

Wilson Area School District Planned Course Guide

Title of planned course: Analytical Geometry

Subject Area: Mathematics

Grade Level: 12

Course Description: This course is designed to introduce students to the graphs of relations and how an equation determines the graphical representation. Topics include: conic sections, rational equations, polar coordinates and equations, space coordinates and equations, operations with vectors. This is a blend of algebra and geometry skills. It is highly recommended each student have a graphic calculator.

Time/Credit for this Course: Half year / .5 Credits

Curriculum Writing Committee: BethAyn Tarsi

Curriculum Map

August:

Determining the angle between two lines

September:

Division of a line segment
Directed distance
Families of lines and curves

October:

Conic Sections

November:

Algebraic Curves
Polar Coordinates

December:

Polar Equations
Space Coordinates

January:

Space Surfaces
Vectors

Wilson Area School District Planned Course Materials

Course Title: Analytical Geometry

Textbook: Analytic Geometry
Fuller & Tarwater
Addison-Wesley Publishing Company
1994

Teacher Resources:

- Teacher created handouts/activities
- Internet resources

Curriculum Scope & Sequence

Planned Course: Analytic Geometry

Unit: Fundamental Concepts

Time frame: 7-10 classes

State Standards: 2.5.11.A, 2.5.11.B, 2.8.11.D, 2.9.11.A, 2.9.11.C

Anchor(s) or adopted anchor: M11.D.1, M11.C.1, M11.D.3, M11.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Determine the directed distance between a line and a point
- Relate the slope of a line to the tangent of an angle
- Determine the angle between two lines
- Divide and/or extend a line segment
- Create the parent equation for a family of lines

Core Activities: Students will complete/participate in the following:

- Practice problems at board and seat
- Constructing graphs and applying applicable formulas
- Applying appropriate formulas to real world application
- Analyzing the graphs of a given problem situation to make predictions of expected solutions.

Extensions:

- Determine the inclination of the sun based on height, and length of shadow to reinforce the concept of tangent is merely the inclination of a line or its slope.
- Incorporate community architecture to determine the angles between objects.

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- small group activities
- higher order thinking questions
- Power-Point Presentations
- warm-ups
- book examples

Materials & Resources:

- MS Office and PowerPoint
- Graphing Calculators
- Pre-written notes/handouts/activities
- Textbook

Assessments:

- Teacher observation
- Homework
- Warm-ups
- Questioning
- Worksheets
- Tests/quizzes

Curriculum Scope & Sequence

Planned Course: Analytic Geometry

Unit: Conic Sections

Time frame: 7-10 classes

State Standards: 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.D, 2.9.11.A, 2.9.11.C, 2.11.11.A

Anchor(s) or adopted anchor: M11.D.2, M11.D.1, M11.C.1, M11.D.3, M11.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Determine which conic section an equation will create
- Graph a conic section given the equation
- Write the equation of a conic section given the graph or specific criteria
- Determine the domain and range of a conic section
- Convert the equation of a conic section from standard to graphing form

Core Activities: Students will complete/participate in the following:

- Practice problems at the board and seat
- Algebraic skills for completing the square
- Connections between equations and graphs
- Compare and contrast graphs and equations

Extensions:

- Unit project: create a picture by utilizing the shapes of conics.
- Create a picture book of conic sections found locally.

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- small group activities
- higher order thinking questions
- Power-Point Presentations
- warm-ups
- book examples

Materials & Resources:

- MS Office and PowerPoint
- Graphing Calculators
- Pre-written notes/handouts/activities
- Textbook

Assessments:

- Teacher observation
- Homework
- Warm-ups
- Questioning
- Worksheets
- Tests/quizzes

Curriculum Scope & Sequence

Planned Course: Analytic Geometry

Unit: Algebraic Curves

Time frame: 5-8 classes

State Standards: 2.5.11.A, 2.5.11.B, 2.9.11.A, 2.9.11.C, 2.11.11.A

Anchor(s) or adopted anchor: M11.C.1, M11.D.3, M11.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Determine the vertical and horizontal asymptotes of a rational function
- Determine the zeroes of a polynomial function
- Utilize the asymptotes and zeroes of an equation to construct the graph
- Given the graph of a rational equation create the equation

Core Activities: Students will complete/participate in the following:

- Practice problems at the board and seat
- Graph rational functions
- Write the equation of a rational function given the graph

Extensions:

- Light it up activity in which students must gather data and then construct the equation of the rational function which represents their data.

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- small group activities
- higher order thinking questions
- Power-Point Presentations
- warm-ups
- book examples

Materials & Resources:

- MS Office and PowerPoint
- Graphing Calculators
- Pre-written notes/handouts/activities
- Textbook

Assessments:

- Teacher observation
- Homework
- Warm-ups
- Questioning
- Worksheets
- Tests/quizzes

Curriculum Scope & Sequence

Planned Course: Analytic Geometry

Unit: Polar Coordinates

Time frame: 5-8 classes

State Standards: 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.D, 2.9.11.A, 2.9.11.C, 2.11.11.A

Anchor(s) or adopted anchor: M11.D.2, M11D.1, M11.C.1, M11.D.3, M11.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Convert Cartesian coordinates to polar coordinates
- Graph polar coordinates
- Graph a polar equation
- Convert a Cartesian equation to a polar equation

Core Activities: Students will complete/participate in the following:

- Practice problems at the board and seat
- Utilize formulas to convert Cartesian coordinates to polar coordinates
- Compare and contrast the rectangular coordinate system with the polar system
- Apply formulas to convert Cartesian equations to polar equations

Extensions:

- Utilize the graphing calculator to graph polar equations
- Find the polar equation of a conic section

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- small group activities
- higher order thinking questions
- Power-Point Presentations
- warm-ups
- book examples

Materials & Resources:

- MS Office and PowerPoint
- Graphing Calculators
- Pre-written notes/handouts/activities
- Textbook

Assessments:

- Teacher observation
- Homework
- Warm-ups
- Questioning
- Worksheets
- Tests/quizzes

Curriculum Scope & Sequence

Planned Course: Analytic Geometry

Unit: Space Coordinates and Surfaces

Time frame: 5-8 classes

State Standards: 2.5.11.A, 2.5.11.B, 2.9.11.A, 2.9.11.C, 2.11.11.A

Anchor(s) or adopted anchor: M11.C.1, M11.D.3, M11.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Graph space coordinates
- Determine the coordinates of a point in space
- Graph a space equation
- Determine the resulting shape of a space equation

Core Activities: Students will complete/participate in the following:

- Practice problems at the board and seat
- Construct the graph of a space equation
- Graph space coordinates and space equations

Extensions: Utilize Geometry Sketchpad to create the graph conic sections in space format

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- small group activities
- higher order thinking questions
- Power-Point Presentations
- warm-ups
- book examples

Materials & Resources:

- MS Office and PowerPoint
- Graphing Calculators
- Pre-written notes/handouts/activities
- Textbook

Assessments:

- Teacher observation
- Homework
- Warm-ups
- Questioning
- Worksheets
- Tests/quizzes

Curriculum Scope & Sequence

Planned Course: Analytic Geometry

Unit: Vectors

Time frame: 3-5 classes

State Standards: 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.9.11.A, 2.9.11.C, 2.11.11.A

Anchor(s) or adopted anchor: M11.D.2, M11.C.1, M11.D.3, M11.C.3.1

Essential content/objectives: At end of the unit, students will be able to:

- Apply vector properties to solve real world problems involving forces, velocities, and other physical concepts.
- Add vectors and apply the resulting vector to a real world situation
- Subtract vectors and apply the resulting vector to a real world situation
- Apply and understand the effects of a scalar on a vector
- Apply vectors to the Cartesian coordinate system

Core Activities: Students will complete/participate in the following:

- Practice problems at the board and seat
- Utilize vector addition and subtraction to solve real world problems
- Graph vector coordinates in the Cartesian coordinate system

Extensions:

- Utilize vectors in space to construct solids
- Utilize trig functions in conjunction with vectors to solve more complex real world problems.

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- small group activities
- higher order thinking questions
- Power-Point Presentations
- warm-ups
- book examples

Materials & Resources:

- MS Office and PowerPoint
- Graphing Calculators
- Pre-written notes/handouts/activities
- Textbook
- Linear Algebra textbooks to incorporate more real world problems

Assessments:

- Teacher observation
- Homework
- Warm-ups
- Questioning
- Worksheets
- Tests/quizzes