

Wilson Area School District Planned Course Guide

Title of planned course: Pre-Calculus

Subject Area: Mathematics

Grade Level: 11 – 12

Course Description: Review and expand on the concepts of fundamental operations of algebraic expressions special products and factors, fractions, exponents and radicals, solving equations, and systems of equations. Other topics include graphing, transformations of non-linear graphs, progressions and logarithms, concepts of paths and the wrapping function, periodic functions, and defining and using the six trigonometric functions. Trigonometric applications include trigonometric function evaluations and operations, equations, identities and the inverse of trigonometric functions, table values, solving right and oblique triangles, and the Laws of Sines and Cosines.

Time/Credit for this Course: Full year 1 credit

Curriculum Writing Committee: Math Department

Curriculum Map

August:

Polynomial Functions

September:

Polynomial Functions
Rational Expressions/Equations

October:

Rational Expressions/Equations
Functions and Graphs

November:

Functions and Graphs
Polynomials and Rational Functions

December:

Polynomials and Rational Functions
Exponential and Logarithmic Functions

January:

Exponential and Logarithmic Functions
Trigonometric Functions

February:

Trigonometric Functions

March:

Trigonometric Functions
Analytic Trigonometry

April:

Analytic Trigonometry
Trigonometric Laws

May:

Trigonometric Laws
Conics

June:

Conics

Planned Course Materials

Course Title: Pre-Calculus

Textbook: Blitzer Pre-Calculus 4e
Pearson / Prentice Hall
2010

Supplemental Books:

Teacher Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets
- Smart boards

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Polynomial Functions

Time frame: 13 – 15 Class Periods

State Standards: 2.1.11.B, 2.1.11.E, 2.2.11.C, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F

Anchor(s) or adopted anchor: M11.A.1, M11.A.2, M11.D.1, M11.D.2, M11.D.4

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

- Evaluate and use absolute values, identify properties of real numbers, and evaluate algebraic expressions.
- Use properties of exponents to simplify and solve exponential expressions.
- Apply the product and quotient rule to simplify square roots. Add, subtract, and evaluate square root problems.
- Add, subtract, multiply, foil and perform operations with polynomials.
- Factor the greatest common factor, by grouping, trinomials, the difference of squares, perfect square trinomials, and the sum or difference of two cubes.

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

- Classroom lectures
- Guided and Independent practice

Extensions:

- Explaining problems on the board during the guided practice
- Alternate worksheet with more challenging problems

Remediation:

- Review key concepts and examples from the lessons
- Study Island Activity (ie activity: 1a, 1d, 1e, 1h, 1i, 4b, 4g)
- Tutoring in the math lab
- Modified extensions

Instructional Methods:

- Modified lecture
- Notes on the board (smart board when available)
- Small group practice

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Rational Expressions and Equations

Time frame: 13 – 15 Class Periods

State Standards: 2.1.11.A, 2.2.11.C, 2.3.11.E, 2.5.11.A, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F

Anchor(s) or adopted anchor: M11.A.1, M11.A.2, M11.B.2, M11.D.1, M11.D.2, M11.D.4

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

- Add, subtract, multiply, divide, and simplify both rational and complex rational expressions.
- Specify the values that must be excluded from the domain
- Solve linear, rational, quadratic, radical, and absolute value equations
- Solve linear, compound and absolute value inequalities and write the solution in interval notation

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

- Classroom lectures
- Guided and Independent practice
- Group work

Extensions:

- Teaching a small group how to solve the problem
- Alternate worksheet with more challenging problems

Remediation:

- Review of notes and example problems to reinforce lesson concepts
- Study Island Activity (ie activity: 1a, 1d, 1e, 1h, 1i, 4b, 4c, 4d, 4f)
- Tutoring in the math lab

Instructional Methods:

- Direct Lecture
- Notes on the board (smart board when available)
- Small group discussions

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Functions and Graphs

Time frame: 22 – 26 Class Periods

State Standards: 2.1.11.C, 2.1.11.E, 2.5.11.A, 2.5.11.B, 2.6.11.C, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F, 2.11.11A

Anchor(s) or adopted anchor: M11.A.2, M11.A.3, M11.B.2, M11.D.1, M11.D.2, M11.D.4, M11.E.3

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

- Plot points and graph equations in the rectangular coordinate system
- Interpret information given by graphs
- Find the domain and range of a function, determine if the function is a relation, evaluate the function, and then graph
- Identify intervals on which a function increases, decreases, or is constant; locate relative maxima and minima; identify even or odd functions and their symmetry
- Calculate slope and write the equation of a line in point-slope form then graph
- Find slopes and equations of parallel and perpendicular lines
- Translate a graph given a function
- Combine, form, and write composite functions
- Verify, find, and graph inverse functions
- Find the distance between two point, the midpoint of a line, and the center and radius of a circle in standard form
- Construct functions from verbal descriptions and formulas

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

- Classroom lectures
- Guided and Independent practice
- Rate of change activity (ie: the population of the U.S. over the last decade, century, etc.)
- Graphing activities (ie: graph all the stages of transformation of a function)

Extensions:

- Creating the function given the transformations
- Compare graphs with classmates

Remediation:

- Review key concepts and examples from the lessons
- Study Island Activity (ie activity: 1c, 1g, 1h, 3e, 3f, 4b, 4c, 4i)
- Teacher or peer tutoring
- Modified extensions

Instructional Methods:

- Modified lecture
- Notes on the board (smart board when available)
- Small group work

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations
- Rubric for the activities

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Polynomials and Rational Functions

Time frame: 17 – 20 Class Periods

State Standards: 2.1.11.A, 2.2.11.C, 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F

Anchor(s) or adopted anchor: M11.A.1, M11.A.2, M11.A.3, M11.D.1, M11.D.2, M11.D.4

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

- Perform operations with complex and imaginary numbers
- Graph and solve problems involving quadratic functions
- Identify and find all the zeros of a polynomial and their multiplicities
- Use the synthetic division and the Factor Theorem to solve a polynomial equation
- Graph all rational functions
- Solve polynomial and rational inequalities
- Solve problems involving direct, inverse, or combined variation problems

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

- Classroom lectures
- Guided and Independent practice
- Write your own function activity (ie: based on something in your life)
- Graphing activities (ie: graph all the stages of transformation of a function)
- Group work

Extensions:

- Find the equation of a graph given only the graph
- Find the equation of the polynomial given only the zeros
- Alternate worksheet with more challenging problems

Remediation:

- Review of notes and example problems to reinforce lesson concepts
- Study Island Activity (ie activity: 1a, 1h, 4b, 4e, 4f, 4g)
- Tutoring in the math lab
- Peer or teacher tutoring

Instructional Methods:

- Direct Lecture
- Notes on the board (smart board when available)
- Small group discussions

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Exponential and Logarithmic Functions

Time frame: 16 – 20 Class Periods

State Standards: 2.1.11.F, 2.2.11.C, 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F, 2.11.11.B

Anchor(s) or adopted anchor: M11.A.1, M11.A.2, M11.D.1, M11.D.2, M11.D.4

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

- Evaluate and graph exponential functions
- Evaluate and graph logarithmic functions
- Use the properties of logarithms to condense or expand expression
- Use the properties of exponentials and logarithms to solve the equations
- Model exponential growth and decay

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

- Classroom lectures
- Guided and Independent practice
- Graphing all the translations when graphing exponentials and logarithms
- Name that Model (an activity to allow the students practice recognizing growth or decay)
- Group work

Extensions:

- Find the equation of an exponential or logarithmic expression graph given only the graph
- Given a set of data, write the correct model using base e
- Alternate worksheet with more challenging problems
- Explaining in more detail to peers in a small group

Remediation:

- Review of notes and example problems to reinforce lesson concepts
- Tutoring in the math lab

Instructional Methods:

- Direct Lecture
- Notes on the board (smart board when available)
- Small group discussions

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Trigonometric Functions

Time frame: 26 – 30 Class Periods

State Standards: 2.2.11.C, 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F, 2.10.11.A, 2.10.11.B

Anchor(s) or adopted anchor: M11.A.2, M11.C.1, M11.D.1, M11.D.2, M11.D.4

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

- Convert between radians and degrees, then graph in standard position and find the coterminal angles
- Use a unit circle to define trigonometric functions of real number
- Use right triangles to evaluate trigonometric functions
- Use the definitions and signs of trigonometric functions
- Graph any equation involving the six trigonometric functions
- Find the exact values of composite functions with inverse trigonometric functions
- Solve right triangles, problems involving bearings, and simple harmonic motion

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

- Classroom lectures
- Guided and Independent practice
- Label the Unit Circle
- Group work involving application problems

Extensions:

- Find the equation of a trigonometric graph given only the graph
- Create trigonometric expressions for the class to solve
- Alternate worksheet with more challenging problems

Remediation:

- Review of notes and example problems to reinforce lesson concepts
- Study Island Activity (ie activity: 2a, 3b, 3e, 4c)
- Tutoring in the math lab
- Peer or teacher tutoring

Instructional Methods:

- Direct Lecture
- Notes on the board (smart board when available)
- Small group discussions

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Analytic Trigonometry

Time frame: 20 – 25 Class Periods

State Standards: 2.2.11.C, 2.4.11.A, 2.4.11.B, 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F, 2.10.11.B

Anchor(s) or adopted anchor: M11.A.2, M11.C.1, M11.D.1, M11.D.2, M11.D.4

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

- Use the fundamental trigonometric identities to verify identities
- Use the sum and difference formulas for sine, cosine, and tangent
- Use the double-angle, power-reducing, and half-angle formulas
- Use the product-to-sum and sum-to-product formulas
- Solve trigonometric equations using the identities and formulas

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

- Classroom lectures
- Guided and Independent practice
- Group work involving application problems

Extensions:

- Alternate worksheet with more challenging problems
- Verify identities involving the formulas

Remediation:

- Review of notes and example problems to reinforce lesson concepts
- Study Island Activity (ie activity: 2a, 3b, 3e)
- Tutoring in the math lab
- Peer or teacher tutoring

Instructional Methods:

- Direct Lecture
- Notes on the board (smart board when available)
- Small group discussions

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Trigonometric Laws

Time frame: 15 – 20 Class Periods

State Standards: 2.2.11.C, 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F, 2.10.11.B

Anchor(s) or adopted anchor: M11.A.2, M11.C.1, M11.D.1, M11.D.2, M11.D.4

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

- Use the law of sines to solve the triangle(s) and application problems
- Use the law of cosines to solve oblique triangles and application problems
- Find the area of a triangle using law of sines or Heron's formula
- Solve application problems involving vectors

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

- Classroom lectures
- Guided and Independent practice
- Group work involving solving application problems

Extensions:

- Alternate worksheet with more challenging problems

Remediation:

- Review of notes and example problems to reinforce lesson concepts
- Study Island Activity (ie activity: 2a, 2b, 3b)
- Tutoring in the math lab
- Peer or teacher tutoring

Instructional Methods:

- Direct Lecture
- Notes on the board (smart board when available)
- Small group discussions

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations

Curriculum Scope & Sequence

Planned Course: Pre-Calculus

Unit: Conic Sections

Time frame: 8 – 10 Class Periods

State Standards: 2.2.11.C, 2.5.11.A, 2.5.11.B, 2.8.11.B, 2.8.11.C, 2.8.11.D, 2.8.11.E, 2.8.11.F, 2.9.11.C

Anchor(s) or adopted anchor: M11.A.2, M11.C.3, M11.D.1, M11.D.2, M11.D.4

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

- Graph, write equations, and solve applied problems involving ellipses
- Graph, write equations, and solve applied problems involving hyperbolas
- Graph, write equations, and solve applied problems involving parabolas

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

- Classroom lectures
- Guided and Independent practice
- Graphing Artwork (ie: students will use conics to draw a picture and label the equations that made the shapes)
- Group work involving solving application problems

Extensions:

- Alternate worksheet with more challenging problems
- More conic shapes in their artwork

Remediation:

- Review of notes and example problems to reinforce lesson concepts
- Tutoring in the math lab
- Peer or teacher tutoring

Instructional Methods:

- Direct Lecture
- Notes on the board (smart board when available)
- Small group discussions

Materials & Resources:

- Textbook
- Multimedia
- Calculators
- Worksheets

Assessments:

- Homework Assignments
- Quizzes and Tests
- Observations