Cover Sheet - Planned Course Overview

A. Planned Course Title: College Ready Mathematics Course Number: M317

B. Grade level: HS
C. Board Approval Date: August 27, 2018
D. Instructional Time:
1. Length of course in weeks: 36 weeks
2. Number of class periods per week: 5
3. Length of class periods: 43 minutes
4. Total clock hours/credit for the course: 1.0 credit

E. List of the units of study within the course and estimated number of class periods or weeks allotted to each:

Topic	Estimated Time
Mechanics & Mindset of a Good Student	2 days
Unit 1: Real Numbers & Variables	15 days
Unit 2: Solving Equations & Inequalities	15 days
Unit 3: Linear Equations & Functions	20 days
Unit 4: Systems of Linear Equations	20 days
Unit 5: Polynomial Operations	15 days
End Math 022 Concepts. Take 022 Final Exam	
Unit 6: Factoring Polynomials	15 days
Unit 7: Quadratic Functions	15 days
Unit 8: Rational Expressions, Equations, & Functions	15 days
Unit 9: Graphs, Relations, & Functions	15 days
Unit 10: Radical & Rational Exponents	15 days
End of Math 026. Take 026 Final Exam	
Northampton Community College: College Ready Course	18 days

F. The texts or major resources for the course:
Title: Holt McDougal: Algebra 1
Author: E. Burger, D. Chard, P. Kennedy, S. Leinwand, F. Renfro, T. Roby, B. Waits
Publisher: Houghton Mifflin Harcourt Publishing Company
Copyright: 2012

Title: Prentice Hall Mathematics: Algebra 2
Author: Bellman, Bragg, Charles, Hall, Handlin, Kennedy.
Publisher: Pearson Prentice Hall
Copyright: 2007

Title: Khan Academy
Company: Khan Academ
G. Special Notes:
H. Names of the committee members who developed the planned course:
Cullen Mentzell

College Ready Mathematics 2018

Unit 1: Real Numbers & Variables
Unit Overview: This unit will focus on students using the order of operations correctly and student's mathematical computation abilities.

Standards:
CC.2.1.HS.F1: Apply and extend the properties of exponents to solve problems with rational exponents.
CC.2.1.HS.F.2: Apply properties of rational and irrational numbers to solve real world or mathematical problems.
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 expressions in equivalent forms to solve problems.
CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

Essential Question (Core Concepts)
How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

What makes a tool and/or strategy appropriate for a given task?

Objectives (Skills/Knowledge)
- Students will be able to add, subtract, multiply, divide, and evaluate exponents without a calculator (multiplication up to 12 x 12 and exponents up to 12^2).
- Students will be able to substitute and evaluate algebraic expressions using the order of operations.

Vocabulary
Algebraic Expression
Coefficient
Evaluate
Exponent
Opposite
Reciprocal
Term
Variable

Activities/Strategies/Study Skills
- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments
Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 2: Solving Equations & Inequalities.
Unit Overview: This unit will focus on solving one, two, and multi-step equations with one variable. Students will also work on constructing their own equations to model a mathematical situation.

Standards:
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

Essential Question (Core Concepts)
How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

What makes a tool and/or strategy appropriate for a given task?

How is mathematics used to quantify, compare, represent, and model numbers?

How are relationships represented mathematically?

How can recognizing repetition or regularity assist in solving problems more efficiently?

Objectives (Skills/Knowledge)
- Students will be able to solve multi-step equations and inequalities.
- Students will be able write equations and inequalities to model problem situations.

Vocabulary
Additive Inverse
Algebraic Equation
Coefficient
Multiplicative Inverse
Opposite
Reciprocal
Solution of an Equation
Term
Variable

Activities/Strategies/Study Skills
- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments
Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 3: Linear Equations and Functions

Unit Overview: This unit will focus on graphing, writing, and modeling linear equations. Students will also learn the concept of a function and its properties.

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.4 Interpret the effects transformations have on functions and find the inverses of functions.

CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.

CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.

CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Essential Question (Core Concepts)

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

What makes a tool and/or strategy appropriate for a given task?

How is mathematics used to quantify, compare, represent, and model numbers?

How are relationships represented mathematically?

How can recognizing repetition or regularity assist in solving problems more efficiently?

Objectives (Skills/Knowledge)

- Students will be able to graph and write a linear equation.
- Students will be able to model a situation with a linear equation.
- Students will be able to identify a linear function and state the domain and range of both continuous and discrete functions.

Vocabulary

Dependent Variable
Independent Variable
Domain
Range
Function
Linear Equation
Linear Function
Linear Inequality
Parent Function
Point-Slope Form

Relation
Slope
Slope-Intercept Form
Standard Form
Translation
Vertical Line Test
X - Intercept
Y - Intercept

Activities/Strategies/Study Skills

- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments

Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 4: Systems of Linear Equations

Unit Overview: Students will learn how to solve a system of linear equations by graphing, substitution, and elimination. There will also be a focus on choosing the best method to solve a system of equations. Students will also learn how to create their own system of equations to model a real world scenario and solve it.

Standards:

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Essential Question (Core Concepts)

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

What makes a tool and/or strategy appropriate for a given task?

How is mathematics used to quantify, compare, represent, and model numbers?

How are relationships represented mathematically?

Objectives (Skills/Knowledge)

- Students will be able to solve a system of equations by graphing, substitution, and elimination.
- Students will be able to construct their own system of equations to model a problem situation.

Vocabulary

System of Equations
Solution to a System of Equations
Dependent System
Equivalent System

Activities/Strategies/Study Skills

- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments

Practice worksheets, Desmos Assignments, Quizzes, Unit Test.
Khan Academy & Desmos.

Unit 5: Polynomial Operations

Unit Overview: The main focus of this unit will be adding, subtracting, and multiplying polynomials. How to work with zero exponents, negative exponents, product of powers, quotient of powers, power of a power, and the power of a quotient will also be studied.

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 expressions in equivalent forms to solve problems.

CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.

CC.2.2.HS.D.5 Use polynomial identities to solve problems.

Essential Question (Core Concepts)

How is mathematics used to quantify, compare, represent, and model numbers?

How are relationships represented mathematically?

Objectives (Skills/Knowledge)

- Students will be able to add, subtract, and multiply monomials, binomials, and trinomials.
- Students will be able to simplify and explain why they are able to use the following rules of exponents: zero exponent, negative exponent, product of powers, quotient of powers, power of a power, and quotient of powers.

Vocabulary

Base
Coefficient
Variable
Exponent
Monomial
Binomial
Trinomial
Polynomial
Degree
Constant
Linear
Quadratic
Cubic

Activities/Strategies/Study Skills

- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments

Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 6: Factoring Polynomials

Unit Overview: This unit takes what students learned in unit 5 and makes them work backwards. Students will learn how to factor a polynomial by factoring out a greatest common factor, factor quadratic polynomials, and factor by grouping.

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 expressions in equivalent forms to solve problems.

CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.

CC.2.2.HS.D.5 Use polynomial identities to solve problems.

CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.

Essential Question (Core Concepts)

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

How is mathematics used to quantify, compare, represent, and model numbers?

How are relationships represented mathematically?

What makes a tool and/or strategy appropriate for a given task?

Objectives (Skills/Knowledge)

- Students will be able factor out a greatest common factor from a polynomial.
- Students will be able to factor a quadratic trinomial into two binomials.
- Students will be able to factor a polynomial using the factor by grouping method.

Vocabulary

Difference of Two Squares
Perfect Square Trinomial
Zero Product Property
Zero of Function
Base
Coefficient
Variable
Exponent
Monomial
Binomial
Trinomial
Polynomial
Degree
Constant
Linear
Quadratic
Cubic

Activities/Strategies/Study Skills

- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments

Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 7: Quadratic Functions.

Unit Overview: This unit will introduce quadratic functions to students. Students will learn how to graph, solve, and model with quadratic functions. Students will study the three forms of quadratic functions: intercept form, vertex form, and standard form. Quadratic equations can be solved by factoring, completing the square, taking square roots, and the quadratic formula. They can also be used to model the path of a launched object such as a the flight of a baseball.

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.4 Interpret the effects transformations have on functions and find the inverses of functions.
CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
CC.2.2.HS.D.5 Use polynomial identities to solve problems.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers. A2.1.1.1.1, A2.1.1.1.2, A2.1.1.2.1, A2.1.1.2.2
CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. A2.2.1.1.1, A2.2.1.1.2, A2.2.1.1.3, A2.2.1.1.4

Essential Question (Core Concepts)

How is mathematics used to quantify, compare, represent, and model numbers?

How can mathematics support effective communication?

How are relationships represented mathematically?

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
What makes a tool and/or strategy appropriate for a given task?

How can patterns be used to describe relationships in mathematical situations?

Objectives (Skills/Knowledge)

- Students will be able to graph a quadratic function in standard form, vertex form, and intercept.
- Students will be able to solve a quadratic equation using the quadratic formula, by factoring, completing the square, graphing, and taking a square root.
- Students will be able to model the flight of a baseball and a dropped object using a quadratic equation.

Vocabulary
Difference of Two Squares
Perfect Square Trinomial
Zero Product Property
Zero of Function
Base
Coefficient
Variable
Exponent
Imaginary Number (i)
Monomial
Binomial
Trinomial
Polynomial
Degree
Constant
Linear
Quadratic
Quadratic Formula
Cubic

Activities/Strategies/Study Skills
- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments
Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 8: Rational Expressions, Equations, & Functions.
Unit Overview: Students will study rational functions and their graphs. The unit will start off with student learning how to simplify rational expressions and where they have discontinuities. They will then learn how to graph rational equations. The unit will finish with students learning how to solve a rational equation.

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.6 Interpret functions in terms of the situations they model.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

Essential Question (Core Concepts)
How can mathematics support effective communication?

How are relationships represented mathematically?

What makes a tool and/or strategy appropriate for a given task?

Objectives (Skills/Knowledge)
- Students will be able to simplify a rational expression into its simplest form.
- Students will be able to identify any discontinuities in a rational function and then graph the function.
- Students will be able to solve a rational equation (highest degree is 2).

Vocabulary
Rational Function
Discontinuity
Simplest Form
Vertical Asymptote
Horizontal Asymptote
Hole in a Graph

Activities/Strategies/Study Skills
- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments
Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 9: Graphs, Relations, & Functions.

Unit Overview: In this unit students will study what makes a relation a function. They will also study the different aspects of functions including domain and range of a function. Students will also learn how to use functions to model mathematical situations. Other topics include compound inequalities, absolute value equations and inequalities, and variation.

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.5 Construct and compare linear, quadratic, and exponential models to solve problems.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
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 expressions in equivalent forms to solve problems.
CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Essential Question (Core Concepts)

How is mathematics used to quantify, compare, represent, and model numbers?

How can mathematics support effective communication?

How are relationships represented mathematically?

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

What makes a tool and/or strategy appropriate for a given task?

How can recognizing repetition or regularity assist in solving problems more efficiently?

How can patterns be used to describe relationships in mathematical situations?

How can data be organized and represented to provide insight into the relationship between quantities?

Objectives (Skills/Knowledge)

- Students will be able to graph and write a linear function.
- Students will be able to identify & write the domain and range of both a discrete &continuous functions.
- Students will be able to determine if a relation is also a function.
- Students will be able to make their own linear model for a given situation.
- Students will be able to solve and graph and compound inequality.
- Students will be able to solve an absolute value equation.

Vocabulary
Absolute Value Equation
Compound Inequality
Dependent Variable
Independent Variable
Domain
Range
Function
Relation
Vertical Line Test

Activities/Strategies/Study Skills
- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments
Practice worksheets, Desmos Assignments, Quizzes, Unit Test.

Unit 10: Radical Expressions & Rational Exponents

Unit Overview: Students will begin this unit with an introduction to roots and radical expressions. Next students learn how to multiply and divide radical expressions. Students then study binomial radical expressions and rational exponents. Lastly, students will learn the different techniques to solve a radical equation.

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 expressions in equivalent forms to solve problems.

CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.

CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.

Essential Question (Core Concepts)

How is mathematics used to quantify, compare, represent, and model numbers?

How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

How can patterns be used to describe relationships in mathematical situations?

Objectives (Skills/Knowledge)

- Students will be able to add, subtract, and divide radical expressions.
- Students will be able to simplify an expression with rational exponents.
- Students will be able to solve a radical equation.

Vocabulary

Like Radicals
*N*th Root
Radical Equation
Radicand
Rational Exponent
Square Root Equation

Activities/Strategies/Study Skills

- Khan Academy Videos.
- Desmos Assignments.
- Repetition of math facts.
- Practice worksheets.

Assessments

Practice worksheets, Desmos Assignments, Quizzes, Unit Test.