz 1: Circles
8. Inscribed Angles and Intercepted Arcs
9. Secants and Intercepted Arcs 1
10. Secants and Intercepted Arcs 2
11. Chords, Secant and Tangent Measures
12. Circles: Area
13. Circles: Area of Sectors
14. Radian Measure
15. Quiz 2: Circles and Measurements
16. Solids: Prisms
17. Solids: Pyramids
18. Solids: Cylinders
19. Solids: Cones
20. Solids: Spheres
21. Cavalieri's Principle
22. Quiz 3: Solids
23. Test
24. Alternate Test*

Analytic Geometry

Unit 5: Extending the Number System

Assignments

1. Rational and Irrational Operations
2. Exponents 1
3. Exponents 2
4. Exponents 3
5. Rational Exponents
6. Quiz 1
7. Imaginary Numbers
8. Polynomials: Products and Factoring
9. Polynomials: Multiplying Polynomials
10. Polynomials: Special Products 1
11. Polynomials: Special Products 2
12. Quiz 2
13. Polynomials: Factoring Trinomials
14. Polynomials: Factoring Special Products 1
15. Polynomials: Factoring Special Products 2
16. Polynomials: Adding and Subtracting
17. Polynomials: Division
18. Quiz 3
19. Test
20. Alternate Test*

Unit 6: Semester 1 Exam

Assignments

1. Exam
2. Alternate Exam*

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Unit 7: Quadratic Functions Part I

Assignments

1. Interpreting Expressions 1
2. Interpreting Expressions 2
3. Interpreting Complicated Expressions
4. Rewriting Expressions
5. Quadratics: Finding the Zeroes
6. Quadratics: Completing the Square 1
7. Quiz 1: Interpreting Expressions
8. Creating Equations 1
9. Creating Equations 2
10. Literal Equations
11. Solving Quadratics
12. The Quadratic Formula
13. Completing the Square (2)
14. Quadratics: Complex Roots
15. Quiz 2: Polynomials
16. Test
17. Alternate Test*

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Unit 8: Quadratic Functions Part II

Assignments

1. Graphs: Key Features 1
2. Graphs: Key Features 2
3. Graphs: Domain and Range
4. Functions: Average Rate of Change
5. Graphing Functions
6. Transformations
7. Quiz 1: Graphs and Functions
8. Quadratics: Completing the Square
9. Comparing Functions
10. Writing a Function
11. Explicit Functions
12. Combining Functions
13. Function Transformations
14. Scatter Plots
15. Quiz 2: Using Functions
16. Test
17. Alternate Test*

Analytic Geometry

Unit 9: Modeling Geometry

Assignments

1. Circle Equation
2. Circle Equation: Completing the Square
3. Systems of Equations
4. Symmetry: Parabola
5. Parabola Equation 1
6. Parabola Equation 2
7. Quiz 1: Modeling Equations
8. Figures in the Coordinate Plane
9. Proofs with Coordinate Geometry 1
10. Proofs with Coordinate Geometry 2
11. Independent Triangles 1
12. Independent Triangles 2
13. Quiz 2: Coordinate Geometry
14. Overlapping Triangles 1
15. Overlapping Triangles 2
16. Isosceles Triangles 1
17. Isosceles Triangles 2
18. Quiz 3: Triangles
19. Test
20. Alternate Test*

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Unit 10: Applications of Probability

Assignments

1. Sample Space Definitions
2. Compound Events
3. Equally Likely Events
4. Addition of Probabilities
5. Multiplication of Probabilities
6. Quiz 1: Events and Probabilities
7. Two-Way Frequency Tables 1
8. Two-Way Frequency Tables 2
9. Conditional Probability
10. Conditional Probability in the Real World
11. Test
12. Alternate Test*

Unit 11: Semester 2 Exam

Assignments

1. Exam
2. Alternate Exam*

Unit 12: End of Course

Assignments

1. Exam
2. Alternate Exam – Form A*
3. Alternate Exam – Form B*

(*) Indicates alternative assignment