

State Dual Credit Pre-Calculus Syllabus

Course Description: Pre-Calculus expands the study of functions, including polynomial, exponential, logarithmic, and trigonometric functions introduced in Algebra II. The course also includes topics from analytic geometry and includes a heavy emphasis on trigonometry. This class prepares students for Calculus.

Grade Assessment:

Pre-Calculus is a semester-long course. The final exam/challenge exam will be 15% of your final grade. State Dual credit classes are awarded 4 quality points at the end of the semester.

Term Grades consists of:

- Homework/Homework Quizzes (10%)
- Quizzes (15%)
- Unit Tests (75%)

Unit 1A – Trigonometry (11 days)

- Right Triangle Trig Applications (1 day)
 - o 7a. Solve right triangle problems including applications
 - o 7b. Solve right triangle involving angles of elevation and depression
- Measuring Angles (1 day)
- Unit Circle (2 day)
 - o 6a. Relate values on the unit circle to trig function values, and vice-versa, with numerical values at specific angles and their periodic extensions.
- Inverse Functions (1 day)
 - o 6a. Use trigonometric functions and identities to find specific results.
- Trig on any Circle (1 day)
 - o 6a. Use trigonometric functions and identities to find specific results.
- Law of Sines and Cosines (1 day)
 - o 7c. Use the Law of Cosines and Sines for all triangles types.
- Bearing Problems (2 days)
 - o 7b. Solve right triangle problems using compass notation using trigonometric identities and rules.
 - o Use the Law of Cosines and Sines for all triangles types.
- Review (1 day)
- Test (1 day)

Unit 1B – Trigonometry (14 days)

- Equation of a Circle by Completing the Square (1 day)
 - o 8b. Convert a quadratic equation into the equation of a circle or ~~parabola~~ using completion of squares.
- Arc Length & Sector Area (1 day)
 - o 8d. Calculate basic geometric properties like area of a sector, arc length, and the relation between the area of a sector and the inscribed triangle.
- Polar coordinates (2 day)
 - o 8a. Work with circles as a (Cartesian) conic section and in terms of its geometric and polar properties.
 - o 8e. Relate, through the unit circle, polar coordinates to Cartesian coordinates and vise versa.
- Vectors (1day)
 - o 7d. Use vector concepts of magnitude and direction.
- Graphing Sine/Cosine Activity (1 day)
 - o 6b. Relate values on the unit circle to trig function values, and vice-versa, with numerical values at specific angles and their periodic extensions.
 - o 6c. Graph the six trigonometric functions and identify characteristics such as period, amplitude, phase shift, and asymptotes.

State Dual Credit Pre-Calculus Syllabus

- Discovering Trig Transformations (1 day)
 - o 6b. Relate values on the unit circle to trig function values, and vice-versa, with numerical values at specific angles and their periodic extensions.
 - o 6c. Graph the six trigonometric functions and identify characteristics such as period, amplitude, phase shift, and asymptotes.
- Graphs of Trig Functions (1 day)
 - o 5b. Identify basic properties of functions (definition of ~~function~~, domain, range, odd, even, ~~asymptotic behavior~~)
 - o 6c. Graph the six trigonometric functions and identify characteristics such as period, amplitude, phase shift, and asymptotes.
- Graphs of Trig Reciprocal Functions (2 days)
 - o 6c. Graph the six trigonometric functions and identify characteristics such as period, amplitude, phase shift, and asymptotes.
- Applications of Trig Problems (1 day)
 - o 4a. Use functions to model behavior described by words and/or data.
 - o 4b. Identify and make appropriate models for situations involving for example, ~~direct and inverse variation, proportionality, average rate of change, exponential growth and decay, logarithmic relations, and~~ periodic behavior)
- Review (1 day)
- Test (1 day)
- Review Test from Unit 1A (1 day)

Unit 2 – Trig Identities (13 days)

- Solving Trig Functions (1 day)
 - o 6f. Solve trigonometric equations by factoring, by using identities, and by graphing.
- Evaluating Identities (1 day)
 - o 6f. Solve trigonometric equations by factoring, by using identities, and by graphing.
- Using Operations with Identities to Verify Expressions (2 days)
 - o 6a. Use trigonometric functions and identities to find specific results.
 - o 6e. Apply multiple identities to simplify expressions and solve equations, including ones involving inverses.
- Verifying Trig Expressions (1 day)
 - o 6a. Use trigonometric functions and identities to find specific results.
- Solving Equations with Identities (1 day)
 - o 6d. Use trigonometric identities to evaluate numerical values, simplify expressions and solve equations.
 - o 6e. Apply multiple identities to simplify expressions and solve equations, including ones involving inverses.
 - o 6f. Solve trigonometric equations by factoring, by using identities, and by graphing.
- Sum & Difference Identities (2 days)
 - o 6d. Use trigonometric identities to evaluate numerical values, simplify expressions and solve equations.
- Double & Half Angle Identities (2 days)
 - o 6d. Use trigonometric identities to evaluate numerical values, simplify expressions and solve equations.
- Review (1 day)
- Test (1 day)
- Review Test from Unit 1 (1 day)

Unit 3 – Polynomials (13 days)

- Solving Quadratics (1day)
 - o 1a. Apply various techniques, as appropriate, to simplify expressions and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques.

State Dual Credit Pre-Calculus Syllabus

- o 1b. Solve quadratics equations for both real and complex roots.
 - o 8b. Convert a quadratic equation into the equation of a ~~circle~~ or parabola using completion of squares.
- Quadratic Applications (1 day)
 - o 1b. Solve quadratics equations for both real ~~and complex~~ roots.
 - o 4a. Use functions to model behavior described by words and/or data.
 - o 4c. Use appropriate units and functions properties, like domain, as needed in function models. Interpret the solutions in terms of the original problem.
- Composition of Functions (2 days)
 - o 5a. Manipulate functions and identify their properties.
 - o 5c. Manipulate functions as elements to get new functions via addition, subtraction, multiplication, division, and composition and can simplify the resulting expressions.
- Characteristics of Polynomials (1 day)
 - o 5b. Identify basic properties of functions (definition of ~~function~~, domain, range, odd, even, ~~asymptotic behavior~~)
 - o 4b. Identify and make appropriate models for situations involving for example, ~~direct and inverse variation, proportionality, average rate of change, exponential growth and decay, logarithmic relations, and periodic behavior~~
- Dividing and Solving Polynomials (2 day)
 - o 1a. Apply various techniques, as appropriate, to simplify expressions and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques.
 - o 1c. Solving polynomial equations of degree >2 for both real and complex roots.
 - o 1d. Use synthetic division and other relevant results to identify and simplify the equation.
- Quadratic and Cubic Form (1 day)
 - o 1a. Apply various techniques, as appropriate, to simplify expressions and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques.
 - o 1c. Solving polynomial equations of degree >2 for both real and complex roots.
- Extreme / Increasing & Decreasing / End Behavior (1 day)
 - o 3d. From the graph can locate critical points and identify if each is a minimum, maximum or point of inflection, and locate intervals of increasing and decreasing.
 - o 5b. Identify basic properties of functions (definition of ~~function~~, domain, range, ~~odd, even, asymptotic behavior~~)
- Polynomial Applications (1day)
 - o 4a. Use functions to model behavior described by words and/or data.
 - o 4b. Identify and make appropriate models for situations involving for example, ~~direct and inverse variation, proportionality, average rate of change, exponential growth and decay, logarithmic relations, and periodic behavior~~
- Review (1 day)
- Test (1 day)
- Review Test from Unit 1 & 2 (1 day)

Unit 4 – Graphing and Solving Functions (15 days)

- Even & Odd Functions (1 day)
 - o 5b. Identify basic properties of functions (definition of ~~function~~, domain, range, odd, even, ~~asymptotic behavior~~)
- Inverse Functions (1 day)
 - o 5d. Construct and evaluate inverse functions and use domain/range restriction appropriately.
- Transformations (2 days)
 - o 3a. Express properties and transformations of functions graphically, and can use a graph to determine function properties.

State Dual Credit Pre-Calculus Syllabus

- o 3b. On both the graph and the function can apply and identify the basic transformations.
- Graphing And Solving Absolute Value Functions (1 day)
 - o 1a. Apply various techniques, as appropriate, to simplify expressions and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques.
 - o 1e. Solve equations involving absolute values, ~~radical, rational, exponential or logarithmic~~ expressions.
- Graphing and Solving Radical Functions (1 day)
 - o 1a. Apply various techniques, as appropriate, to simplify expressions and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques.
 - o 1e. Solve equations involving ~~absolute values, radical, rational, exponential or logarithmic~~ expressions.
- Direct And Inverse Variation (1 day)
 - o 4a. Use functions to model behavior described by words and/or data.
- Rational Functions (1 days)
 - o 1a. Apply various techniques, as appropriate, to simplify expressions and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques.
 - o 1e. Solve equations involving ~~absolute values, radical, rational, exponential or logarithmic~~ expressions.
 - o 3c. From the function can identify graphical functional properties and vice versa: intercepts, asymptotes, (vertical, horizontal, slant), domain, range, and end behavior.
 - o 5b. Identify basic properties of functions (definition of ~~function, domain, range, odd, even,~~ asymptotic behavior)
- Rational Applications (1 day)
 - o 4a. Use functions to model behavior described by words and/or data.
- Limits (1 day)
- Inequalities (1 day)
 - o 2a. Apply various techniques (algebraic and graphical) to solve inequalities involving polynomials (including degree >2), and absolute values, and can express answers using interval notation.
- Inequalities Applications and More (1 day)
 - o 2a. Apply various techniques (algebraic and graphical) to solve inequalities involving polynomials (including degree >2), and absolute values, and can express answers using interval notation.
 - o 4a. Use functions to model behavior described by words and/or data.
- Review (1 day)
- Test (1 day)
- Review Test (1 day)

Unit 5 – Exponential and Logarithmic Functions (7 days)

- Graphing Exponential and Logarithmic Functions (2 day)
 - o 3a. Express properties and transformations of functions graphically, and can use a graph to determine function properties.
 - o 3c. From the function can identify graphical functional properties and vice versa: intercepts, asymptotes, (vertical, horizontal, slant), domain, range, and end behavior.
 - o 5b. Identify basic properties of functions (definition of ~~function, domain, range, odd, even,~~ asymptotic behavior).
- Evaluating Logs (1day)
 - o 1g. Use the properties of logs and exponentials to simplify expressions involving logs and exponentials.

State Dual Credit Pre-Calculus Syllabus

- Properties of Logs (2 days)
 - o 1g. Use the properties of logs and exponentials to simplify expressions involving logs and exponentials.
- Solving Exponential and Logs (1day)
 - o 1a. Apply various techniques, as appropriate, to ~~simplify expressions~~ and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques.
 - o 1e. Solve equations involving ~~absolute values, radical, rational,~~ exponential or logarithmic expressions.
 - o 1g. Use the properties of logs and exponentials to simplify expressions involving logs and exponentials.
- Applications (1day)
 - o 4a. Use functions to model behavior described by words and/or data.
 - o 4b. Identify and make appropriate models for situations involving for example, ~~direct and inverse variation, proportionality, average rate of change,~~ exponential growth and decay, logarithmic relations, and ~~periodic behavior~~
- Review (1 day)
- Test (1 day)

Challenge Exam Review (5 days)

Final exam Review (3 days)

81 days total

Access to instructional materials statement:

Parents are encouraged to join Canvas through the Canvas Parent App if they would like access to instructional materials. Skyward is still our primary grade book and is considered to be the official grading system for all courses at Lenoir City High School. We encourage all families to use their Skyward Parent Access accounts for current attendance and grading information.