WARREN COUNTY SCHOOL DISTRICT

PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: Algebra II
Course Number: 00239
Course Prerequisites: Completion of Algebra 1 College Preparatory with at least 60% OR grade of 75% or higher in Algebra IB. This course is limited to teacher recommendation

Course Description: Algebra II is the continuation of Algebra foundational concepts that are integral parts of secondary mathematics courses. This course expands on the foundation of algebraic theory that was begun in Algebra I at a slower pace. It uses practical problems to connect algebra to the real world and applies the theory introduced in Algebra I, going from linear equations and inequalities to complex numbers. It includes the study and applications of quadratics including parabolas. District marking period assessments are required.

Suggested Grade Level: Grades 10-12
Length of Course: Two Semesters
Units of Credit: 1
PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:
CSPG #50 Mathematics (7-12)
To find the CSPG information, go to CSPG
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: 02056
To find the State Course Code, go to State Course Code, download the Excel file for *SCED*, click on SCED 6.0 tab, and choose the correct code that corresponds with the course.

TEXTBOOKS AND SUPPLEMENTAL MATERIALS

Board Approved Textbooks, Software, and Materials:

Title:	*enVision Algebra 2*
Publisher:	SAVVAS Learning Company, LLC.
ISBN #:	978-0-328-93156-9
Copyright Date:	2018
WCSD Board Approval Date:	6/29/2020

Supplemental Materials: *enVision Algebra 1* - SAVVAS Learning Company, LLC., *Big Ideas Math - Algebra 2: A Common Core Curriculum* - Big Ideas Learning, LLC., Kuta Software, Get More Math, SAS pdesas.org, IXL, Brainfuse, Online Calculator: Desmos, Graphing Calculator: TI-83 PLUS

Curriculum Document

WCSD Board Approval:

Date Finalized:	5/23/2022
Date Approved:	6/13/2022
Date(s) Revised:	6/12/2023
Implementation Year:	2022-2023

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, AND CONCEPTS

Marking Period 1: Linear Equations, Functions, and Graphs, and Quadratic Functions: Graphs

- Linear Equations (Review) and Literal Equations/Formulas
- Linear Graphs (Review) and Scatterplots
- Characteristics of Quadratic Graphs
- Quadratic Functions in Vertex Form
- Quadratic Functions in Standard Form
- Features of Functions
- Transformations of Functions
- Application of Vertex Form of a Quadratic Function
- Application of Standard Form of a Quadratic Function
- **Marking Period 1 Review and Assessment**

Marking Period 2: Quadratic Functions and Equations, and Polynomial Functions

- Quadratic Functions: Factored Form
- Complex Numbers and Operations
- Quadratic Solutions: Square Root Method, Quadratic Formula, Factoring
- Graphs of Polynomial Functions
- Polynomials: Addition, Subtraction, Multiplication
- Division of Polynomials
- Zeros of Polynomial Functions
- Theorems about Roots of Polynomial Equations
- **Marking Period 2 Review and Assessment**

Marking Period 3: Rational Exponents and Radical Functions, Exponential and Logarithmic Functions

- nth Roots, Radicals, and Radical Functions
- Properties of Exponents and Radicals
- Graphs of Radical Functions
- Radical Equations
- Function Operations
- Inverse Relations
- Characteristics of Exponential Functions
- Exponential Models: General Exponential Model, Compound Interest
- Logarithms
- Exponential and Logarithmic Equations (SIMPLE)
- **Marking Period 3 Review and Assessment**

Marking Period 4: Rational Functions, Sequences, and Probability

- Rational Expressions: Multiplication, Division
- Rational Expressions: Addition, Subtraction
- Rational Equations
- Sequences
- Arithmetic Sequences
- Geometric Sequences
- Sample Spaces and Probability
- Odds
- Independent and Dependent Events
- Compound Probability
- Permutations and Combinations
- **Marking Period 4 Review and Assessment**

Standards/Eligible Content and Skills

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Review: Solve linear equations: Multi-Step, Variables on Both Sides	A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3	MP1
Solve a literal equation/formula for a given variable	A2.1.3.2.2	MP1
Determine how a change in one variable relates to a change in the second variable (e.g., y = 4/x; if x doubles, what happens to y?)	A2.1.3.2.1	MP1
Review: Graph linear functions: Table of Values, y = mx + b (Slope-Intercept Form)	A1.1.2.1.1 A1.1.2.1.3 A1.2.2.1.1 A1.2.2.1.2 A1.2.2.1.3 A1.2.2.1.4	MP1
Review: Write a linear equation from a graph	A1.2.1.2.1 A1.2.1.2.2	MP1
Draw, identify, find, interpret, and write an equation for a line of best fit for a scatterplot	A2.2.3.1.1	MP1
Make predictions using the equations and graphs of the lines of best fit	A2.2.3.1.2	MP1
Identify a quadratic parent function	A2.2.2.1.1 A2.2.2.2.1	MP1
Understand the graph the function of $f(x) = ax^2$	A2.2.2.2.1	MP1
Compare $f(x) = ax^2$ to the parent $f(x) = x^2$	A2.2.2.2.1 CC.2.2.HS.C.4 CC.2.2.HS.C.5	MP1
Interpret quadratic functions from tables	A2.2.2.2.1	MP1
Apply quadratic functions to model and solve real-world and mathematical problems	A2.2.2.2.1 CC.2.2.HS.D.10	MP1
Understand the graph the function of $f(x) = x^2 + k$	A2.2.2.2.1	MP1
Compare $f(x) = x^2 + k$ to the parent $f(x) = x^2$	A2.2.2.2.1 CC.2.2.HS.C.4 CC.2.2.HS.C.5	MP1
Understand the graph the function of $f(x) = (x – h)^2$	A2.2.2.2.1	MP1
Compare $f(x) = (x – h)^2$ to the parent $f(x) = x^2$	A2.2.2.2.1 CC.2.2.HS.C.4 CC.2.2.HS.C.5	MP1
Understand the graph the function of $f(x) = (x – h)^2 + k$	A2.2.2.2.1	MP1
Compare $f(x) = (x – h)^2 + k$ to the parent $f(x) = x^2$	A2.2.2.2.1 CC.2.2.HS.C.4 CC.2.2.HS.C.5	MP1
Identify the vertex, axis of symmetry, horizontal and vertical translations, and direction of the graph of a quadratic function	A2.2.2.1.1	MP1

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Graph using vertex form	A2.2.2.1.1 A2.2.2.1.4	MP1
Use vertex form to model and solve real-world and mathematical problems	A2.2.2.1.1 CC.2.2.HS.D.10	MP1
Identify the y-intercept, axis of symmetry, and the x-coordinate for the vertex from the standard form of a quadratic function: $f(x) = ax^2 + bx + c$	A2.2.1.1.4 A2.2.2.1.1	MP1
Graph a quadratic function in standard form	A2.2.2.1.1 A2.2.2.1.4	MP1
Compare the properties of quadratic functions	A2.2.2.2.1	MP1
Analyze the structure of different forms of quadratic functions	A2.2.2.2.1	MP1
Understand domain and range	A2.2.1.1.4 A2.2.2.1.1	MP1
Find x- and y-intercepts	A2.2.1.1.4 A2.2.2.1.1	MP1
Identify positive and negative intervals	A2.2.1.1.4 A2.2.2.1.1	MP1
Identify where a function increases or decreases	A2.2.1.1.4 A2.2.2.1.1	MP1
Translate a quadratic function	A2.2.2.1.4	MP1
Reflect a function across the x- or y-axis	A2.2.1.1.4 A2.2.2.1.1	MP1
Understand stretches and compressions	A2.2.1.1.4 A2.2.2.1.1 A2.2.2.2.1	MP1
Graph a combination of transformations	A2.2.2.2.1	MP1
Identify transformations from an equation	A2.2.2.2.1	MP1
Write an equation from a graph	A2.2.2.2.1	MP1
Transform a quadratic function: Direction, Horizontal Translation, Vertical Translation	A2.2.1.1.4 A2.2.2.1	MP1
Determine the key features of a quadratic function: Vertex, Axis of Symmetry, Minimum/Maximum, Domain, Range	A2.2.1.1.4 A2.2.2.1	MP1
Write an equation of a parabola given the key features of a quadratic function	A2.2.1.1.4 A2.2.2.1	MP1
Write an equation of a parabola given the graph	A2.2.1.1.4 A2.2.2.1	MP1
Write an equation of a transformed function	A2.2.1.1.4 A2.2.2.1	MP1
Find the vertex of a quadratic function in standard form	A2.2.1.1.4 A2.2.2.1	MP1
Graph a quadratic function in standard form	A2.2.1.1.4 A2.2.2.1	MP1
Interpret the graph of a quadratic function	A2.2.1.1.4 A2.2.2.1	MP1

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Marking Period 1 Review and Assessment		**MP1**
• Review and demonstrate knowledge of Linear Equations, Functions, and Graphs		MP1
• Review and demonstrate knowledge of Quadratic Functions: Graphs		MP1
Factor quadratic expressions: GCF, Difference of Squares, Trinomial Squares	A2.1.2.2.1	MP2
Relate factors to zeros of a function	A2.1.2.2.1 A2.1.3.1.1 A2.2.1.1.4 A2.2.2.1.1	MP2
Solve quadratic equations by factoring	A2.1.2.2.1 A2.1.3.1.1 A2.2.1.1.4 A2.2.2.1.1	MP2
Find the zeros of a quadratic function	A2.2.1.1.4 A2.2.2.1.1	MP2
Determine positive or negative intervals	A2.2.1.1.4	MP2
Write the equation of a parabola in factored form	A2.1.2.2.1 A2.1.3.1.1 A2.2.1.1.4 A2.2.2.1.1	MP2
Review: Simplify Radicals	A1.1.1.1.2 A2.1.2.1	MP2
Simplify radicals using the imaginary unit i	A2.1.1.1.1 A2.1.2.1	MP2
Simplify and evaluate expressions involving powers of i	A2.1.1.1.2	MP2
Solve a quadratic equation with complex solutions of the form $x^2 = c$, where c is a real number, using square roots	A2.1.1.1.1 A2.1.1.1.2 A2.1.1.2.1 A2.1.2.1	MP2
Add, subtract, and multiply complex numbers with solutions in the form a + bi	A2.1.1.2.1 A2.1.1.2.2	MP2
Simplify a quotient with complex numbers in the form a + bi	A2.1.1.2.1 A2.1.1.2.2	MP2
Use square roots to solve quadratic equations in standard form	A2.1.3.1.1	MP2
Use the quadratic formula to solve quadratic equations	A2.1.3.1.1	MP2
Solve quadratic equations using any method: Square Root Method, Quadratic Formula, Factoring	A2.1.3.1 A2.1.3.1.1 A2.2.2.1.1	MP2
Use the discriminant to identify the number and type of real-number solutions for a quadratic equation	A2.1.3.1.1 A2.2.1.1.4	MP2
Classify polynomials	A2.2.1.1.4 A2.2.2.1.1	MP2

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Identify and determine the characteristics of a polynomial function from a graph: Intervals of Increase/Decrease, Turning Points, Intercepts, Relative Maximums/Minimums	A2.2.1.1.4 A2.2.2.1.3	MP2
Graph a polynomial function using tables/graphing calculators	A2.2.1.1.4 A2.2.2.1.1 A2.2.2.1.3 A2.2.2.1.4	MP2
Add, subtract, and multiply polynomial expressions	A2.1.2.2	MP2
Write and simplify a polynomial function from real-world and mathematical problems	A2.1.2.2 CC.2.2.HS.D.10	MP2
Use long division to divide polynomials	A2.1.2.2	MP2
Use synthetic division to divide polynomials by (x – a)	A2.1.2.2	MP2
Relate P(a) to the remainder of P(x) ÷ (x – a)	A2.1.2.2	MP2
Use the Remainder Theorem to evaluate polynomials with synthetic division	A2.1.2.2 CC.2.2.HS.D.5	MP2
Factor expressions: Grouping, Sum and Difference of Cubes, Quadratic Form	A2.1.2.2.1	MP2
Factor polynomials completely: GCF, Difference of Squares, Trinomial Squares, Grouping, Sum and Difference of Cubes	A2.1.2.2.1	MP2
Check whether (x – a) is a factor of P(x)	A2.1.2.2.1	MP2
Solve a polynomial equation by factoring	A2.1.3.1	MP2
Find real and complex zeros of polynomial functions	A2.1.3.1 A2.2.1.1.4 A2.2.2.1.1 CC.2.2.HS.D.5	MP2
Solve polynomial equations	A2.2.1.1.4 A2.2.2.1.1	MP2
Identify possible rational solutions for polynomial equations	A2.2.1.1.4 A2.2.2.1.1 CC.2.2.HS.D.5	MP2
Use the Rational Root Theorem to solve a polynomial equation to find all the rational roots	A2.2.1.1.4 A2.2.2.1.1 CC.2.2.HS.D.5 CC.2.2.HS.D.10	MP2
Find all complex roots	A2.2.1.1.4 A2.2.2.1.1	MP2
Marking Period 2 Review and Assessment		**MP2**
• Review and demonstrate knowledge of Quadratic Functions and Equations		MP2
• Review and demonstrate knowledge of Polynomial Functions		MP2
Find all real nth roots	A2.1.2.1.1	MP3
Understand rational exponents	A2.1.2.1.1	MP3

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Evaluate expressions with rational exponents	A2.1.2.1.1	MP3
Simplify nth roots	A2.1.2.1.1	MP3
Use nth roots to solve equations	A2.1.3.1.2	MP3
Use nth roots to model and solve real-world and mathematical problems	A2.1.2.1.1 CC.2.1.HS.F.1	MP3
Use properties of exponents	A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3	MP3
Use properties of exponents to rewrite radicals	A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3	MP3
Rewrite the product or quotient of a radical	A2.1.1.2 A2.1.2.1 A2.1.3.1 A2.1.3.1.2	MP3
Add and subtract radical expressions	A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3	MP3
Multiply binomial radical expressions	A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3	MP3
Rationalize a binomial denominator	A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3	MP3
Graph square root functions	A2.2.2.1.4	MP3
Identify characteristics of square root functions: Domain, Range, Increasing/Decreasing	A2.2.1.1.4	MP3
Solve an equation with one radical; check the solutions	A2.1.3.1.2	MP3
Identify extraneous solutions in radical equations	A2.1.3.1.2	MP3
Add and subtract functions	CC.2.2.HS.D.2	MP3
Multiply functions	CC.2.2.HS.D.2	MP3
Divide functions	CC.2.2.HS.D.2	MP3
Compose functions	CC.2.2.HS.D.2	MP3
Determine the domain and range of a relation	A2.2.1.1.3	MP3
Represent the inverse of a relation in a table of values	A2.2.1.1.3	MP3
Find an equation of an inverse relation	A2.2.1.1.3	MP3
Identify domain, range, and intercepts of exponential functions	A2.2.1.1.4 A2.2.2.1.2 A2.2.2.1.3	MP3
Graph an exponential function	A2.2.2.1.4	MP3

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Determine whether a function represents exponential growth or exponential decay	A2.2.1.1.4	MP3
Apply exponential growth and exponential decay formulas in real-world and mathematical problems: General Exponential Model, Compound Interest	A2.1.3.1.4	MP3
Understand logarithms	A2.1.2.1.4	MP3
Convert between exponential and logarithmic forms	A2.1.2.1.4 A2.2.2.1.4	MP3
Evaluate logarithmic expressions	A2.1.2.1.4	MP3
Evaluate common and natural logarithmic expressions	A2.1.2.1.4	MP3
Solve SIMPLE logarithmic equations: Common, Natural	A2.1.3.1.3 A2.2.2.1.2	MP3
Marking Period 3 Review and Assessment		**MP3**
• Review and demonstrate knowledge of Rational Exponents and Radical Functions		MP3
• Review and demonstrate knowledge of Exponential and Logarithmic Functions		MP3
Write equivalent rational expressions	A2.1.2.2.2	MP4
Simplify rational expressions	A2.1.2.2.2	MP4
Multiply and divide rational expressions	A2.1.2.2.2	MP4
Use multiplication and division of rational expressions to model and solve real-world and mathematical problems	A2.1.2.2.2	MP4
Identify the least common multiple (LCM) of polynomials	A2.1.2.2.2	MP4
Add and subtract rational expressions with like and unlike denominators	A2.1.2.2.2	MP4
Model and simplify rational expressions of real-world and mathematical problems	A2.1.2.2.2 CC.2.2.HS.D.10	MP4
Simplify compound/complex fractions	A2.1.3.1.2	MP4
Solve rational equations: Cross Multiplying, Using the Least Common Denominator (LCD)	A2.1.3.1.2	MP4
Identify extraneous solution(s)	A2.1.3.1.2	MP4
Solve rational equations with extraneous solution(s); check the solutions	A2.1.3.1.2	MP4
Model and solve real-world work-rate and rate (speed) problems	A2.1.3.1.2 CC.2.2.HS.D.10	MP4
Write terms in sequence notation from a given function	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Identify and describe patterns in a sequence	A2.2.1.1.1 A2.2.1.1.2	MP4

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Graph a sequence	A2.2.1.1.1 A2.2.1.1.2	MP4
Write a rule for the nth term of a sequence	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Identify and describe an arithmetic sequence	A2.2.1.1.1 A2.2.1.1.2	MP4
Write and use a rule for the nth term of an arithmetic sequence given a sequence	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Write and graph a rule for the nth term of an arithmetic sequence given a term and the common difference	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Write a rule for the nth term of an arithmetic sequence given two terms from a list, graph, and table of values	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Identify and describe a geometric sequence	A2.2.1.1.1 A2.2.1.1.2	MP4
Write and use a rule for the nth term of a geometric sequence given a sequence	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Write and graph a rule for the nth term of a geometric sequence given a term and the common ratio	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Write a rule for the nth term of a geometric sequence given two terms from a list, graph, and table of values	A2.2.1.1.1 A2.2.1.1.2 CC.2.2.HS.C.3	MP4
Find the indicated number of terms of a sequence given the first term and a rule	A2.2.1.1.1 A2.2.1.1.2	MP4
Review: Find sample spaces	A2.2.3.2	MP4
Review: Find theoretical and experimental probabilities	A2.2.3.2	MP4
Identify and determine the odds in favor and/or against occurring	A2.2.3.2.2	MP4
Use odds to find probability and use probability to find odds	A2.2.3.2.2	MP4
Determine whether events are independent events	CC.2.4.HS.B.6	MP4
Find probabilities of independent and dependent events	A2.2.3.2.3	MP4
Find conditional probabilities	CC.2.4.HS.B.6	MP4
Use probability for independent and dependent events to predict outcomes	A2.2.3.2.3	MP4
Use the concepts of independence and conditional probability to interpret data	A2.2.3.2 CC.2.4.HS.B.6	MP4
Find the probabilities of compound events: Disjoint Events(Mutually Exclusive), Overlapping Events	A2.2.3.2.3 CC.2.4.HS.B.7	MP4

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Apply the rules of probability to compute probabilities of compound events in a uniform probability model	A2.2.3.2 CC.2.4.HS.B.7	MP4
Use probability for compound events to predict outcomes	A2.2.3.2.3	MP4
Use the Fundamental Counting Principal to determine the number of outcomes	A2.2.3.2.1	MP4
Find the number of permutations	A2.2.3.2.1	MP4
Find the number of combinations	A2.2.3.2.1	MP4
Use permutations and combinations to find probabilities of real-world and mathematical problems	A2.2.3.2.1	MP4
Marking Period 4 Review and Assessment		**MP4**
• Review and demonstrate knowledge of Rational Functions		MP4
• Review and demonstrate knowledge of Sequences		MP4
• Review and demonstrate knowledge of Probability		MP4

ASSESSMENTS

PDE 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:

- Pre-assessments of prior knowledge (e.g., Entrance cards or KWL chart)
- Bellringers/Problems of the Day (PODs)
- Discussions
- Exit ticket
- Teacher observations/Questioning
- Graphic organizers (e.g., Venn Diagrams, word mapping, webbing, KWL chart, etc.)
- Outlining
- Cooperative learning
- Written work
- Quizzes
- Oral response
- Self-evaluation
- Homework
- Summarizing
- Note-taking

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
- Chapter/unit tests
- Quizzes
- Marking period assessments
- Projects
- Student presentations