# Wilson Area School District
# Planned Course Guide

**Title of planned course:** Honors Pre-Calculus

**Subject Area:** Mathematics

**Grade Level:** 10 - 11

**Course Description:** Honors Pre-calculus is a course designed to prepare students for Honors Calculus or AP Calculus AB. This course will cover advanced topics in Algebra and Trigonometry with emphasis on the various functions that are studied in Calculus. The functions studied include Linear, Quadratic, Polynomial, Rational, Exponential, Logarithmic, and Trigonometric. The following topics will be covered relative to these functions: notation, graphing, transformations, composition, inverse functions, continuity, end behavior, modeling and other properties.

**Time/Credit for this course:** One Full Academic Year / 1.0 Credit

**Curriculum Writing Committee:** Christal Vitko

# Wilson Area School District
# Planned Course Materials

**Course Title:** Honors Pre-Calculus

**Textbook:** Blitzer Precalculus 4e
Prentice Hall
Copyright 2010

**Teacher Resources:** Infinite Algebra 2 Generator (software)
TI-Smartview
I Learn Academy

# Curriculum Map

**August:** Functions and Graphs

**September:** Functions and Graphs

**October:** Functions and Graphs, Polynomial Functions

**November:** Polynomial and Rational Functions

**December:** Exponential and Logarithmic Functions

**January:** Exponential and Logarithmic Functions, Unit Circle

**February:** Unit Circle, Right Triangle Trigonometry, Graphs of Trig Functions

**March:** Inverses of Trigonometric Functions, Applications of Trigonometry

**April:** Trigonometric Identities and Equations

**May:** Trigonometric Identities and Equations, Introduction to Limits

**June:** Introduction to Limits

# Curriculum Scope & Sequence

**Planned Course:** Honors Pre-Calculus

**Unit:** (1) Functions and Graphs

**Time Frame:** 16 - 18 Blocks

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

**Anchor(s) or Adopted Anchor:** M11.A.2-3, M11.B.2, M11.D.1-2, M11.D.4, M11.E.3

**Essential Content/Objectives:** At the end of the unit, students will be able to:

- Graph an equation using a graphing calculator and adjust the viewing window
- 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 points, 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:

- Guided and independent practice
- Use the graphing calculator to investigate and solve problems
- Pair and group practice with Active Pairing such as Maypole and Nametags
- Think-Write-Pair-Share activities
- Student reflection in journals
- Peer teaching
- Use, select, and discuss solved problems to analyze algebraic reasoning and strategies
- Movement activities such as Jigsaw, Nametags
- Quiz, Quiz, Trade Activities
- What Can I Say Writing Activity
- Directions for a Friend Activities
- Matching Activities for Linear Functions, Transformations, Algebraic Models

**Extensions:**

- Creating the function given the transformations
- Create a Doodle Board for Linear Functions, Inverse Functions, and Circles

**Remediation:**

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

**Instructional Methods:**

- Explicit Instruction
- Model use of graphing calculator
- Small group discussion

**Materials & Resources**

- Textbook (digital and hard copy)
- Worksheets
- Graphing Calculator
- Computers
- Journals

**Assessments:**

- Homework Assignments
- Journal entries
- Quizzes
- Tests

# Curriculum Scope & Sequence

**Planned Course:** Honors Pre-Calculus

**Unit:** (2) Polynomials and Rational Functions

**Time Frame:** 11 - 14 Blocks

**State Standards:** 2.1.11.A, 2.2.11.C, 2.5.11.A-B, 2.8.11.C-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 the end of the unit, students will be able to:

- Perform operations with complex and imaginary numbers
- 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 polynomial functions
- Determine vertical and horizontal asymptotes of rational functions
- Determine the locations of holes of rational functions
- Graph all rational functions

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

- Guided and independent practice
- Use the graphing calculator to investigate and solve problems
- Pair and group practice with Active Pairing such as Maypole and Nametags
- Think-Write-Pair-Share activities
- Student reflection in journals
- Peer teaching
- Use, select, and discuss solved problems to analyze algebraic reasoning and strategies
- Movement activities such as Jigsaw, Nametags
- Quiz, Quiz, Trade Activities
- What Can I Say Writing Activity
- Directions for a Friend Activities
- Matching Activities for graphs of polynomial and rational functions

**Extensions:**

- Find the equation of a graph given only the graph
- Find the equation of the polynomial given only the zeros
- Find the equation of a rational function given the graph
- Find the equation of a rational function given asymptotes and holes and other graphical features.
- Create a Doodle Board for Polynomial Functions and Rational Functions

**Remediation:**

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

**Instructional Methods:**

- Explicit Instruction
- Model use of graphing calculator
- Small group discussion

**Materials & Resources**

- Textbook (digital and hard copy)
- Worksheets
- Graphing Calculator
- Computers
- Journals

**Assessments:**

- Homework Assignments
- Journal entries
- Quizzes
- Tests

# Curriculum Scope & Sequence

**Planned Course:** Honors Pre-Calculus

**Unit:** (3) Exponential and Logarithmic Functions

**Time Frame:** 12 - 15 blocks

**State Standards:** 2.1.11.F, 2.2.11.C, 2.5.11.A-B, 2.8.11.C-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 the end of the students will be able to:

- Evaluate and graph exponential functions
- Evaluate and graph logarithmic functions
- Express logarithms using the change of base formula
- Use the properties of logarithms to condense or expand expression
- Use the properties of exponentials and logarithms to solve the equations
- Use compound interest formulas
- Model exponential growth and decay

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

- Guided and independent practice
- Use the graphing calculator to investigate and solve problems
- Pair and group practice with Active Pairing such as Maypole and Nametags
- Think-Write-Pair-Share activities
- Student reflection in journals
- Peer teaching
- Use, select, and discuss solved problems to analyze algebraic reasoning and strategies
- Movement activities such as Jigsaw, Nametags
- Quiz, Quiz, Trade Activities
- What Can I Say Writing Activity
- Directions for a Friend Activities
- Matching Activities for graphs of exponential and logarithmic functions

**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*
- Create a Doodle Board for exponential functions and logarithmic functions

**Remediation:**

- Review of notes and example problems to reinforce lesson concepts
- Tutoring with math teacher or peer tutor

**Instructional Methods:**

- Explicit Instruction
- Model use of graphing calculator
- Small group discussion

**Materials & Resources**

- Textbook (digital and hard copy)
- Worksheets
- Graphing Calculator
- Computers
- Journals

**Assessments:**

- Homework Assignments
- Journal entries
- Quizzes
- Tests

# Curriculum Scope & Sequence

**Planned Course:** Honors Pre-Calculus

**Unit:** (4) Trigonometric Functions

**Time Frame:** 18 - 20 Blocks

**State Standards:** 2.2.11.C, 2.5.11.A-B, 2.8.11.B-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 the end of the 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 the six trigonometric functions of real number
- Evaluate the six trigonometric functions of special angles and quadrantal angles
- Use right triangles to evaluate the six trigonometric functions
- Use the definitions and signs of the six trigonometric functions
- Graph any equation involving the six trigonometric functions
- Find the exact values of composite functions with inverse trigonometric functions
- Prove basic trigonometric identities
- Solve right triangles, problems involving bearings, and simple harmonic motion

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

- Guided and independent practice
- Use the graphing calculator to investigate and solve problems
- Pair and group practice with Active Pairing such as Maypole and Nametags
- Think-Write-Pair-Share activities
- Student reflection in journals
- Peer teaching
- Use, select, and discuss solved problems to analyze algebraic reasoning and strategies
- Movement activities such as Jigsaw, Nametags
- Quiz, Quiz, Trade Activities
- What Can I Say Writing Activity
- Directions for a Friend Activities
- Matching Activities for graphs of trig functions

**Extensions:**

- Create their own shortcut for memorizing the Unit Circle
- Find the equation of a trigonometric graph given only the graph
- Create trigonometric expressions for the partner/class to prove
- Create a Doodle Board for trig functions and inverse trig functions

**Remediation:**

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

**Instructional Methods:**

- Explicit Instruction
- Model use of graphing calculator
- Small group discussion

**Materials & Resources**

- Textbook (digital and hard copy)
- Worksheets
- Graphing Calculator
- Computers
- Journals

**Assessments:**

- Homework Assignments
- Journal entries
- Quizzes
- Tests

# Curriculum Scope & Sequence

**Planned Course:** Honors Pre-Calculus

**Unit:** (5) Analytic Trigonometry

**Time frame:** 12 – 14 Blocks

**State Standards:** 2.2.11.C, 2.4.11.A, 2.4.11.B, 2.5.11.A-B, 2.8.11.B-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 the end of the 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:

- Guided and independent practice
- Use the graphing calculator to investigate and solve problems
- Pair and group practice with Active Pairing such as Maypole and Nametags
- Think-Write-Pair-Share activities
- Student reflection in journals
- Peer teaching
- Use, select, and discuss solved problems to analyze algebraic reasoning and strategies
- Movement activities such as Jigsaw, Nametags
- Quiz, Quiz, Trade Activities
- What Can I Say Writing Activity
- Directions for a Friend Activities
- Proving trig identities activity/putting the steps in order

**Extensions:** Create a Doodle Board for proving trig identities and solving trig equations

**Remediation:**

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

**Instructional Methods:**

- Explicit Instruction
- Model use of graphing calculator
- Small group discussion

**Materials & Resources**

- Textbook (digital and hard copy)
- Worksheets
- Graphing Calculator
- Computers
- Journals

**Assessments:**

- Homework Assignments
- Journal entries
- Quizzes
- Tests

# Curriculum Scope & Sequence

**Planned Course:** Honors Pre-Calculus

**Unit:** (11) Introduction to Limits

**Time Frame:** 6 - 8 Blocks

**State Standards:** 2.1.HS.F.3, 2.2.HS.C.1-2, 2.2.HS.C.5-6, 2.2.HS.D.1, 2.2.HS.D.4, 2.2.HS.D.6, 2.2.HS.D.10

**Anchor(s) or Adopted Anchor:** A1.2.1, A2.2.1, A2.1.3, A2.1.2, A2.2.2

**Essential Content/Objectives:** At the end of the unit, students will be able to:

- Interpret limit notation
- Evaluate limits using a table and a graph
- Evaluate one-sided limits

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

- Guided and independent practice
- Use the graphing calculator to investigate and solve problems
- Pair and group practice with Active Pairing such as Maypole and Nametags
- Think-Write-Pair-Share activities
- Student reflection in journals
- Peer teaching
- Use, select, and discuss solved problems to analyze algebraic reasoning and strategies
- Movement activities such as Jigsaw, Nametags
- Quiz, Quiz, Trade Activities
- What Can I Say Writing Activity
- Directions for a Friend Activities

**Extensions:** Draw a graph and write the expression for a function given information on limits as various values

**Remediation:**

- Review of notes and example problems to reinforce lesson concepts
- Peer or teacher tutoring

**Instructional Methods:**

- Explicit Instruction
- Model use of graphing calculator
- Small group discussion

**Materials & Resources**

- Textbook (digital and hard copy)
- Worksheets
- Graphing Calculator
- Computers
- Journals

**Assessments:**

- Homework Assignments
- Journal entries
- Quizzes
- Tests