**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.

|  |  |
| --- | --- |
| **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:** [x] Yes [ ] No

**WCSD STUDENT DATA SYSTEM INFORMATION**

**Course Level:** Academic

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

[x] F – Final Average [x] MP – Marking Period [x] EXM – Final Exam

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

[x]  UGPA-Non-Weighted Grade Point Average [x]  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**

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

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

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

**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