**COURSE DESCRIPTION**

**Course Title:** Pre-Calculus CP

**Course Number:** 00270

**Course Prerequisites:** Recommended grade average of 75% of higher in Algebra I CP, Algebra II CP, and Geometry CP.

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| **Course Description:** | Pre-Calculus College Preparatory is an academic course designed to solidify the fundamental concepts of high school algebra and geometry. Major topics include functions and their graphs, polynomial and rational functions, exponential and logarithmic functions, trigonometric functions, and analytic trigonometry. |

**Suggested Grade Level**: Grades 11-12

**Length of Course:** Two Semesters

**Units of Credit:** 1

**PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:**

Mathematics #50

To find the CSPG information, go to [CSPG](https://www.education.pa.gov/Educators/Certification/Staffing%20Guidelines/Pages/default.aspx)

**Certification verified by the WCSD Human Resources Department:** Yes No

**WCSD STUDENT DATA SYSTEM INFORMATION**

**Course Level:** Academic

**Mark Types:** Check all that apply.

F – Final Average MP – Marking Period EXM – Final Exam

**GPA Type**:  GPAEL-GPA Elementary  GPAML-GPA for Middle Level  NHS-National Honor Society

UGPA-Non-Weighted Grade Point Average  GPA-Weighted Grade Point Average

**State Course Code**: 02110

To find the State Course Code, go to [State Course Code](https://nces.ed.gov/forum/sced.asp), download the Excel file for *SCED*, click on SCED 6.0 tab, and chose the correct code that corresponds with the course.

**TEXTBOOKS AND SUPPLEMENTAL MATERIALS**

**Board Approved Textbooks, Software, and Materials:**

**Title:**  Pre-Calculus with Limits: A Graphing Approach

**ISBN #:**  978-1-337-90428-5

**Copyright Date:** 2020

**WCSD Board Approval Date:** 6/29/2020

**Supplemental Materials:** Click or tap here to enter text.

**Curriculum Document**

**WCSD Board Approval:**

**Date Finalized:** 6/5/2020

**Date Approved:**  6/29/2020

**Implementation Year:** 2020-2021

**SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS**

The teacher shall make appropriate modifications to instruction and assessment based on a student’s Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

**SCOPE AND SEQUENCE OF CONTENT, CONCEPTS, AND SKILLS**

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| **Performance Indicator** | **PA Core Standard and/or Eligible Content** | **Month Taught and Assessed for Mastery** |
| Find the slopes of lines. | 2.2 | September  October |
| Write linear equations given points on lines and their slopes. | 2.2 | September  October |
| Use slope intercept form of linear functions to sketch lines. | 2.2 | September  October |
| Use slopes to identify parallel and perpendicular lines. | 2.2 | September  October |
| Determine if a relation between two variables represents a function. | 2.2 | September  October |
| Use function notation and evaluate functions. | 2.2 | September  October |
| Find the domain of functions. | 2.2 | September  October |
| Use functions to model and solve real like problems. | 2.2 | September  October |
| Find the domain and range of functions and use the vertical line test for functions. | 2.2 | September  October |
| Determine intervals on which functions are increasing, decreasing, or constant. | 2.2 | September  October |
| Determine relative minimums and relative maximums of functions. | 2.2 | September  October |
| Identify and graph step functions and other piece-wise defined functions. | 2.2 | September  October |
| Identify even and odd functions. | 2.2 | September  October |
| Recognize graphs of parent functions. | 2.2 | September  October |
| Use vertical and horizontal shifts to sketch graphs of functions. | 2.2 | September  October |
| Use reflections to sketch graphs of functions. | 2.2 | September  October |
| Use non-rigid transformations to sketch graphs of functions. | 2.2 | September  October |
| Add, subtract, multiply, and divide functions. | 2.2 | September  October |
| Find compositions of one function with another function. | 2.2 | September  October |
| Use combinations of functions to model and solve real life problems. | 2.2 | September  October |
| Find inverse functions informally and verify that two functions are inverse functions of each other. | 2.2 | September  October |
| Use graphs of functions to determine if functions have inverse functions. | 2.2 | September  October |
| Determine if functions are one to one. | 2.2 | September  October |
| Find inverse functions algebraically. | 2.2 | September  October |

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| Construct scatterplots and interpret correlation. | 2.2 | September  October |
| Use scatterplots in a graphing utility to find linear models for data. | 2.2 | September  October |
| Analyze graphs of quadratics functions. | 2.2 | October  November |
| Write quadratic functions in standard form and use the results to sketch graphs of functions. | 2.2 | October  November |
| Find minimum and maximum values of quadratics functions in real life applications. | 2.2 | October  November |
| Use transformations to sketch graphs of polynomial functions. | 2.2 | October  November |
| Use the leading coefficient test to graph the end behavior of polynomial functions. | 2.2 | October  November |
| Find and use zeros of polynomial functions as sketching aides. | 2.2 | October  November |
| Use the intermediate value theorem to help locate zeros of polynomial functions. | 2.2 | October  November |
| Use long division to divide polynomials by other polynomials. | 2.2 | October  November |
| Use synthetic division to divide polynomials by binomials. | 2.2 | October  November |
| Use the remainder and factor theorems. | 2.2 | October  November |
| Use the rational zero test to determine possible rational zeros of polynomials functions | 2.2 | October  November |
| Use Descartes’ Rules of signs and the upper and lower bounds to find real zeros of polynomials. | 2.2 | October  November |
| Use the imaginary unit i to write complex numbers. | 2.2 | October  November |
| Add, subtract, multiply, and divide complex numbers. | 2.2 | October  November |
| Use complex conjugates to write the quotient of two complex numbers in standard form. | 2.2 | October  November |
| Find complex solutions of quadratic equations. | 2.2 | October  November |
| Use the fundamental theorem of algebra to determine the number of zeros of a polynomial function. | 2.2 | October  November |
| Find all zeros of polynomial functions. | 2.2 | October  November |
| Find conjugate pairs of complex zeros. | 2.2 | October  November |
| Find zeros of polynomials by factoring. | 2.2 | November  December |
| Find the domains of rational functions. | 2.2 | November  December |
| Find vertical and horizontal asymptotes of rational functions. | 2.2 | November  December |
| Use rational functions to model and solve real life problems. | 2.2 | November  December |
| Analyze and sketch graphs of rational functions. | 2.2 | November  December |
| Sketch graphs of rational functions that have slant asymptotes. | 2.2 | November  December |
| Use graphs of rational functions to model and solve real life problems. | 2.2 | November  December |
| Classify scatter plots. | 2.2 | November  December |
| Use scatter plots and a graphing utility to find quadratic models for data. | 2.2 | November  December |
| Choose a model that best fits a set of data. | 2.2 | November  December |
| Recognize and evaluate exponential functions with base a. | 2.2 | January  February |
| Graph exponential functions with base a. | 2.2 | January  February |
| Recognize and evaluate and graph exponential functions with base e. | 2.2 | January  February |
| Use exponential functions to model and solve real life problems. | 2.2 | January  February |
| Recognize and evaluate logarithmic functions with base a. | 2.2 | January  February |
| Graph logarithmic functions with base a. | 2.2 | January  February |
| Recognize, evaluate, and graph natural logarithmic functions. | 2.2 | January  February |
| Use logarithmic functions to model and sole real life problems. | 2.2 | January  February |
| Rewrite logarithms with different bases. | 2.2 | January  February |
| Use properties of logarithms to evaluate or rewrite logarithmic expressions. | 2.2 | January  February |
| Use properties of logarithms to expand or condense logarithmic expressions. | 2.2 | January  February |
| Use logarithmic functions to model and solve real life problems. | 2.2 | January  February |
| Solve simple exponential and logarithmic equations. | 2.2 | January  February |
| Solve more complicated exponential equations. | 2.2 | January  February |
| Solve more complicated logarithmic equations. | 2.2 | January  February |
| Use exponential and logarithmic equations to model and solve real life problems. | 2.2 | January  February |
| Recognize the five most common types of models involving exponential or logarithmic functions. | 2.2 | January  February |
| Use exponential growth and decay functions to model and solve real life problems. | 2.2 | January  February |
| Use Gaussian functions to solve and model real life problems. | 2.2 | January  February |
| Use logistic growth functions to model and solve real life problems. | 2.2 | January  February |
| Use logarithmic functions to model and solve real life problems. | 2.2 | January  February |
| Classify scatterplots. | 2.2 | January  February |
| Use scatterplots and a graph utility to find models for data and determine the model that best fits a set of data. | 2.2 | January  February |

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| Use a graphing utility to find exponential and logistic models for data. | 2.2 | January  February |
| Describe angles. | 2.3 | February  March |
| Use radian measure. | 2.2 | February  March |
| Use degree measure and convert between degrees and radians. | 2.2 | February  March |
| Use angles to model and solve real life problems. | 2.3 | February  March |
| Identify the unit circle and describe its relationship to real numbers. | 2.2 | February  March |
| Evaluate trigonometric functions using the unit circle. | 2.2 | February  March |
| Use domain and period to evaluate sine and cosine functions. | 2.2 | February  March |
| Use a calculator to evaluate trigonometric functions. | 2.2 | February  March |
| Evaluate trigonometric functions of acute angles. | 2.2 | February  March |
| Use fundamental trigonometric identities. | 2.2 | February  March |
| Use trigonometric identities to solve and model real life problems. | 2.2 | February  March |
| Evaluate trigonometric functions of any angle. | 2.2 | February  March |
| Find reference angles. | 2.2 | February  March |
| Evaluate trigonometric functions of real numbers. | 2.2 | February  March |
| Sketch the graphs of basic sine and cosine functions. | 2.2 | March  April |
| Use amplitude and period to sketch the graphs of sine and cosine functions. | 2.2 | March  April |
| Sketch translations of graphs of sine and cosine functions. | 2.2 | March  April |
| Use sine and cosine functions to model real life data. | 2.2 | March  April |
| Sketch the graph of tangent functions. | 2.2 | March  April |
| Sketch the graph of cotangent functions. | 2.2 | March  April |
| Sketch the graph of secant and cosecant functions. | 2.2 | March  April |
| Evaluate and graph inverse sine functions. | 2.2 | March  April |
| Evaluate and graph other inverse functions. | 2.2 | March  April |
| Evaluate composition of trigonometric functions. | 2.2 | March  April |
| Solve real life problems involving right triangles. | 2.2, 2.3 | March  April |
| Solve real life problems involving directional bearings. | 2.2 | March  April |
| Solve real life problems involving harmonic motion. | 2.2 | March  April |
| Recognize and write the fundamental trigonometric identities. | 2.2 | April  May |
| Use the fundamental trigonometric identities to evaluate trigonometric functions, simplify trigonometric expressions, and rewrite trigonometric expressions. | 2.2 | April  May |
| Verify trigonometric identities. | 2.2 | April  May |
| Use standard algebraic techniques to solve trigonometric equations. | 2.2 | April  May |
| Solve trigonometric equations of quadratic type. | 2.2 | April  May |
| Solve trigonometric equations involving multiple angles. | 2.2 | April  May |
| Use inverse trigonometric functions to solve trigonometric equations. | 2.2 | April  May |
| Use sum and difference formulas to evaluate trigonometric functions, verify trigonometric identities, and solve trigonometric equations. | 2.2 | April  May |
| Use multiple-angle formulas to rewrite and evaluate trigonometric functions. | 2.2 | April  May |
| Use power-reducing formulas to rewrite and evaluate trigonometric functions. | 2.2 | April  May |
| Use half-angle formulas to rewrite and evaluate trigonometric functions. | 2.2 | April  May |
| Use product-to-sum and sum-to-product formulas to rewrite and evaluate trigonometric functions. | 2.2 | April  May |
| Use the Law of Sines to solve oblique triangles. | 2.2 | April  May |
| Find areas of oblique triangles and use the Law of Sines to model and solve real-life problems. | 2.2 | April  May |
| Use the Law of Cosines to solve oblique triangles. | 2.2 | April  May |
| Use the Law of Cosines to model and solve real-life problems. | 2.2 | April  May |
| Use Heron’s Area Formula to find areas of triangles. | 2.2 | April  May |

**ASSESSMENTS**

**PSSA Academic Standards, Assessment Anchors, and Eligible Content:** The teacher must be knowledgeable of the PDE Academic Standards, Assessment Anchors, and Eligible Content and incorporate them regularly into planned instruction.

**Formative Assessments:** The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

**Effective formative assessments for this course include:** Suggested but not limited to: Bell Ringers, Exit Ticket, Cooperative Learning, Observations, Written work, Quizzes, Oral response, Self-evaluation, Homework

**Summative Assessments:** The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

**Effective summative assessments for this course include:** Suggested but not limited to: Performance Assessment, Tests