PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Algebra 2 & Trigonometry

Curriculum Writing Committee:

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Grade Level: 10, 11

Date of Board Approval: _____

Course Weighting: Algebra 2 & Trigonometry

	1st	2nd	3rd	4th	Total Points	Total Percentages
Quizzes	100	100	100	100	400	25%
Tests	250	250	200	300	1000	62.5%
Constructed Response Questions/Graded Assignments	20	20	20	20	80	5%
Homework/Participation	30	30	30	30	120	7.5%
Total	400	400	350	450	1600	100%

Curriculum Map

Overview: This academic course for college bound students ~~This rigorous course~~ is designed to continue the study and application of algebraic principles from Algebra 1 and extended in Geometry. Students will be challenged with abstract problems and applications as they study and apply linear and quadratic functions, polynomial functions, exponential functions, inverse functions, logarithmic functions, circular trigonometry and trigonometric relationships, ~~matrices~~, and functions involving real and complex solutions. Students will apply concepts learned in this course to ~~learn to~~ model real–world situations. ~~using the mathematics studied in the course. Material will be covered more deeply and at a faster pace than in the Algebra 2 and Trigonometry course.~~

Time/Credit for the Course: Full Year, 1 credit

Goals:

- **Marking Period 1 (45 Days) –** Students will be able to understand the following:
  - **Unit 0: Data Analysis –** ***Ongoing throughout MP1 (Warm–Ups)***
    - Calculating probability (both simple and compound probability)
    - Analyzing data using measure of center and spread
  - **Unit 1: Fundamentals of Algebra – 18 Days**
    - Properties of real numbers
    - Solving equations and inequalities in one variable
    - Solving absolute value equations and inequalities in one variable

        - Relations and Functions
        - Domain and Range of continuous and discrete functions (using both interval and set notation)
        - Evaluating functions using function notation
        - Identify characteristics of functions (e.g., intervals of increase/decrease, and intercepts)

    - **Unit 2: Linear Functions – 18 Days**
        - Linear functions (graphically and algebraically)
        - Applications linear functions (graphically and algebraically)
        - Applications of linear models including scatter plots and lines of best fit
        - ~~Absolute value and~~ Piece–wise functions
        - Absolute value functions and their transformations

    - **Unit 3: Systems of Linear Equations and Inequalities – 9 Days**
        - ~~Relations and functions~~
        - ~~Transformations of functions~~
        - Solving systems of equations algebraically and graphically
        - Graphing linear inequalities
        - Solving and graphing systems of inequalities
        - Applications of systems of equations

- **Marking Period 2 (45 Days) –** Students will be able to understand the following:
    - ~~**Unit Three Systems of Equations (Continued): 4 Days**~~
        - ~~Linear Programming~~

    - ~~**Unit Four Introduction to Matrices: 14 Days**~~
        - ~~Matrices both with and without a graphing calculator (operations, inverses, and matrix solutions with linear systems)~~
        - ~~Solving systems of equations using augmented matrices, matrix inverses, or Cramer's Rule~~

    - **Unit 4: Quadratics – 25 Days**
        - Graphs of quadratic functions, ~~including transformations~~ (from standard and vertex forms)
        - Identify characteristics of quadratic function (e.g., intervals of increase/decrease, intercepts, and zeros)
        - Solving quadratic equations by graphing, factoring, taking the square root, completing the square, and quadratic formula
        - Real and complex roots of quadratic functions and the discriminant
        - Applications of quadratic functions
        - Operations with complex numbers

    - ~~**Unit 5: Exponents and Radicals – 15 Days**~~
        - ~~Graphs of quadratic functions, including transformations~~

        - ~~Identify characteristics of quadratic function (e.g., intervals of increase/decrease, intercepts, and zeros)~~
        - ~~Solving quadratic equations by graphing, factoring, taking the square root, completing the square, and/or quadratic formula~~
        - ~~Real and complex roots of quadratic functions~~
        - ~~Applications of quadratic functions~~
        - ~~Operations with complex numbers~~

    - **Unit 5: Introduction to Polynomials – 20 Days**
        - Operations with polynomials including adding, subtracting, and multiplying ~~long division~~
        - ~~Pascal's triangle and binomial expansion~~
        - Expressions involving exponents
        - Division of polynomial functions using long and synthetic division
        - Real and complex roots of polynomial functions
        - Factor Theorem and Remainder Theorem
        - Factoring quartics in quadratic form and by grouping
        - Solving quartic and quintic equations

- **Marking Period 3 (45 Days) –** Students will be able to understand the following:
    - ~~**Unit Six Exponents and Radicals (Continued): 7 Days**~~
        - ~~Expressions involving rational exponents (continued)~~
        - ~~Roots and radical expressions~~
        - ~~Operations on radical expressions~~
        - ~~Solving radical equations~~

    - **Unit 6: Radicals and Inverses – 20 Days**
        - Function operations, including composition of functions
        - Inverse relations and functions
        - Expressions involving rational exponents
        - Roots and radical expressions
        - Operations with radical expressions and rational exponents
        - Solving radical equations

    - **Unit 7: Exponential and Logarithmic Functions – 25 Days**
        - ~~Function operations, including composition of functions~~
        - ~~Inverse relations and functions~~
        - Graphs of exponential and logarithmic functions
        - Identify characteristics of exponential and logarithmic functions (e.g., intervals of increase/decrease, intercepts, zeros and asymptotes)
        - Properties of logarithms
        - Natural logarithms
        - Solving exponential and logarithmic equations
        - Applications of exponential and logarithmic functions

- ~~**Unit 7: Polynomials – 20 Days**~~
  - ~~Operations with polynomials including long division~~
  - ~~Pascal's triangle and binomial expansion~~
  - ~~Factor and remainder theorems~~
  - ~~Real and complex roots of polynomial functions~~
  - ~~Factoring cubics~~
  - ~~Factoring quartics in quadratic form~~

- **Marking Period 4 (45 Days) –** Students will be able to understand the following:
  - **Unit 8: Rational Functions – 10 Days**
    - Simplifying rational expressions
    - Operations on rational expressions
    - Solving rational equations
    - ~~Graphs of rational functions~~

  - ~~**Unit 9: Linear Functions – 19 Days**~~
    - ~~Calculating probability (simple, compound and conditional probability) include those that require combinations, permutations and the fundamental counting principle~~
    - ~~Use odds to find probability and/or use probability to find odds~~
    - ~~Analyzing data using measures of center and spread~~

  - **Unit 9: Trigonometry – 35 Days (Includes Final Review/Exam)**
    - ~~Distance and midpoint formulas~~
    - ~~Describing circles algebraically and graphically~~
    - Measuring angles in degrees and radians
    - Trigonometric functions and the Unit Circle
    - Applications of Trigonometry
    - ~~Analyzing the graphs of trigonometric functions~~

Big Ideas:

- **Big Idea #1**: Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.
- **Big Idea #2**: Mathematical relationships among numbers can be represented, compared, and communicated.
- **Big Idea #3**: Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.
- **Big Idea #4**: Patterns exhibit relationships that can be extended, described, and generalized. Data can be modeled and used to make inferences.

Textbook and Supplemental Resources:

- **Primary Textbook Name:** Glencoe Algebra 2
  - **Textbook ISBN:** 978–0–07–903990–3
  - **Textbook Publisher/Year of Publication:** McGraw–Hill Education, 2018

- **Supplemental Resources:**
  - Kuta Software
  - Teacher–Generated Worksheets
  - Mathmedic Worksheets
  - Desmos Interactive Activities
  - DeltaMath Activities
  - Graphing Calculator: TI–84 and Desmos
  - TI Smart View Software
  - Teacher–developed SAT Question Bank
  - College Board's SAT Suite
  - Khan Academy
  - Smart Notebook Gallery Essentials
  - Geometer's Sketchpad
  - IXL

Curriculum Plan

Unit 0 ~~11~~: Data Analysis *(Ongoing throughout MP1)*

- **Standards:**
  - CC.2.4.HS.B.6 – Use the concepts of independence and conditional probability to interpret data.
  - CC.2.4.HS.B.7 – Apply the rules of probability to compute probabilities of compound events in a uniform probability model.

Objectives:

- Students will be able to specify the sample space for a random experiment and calculate the probability that a given event will occur. (DOK – Level Two)
- Students will be able to ~~determine when to~~ use ~~factorials,~~ the fundamental counting principle~~, a permutation, or combination of n elements~~ to find the total number of possible outcomes of an experiment. (DOK – Level Three)
- Students will be able to calculate the probability of mutually exclusive events and of dependent and independent events. (DOK – Level Two)
- Students will be able to calculate, compare, and interpret mean, median, mode, range, and standard deviation for quantitative variables. (DOK – Level Three)
- ~~Students will be able to identify a set of data that is normally distributed. (DOK – Level One)~~

Core Activities and Corresponding Instructional Methods:

- Build math language/vocabulary used in Data Analysis including *sample space*, *mutually exclusive events*, *dependent versus independent events*, ~~*factorial*~~, and *outlier.*
    - Teachers will use appropriate language to describe concepts and processes used in probability and statistics.
    - During class discussions and investigations, teachers will encourage and guide students to use appropriate math terminology.
    - Writing activities incorporating appropriate math language
    - IXL, DeltaMath, or Kuta software
    - Suggested Activities:
        - Glencoe *Algebra 2*, Lessons 4, 5 and 6 on pages P9–P19
        - SAT data analysis and probability questions

- Develop students' skills in calculating the probability of both simple and compound events, using ~~factorials,~~ fundamental counting principle~~, permutations, or combinations when needed~~ to determine the number of total possible outcomes.
    - Direct instruction as needed using Smart Technology, ~~online~~ textbook, and resources
    - Guided practice
    - Cooperative learning groups
    - IXL, DeltaMath, or Kuta software
    - Suggested Activities:
        - Glencoe *Algebra 2*, Lessons 4, 5 and 6 on pages P9–P19
        - SAT data analysis and probability questions

- ~~Develop students' ability to analyze the characteristics of a data set using measures of center and spread, including data that is normally distributed.~~
    - ~~Direct instruction as needed using Smart Technology and online textbook and resources~~
    - ~~Guided practice~~
    - ~~Cooperative learning groups~~

Assessments:

- **Diagnostic:**
    - ~~Teacher prepared pre-test/diagnostic test~~
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework

- Exit tickets
- Group activities
- IXL, Deltamath, or Kuta software
- Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
  - Common Assessment for Unit 0 ~~11~~
    - Given as a common quiz after completing mini lessons in warm–ups.

- **Corrective:**
  - Chapter 8 Study Guides and Interventions

- **Extensions:**
  - H.O.T. problems – Glencoe *Algebra 2*, pages 536, 543, 549, 558, 564, 577
  - Chapter 8 Enrichment Activities

Unit 1: Fundamentals of Algebra (18 Days)

- **Standards:**
  - CC.2.1.HS.F.2 – Apply properties of rational and irrational numbers to solve real–world or mathematical problems.
  - CC.2.1.HS.F.4 – Use units as a way to understand problems and to guide the solution of multi–step 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.6 – Extend the knowledge of rational functions to rewrite in equivalent forms.
  - 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.2.2.HS.D.10 – Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
  - CC.2.4.HS.B.3 – Analyze linear models to make interpretations based on the data.
  - CC.2.2.HS.C.1 – Use the concept and notation of functions to interpret and apply them in terms of their context.

Objectives:

- Students will be able to identify and apply properties of real numbers. (DOK – Level One)
- Students will be able to apply the order of operations to simplify numerical expressions and to simplify and/or evaluate algebraic expressions. (DOK – Level Two)
- Students will be able to apply how algebraic, set, and interval notation can be used to describe collections of objects, specifically numbers. (DOK – Level Two)
- Students will be able to determine the values that are included and excluded given a visual or algebraic expression. (DOK – Level Two)
- Students will be able to solve algebraic equations or inequalities in one variable, including compound inequalities, graphing the solution on a number line when required. (DOK – Level Two)
- Students will be able to solve a literal equation for the designated variable, i.e. solve for one variable in terms of another. (DOK – Level Two)
- Students will be able to solve absolute value equations and inequalities, graphing the solution on a number line when required. (DOK – Level Two)
- Students will be able to find the domain and range from discrete and continuous functions given a graph, mapping diagram, relation and table of values. (DOK – Level Two)
- Students will be able to identify if a relation is a function. (DOK – Level One)
- Students will be able to evaluate functions using function notation. (DOK – Level Two)
- Students will be able to identify characteristics of a function (e.g. intervals over which it is increasing, decreasing or constant).

Core Activities and Corresponding Instructional Methods:

- Expose students' prior knowledge of properties of real numbers, as well as other fundamental Algebra 1 skills (real number system subsets and properties, simplifying and/or evaluating algebraic expressions, solving linear equations, linear inequalities.~~, including absolute value equations and inequalities).~~
    - Questioning
    - Direct instruction (as needed) using SMART Technology and online textbook resources
    - Guided practice
    - Cooperative learning groups with mathematical discussions using vocabulary from the chapter: expression, inequality, absolute value
    - IXL, Deltamath, or Kuta software
    - Suggested Activities:
        - Desmos: Solving Equations Escape Room
        - Algebraic Expressions Order of Operations Evaluating
        - Properties of Real Numbers
        - Subsets of reals and properties of reals
        - Solving Linear Equations
        - Solving Linear Inequalities
        - Glencoe *Algebra 2*, Lesson 1–1, Page 9, #35–42

- ~~Develop students' ability to express solutions in interval and set notations. *Future unit~~
    - ~~Suggested notes and practice exercises: "What are the Rules at Zaxby's?"~~
    - ~~Direct instruction using Smart Technology and resources.~~
    - ~~Guided practice using online resources and worksheets.~~
    - ~~Cooperative learning groups~~
    - ~~IXL and/or Deltamath~~

- Develop students' skills in solving absolute value equations, absolute value inequalities, compound inequalities and solving problems by applying algebraic processes.
    - Suggested Notes and Practice Exercises: Exploring Absolute Value
    - Direct instruction using SMART Technology and resources
    - Guided practice using online resources and worksheets
    - Cooperative learning groups
    - IXL and/or Deltamath and/or Kuta software assignments on exploring absolute value and inequalities
    - Suggested Activities:
        - Solving Absolute Value Equations
        - Solving Absolute Value Inequalities
        - Solving compound inequalities
        - Glencoe *Algebra 2*, Lesson 1–1, Page 12, #73

- Develop students' skills in identifying functions, their domain and range and characteristics.

    - Suggested Notes and Practice Exercises: Notes on Function Notation, Notes on Domain and Range of a Function
    - Direct instruction using SMART Technology and resources
    - Guided practice using online resources and worksheets
    - Cooperative learning groups
    - IXL, Deltamath, or Kuta software assignments on exploring absolute value and inequalities
    - Suggested Activities:
        - Domain and Range Skills Practice
        - Functions Practice
        - Applications of Functions
        - Glencoe *Algebra 2*, Lesson 0–1, Pages P4&P5

- Develop students' ability to solve real–world applications by applying their understanding of various equations, inequalities, and functions.
    - ~~Suggested notes and practice exercises:~~
        - ~~Notes: Functions in the Real World~~
        - ~~Notes/Practice: Models and Applications~~
    - Direct instruction using SMART Technology and ~~online~~ textbook and resources
    - Guided practice using online resources and worksheets. Cooperative learning groups with discussions on open–ended Keystone examples from Math Department Keystone Review Bank
    - IXL and/or Deltamath and/or Kuta software assignments on solving real world applications
    - Suggested Activities
        - Linear Equation Applications
        - Linear Inequalities Applications

Assessments:

- **Diagnostic:**
    - ~~Teacher prepared Pre Test/Diagnostic Test for Unit 1~~
    - Teacher Questioning and Observation
    - Keystone Algebra 1 Exam Results

- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL/Deltamath and/or Kuta software
    - Teacher prepared assessments (quizzes, tests, and graded assignments) for Unit 1

- **Summative:**

    - Unit 1 Common Assessment

- **Correctives:**
    - Study Guide and Interventions 1–1
    - Study Guide and Interventions 1–2
    - Study Guide and Interventions 2–1

- **Extensions:**
    - Optimization with Linear Programming – Glencoe *Algebra 2*, page 60–66
    - H.O.T. problems – Glencoe *Algebra 2*, page 11 and 18
    - Enrichment Activity 1–1
    - Enrichment Activity 1–2
    - Enrichment Activity 2–1

Unit 2: Linear Functions (18 Days)

- **Standards:**
  - CC.2.1.HS.F.3 – Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays
  - CC.2.1.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.B.2 – Summarize, represent, and interpret data on two categorical and quantitative variables
  - CC.2.2.HS.B.3 – Analyze linear models to make interpretations based on the data.

Objectives:

- Students will be able to graph an equation by plotting points on a coordinate plane, correctly identifying/labeling both axes, the origin, and the appropriate quadrant. (DOK – Level Two)
- ~~Students will be able to use graphing calculators to graph equations as they begin to explore the features of a graphing calculator. (DOK – Level Two)~~
- Students will be able to interpret story graphs and to sketch the graph given a real–world situation with two related variables. (DOK – Level Two)
- Students will identify the independent and dependent variables of a model. (DOK – Level One)
- ~~Students will be able to solve linear equations or rational equations (multiplying by the common denominator), recognizing equations with no solution or equations classified as identities. (DOK – Level Three)~~
- Students will be able to apply their skills to develop mathematical models to solve real–world problems. (DOK – Level Four)
- ~~Students will be able to solve a literal equation for the designated variable, i.e. solve for one variable in terms of another. (DOK – Level Two)~~
- ~~Students will be able to identify the domain and/or range of a relation and to determine whether a given relation is a function. (DOK – Level Three)~~
- ~~Students will be able to evaluate a function. (DOK – Level Two)~~
- Students will be able to analyze the graph of a function by identifying the intercepts, ~~zeros and maximum (or minimum) values of the function~~, determining whether the function is increasing, decreasing, or constant. ~~and whether the function is even or odd.~~ (DOK – Level Four)
- Students will be able to graph piece–wise functions and to write the equation of a piece–wise function given the graph. (DOK – Level Two)

- Students will be able to determine the slope of a line given the graph, a linear equation in any form, or two points. (DOK – Level Two)
- Students will be able to construct the equation of a line given a graph, a point and the slope, two points, a line parallel and/or a line perpendicular in point slope form, slope intercept form and standard form. (DOK – Level Three)
- Students will be able to produce and use the line of best fit given a scatterplot. They will also be able to use graphing calculators to graph the data and produce the regression equation. (DOK – Level Two)
- Students will be able to graph an absolute value function from vertex form. (DOK – Level Two)
- Students will be able to identify the vertex of an absolute value function from vertex form. (DOK – Level One)
- Students will be able to identify any horizontal and vertical shifts of an absolute value function from vertex form. (DOK – Level One)
- Students will be able to identify any reflections and vertical stretches/compressions of an absolute value function from vertex form. (DOK – Level Two)

Core Activities and Corresponding Instructional Methods

- ~~Build math language/vocabulary including *relation, function, domain, range.*~~
  - ~~Teachers will use appropriate language to identify algebraic terms and processes.~~
  - ~~During class discussions and investigations, teachers will encourage and guide students to use appropriate math terminology.~~
  - ~~Writing activities incorporating appropriate math language~~
  - ~~IXL and/or Deltamath~~

- Build students' ability to analyze graphs of functions, specifically by identifying significant points on the graph and through transformation of the function.
  - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
  - Guided practice using the TI–84 graphing calculator or Desmos
  - Cooperative learning groups
  - IXL, Deltamath, or Kuta software
  - Suggested Activities:
    - Glencoe *Algebra 2*, Lesson 2–5, pages 118–124 (8–11, 24–29, 31, 33–34)
    - Textbook Resources 2–5
    - Kuta generated additional practice graphing absolute value functions with different transformations.

- Expose students' prior knowledge of graphing linear functions and writing equations of lines in slope–intercept form, point–slope form, and standard form, including the line of best fit.
  - ~~Diagnostic assessment,~~ Questioning techniques

- Cooperative learning groups
- Direct instruction, as needed, using Smart Technology and ~~online~~ textbook and resources.
- Guided practice
- Suggested Activities ~~notes and practice problems~~:
  - Linear Relationships
  - Point–Slope Form
  - Standard Form
  - Parallel and Perpendicular Lines
  - Linear Models
  - Linear Regression
  - Glencoe *Algebra 2*, Lesson 1–3, Pages 21–27(#1–35)
  - Glencoe *Algebra 2*, Lesson 1–4, Pages 28–34(#1–38)
  - Glencoe *Algebra 2* Textbook Resources
  - Suggested Activity: Scatter Plot labs – create and analyze a scatter plot by finding the line of best fit.
    - Gather student data, ex. height vs wingspan
    - Create and describe the scatter plot for two–variable data.
    - Interpret the slope and y–intercept of a line of best fit.
    - Make a prediction using the line of best fit.

- ~~Expose students' prior knowledge of functions and notation, guiding students to add, subtract, multiply and divide functions as well as find the composition of two functions.~~
  - ~~Suggested notes and practice problems: Function Composition~~
  - ~~Direct instruction as needed using Smart Technology and online textbook and resources~~
  - ~~Guided practice~~
  - ~~Cooperative learning groups~~

- Develop students' ability to graph and write piecewise functions.
  - ~~Diagnostic assessment, q~~Questioning techniques
  - Cooperative learning groups
  - Direct instruction, as needed, using Smart Technology, ~~online~~ textbook, and resources.
  - Guided practice
  - Suggested Activities ~~notes and practice problems~~:
    - Piecewise Functions
    - Glencoe *Algebra 2*, Lesson 2–5, pages 118–124 (#1–4, #12–19, #30, #37–38)

- Textbook resources 2–5
- Kuta generated additional practice graphing piecewise functions.

Assessments:

- **Diagnostic:**
  - ~~Teacher prepared pre-test/diagnostic test~~
  - Teacher questioning and observation
  - Keystone Algebra 1 Exam

- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL, Deltamath,or Kuta software
  - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
  - Unit 2 Common Assessment

- **Correctives:**
  - Study Guide and Intervention 1–3
  - Study Guide and Intervention 1–4
  - Study Guide and Intervention 2–5

- **Extensions:**
  - Optimization with Linear Programming – Glencoe *Algebra 2*, pages 60–66
  - H.O.T. problems – Glencoe *Algebra 2*, pages 26, 33 and 123
  - Enrichment Activity 1–3
  - Enrichment Activity 1–4
  - Enrichment Activity 2–5

Unit 3: Systems of Equations & Inequalities (9 Days)

- **Standards:**
  - CC.2.1.HS.F.3 – Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays
  - CC.2.1.HS.F.4 – Use units as a way to understand problems and to guide the solution of multi–step problems.
  - 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.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.2.2.HS.D.10 – Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Objectives:

- Students will be able to graph a linear equation in two variables or linear inequality in two variables from any form (slope–intercept form, point–slope form, or standard form). (DOK – Level Two)
- Students will be able to write the equation of a line in slope–intercept form, point–slope form, or standard form given the graph, a point, and the slope, or two points. (DOK – Level Two)
- ~~Students will be able to produce and use the line of best fit given a scatterplot. They will also be able to use graphing calculators to graph the data and produce the regression equation. (DOK – Level Two)~~
- Students will be able to write the equations of lines that are parallel or perpendicular to a given line and to determine whether two given lines are parallel, perpendicular, or neither. (DOK – Level Two)
- Students will be able to write and solve linear equations that model real–world applications. (DOK – Level Three)
- ~~Students will be able to determine whether a linear system of equations is consistent or inconsistent, dependent, or independent. (DOK – Level Two)~~
- Students will be able to solve a system of linear equations both graphically and algebraically (substitution or elimination method). (DOK – Level Two)
- Students will be able to graph linear inequalities. (DOK – Level Two)
- Students will be able to solve a system of linear inequalities by graphing. (DOK – Level Two)
- ~~Students will be able to model a real–world situation using linear programming by developing an objective function and its constraints, graphing the feasible region, and~~

~~finding the points of intersection of these constraints which will be the maximum and minimum values of the objective function. (DOK – Level Four)~~

Core Activities and Corresponding Instructional Methods

- Develop students' skills in solving a system of linear equations by graphing, using the substitution method, or using the elimination method.
    - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
    - Suggested notes and practice:
        - Graphing and Substitution
        - Elimination
        - Textbook Resources:
            - 1–6 Solving Systems of Equations
        - Glencoe *Algebra 2*, Lesson 1–6, pages 42–51 ,# 3–8, 13–27
        - Kuta generated additional practice graphing systems of equations and inequalities.
    - Guided practice including problems using TI–84 graphing calculator or Desmos
    - Cooperative learning groups
    - IXL, Deltamath, or Kuta software
- Develop students' skills in graphing linear inequalities and systems of linear inequalities.
    - Direct instruction using Smart Technology, textbook, and resources
    - Cooperative learning groups
    - Guided practice
    - IXL, Deltamath, or Kuta software
    - Suggested practice:
        - Textbook Resources:
            - 1–5 Graphing Linear Inequalities
            - 1–7 Solving Systems of Inequalities by Graphing
        - Glencoe *Algebra 2*, Lesson 1–5, pages 35–39, #1–4, 6–11
        - Glencoe *Algebra 2*, Lesson 1–7, pages 52–58, #1–6, 7–15
- Develop students' ability to solve real world problems by applying their understanding of linear functions, systems of linear equations, and systems of linear inequalities.
    - Direct instruction using Smart Technology, textbook, and resources.
    - Cooperative learning groups
    - Guided practice
    - IXL, Deltamath, or Kuta software
    - Suggested practice:
        - Textbook Resources
            - Word Problem Practice: Graphing Linear Inequalities
            - Word Problem Practice: Solving Systems of Equations

        - Word Problem Practice: Solving Systems of Inequalities by Graphing

- Linear Programming Lab: Find the maximum and minimum of an objective function given linear constraints given a real–world situation.
    a. Suggested Activity: Linear Programming
    b. Write the constraints and the objective function given the situation.
    c. Find the feasible region using graph paper or Desmos.
    d. Find the optimization point (maximum or minimum) using the vertices and the objective function.

Assessments:

- **Diagnostic:**
    - Teacher prepared pre–test/diagnostic test
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL, Deltamath, or Kuta software
    - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
    - Unit 3 Common Assessment

- **Correctives:**
    - Study Guide and Interventions
        - Graphing Linear Inequalities
        - Solving Systems of Equations
        - Solving Systems of Inequalities by Graphing

- **Extensions:**
    - Optimization with Linear Programming – Glencoe *Algebra 2*, pages 60–66
    - H.O.T. problems – Glencoe *Algebra 2*, pages 33, 38, 50, 57, 65
    - Textbook Enrichment Activities:
        - Solutions to Non–Linear Equations
        - Limits
        - Creative Designs

Unit 4: Introduction to Matrices: 14 Days

Standard(s):
CC.2.1.HS.F.3, CC.2.1.HS.F.4, CC.2.2.HS.C.2, CC.2.2.HS.C.3, CC.2.2.HS.C.5, CC.2.2.HS.C.6, CC.2.2.HS.D.2, CC.2.2.HS.D.3, CC.2.2.HS.D.5, CC.2.2.HS.D.8, CC.2.2.HS.D.9, CC.2.2.HS.D.10

Anchor(s): A1.1.2.1, A1.2.1.2, A2.2.2.1

Eligible Content:
A1.1.2.1.1 Write, solve and/or apply a linear equation (including problem situations).
A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving process (linear equations only).
A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only).
A1.2.1.2.1 Create, interpret and/or use the equation, graph, or table of a linear function.
A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table, and equation).
A2.2.2.1.1 Create, interpret and/or use the equation, graph, or table of a polynomial function (including quadratics).
A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table, and equation).

Goals: Students will solve a system of linear equations using three additional methods: augmented matrices, matrix inverses, or Cramer's Rule. Students will also be able to complete operations with matrices, find the matrix inverse, and solve matrix equations.

Objectives:

1. Students will be able to use an augmented matrix to solve a system of equations in more than two variables, including systems with no solution or systems with infinite solutions. (DOK – Level Three)
2. Students will be able to determine the dimension (order) of a matrix and the element in a specified row and column and to recognize the zero matrix, the identity matrix, and square matrices. (DOK – Level One)
3. Students will be able to complete operations with matrices (addition, scalar multiplication, and multiplication). (DOK – Level Two)

4. Students will be able to find the multiplicative inverse of a matrix using row operations to transform the given matrix to the identity matrix. (DOK – Level Two)
5. Students will be able to find the determinant of a 2 × 2 matrix. (DOK – Level One)
6. Students will be able to solve matrix equations. (DOK – Level Two)
7. Students will be able to solve a linear system using matrix inverses or Cramer's Rule. (DOK – Level Two)
8. Students will be able to use graphing calculators to complete operations with matrices, find the determinant or inverse, and solve systems using matrices. (DOK – Level Two)
9. Students will be able to mathematically model a real–world situation using a system of linear equations and to solve that problem using any of the following methods: graphing, substitution, elimination, augmented matrices, matrix inverses, or Cramer's Rule. (DOK – Level Four)

Core Activities and Corresponding Instructional Methods:

1. Develop students' skills and understanding of matrices both with and without a calculator (operations with matrices, determinant, inverses, matrix equations, and matrix solutions to linear systems which includes Cramer's Rule).
    a. Direct instruction using Smart Technology, online textbook, and resources.
    b. Suggested notes and practice problems:
        i. Introduction to Matrices
        ii. Matrix Addition
        iii. Matrix Multiplication
        iv. Identities and Inverse Matrices
        v. Cramer's Rule
    c. Guided practice
    d. Cooperative learning groups
    e. Suggested Activity: Cryptography project (Code and decode secret messages using the inverse of function.

Assessments:

Diagnostic:

Teacher prepared pre–test/diagnostic test
Teacher questioning and observation
Keystone Algebra 1 Exam

~~Formative:~~

- ~~Teacher observations, questioning techniques, and discussions~~
- ~~Homework~~
- ~~Exit tickets~~
- ~~Group activities~~
- ~~IXL/Deltamath~~
- ~~Teacher prepared assessments (quizzes, tests, and graded assignments)~~

~~Summative:~~

- ~~Common Assessment for Unit 4~~

Unit 4: Quadratic Functions (25 Days)

- **Standards:**
  - CC.2.1.HS.F.3 – Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays
  - CC.2.1.HS.F.4 – Use units as a way to understand problems and to guide the solution of multi–step problems.
  - CC.2.1.HS.F.6 – Extend the knowledge of arithmetic operations and apply to complex numbers.
  - CC.2.1.HS.F.7 – Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.
  - 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 situation 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.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.2.2.HS.D.10 – Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Objectives:

- Students will be able to graph a quadratic function in standard form or vertex form without a calculator (identifying the vertex, orientation, axis of symmetry, intercepts, and maximum or minimum values). (DOK – Level Three)
- Students will be able to use the graphing calculator to identify key features of a quadratic function. (DOK – Level Two)
- Students will be able to identify specific transformations (horizontal shift, vertical shift, vertical stretch or compression) of a quadratic function in vertex form with or without a graphing calculator. (DOK – Level Two)

- Students will be able to factor quadratic equations (greatest common factor, factor by grouping, trinomials including those with a leading coefficient other than one, recognizing special cases such as the difference of two perfect squares or perfect square trinomials). (DOK – Level Three)
- Students will be able to solve a quadratic equation by factoring, or by taking the square root of both sides, completing the square and using quadratic formula. (DOK – Level Three)
- ~~Students will be able to simplify radicals (specifically square roots), rationalizing the denominator when necessary. (DOK – Level Two)~~
- Students will be able to simplify, add, subtract, multiply, and divide complex numbers, using the complex conjugate when required. (DOK – Level Two)
- ~~Students will be able to solve quadratic equations by completing the square or using the quadratic formula. (DOK – Level Three)~~
- Students will be able to use the discriminant to describe the type of solutions (real or imaginary, rational, or irrational) of a quadratic equation. (DOK – Level Two)
- Students will be able to write the quadratic equation in vertex form given points on the graph, the vertex, or the x–intercepts. (DOK – Level Four)
- Students will be able to convert from vertex form to standard form as well as from standard form to vertex form of a quadratic function by completing the square. (DOK – Level Three)
- ~~Students will be able to write the quadratic equation given three points on the function using a system of equations and matrices. (DOK – Level Four)~~
- Students will be able to apply their understanding of quadratic functions to model real–world situations and solve word problems. (DOK – Level Four)

Core Activities and Corresponding Instructional Methods

- Expose students' prior knowledge of functions and graphing in the coordinate plane, guiding students to graph quadratic functions. Investigate the properties of quadratic functions.
    - ~~Diagnostic assessment,~~ Questioning techniques
    - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
    - Suggested notes and practice:
        - Characteristics of a Parabola
        - Textbook Resources:
            - 3–1 Practice: Graphing Quadratic Functions
        - Glencoe *Algebra 2*, Lesson 3–1, pages 151–159
        - Kuta generated additional practice graphing quadratic functions
    - Guided practice including problems using TI–84 graphing calculator or Desmos
    - Cooperative learning groups
    - IXL, Deltamath, or Kuta software
- Build math language/vocabulary (vertex, axis of symmetry, degree, zeros/roots, etc.).

- Teachers will use appropriate language to identify algebraic terms and processes.
- During class discussions and investigations, teachers will encourage and guide students to use appropriate math terminology.
- ~~Writing activities incorporating appropriate math language.~~
- Suggested Activity:
  - Amplify/Desmos:
    - Two Truths and a Lie

- Develop students' skills in solving quadratic functions by graphing, factoring, taking the square root, completing the square, and using the quadratic formula.
  - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
  - Graphing activity using TI–Smartview, guiding students to find the appropriate window to view the graph and identifying properties of the graph.
  - Cooperative learning groups
  - Guided practice
  - IXL, Deltamath, or Kuta software
  - Suggested Practice:
    - Textbook Resources
      - 3–2 Solving Quadratic Equations by Graphing
      - 3–4: Solving Quadratic Equations by Factoring
      - 3–5 Solving Quadratic Equations by Completing the Square
      - 3–6 The Quadratic Formula and the Discriminant
    - Glencoe *Algebra 2*, Lesson 3–2, pages 163–170, #1–11, 14–19
    - Glencoe *Algebra 2*, Lesson 3–4, pages 179–187, #1–15, 35–43
    - Glencoe *Algebra 2*, Lesson 3–5, pages 191–197, #1–4, 6–13
    - Glencoe *Algebra 2*, Lesson 3–6, pages 199–207, #1–8, 14–19
- Develop students' ability to solve real world problems involving quadratic functions.
  - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
  - Cooperative learning groups
  - Guided practice
  - IXL, Deltamath, or Kuta software
  - Suggested Practice:
    - Textbook Resources
      - 3–1 Word Problem Practice
      - 3–2 Word Problem Practice
      - 3–5 Word Problem Practice
    - Glencoe *Algebra 2*, Lesson 3–2, pages 163–170, #38–40, 49–51
    - Glencoe *Algebra 2*, Lesson 3–4, pages 179–187, #55
    - Glencoe *Algebra 2*, Lesson 3–5, pages 191–197, #48, 53
    - Glencoe *Algebra 2*, Lesson 3–6, pages 199–207, #9, 20, 33

- Expose students' prior knowledge of the real number system and introduce the complex number system. Guide students to perform operations with complex numbers.
    - ~~Diagnostic assessment,~~ Questioning techniques
    - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
    - Cooperative learning groups
    - Guided practice
    - IXL, Deltamath, or Kuta software
    - Suggested Practice:
        - Textbook Resources
            - 3–3 Complex Numbers
        - Glencoe *Algebra 2*, Lesson 3–3, pages 172–178, #1–16

Assessments:

- **Diagnostic:**
    - ~~Teacher prepared pre-test/diagnostic test~~
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL, Deltamath, or Kuta software
    - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
    - Unit 4 Common Assessment

- **Correctives:**
    - Study Guide and Interventions
        - Graphing Quadratic Functions
        - Solving Quadratic Equations by Graphing
        - Solving Quadratic Equations by Factoring
        - Solving Quadratic Equations by Completing the Square
        - The Quadratic Formula and the Discriminant
        - Complex Numbers

- **Extensions:**
    - Quadratic Inequalities – Glencoe *Algebra 2*, pages 209–215
    - H.O.T. problems – Glencoe *Algebra 2*, pages 206, #43–48

- Textbook Enrichment Activities:
  - Sum and Product of Roots
  - Conjugates and Absolute Value
  - Using Patterns to Factor

~~Unit 8~~ Unit 5: Introduction to Polynomials (20 Days)

- **Standard(s):**
  - CC.2.1.HS.F.4 – Use units as a way to understand problems and to guide the solution of multi–step problems.
  - CC.2.1.HS.F.7 – Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.
  - 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.6 – Interpret functions in terms of the situations they model.
  - 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.10~~
  - CC.2.1.HS.F.1 – Apply and extend the properties of exponents to solve problems with rational exponents.

Objectives:

- Students will be able to determine the degree and type of polynomial. (DOK – Level One)
- Students will be able to add, subtract, and multiply polynomials. (DOK – Level Two)
- Students will be able to multiply and divide monomials using exponent rules. (DOK – Level Two)
- ~~Students will be able to use Pascal's Triangle to expand binomials. (DOK – Level Two)~~
- Students will be able to use graphing calculators to identify specific characteristics of the graph of a polynomial such as domain, range, zeros, maximum and/or minimum values. (DOK – Level Three)
- Students will be able to divide polynomials using long division (or box method) and or synthetic division. (DOK – Level Two)
- Students will be able to factor polynomials completely, including quintics with a GCF of x, quartics in quadratic form and quartics that can be factored by grouping~~ the sum or difference of two cubes~~. (DOK – Level Two)
- Students will be able to find all zeros (including complex zeros) of a polynomial using the Factor Theorem, Remainder Theorem,~~ Rational Zero Theorem,~~ dividing the polynomial, factoring the polynomial, and/or using the quadratic formula. (DOK – Level Three)

Core Activities and Corresponding Instructional Methods:

- Expose students' prior knowledge of polynomials (Algebra 1 content). Develop students' skills in adding, subtracting, multiplying, and dividing polynomials and monomials.
    - Direct instruction using Smart Technology and ~~online~~ textbook and resources
    - Guided practice
    - Cooperative learning groups
    - IXL, Deltamath, or Kuta software
    - Suggested Activities ~~notes and practice problems~~:
        - Glencoe *Algebra 2*, Lesson 4–1, pages 229–235(all)
        - Textbook Resources 4–1
        - Kuta generated additional practice problems with exponent rules and operations with polynomials.
        - Glencoe *Algebra 2*, Lesson 4–3, pages 242–249(all except those dividing by a trinomial)
        - Textbook Resources 4–3
        - Notes: Polynomials
        - Notes: Multiplying and Dividing Polynomials
        - ~~Notes: Pascal's Triangle~~
        - Notes: Synthetic Division

- Develop students' skills in solving polynomials by ~~graphing or~~ factoring.
    - Direct instruction using Smart Technology and ~~online~~ textbook and resources
    - Guided practice
    - Cooperative learning groups
    - IXL, Deltamath, or Kuta software
    - Suggested Activities
        - Glencoe *Algebra 2*, Lesson 4–6, pages 274–281
        - Textbook Resources 4–6
        - Kuta generated factoring practice

~~1. Suggested notes and practice problems:~~

~~a. Notes: Graphing Polynomial Functions~~

~~b. Notes: Solving Polynomial Equations by Factoring~~

- Develop students' skills in applying the Remainder and Factor Theorem.
    - Direct instruction using Smart Technology and online textbook and resources
    - Guided practice
    - Cooperative learning groups
    - IXL, Deltamath, or Kuta software
    - Suggested Activities

- Glencoe *Algebra 2*, Lesson 4–8, pages 287–292
- Textbook Resources 4–8
- Kuta generated practice

2. ~~Develop students' ability to solve real world problems by applying their understanding of polynomials and its zeros.~~
    a. ~~Guided practice~~
    b. ~~Cooperative learning groups~~

Assessments:

- **Diagnostic:**
    - ~~Teacher prepared pre-test/diagnostic test~~
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL, Deltamath, or Kuta software
    - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
    - Common Assessment for Unit 5

- **Correctives:**
    - Study Guide and Intervention 4–1,4–3,4–6, and 4–8

- **Extensions:**
    - H.O.T. problems – Glencoe *Algebra 2*, pages 234, 248, 280, and 291
    - Enrichment Activity 4–1, 4–3, 4–6 and 4–8

Unit 6: Radicals and Inverses (20 Days)

- **Standards:**
  - 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.
  - 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.4 – Interpret the effects transformations have on functions and find the inverses of functions.
  - 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.~~

Objectives:

- Students will be able to apply function operations, including composition of functions. (DOK – Level Two)
- Students will be able to find the inverse of a function and to verify the inverse by composing with the original function. (DOK – Level Three)
- Students will be able to evaluate and simplify expressions involving exponents. (DOK – Level One)
- Students will be able to apply the properties of exponents to fractional exponents to simplify or evaluate numerical and algebraic expressions. (DOK – Level Three)
- Students will be able to connect fractional exponents to radicals. (DOK – Level Two)
- Students will be able to simplify, add, subtract, multiply, and/or divide radicals with higher indexes including rationalizing the denominator when required. (DOK – Level Two)
- Students will be able to solve equations involving radicals or rational exponents, checking for extraneous solutions. (DOK – Level Three)

Core Activities and Corresponding Instructional Methods

- Expose students' prior knowledge of functions and notation, guiding students to add, subtract, multiply and divide functions as well as find the composite of two functions.
  - Questioning
  - Direct instruction using Smart Technology, textbook, and resources
  - Cooperative learning groups
  - Guided practice
  - IXL, Deltamath, or Kuta software
  - Suggested Practice:
    - Textbook Resources

            - 5–1 Operations with Functions
            - 5–2 Composition of Functions
        - Glencoe *Algebra 2*, Lesson 5–1, pages 315–321, #1–16,18–25
        - Glencoe *Algebra 2*, Lesson 5–2, pages 322–328, #1–9, 15–23, 34–42
- Develop students' skills to find inverse functions and relations, from tables, graphs and equations.
    - Questioning
    - Direct instruction using Smart Technology, textbook, and resources
    - Suggested Practice:
        - Textbook Resources
            - 5–3 Inverse Functions and Relations
        - Glencoe *Algebra 2*, Lesson 5–3, pages 329–335, #1–10, 39–41
- Expose students' prior knowledge of radicals and properties of exponents, guiding students to make a connection between them.
    - ~~Diagnostic assessment,~~ Questioning techniques
    - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
    - Suggested Notes and Practice:
        - Notes: Properties of Exponents
        - Properties of Rational Exponents
        - Glencoe *Algebra 2*, Lesson 4–1, pages 229–230,233
        - Kuta generated additional practice graphing quadratic functions
    - Guided practice
    - Cooperative learning groups
    - Suggested Activity: Desmos Activity: Laws of Exponents: Escape the Room
    - IXL, Deltamath, or Kuta software
- Build math language/vocabulary (index, rationalizing the denominator, etc.).
    - Teachers will use appropriate language to identify algebraic terms and processes.
    - During class discussions and investigations, teachers will encourage and guide students to use appropriate math terminology.
    - ~~Writing activities incorporating appropriate math language.~~
    - Suggested Activity:
        - IXL or Delta Math
- Develop students' skills in adding, subtracting, multiplying, and dividing radical expressions and expressions with rational exponents, as well as solving radical equations or equations involving rational exponents.
    - Direct instruction using Smart Technology, ~~online~~ textbook, and resources
    - ~~Suggested notes and practice problems: Radical Equations~~
    - Cooperative learning groups
    - Guided practice
    - IXL, Deltamath, or Kuta software

- Suggested Practice:
  - Textbook Resources
    - 5–6 Solving Radical Equations
  - Glencoe *Algebra 2*, Lesson 5–6, pages 352–358, #1–12, 23–34, 36–47

Assessments:

- **Diagnostic:**
  - ~~Teacher prepared pre- test/diagnostic test~~
  - Teacher questioning and observation
  - Keystone Algebra 1 Exam

- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL, Deltamath, or Kuta software
  - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
  - Unit 6 Common Assessment

- **Correctives:**
  - Study Guide and Interventions
    - Operations and Functions
    - Composition of Functions
    - Inverse Functions and Relations
    - Solving Radical Equations

- **Extensions:**
  - Solving Radical Equations – Glencoe *Algebra 2*, pages 359–360
  - H.O.T. problems – Glencoe *Algebra 2*, page 320 #45–49, page 334 #52–56, page 357 #67–75
  - Textbook Enrichment Activities:
    - Using Spreadsheets with Functions
    - Composition of Graphs of Functions
    - Reading Algebra
    - Special Products with Radicals

Unit 7: Exponential and Logarithmic Functions (25 Days)

- **Standards:**
  - 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.
  - CC.2.1.HS.F.4 – Use units as a way to understand problems and to guide the solution of multi–step problems.
  - ~~CC.2.1.HS.F.7 – Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.~~
  - ~~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 situation they model.
  - CC.2.2.HS.D.10 – Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Objectives:

- Students will be able to graph exponential functions using special characteristics of the graph, including domain, range, and asymptotes. (DOK – Level Two)
- Students will be able to compare and contrast functions involving exponential growth and exponential decay. (DOK – Level Two)
- Students will be able to identify specific transformations (reflection, horizontal shift, vertical shift) of an exponential function with or without a graphing calculator. (DOK – Level Two)
- Students will be able to solve an exponential equation by finding a common base or common exponent. (DOK – Level Three)
- Students will be able to rewrite exponential expressions (including expressions involving the natural base "e") as logarithms and vice versa. (DOK – Level Two)
- Students will be able to evaluate logarithms both with and without a calculator. (DOK – Level Two)
- Students will be able to apply the properties of logarithms to expand or condense an expression. (DOK – Level Two)
- Students will be able to solve an exponential equation (including equations involving the natural base "e") using logarithms. (DOK – Level Three)

- Students will be able to solve a logarithmic equation by rewriting it as an exponential equation (using properties when needed). (DOK – Level Three)
- Students will be able to ~~derive and~~ apply the change–of base formula. (DOK – Level Three)
- Students will be able to use exponential (or logarithmic) models to solve real–world problems such as compound interest, exponential growth, and/or radioactive decay. (DOK – Level Four)

Core Activities and Corresponding Instructional Methods:

- Develop students' ability to graph exponential functions
    - Direct instruction using Smart Technology, textbook resources, and Desmos
    - Guided practice
    - Cooperative learning groups
    - Suggested Activities: ~~notes and practice problems~~
        - The Exponential Family
        - Glencoe *Algebra 2*, Lesson 6–1, Pages 373–380
        - Textbook Resources 6–1

- Develop students' skills in evaluating logarithmic expressions using properties of logarithms as well as solving exponential and logarithmic equations.
    - Direct instruction using Smart Technology and online textbook and resources
    - Guided practice
    - Cooperative learning groups
    - IXL, Deltamath, or Kuta software
    - Suggested Notes and Practice Problems:
        - Notes: Introduction to Logarithms
        - Logarithms Properties
        - Logarithms Puzzle
        - Glencoe *Algebra 2* Lesson 6–2, pages 383–389 (skipping inequalities)
        - Textbook Resources 6–2
        - Glencoe *Algebra 2* Lesson 6–4, pages 397–404 (limited focus on graphing)
        - Textbook Resources 6–4
        - Glencoe *Algebra 2* Lesson 6–6, pages 416–422
        - Textbook Resources 6–6
        - Glencoe *Algebra 2* Lesson 6–7, pages 423–429 (skipping inequalities)
        - Textbook Resources 6–7
        - Glencoe *Algebra 2* Lesson 6–8, pages 430–436 (skipping inequalities)
        - Textbook Resources 6–8
        - Glencoe *Algebra 2* Lesson 6–9, pages 437–442 (skipping inequalities)

        - Textbook resources 6–9

- Develop students' ability to solve real world problems, specifically problems involving exponential growth or decay.
    - Guided practice
    - Cooperative learning groups
    - ~~Suggested notes and practice problems:~~
    - Suggested Activities:
        - Desmos Activity: Exponential Growth/Decay Applications
        - Solving Exponential Equations
        - Notes on Exponential Models
        - ~~Writing Exponential Functions~~
        - Glencoe *Algebra 2*, Lesson 6–10, pages 445–451
        - Textbook resources 6–10
        - Who wants to be a Millionaire?

Assessments:

- **Diagnostic:**
    - ~~Teacher prepared pre- test/diagnostic test~~
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL, Deltamath, or Kuta software
    - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
    - Common Assessment for Unit 7

- **Correctives:**
    - **Study Guide and Interventions From Chapter 6 Resources**

- **Extensions:**
    - H.O.T. problems – Glencoe *Algebra 2*, pages 379, 388, 403, 421, 428, 435, 441, and 450
    - Enrichment Activities From Chapter 6 Resources

Unit 8 ~~9~~: Rational Functions (10 Days)

- **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 situation they model.
  - 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.10 – Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Objectives:

- ~~Students will be able to use graphing calculators to identify specific characteristics such as domain, range, and asymptotes of rational functions. (DOK – Level Two)~~
- ~~Students will be able to describe transformations of a rational function. (DOK – Level Three)~~
- Students will be able to simplify rational expressions by factoring, stating restrictions on the domain. (DOK – Level Two)
- Students will be able to multiply, divide, add and subtract rational expressions. (DOK – Level Two)
- Students will be able to simplify complex fractions. (DOK – Level Two)
- Students will be able to solve rational equations, checking for extraneous solutions. (DOK – Level Three)
- ~~Students will be able to apply their knowledge of rational functions to solve real–world problems. (DOK – Level Four)~~

Core Activities and Corresponding Instructional Methods:

- Expose students' prior knowledge of rational numbers, guiding students to add, subtract, multiply and divide rational expressions.
  - Direct instruction as needed using Smart Technology, ~~online~~ textbook, and resources
  - Guided practice
  - Cooperative learning groups
  - IXL, DeltaMath, or Kuta software

- Suggested Activities: ~~notes and practice problems:~~
  - ~~Taking a Closer Look; Rationals~~
  - Operations with Rational Expressions: Simplifying
  - Operations with Rational Expressions: Adding and Subtracting
  - Adding and Subtracting Rational Expressions
  - Multiplying and Dividing Rational Expressions
  - Textbook Resources 7–1
  - Textbook Resources 7–2
  - Glencoe *Algebra 2*, Lesson 7–1, pages 467–475
  - Glencoe *Algebra 2*, Lesson 7–2, pages 476–482

- Develop students' skills in solving rational equations.
  - Direct instruction using Smart Technology and ~~online~~ textbook and resources
  - Guided practice
  - Cooperative learning groups
  - IXL, DeltaMath, or Kuta software
  - Suggested Activities: ~~notes and practice problems:~~
    - Solving Rational Equations
    - Glencoe *Algebra 2*, Lesson 7–6, pages 508–516 (skipping inequalities)
    - Textbook Resources 7–6

Assessments:

- **Diagnostic:**
  - ~~Teacher prepared pre-test/diagnostic test~~
  - Teacher questioning and observation
  - Keystone Algebra 1 Exam

- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL, Deltamath, or Kuta software
  - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
  - Common Assessment for Unit 8 9
  - Cumulative Final Assessment

- **Correctives:**
  - Chapter 7 Study Guides and Interventions

- **Extensions:**
  - H.O.T. problems – Glencoe *Algebra 2*, pages 474, 481, 515
  - Chapter 7 Enrichment Activities

Unit 9 ~~10~~: Trigonometric Functions (35 Days)

- **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.7 – Apply radian measure of an angle and the unit circle to analyze the trigonometric functions.
  - CC.2.2.HS.C.8 – Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.
  - CC.2.2.HS.D.8 – Apply inverse operations to solve equations or formulas for a given variable.
  - CC.2.2.HS.D.10 – Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
  - CC.2.2.3.HS.A.7 – Apply trigonometric ratios to solve problems involving right triangles.

Objectives:

- Students will be able to derive and apply the distance formula and the midpoint formula. (DOK – Level Three)
- Students will be able to produce the equation for a circle given the graph, the center and a point on the circle, or the endpoints of a diameter of the circle. (DOK – Level Four)
- Students will be able to complete the square to convert the equation of a circle from general form to standard form. (DOK – Level Four)
- ~~Students will be able to represent the sine, cosine, tangent, cosecant, secant, or cotangent of an angle given the sides of a right triangle. (DOK – Level Two)~~
- Students will be able to find the unknown side of a special right triangle (45°–45°–90° or 30°–60°–90°). (DOK – Level Two)
- Students will be able to solve a right triangle (find all angles and side lengths). (DOK – Level Four)
- Students will be able to solve problems involving the angle of elevation (or depression) using trigonometry. (DOK – Level Two)
- Students will be able to describe angles in both degrees and radians in a circle (standard position, positive angles, negative angles, coterminal angles, quadrantal angles). (DOK – Level Two)
- Students will be able to determine the six trigonometric functions for any angle within the circle (in terms of x, y, and r) or for any point in the coordinate plane by constructing a perpendicular segment to the x–axis. (DOK – Level Four)
- Students will be able to use the unit circle to determine exact values for the six trigonometric functions at special angles (30°, 45°, 60°, 90° in all four quadrants). (DOK – Level Two)
- Students will be able to determine the appropriate angle given the exact trigonometric value. (DOK – Level Three)

- Students will be able to use a calculator to approximate the value of the six trigonometric functions given any angle and to identify the angle in both radians and degrees given the trigonometric value. (DOK – Level Two)
- Students will be able to solve equations involving trigonometric functions. (DOK – Level Two)
- Students will be able to recognize the graphs of each of the trigonometric functions. (DOK – Level One)
- Students will be able to use the values from the unit circle to produce a sine wave and cosine wave. (DOK – Level Two)
- ~~Students will be able to identify one cycle of a periodic function as well as the period and amplitude of the function. (DOK – Level One)~~

Core Activities and Corresponding Instructional Methods:

- ~~Build math language/vocabulary including *amplitude, period, cycle, radian*.~~
  - ~~Teachers will use appropriate language to identify algebraic terms and processes.~~
  - ~~During class discussions and investigations, teachers will encourage and guide students to use appropriate math terminology.~~
  - ~~Writing activities incorporating appropriate math language~~

- Develop students' skills in converting between degrees and radians. Guide students to find the exact value of the coordinates for specified angles on the unit circle.
  - Direct instruction using Smart Technology and ~~online~~ textbook and resources
  - Guided practice
  - Cooperative learning groups
  - IXL, DeltaMath, or Kuta software
  - Suggested Activities ~~notes and practice problems~~:
    - How else can you measure angles?
    - Angles on the Coordinate Plane
    - Radians and the Unit Circle
    - Glencoe *Algebra 2*, Lesson 9–2, pages 604–610
    - Textbook Resources 9–2

- Develop students' ability to find trigonometric values for specific angle measures, using the unit circle.
  - Guided practice
  - Cooperative learning groups
  - IXL, DeltaMath, or Kuta software
  - Suggested Activities ~~notes and practice problems~~:
    - The Unit Circle
    - Trig–a–no–what

        - Glencoe *Algebra 2*, Lesson 9–4, 620–626
        - Textbook Resources 9–4

Assessments:

- **Diagnostic:**
    - ~~Teacher prepared pre- test/diagnostic test~~
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL, Deltamath, or Kuta software
    - Teacher prepared assessments (quizzes, tests, and graded assignments)

- **Summative:**
    - Common Assessment for Unit 9~~-10~~
    - Cumulative Final Assessment

- **Correctives:**
    - Chapter 9 Study Guides and Interventions

- **Extensions:**
    - H.O.T. problems – Glencoe *Algebra 2*, pages 609, 625
    - Chapter 9 Enrichment Activities