College Math Readiness is a full year course for high school seniors to review basic and intermediate algebra in preparation for success in college algebra and advanced math studies at a post-secondary school. The course reviews with intent to master topics from Algebra 1 and Algebra 2. Embedded within the course is a one-credit College Success course taught by Northampton County Community College staff. Students enrolled in this course will be given final exams from two of the Community College's math remediation courses. Units 1-5 constitute Math 022 at NCC and students who earn a 73% or higher on the corresponding final exam will be given credit for Math 022 at the college. Units 6-9 constitute Math 026 at NCC and students who earn a 73% or higher on the corresponding final exam will be given credit for Math 026 at the college.

Even though the course is designed to align with Northampton Community College math remediation courses, students planning to attend other colleges or technical schools will benefit from this course, as it reviews relevant high school math in preparation for further study. Students will be prepared for college placement tests at many schools and be able to avoid the time and money that could be required for remedial work before taking college level math.

College Math Readiness will by taught in the classroom, but through a hybrid approach. Students will be able to work at their own pace using online lessons and practice exercises. Small group instruction and teacher direct instruction will supplement online lessons.

Credits: 1.0

Prerequisites: Algebra 1 and Algebra 2

Course is offered only in grade 12.

Unit 1: Real Numbers and Variables

Unit Outcomes: Students will review operations with real numbers and algebraic expressions. Students will employ algebraic symbols and vocabulary to clearly communicate mathematical concepts and perform arithmetic operations as well as apply operations to real life situations.

Essential Outcomes:

A. Evaluate algebraic expressions
B. Use notation and symbols to represent the Real numbers
C. Add and subtract real numbers
D. Multiply and divide real numbers
E. Use properties of real numbers
F. Simplify expressions using the Order of Operations

Related PA Standards:

- CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
- CC.2.2.HS.D.2 Write expression in equivalent forms to solve problems.

Content and Instructional Strategies:
Independent online lessons and practice
Small group instruction
Direct instruction
Real life problems/connections

Remediation:
Websites
Re-teaching Activities
Extra worksheets
Pre-test study guides

Enrichment:
Enrichment/challenge worksheets
Websites
Applications

Assessment Criteria:
Online assignments
Warm-ups and/or Exit tickets
Teacher created quizzes, tests, and open-ended questions

Resources and Materials:
Chrome Book
Online lessons and practice
Scientific calculator
Smart Board for direct instruction

Unit 2: Equations, Inequalities, and Problem Solving

Unit Outcomes: Students will master solving linear equations and inequalities. Students will apply algebraic principles and techniques to solve problems involving one variable.

Essential Outcomes:

A. Use the addition principle in solving equations
B. Use the multiplication principle in solving equations
C. Use the addition and multiplication principles together to solve equations
D. Apply variables and equation solving to applications
E. Solve application problems involving percents
F. Solve formulas for a specific variable
G. Solve linear inequalities and graph the solution set on a number line

PA Common Core Standards:

- CC.2.2.HS.D.8 Apply inverse operations to solve equations of formulas for a given variable.
- CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
- CC.2.2.HS.D10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

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Unit 3: Graphing Linear Equations

Unit Outcomes: Students will apply linear equations to data analysis through line graphs and bar graphs. Additionally, students will analyze linear data through rates of change and intercepts. Students will represent linear functions in multiple representations: graph, table, equation and words.

Essential Outcomes:

A. Interpret line, bar, and circle graphs
B. Graph linear equations in the coordinate plane
C. Find and interpret slope as a rate of change
D. Analyze data by looking a linear trends and line graphs
E. Write equations of lines

PA Common Core standards:

- CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret unit and scales in formulas, graphs, and data displays.
- CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
- CC.22.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
- CC.2.4.HS.B.1 Summarize, represent, and interpret data on a single count or measurement variable.
- CC.2.4.HS.B.3 Analyze linear models to make interpretations based on the data.

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Unit 4: Systems of Equations in Two Variables

Unit Outcomes: Students will solve systems of equations in two variables by graphing, substitution and elimination. Students will apply and solve systems of equations in two variables to real life applications.

Essential Outcomes:

A. Graph systems of equations and find solution points
B. Solve systems of equations using the substitution method
C. Solve systems of equations using the elimination method
D. Apply systems of equations to problem solving

PA Common Core Standards:

- CC.22.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

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Unit 5: Polynomial Operations

Unit Outcomes: Students will review laws of exponents and extend their use to review scientific notation. Students will identify polynomials and review the basic polynomial operations, which also relate to working with exponents.

Essential Outcomes:

A. Simplify expressions with integer exponents
B. Compute operations with numbers in scientific notation
C. Identify and classify polynomials
D. Add and subtract polynomials
E. Multiply polynomials
F. Recognize and use special products of polynomials (squaring, conjugates)
G. Divide polynomials

PA Common Core Standards:

- CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational expressions.
- CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
- CC.2.2.HS.D.5 Use polynomial identities to solve problems.

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Unit 6: Factoring Polynomials

Unit Outcomes: Students will work with common factors and use strategies to factor, solve and create models using trinomials. Students will master skills in polynomial operations, factoring and apply skills to solving polynomial equations.

Essential Outcomes:

A. Find the greatest common factor and factor expressions using the distributive property
B. Factor trinomials
C. Factor special products – difference of two squares, perfect trinomial square
D. Combine factoring techniques and factor by grouping
E. Solve polynomial equations by factoring
F. Model and solve problems with quadratic functions

PA Common Core Standards:

- A1.1.1.2.1 Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for sets of monomials.
- A1.1.1.5.2 Factor algebraic expressions, including difference of squares and trinomials.
- CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.

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Unit 7: Rational Expressions, Equations and Functions

Unit Outcomes: Students will recognize rational expressions and perform algebraic operations. Students will solve rational equations and create and apply models to solve real-life problems.

Essential Outcomes:

A. Simplify rational expressions and state variable restrictions
B. Multiply and divide rational expressions
C. Add and subtract rational expressions with a common denominator
D. Find least common denominator and form equivalent rational expressions
E. Add and subtract rational expressions with unlike denominators
F. Simplify complex rational expressions
G. Solve rational equations
H. Model real-life problems using rational expressions

PA Common Core Standards:

- CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
- CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.
- CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

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Unit 8: Graphs, Relations, and Functions

Unit Outcomes: Students will define functions and terms specific to functions. Students will represent functions numerically, graphically, algebraically and verbally. Students will graph linear functions and inequalities as well as define and represent the absolute value function. Students will use functions to solve and model equations and inequalities.

Essential Outcomes:

A. Identify relations, domain and range
B. Identify functions, domain and range
C. Use function notation to evaluate functions and apply to applications
D. Represent functions through equations, tables, and graphs
E. Use linear functions to model and solve problems
F. Solve absolute value equations and inequalities
G. Represent direct and inverse variation and apply to problems

PA Common Core Standards:

- CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.
- CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
- CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
- CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.

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Unit 9: Quadratic Equations and Functions

Unit Outcomes: Students will solve and graph quadratic functions and applications by using factoring, square root method, completing the square, and the quadratic formula over the real and complex number systems.

Essential Outcomes:

A. Solve quadratic equations by Factoring
B. Solve quadratic equations by Completing the Square
C. Solve quadratic equations by using the Quadratic formula
D. Solve equations in quadratic form
E. Graph quadratic functions using transformations
F. Graph quadratic functions using vertex, intercepts, and axis of symmetry

PA Common Core Standards

- CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
- CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.
- CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
- CC.2.2.HS.D.5 Use polynomial identities to solve problems.
- CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
- CC.22.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

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Unit 10: College Success

Unit Outcome: This unit will be taught by Northampton Community College staff and is embedded throughout the course. The College Success unit is designed to help students navigate the Community College system. Through the exploration and awareness of academic skills, goal setting, college policies and procedures and self-exploration, students will create an individualized success plan that will provide a clear pathway to succeed in college.

Essential Outcomes:

A. Demonstrate ability to navigate the college environment
B. Create an individualized college success plan
C. Demonstrate an awareness of diverse perspectives