Branchburg Township Public Schools

Office of Curriculum and Instruction

Algebra 8 Math Curriculum

Adopted by the Board of Education September 2023

This curriculum is aligned with the 2016 New Jersey Student Learning Standards in Mathematics

Curriculum Scope and Sequence			
Content Area	Math	**Course Title/Grade Level:**	Algebra 8

Topic/Unit Name		Suggested Pacing (Days/Weeks)
Topic/Unit #1	Relationships between Quantities (Chapters 0-2)	50 days/10 wks
Topic/Unit #2	Linear Relationships (Chapters 3-6)	70 days/14 wks
Topic/Unit #3	Exponential and Quadratic Relationships (Chapters 7-9)	35 days/7 wks
Topic/Unit #4	Advanced Functions and Equations (Chapters 10-11)	25 days/5 wks

Topic/Unit Title	Relationships between Quantities (Chapters 0-2)	Approximate Pacing	50 days

STANDARDS

NJSLS (Math)

N.Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R.

STANDARDS FOR MATHEMATICAL PRACTICES:
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with Mathematics.
5. Use appropriate tools strategically.
6. Attend to Precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Interdisciplinary Connections:

L.7.3.A. Use knowledge of language and its conventions when writing, speaking, reading, or listening. Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy**.**

ACTIVITY: Students will solve real-world problems where the numerical answer is secondary to the written explanation as to the process. Students will provide reasoning and justification using mathematical vocabulary in their writing.

Computer Science & Design Thinking:	Career Readiness, Life Literacies and Key Skills:
8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.	**9.1.8.PB.5:** Identify factors that affect one's goals, including peers, culture, location, and past experiences.

ACTIVITY: Students complete the "Absolute value equations and inequalities" gizmo, where students vary the terms of the absolute-value function and vary the value that they are comparing it to. Then explore how the graph and solution set change in response. **8.2.8.ETW.4:** Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best. **Activity:** Students calculate their carbon footprint and share their results with the class, reflecting on how life choices impact the environment (for example: solar-powered electricity versus non solar-powered electricity).	**ACTIVITY:** Students will take part in daily formative assessments for which their results will be recorded in an online progress database. As results are added, students will comment/reflect on their individual progress and set goals and strategies for themselves to improve.

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

Essential Questions:

How do you evaluate numerical expressions by using the order of operations?
How do you use the Distributive Property to evaluate and simplify expressions?
How do you determine whether a relation is a function?
How can mathematical ideas be represented?
How do you solve equations with various operations?
How do you solve proportions?
How can we use formulas to solve real-world problems?
Why is it helpful to represent the same mathematical idea in different ways?
How do my life choices impact the environment? (climate change project)
How can I reduce my carbon footprint? (climate change project)

Enduring Understandings:

How verbal phrases translate into algebraic expressions (Chapter 1)
How to identify a function (Chapter 1)
When a function is positive versus negative (Chapter 1)
How to identify whether a function is increasing or decreasing (Chapter 1)

When solving equations that involve absolute values, there are two cases to consider (Chapter 2)
When solving equations, it is critical to perform the same operation on both sides to keep the equation balanced (Chapter 2)

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: **<u>Unit Vocabulary</u>:** algebraic expression (Lesson 1-1), variable (Lesson 1-1), term (Lesson 1-1), power (Lesson 1-1), coefficient (Lesson 1-4), equation (Lesson 1-5), solution (Lesson 1-5), identity (Lesson 1-5), relation(Lesson 1-6), domain (Lesson 1-6), range (Lesson 1-6), independent variable (Lesson 1-6), dependent variable (Lesson 1-6), function (Lesson 1-7), intercept (Lesson 1-8), line symmetry (Lesson 1-8), end behavior (Lesson 1-8), formula (Lesson 2-1), solve an equation (Lesson 2-2), equivalent equations (Lesson 2-2), multi-step equations (Lesson 2-3), identity (Lesson 2-4), ratio (Lesson 2-6), proportion (Lesson 2-6), rate (Lesson 2-6), unit rate (Lesson 2-6), scale model (Lesson 2-6), percent of change (Lesson 2-7), literal equation (Lesson 2-8), dimensional analysis (Lesson 2-8), weighted averages (Lesson 2-9) Climate Change project: carbon footprint, fossil gas, emissions, metric ton, therm, CO_2e, CCF (Centum cubic feet)	***Students will be able to:*** - Solve equations using all four operations - Solve equations involving more than one operation - Solve equations involving consecutive integers - Solve equations with the variable on each side - Solve equations involving grouping symbols - Evaluate absolute value expressions - Solve absolute value equations - Compare ratios - Solve proportions - Solve equations for given variables - Use formulas to solve real-world problems -Define carbon footprint. -Calculate a carbon footprint.

ASSESSMENT OF LEARNING

Summative Assessment (Assessment at the end of the learning period)	Chapter quizzes and tests

Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Chapter pre-test, Ticket-in-the-Door, Ticket-out-the-Door, Online formative assessments (www.thatquiz.com, *KAHOOT!*, www.quizizz.com, www.edulastic.com) Teacher Observation
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Unit project: Calculate Your Carbon Footprint (slideshow); student data spreadsheet Labs
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Math MAP Assessment given in the Fall, Winter, and Spring
RESOURCES	
Core instructional materials: Glencoe McGraw-Hill Algebra 1 textbook	
Supplemental materials: Explore Learning Gizmo Simulations CME Algebra Project resources Diversity: Simplify Expressions for Human Rights Climate Change: Create Your Own Carbon Footprint Lesson Resources (staff access)	
Modifications for Learners	
See appendix	

Topic/Unit Title	Linear Relationships (Chapters 3-6)	Approximate Pacing	70 days
STANDARDS			
NJSLS (Math)			
A.CED.A.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A.REI.D.10.** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **F.IF.A.2.** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **F.IF.B.4.** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include:			

intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
F.IF.C.7.a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
F.BF.A.1. Write a function that describes a relationship between two quantities.
F.BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
F.BF.B.4.a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) =2 x3 or f(x) = (x+1)/(x–1) for x ≠1.
F.LE.A.1.a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
F.LE.A.1.b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
F.LE.A.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
S.ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

STANDARDS FOR MATHEMATICAL PRACTICES:
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically
6. Attend to Precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Interdisciplinary Connections:	
W.8.1 Write arguments to support claims with clear reasons and relevant evidence **ACTIVITY:** Students will be offered an open-ended question on a weekly basis where they will have to write an argument, and use relevant evidence to justify their argument using mathematical properties.	
Computer Science & Design Thinking:	**Career Readiness, Life Literacies and Key Skills:**

8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose. Students complete the “Solving Equations by Graphing Each Side” gizmo, where students vary the coefficients in the equation by sliding a scale and explore how the graph changes in response.	**9.1.8.PB.5:** Identify factors that affect one’s goals, including peers, culture, location, and past experiences. **ACTIVITY:** Students will take part in daily formative assessments for which their results will be recorded in an online progress database. Students will analyze their data to find areas for improvement.

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

Essential Questions:

Chapter 3:

How do you graph linear equations?
How do you find the slope of a line?
How do you write and graph direct variation equations?
Why are graphs useful?

Chapter 4:

How do you write and graph equations in slope-intercept form?
How do you write equations in point-slope form?
Why is math used to model real-world situations?

Students will understand:

Chapter 3:

* how to find rate of change / slope
* how to identify the graph of a direct variation
* how to identify a proportional relationship

Chapter 4:

* the appropriate form in which to write a linear equation if given the slope and a point versus given two points
* how slope is related to parallel and perpendicular lines

Chapter 5:

How do you solve linear inequalities by using various operations?
How do we graph inequalities?
How do we graph inequalities that incorporate the words "or" and "and", or include an absolute value?
How are symbols used in mathematics?

Chapter 6:
How do you solve systems of equations by graphing?
How do you solve systems of equations using substitution or elimination?
How can you find the solution to a math problem?
Students will understand:
Chapter 5:
* the general practices for representing solutions of an inequality using a graph
Chapter 6:
* how to determine the number of solutions a system of equations has
* how to determine an appropriate method for solving a system of equations

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: *Chapter 3: linear equation, standard form, constant, x-intercept, y-intercept, linear function, parent function, family of graphs, rate of change, slope, direct variation, constant of variation, arithmetic sequence, slope-intercept form, point-slope form, parallel lines, perpendicular lines, inverse relation, inverse function* Chapter 4:slope-intercept form, point-slope form, parallel and perpendicular lines, scatter plot, line of fit Chapter 5: inequality, set-builder notation, compound inequality, intersection, union, half plane, boundary line Chapter 6: system of equations, consistent, dependent, inconsistent, substitution, elimination	***Students will be able to:*** * identify linear equations, intercepts, and zeros * graph linear equations * use rate of change to solve problems * find the slope of a line * write and graph direct variation equations * solve problems involving direct variation * recognize arithmetic sequences * relate arithmetic sequences to linear functions * write an equation for a proportional relationship * write an equation for a non-proportional relationship * write and graph linear equations in slope-intercept form * model real-world data with equations in slope-intercept form * write an equation of a line in slope-intercept form given the slope and one point * write an equation of a line in slope-intercept form given two points * write equations of lines in point-slope form * write linear equations in different forms

	* write an equation of the line that passes through a given point, parallel to a given line * write an equation of the line that passes through a given point, perpendicular to a given line
ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Chapter Tests, Chapter Quizzes
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Nows/Exit slips using digital platforms such as Edulastic.com, Kahoot.com, and Quizzizz.com to check understanding of a single lesson/concept Teacher observations of student work and learning
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Open-Ended Reflection Assignments Leveled worksheets/activities
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	MAP Assessment
RESOURCES	
Core instructional materials: Glencoe McGraw-Hill Algebra 1	
Supplemental materials: Explore Learning Gizmo Simulations CME Algebra Project resources Diversity: Victor Rios - Person Puzzle (direct variation)	

Modifications for Learners
See appendix

Topic/Unit Title	Exponential and Quadratic Relationships (Chapters 7-9)	Approximate Pacing	31 days
STANDARDS			
NJSLS (Math)			
A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. **A.CED.A.2.** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A.CED.A.3.** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. **A.REI.B.3.** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.			

A.REI.C.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
A.REI.D.12. Graph the solutions to linear inequalities in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

STANDARDS FOR MATHEMATICAL PRACTICES:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others.
4. Model with Mathematics
5. Use appropriate tools strategically
6. Attend to Precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Interdisciplinary Connections:

SL.8.5 Integrate multimedia and visual dsplays into presentations to clarify information, strengthen claims and evidence, and add interest.

ACTIVITY: Students will showcase their knowledge of parabolas in a presentation depicting various architectural structures and how their shape could be described using quadratic equations.

Computer Science & Design Thinking:	Career Readiness, Life Literacies and Key Skills:
8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose. *Students complete the "Solving Linear Inequalities in One Variable" gizmo, where students solve one-step inequalities in*	**9.1.8.PB.5:** Identify factors that affect one's goals, including peers, culture, location, and past experiences.

one variable. Graph the solution on a number line using the simulation.	**ACTIVITY:** Students will take part in daily formative assessments for which their results will be recorded in an online progress database. Now that students are midway through the year, students begin to analyze their data more deeply to determine which factors most impact the change in their scores (such as total time given on assessment, the level of complexity, and the rate at which they are completing the problems).

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

Essential Questions:
How can you make good decisions?
What factors can affect good decision making?
When could a nonlinear function be used to model a real-world situation?
Why do we use different methods to solve math problems?

Enduring Understandings:
How to translate standard form to scientific notation and vice versa. (Chapter 7)
How to distinguish between exponential growth versus exponential decay. (Chapter 7)
How to identify the graph of an exponential function. (Chapter 7)
How to distinguish between the square of a sum, the square of a difference, and the product of a sum and a difference. (Chapt 8)
How to determine the appropriate factoring method to be used. (Chapter 8)
How to identify the graph of a quadratic function. (Chapter 7)
The general differences between linear, exponential, and quadratic functions.(Chapter 9)
How to determine the number of solutions a quadratic equation has using its graph. (Chapter 9)

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: **<u>Unit Vocabulary:</u>** monomial (Lesson 7-1), constant (Lesson 7-1), zero exponent (Lesson 7-2), negative exponent (Lesson 7-2), order of magnitude (Lesson 7-2), rational exponent (Lesson 7-3), cube root (Lesson 7-3)	***Students will be able to:*** - Simplify polynomial expressions and apply the laws of exponents in problem-solving situations -Graph and analyze exponential functions

*n*th root (Lesson 7-3), exponential equation (Lesson 7-3), scientific notation (Lesson 7-4), exponential function (Lesson 7-5), exponential growth (Lesson 7-5), exponential decay (Lesson 7-5), compound interest (Lesson 7-6), geometric sequence (Lesson 7-7), common ratio (Lesson 7-7), recursive formula (Lesson 7-8), polynomial (Lesson 8-1), binomial (Lesson 8-1), trinomial (Lesson 8-1), degree of a monomial (Lesson 8-1), degree of a polynomial (Lesson 8-1) standard form of a polynomial (Lesson 8-1), leading coefficient (Lesson 8-1), FOIL method (Lesson 8-3), quadratic expression (Lesson 8-3), factoring (Lesson 8-5), factoring by grouping (Lesson 8-5), Zero Product Property (Lesson 8-5), quadratic equation (Lesson 8-6), prime polynomial (Lesson 8-7), difference of two squares (Lesson 8-8), perfect square trinomial (Lesson 8-9), Square Root Property (Lesson 8-8), quadratic function (Lesson 9-1), parabola (Lesson 9-1), axis of symmetry (Lesson 9-1), vertex (Lesson 9-1), minimum (Lesson 9-1), maximum (Lesson 9-1), double root (Lesson 9-2), transformation (Lesson 9-3), completing the square (Lesson 9-4), Quadratic Formula (Lesson 9-5), discriminant (Lesson 9-5), step function (Lesson 9-7), greatest integer function (Lesson 9-7), absolute value function (Lesson 9-7)	-Analyze data and represent situations involving exponential growth and decay using tables, graphs, or algebraic methods -Relate geometric sequences to exponential functions, and write recursive formulas to represent -Add, subtract, and multiply polynomials -Factor as necessary in problem solutions -Solve quadratic equations using concrete models, tables, graphs, and algebraic methods -Identify and sketch the general forms of quadratic parent functions -Analyze graphs of quadratic functions and draw conclusions -Make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts of the graph of the function -Use characteristics of the quadratic parent function -Identify and graph special functions

ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	Chapter tests and quizzes
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Chapter pre-test, Ticket-in-the-Door, Ticket-out-the-Door, Online formative assessments (www.thatquiz.com, *KAHOOT!*, www.quizizz.com, www.edulastic.com) Teacher Observation
Alternative Assessments (Any learning activity or	Unit projects

assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Labs
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Math MAP Assessment given in the Fall, Winter, and Spring
RESOURCES	
Core instructional materials: Glencoe McGraw-Hill Algebra 1	
Supplemental materials: Explore Learning Gizmo Simulations CME Algebra Project resources Diversity: An Wang, Subtracting Polynomials for Human Rights	
Modifications for Learners	
See appendix	

Topic/Unit Title	**Exponential and Radical Relationships (Chapters 10-11)**	**Approximate Pacing**	**35 days**
STANDARDS			
NJSLS (Math)			
N.RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5(^{1/3})^3$ to hold, so $(5^{1/3})^3$ must equal 5. **N.RN.A.2.** Rewrite expressions involving radicals and rational exponents using the properties of exponents. **A.SSE.A.2.** Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 – y^4$ as $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.			

A.CED.A.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.REI.B.4.a Solve quadratic equations in one variable.Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.
F.IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.
F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
F.IF.C.7.b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
F.IF.C.7.e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
F.IF.C.8.b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)t$, $y = (0.97)t$, $y = (1.01)12t$, $y = (1.2)t/10$, and classify them as representing exponential growth or decay.
F.BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
F.LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.
F.LE.A.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

STANDARDS FOR MATHEMATICAL PRACTICES:
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others.
4. Model with Mathematics
5. Use appropriate tools strategically
6. Attend to Precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Interdisciplinary Connections:

.8.6: Use technology, including the internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.
ACTIVITY: *Students write math reflections, they use online resources that may be shared with others.*

Computer Science & Design Thinking:	Career Readiness, Life Literacies and Key Skills:
8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose. *Students utilize tech platforms daily for Do Now activities and formative assessments.*	**9.2.8.CAP.2:** Develop a plan that includes information about career areas of interest. **9.2.8.CAP.3:** Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income. **Discussion:** Consider some possible career paths that students are interested in that utilize math. Discuss education requirements, average salary, etc.

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

Essential Questions:
Chapter 10:
How do you simplify radical expressions?
What is the Pythagorean Theorem and how do you use it?
Students will understand:
Chapter 10:
* how to calculate the unknown length of a side of a right triangle
Essential Question
Chapter 11:
How do you identify, use, and graph inverse variations?
How do you simplify rational expressions?
How do you use rational equations to solve problems?
How can simplifying mathematical expressions be useful?
Students will understand:
Chapter 11:
* the difference between and distinguishing characteristics of direct and inverse variations

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: monomial, constant, zero exponent, negative exponent, rational exponent, cube route, nth root, exponential equation, scientific notation, exponential function, exponential growth, exponential decay, compound interest, geometric sequence, common ratio, recursive formula, radicand, radical function, conjugate, radical equations, hypotenuse, legs	***Students will be able to:*** * multiply monomials using the properties of exponents * simplify expressions using the multiplication properties of exponents * divide monomials using the properties of exponents * simplify expressions containing negative and zero exponents * evaluate and rewrite expressions involving rational exponents * solve equations involving expressions with rational exponents * express numbers in scientific notation * find products and quotients of numbers expressed in scientific notation * graph exponential functions * identify data that display exponential behavior * solve problems involving exponential growth * solve problems involving exponential decay * graph and analyze dilations of radical functions * graph and analyze reflections and translations of radical functions * simplify radical expressions by using the Product Property of Square Roots * simplify radical expressions by using the Quotient Property of Square Roots * add and subtract radical expressions * multiply radical expressions * solve problems by using the Pythagorean Theorem * determine whether a triangle is a right triangle
ASSESSMENT OF LEARNING	

Summative Assessment (Assessment at the end of the learning period)	Chapter tests and quizzes
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	Do Nows/Exit slips using digital platforms such as Edulastic.com, Kahoot.com, and Quizzizz.com to check understanding of a single lesson/concept Teacher observations of student work and learning
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	Open-Ended Reflection Assignments Leveled worksheets/activities Project-based learning (extensions) Modified assessments as per IEPs
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	Math MAP Assessment given in the Fall, Winter, and Spring Math Cumulative midterm (winter) and final exam (spring)
RESOURCES	
Core instructional materials: Glencoe McGraw-Hill Algebra 1	
Supplemental materials: Explore Learning Gizmo Simulations "Looking For Pythagoras" Connected Mathematics 2 Unit CME Algebra Project resources Diversity: Olga Taussky-Todd, Malala Yousafzai	
Modifications for Learners	
See appendix	