Summit Public Schools
Summit, New Jersey
Grade Level: 9-10 / Content Area: Mathematics
Length of Course: Full year
Curriculum: Math Strategies - Algebra 1

Overview:
This course provides opportunities for students to build a strong foundation for success in their concurrent math course by obtaining skills through a variety of instructional strategies. Emphasis is placed on foundational skills as well as concepts, skills, vocabulary and definitions necessary to master student learning objectives of their concurrent math course. Upon completion, students should be able to apply mathematical concepts and critical thinking skills to solve problems relevant to the student's concurrent math course.

Submitted By:
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August 2021

QUARTER 1

Unit 1 - Part 1 - Chapters 3 - Graphing Linear Functions

Section #	Section Title	Days
3.1	Functions (domain and range; independent and dependent variables)	1 ½
3.2	Linear Functions (how to show from tables, discrete and continuous)	1
3.3	Functional Notation	2
3.1-3.3	Quick Quiz and Activity	1
3.5	Graphing Linear Equations in Slope Intercept Form	½
3.4	Graphing Linear Equations in Standard Form	½
3.6	** GRAPHING FROM POINT SLOPE FORM**	½
3.7	Graphing Absolute Value Equations - By transformations (a, h, k)	1
	Review	½
	Chapter 3 Test	1

Total Number of Days: 10

Unit 1 - Part 2 - Chapter 4 - Writing Linear Functions

4.1	Writing Equations in Slope-Intercept Form -given slope and y-intercept -given standard form	1
4.2	Writing Equations in Point-Slope Form -given two points -applications	1
4.3	Writing Equations of Parallel and Perpendicular Lines	1
4.1-4.3	Quick Quiz	½
4.6	Arithmetic Sequences - discrete domain and range - No Recursive	2 ½
	Review	1
	Test	1

Total Number of Days: 8

Unit 1 - Part 3 - Chapter 5-Systems of Equations

Section #	Section Title	Days
5.1	Solving Systems of Linear Equations by Graphing (Integrate 5.4) - "Do Now" by hand - Graphing Calculator Introductions	1
5.2	Solving Systems of Linear Equations by Substitution (Integrate 5.4) - With word problems	1
5.3	Solving Systems of Linear Equations by Elimination (Integrate 5.4) - With word problems	1
	Quiz 5.1-5.4	1
	-	
9.6	Non-linear Systems - Only lines and absolute value - By hand and graphing calculator	1
5.6	Linear Inequalities (6.5) By hand and with graphing calculator and introduce desmos?	1
5.7	Systems of Linear Inequalities (6.6)	½
	Review	1 ½
	Test 5.1-5.7	1

Total Number of Days: 10

Unit 2 - Chapter 6-Exponential Functions

Section #	Section Title (old textbook section #)	Days
6.1	Properties of Exponents	2 1/2
	Review	1/2
	Quiz	1
6.3	Exponential Functions - Day 1 - Introduce exponential functions; contrast linear and exponential by tables - Day 2 - Graph with transformations	3
6.4	Growth and Decay -identify growth/decay, write equations -word problems including compound interest	2
6.6	Geometric Sequences	2
	Review	1
	Chapter 6 Test	2

Total Number of Days: 14

QUARTER 2

Unit 3 - Chapter 7-Polynomial Equations and Factoring

Section #	Section Title (old textbook section #)	Days
7.1	Adding and Subtracting Polynomials	1
7.2	Multiplying Polynomials	1
7.3	Special Products of Polynomials	1
	Quiz 7.1-7.3	1
7.4	Factoring by GCF	1
7.5	Factoring Trinomials (a=1)	2
7.6	Factoring Trinomials (a>1)	3
7.7	Factoring Special Products - just difference of squares	½
	Review 7.5-7.7	½
	Quiz 7.5-7.7	1
7.8	Factoring Completely -gcf -grouping -Picking the appropriate method	1 ½
	Review	1 ½
	Chapter 7 Test	1

Total Number of Days: 16

Unit 4 - Part 1 - Chapter 8- Graphing Quadratic Equations

Section #	Section Title (old textbook section #)	Days
8.1	Graphing $f(x)=ax^2$	1
8.2	Graphing $f(x)=ax^2+c$ -with graphing calculator and by hand	1
8.4	Vertex Form **Use transformations** -with graphing calculator and by hand	1
8.3	Graphing $f(x)=ax^2+bx+c$ plus review of 8.1-8.4	2
	Quiz 8.1 - 8.4	1
8.5	Intercept Form	1
8.6	Comparing Functions (Linear, Exponential, Quadratic) - Tables - Graphs - Function form	1
	Review	1
	Chapter 8 Test	1

Total Number of Days: 10

	Midterm Review	TBD

QUARTER 3

Unit 4 - Part 2 - Chapter 9-Solving Quadratic Equations

Section #	Section Title	Days
9.2	Solving Quadratic Equations by Graphing (x-intercepts only)	1
9.1	Radicals -only numerical radicand (will simplify with variables next chapter)	1
9.3	Solving Quadratic Equations by Using Square Roots	1
7.4	Solving Quadratic Equations by Factoring	2
	Quiz 9.1-9.3, 7.4	1
9.4	Solving Quadratic Equations by Completing the Square - Leading coefficient of 1 and b always even	1
9.5	Solving Quadratic Equation by the Quadratic Formula - Discriminant and nature of solutions	1 ½
	Choosing the Best Method, review all methods	1 ½
	Quiz 9.4, 9.5, Choose the best method	1
9.6	Solving Non-linear systems manually and using graphing calculator; word problems	2
	Projectile Motion	2
	Review	1
	Test 9	1

Total Number of Days: 17

Unit 5 - Part 1 - Chapter 11-Data Analysis and Displays

Section #	Section Title (old textbook section #)	Days
4.4	Scatter Plots - Spend time showing how to put into calculator	1
4.5	Lines that Best Fit - ½ day no calculator - 1 day calculator / practice	1 ½
	Quiz 4.4-4.5	½
11.1	Measures of Center of Variation - Only do standard deviation by calculator	1
11.2	Box and Whisker Plots (include outliers)	1
11.3	Shapes of Distributions - If there is time, focus on normal distribution	1 / 2
	Quiz 11.1-11.3	1
11.4	Two-Way Tables **For conditional relative frequency, DO NOT follow the book, use joint frequency divided by relative frequency**	2
11.5	Choosing a Data Display	1
	Review	1
	Test	1

Total Number of Days: 12

QUARTER 4

Unit 5 - Part 2 - Probability Unit

	Counting Principles	1
	Permutations and Combinations	1 ½
	Basic Probability	½
	Complex Probability	2
	Review	1
	Probability Test	1

**Can be pushed into 4th quarter Total Number of Days: 7

Unit 6 - Chapter 10 - Radical Functions

Section #	Section Title (old textbook section #)	Days
9.1	Simplifying Square Roots -Variables and Multiplying -Rationalizing ** Monomial denominators **	3
9.1	Simplifying Cube Roots (numbers and variables)	1
9.1	Adding and Subtracting Radicals	1
10.3	Solving Radical Equations - Only square roots	1
	Review 9.1 and 10.3	1
	Quiz 9.1 and 10.3	1
10.1	Graphing Square Roots ** Use transformations **	1
10.2	EASY Graphing Cube Roots *Using transformations*	1
	Review Unit	1
	Unit Test	1

Total Number of Days: 12

Unit 7a - Rational Expressions

	Simplify Rational Expressions	1
	Multiply Rational Expressions	1
	Divide Rational Expressions	1
	Adding and Subtracting Rational Expressions	2 ½
	Review	½
	Quest?	1

Total Number of Days: 7

NJSLA review - 3-4 days

Unit 7b - Rational Functions

	Inverse Variation - Introduce the graph of the rational function	1
	Graphing Rational Functions - Using transformations ONLY	2
	Solving Rational Equations	2
	Review	1
	Quest?	1

Total Number of Days: 7

Unit 1: Linear Equations (Including Systems of Linear Equations)

Big Ideas: *Course Objectives/Content Statement(s)*

- Write equations in graph-appropriate forms
- Graph functions
- Solve systems of equations
- Graph systems of equations and inequalities
- Explain how to solve and graph equations, functions, systems of equations, and inequalities

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• What are the key characteristics of a linear equation? • How do we write / graph linear equations? • When is it best to use slope intercept, point slope, or standard form of a linear equation? • How are linear functions graphed based on the form provided? • How are systems of equations and inequalities graphed? • How are systems of equations solved?	**Students will understand that:** • Functions are mathematical models that have one unique output for every input. • The equation of a function can be written in multiple forms. Lines are usually graphed in the form $f(x) = mx + b$ where m and b are the slope and y-intercept respectively. • Systems of equations can be solved by graphing, by substitution, or by elimination. • To graph a system of equations or inequalities, graph each function, equation, or inequality on the same coordinate plane. The solution to the system is the intersection of the graphs.
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**
Students will: **A-CED: Creating Equations** A. Create equations that describe numbers or relationships **A-REI: Reason with Equations and Inequalities** A. Understand solving equations as a process of reasoning and explain the reasoning B. Solve equations and inequalities in one variable C. Solve systems of equations D. Represent and solve equations and inequalities graphically	• What is a function? (domain and range; independent and dependent variables) • What is a linear function? (how to show from tables, discrete and continuous) • Using Functional Notation • Graphing Linear Equations in Slope Intercept Form (y=mx+b) • Graphing Linear Equations in Standard Form (Ax+By=C) • Writing Equations in Slope-Intercept Form ○ given slope and y-intercept

F-IF: Interpreting Functions
A. Understand the concept of a function and use function notation
B. Interpret functions that arise in applications in terms of the context
C. Analyze functions using different representations

F-BF: Building Functions
A. Build a function that models a relationship between two quantities
B. Build new functions from existing functions

Career-Ready Practices
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

- given standard form
- Writing Equations in Point-Slope Form
  - given two points
- Writing Equations of Parallel and Perpendicular Lines
- Solving Systems of Linear Equations by Graphing
- Graphing Calculator Introductions (Desmos)
- Solving Systems of Linear Equations by Substitution
- Solving Systems of Linear Equations by Elimination
- Solve systems - word problems

Differentiation	Assessments
Interdisciplinary Connections ● Students can write equations or functions to model real-world systems, for example, d=r*t equations from physics. **Technology Integration** ● Desmos graphing calculator	**Formative Assessments:** ● Entrance and Exit Tickets ● Classwork Checks ● Class Discussions ● Reflection Journals **Summative Assessments, Projects, and Celebrations:** ● Mid and End of Unit Quiz

- IXL
- Delta Math

Media Literacy Integration

- Students can analyze different views of graphs and explain their format.

Global Perspectives

- Students can pick a country and graph their population changes over the last 10 years. Students will then analyze the graph of the function they've created and try to identify the type of function.

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations

- Google Classroom Reviews (make sure all work is complete in the students' math courses)
- Chapter test corrections

Examples

Evaluate.

1. f(x)=2x-4 a. f(-2) b. f(4) c. f(x)=3, find x.

2. Evaluate the function f(x)=3x+6 over the given domain. D: {-2, -1, 0, 1}

3.Write the equation in slope intercept. Then graph the line 2x-3y=6

4. Given the two cost equations, at what value for x will they have the same cost?

C=4x+7

C=2x+25

Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Recommended Texts to Support Unit:

- Big Ideas Mathematics - Algebra 1 (2015)

Unit 2: Exponents and Exponential Functions

Big Ideas: *Course Objectives/Content Statement(s)*

- Compare and contrast exponential functions
- Graph exponential growth functions
- Graph exponential decay functions
- Multiplying and Dividing Exponents
- Zero and Negative Exponents
- Simplifying expressions with exponents

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• What patterns exist in the table of exponential functions? • What are the characteristics of exponential growth and decay graphs? • What are some real life situations that can be modeled with exponential growth or decay? • How do the exponents of variables interact in different situations (multiplication, division, addition, subtraction)?	**Students will understand that:** • An exponent tells you how many times a value is multiplied by itself. • Exponential expressions can be simplified. • In exponential functions, the y-values are found by multiplying the previous y-value by the base. • Exponential functions are functions in which a quantity grows or decreases at a proportional rate. • The difference between exponential growth and decay functions is • Compound interest, bacteria and population are only a few of the many real-life situations that use exponential growth and decay.
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**

Students will:
F-LE: Linear and Exponential Models
A. Construct and compare linear and exponential models and solve problems
B. Interpret expressions for functions in terms of the situation they model
 	
Career-Ready Practices
CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
	• Properties of Exponents
	  ○ Multiplication
	  ○ Division
	  ○ 0 exponent
	  ○ Negative Exponents
	  ○ Power to a power
	• Exponential Functions
	  ○ Growth
	  ○ Decay
	• Graphing Exponential Functions
	• Word Problems

CRP3: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason. **CRP5**: Consider the environmental, social and economic impacts of decisions. **CRP6**: Demonstrate creativity and innovation. **CRP7**: Employ valid and reliable research strategies. **CRP8**: Utilize critical thinking to make sense of problems and persevere in solving them. **CRP9**: Model integrity, ethical leadership and effective management. **CRP10**: Plan education and career paths aligned to personal goals. **CRP11**: Use technology to enhance productivity. **CRP12**: Work productively in teams while using cultural global competence.	
Differentiation	**Assessments**
Interdisciplinary Connections ● Exponential growth and decay models are used in many real-life situations involving science, history, finance, health care and sports. ● One of the most common examples of exponential growth deals with bacteria. Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. For example, if we start with only one bacterium, which can double every hour, by the end of one day, we will have over 16 million bacteria. **Technology Integration** ● Desmos graphing calculator ● IXL ● Delta Math **Media Literacy Integration** ● Students can explore how math can be used to solve story (or word) problems to solve for missing values. **Global Perspectives**	**Formative Assessments:** ● Entrance and Exit Tickets ● Classwork Checks ● Class Discussions ● Reflection Journals **Summative Assessments, Projects, and Celebrations:** ● Mid and End of Unit Quiz ● Google Classroom Reviews (make sure all work is complete in the students' math courses) ● Chapter test corrections **Examples** 1. Create a table and sketch a graph. a. In 1985, there were 285 cell phone subscribers in the small town of Centerville. The number of subscribers increased by 75% per year after 1985. b. Each year a local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. Howmany players remain after 5 rounds? 2. Simplify

- Students will explore that the exponential model is used globally in population and in the financial markets.

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via	Increase opportunities to	Individualized assessment tools

a. 2^{-1} b. $x^3y^4 * x^3y^5$ c. $\frac{x^3y^4}{x^7y^8}$

3. Graph

a. $y = 3 * 2^x$ b. $y = 2 * \frac{1}{4}^x$

4. Evaluate $\frac{x^3y^4}{1-x^2}$ for x=6 and y=2

computer or electronic device	engage in active academic responding	based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 3: Polynomials and Factoring

Big Ideas: *Course Objectives/Content Statement(s)*

- Students will interpret the structure of expressions.
- Students will write and recognize expressions in equivalent forms.
- Students will factor quadratic polynomials.
- Students will factor special polynomials.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How can polynomials be combined through different mathematical operations? • How do properties of exponents relate to polynomials? • How can a polynomial be expressed in different ways based on its structure? • How can factors be used to solve a problem? • How are factors related to polynomials in standard form?	**Students will understand that:** • If two or more polynomials have common terms, the coefficients of common terms can be combined to simplify the expression. • Non-prime polynomials can be factored based on the number of terms, common factors, and defining structures. • Once a polynomial is factored, if this expression is equivalent to zero, each non-constant factor is also equivalent to zero. Solving each of these equations results in the solution(s) of the original equation. This is known as the Zero Product Property. • The methods used to factor a quadratic completely are; gcf, difference of squares, factor/sum (grouping).
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**

Students will:
A-SSE: Seeing Structure in Expressions
A. Interpret the structure of expressions
 	
A-APR: Arithmetic with Polynomials and Rational Expressions
A. Perform arithmetic operations on polynomials
B. Understand the relationship between zeros and factors of polynomials
 	
Career-Ready Practices
	• Polynomial Operations
	  ○ Adding / Subtracting (combining like terms)
	  ○ Multiplying
	• Factoring
	  ○ GCF
	  ○ Grouping
	  ○ Trinomials (a=1)
	  ○ Trinomials (a>1)
	  ○ Difference of two squares
	  ○ Factoring Special Products

CRP1: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills. **CRP3**: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason. **CRP5**: Consider the environmental, social and economic impacts of decisions. **CRP6**: Demonstrate creativity and innovation. **CRP7**: Employ valid and reliable research strategies. **CRP8**: Utilize critical thinking to make sense of problems and persevere in solving them. **CRP9**: Model integrity, ethical leadership and effective management. **CRP10**: Plan education and career paths aligned to personal goals. **CRP11**: Use technology to enhance productivity. **CRP12**: Work productively in teams while using cultural global competence.	• Factoring Completely (all methods combined) • Factoring Word Problems
Differentiation	**Assessments**
Interdisciplinary Connections • Applications to physics include projectile motion and real world situations. **Technology Integration** • IXL • Delta Math • Desmos **Media Literacy Integration** • Websites (such as wolframalpha.com) can provide visual representation and alternate representations of factorable and non-factorable polynomials. This can provide students with an opportunity to analyze polynomials from different perspectives. **Global Perspectives** • Polynomial equations and their solutions are used to find information about savings accounts, area, volume, revenue, cost, and profit.	**Formative Assessments:** • Entrance and Exit Tickets • Classwork Checks • Class Discussions • Reflection Journals **Summative Assessments, Projects, and Celebrations:** • Mid and End of Unit Quiz • Google Classroom Reviews (make sure all work is complete in the students' math courses) • Chapter test corrections

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
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Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and	Modified assessment grading

Examples

1. Perform the operation and classify the polynomial.
$(2x^2 - 6x + 2) - (4x^2 - 6x - 9)$

2. Simplify.

a. $(x-4)(2x+5)$

b. $(x+1)^2$

c. $-2x(x-3)(x-4)$

3. Factor completely.

a. $4x^2-9$

b. x^2-5x-6

c. $3x^2-10x+3$

d. $2x^3+4x^2+2x$

e. $8x^4-4x^3-16x^2+24x$

	activities previews, anticipatory guides, and semantic mapping		

Unit 4: Graphing and Solving Quadratic Functions

Big Ideas: *Course Objectives/Content Statement(s)*

- Students will analyze the graph of a quadratic equation
- Students will recognize solutions to a quadratic equation graphically and algebraically.
- Students will relate the graph of a quadratic equation to projectile motion.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• What are the characteristics of the graph of a quadratic equation? • How can we use a graph to solve a quadratic equation? • How does the graph of a quadratic equation mimic projectile motion? • What does the factored form of a quadratic tell us about the graph and vice versa?	**Students will understand that:** • Not all quadratics can be factored. • You need to utilize different solution methods for different quadratics. • Roots are solutions to a quadratic equation that is equal to 0. They are also known as zeros, and they are visible where the quadratic meets the x-axis (when y=0). • A quadratic function can have 0, 1 or 2 real roots. If a function has zero real roots. • All quadratic functions are a transformation of the parent function f (x) = x^2 • Quadratic functions are used to maximize profit and minimize cost. • Quadratic functions are used to visualize projectile motion.
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**

Students will:
A-SSE: Seeing Structure in Expressions
B. Write expressions in equivalent forms to solve problems
 	
A-APR: Arithmetic with Polynomials and Rational Expressions
C. Use polynomial identities to solve problems
 	
Career-Ready Practices
CRP1: Act as a responsible and contributing citizen and employee.
	• Graphing Quadratics
	  ○ Characteristics of a quadratic
	  ■ Maximum, minimum, vertex, x-intercepts
	  ○ Parent Function (graph and table)
	  ○ Transformations
	  ■ Reflections in the x-axis
	  ■ Vertical Stretch / Shrink
	  ■ Vertical Shifts
	  ■ Horizontal Shifts
	  ○ Graph y=ax^2
	  ○ Graph y=ax^2+c

CRP2: Apply appropriate academic and technical skills.
CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
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CRP12: Work productively in teams while using cultural global competence.

- Standard form y=ax^2+bx+c
  - Locate the vertex using x=-b/2a is the axis of symmetry, use it to create a table.
- Vertex Form
  - Locate the vertex, use it to create a table.

- Solve Quadratic Equations
  - Square Roots
  - Factoring and zero product property
  - Quadratic Formula

Differentiation

Interdisciplinary Connections

- Physics - introduce the idea of projectile motion and how it can be modeled

Technology Integration

- Use desmos to check solutions and visualize quadratic word problems.

Media Literacy Integration

- Create a word problem that can be represented by a parabola. Describe the situation verbally and visually through a graph.

Global Perspectives

- The game Angry Birds has become a nation wide phenomenon that uses parabolas and projectile motion to win the game. Have students research the questions: What is projectile motion? Are there any other games that use parabolas?

Supports for English Language Learners

Assessments

Formative Assessments:

- Entrance and Exit Tickets
- Classwork Checks
- Class Discussions
- Reflection Journals

Summative Assessments, Projects, and Celebrations:

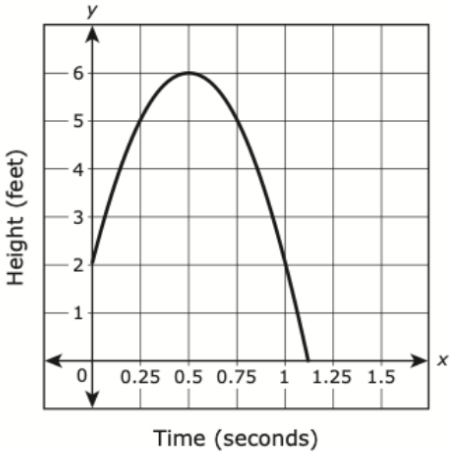
- Mid and End of Unit Quiz
- Google Classroom Reviews (make sure all work is complete in the students' math courses)
- Chapter test corrections

Examples

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks for understanding, feedback	Differentiated materials
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic	Modified assessment grading

1. Analyze the graph to answer the questions below.
A tennis ball was 2 feet off the ground when a tennis player hit it so that the ball traveled up in the air before coming back to the ground. The height of the tennis ball is described by the graph below.



a. What is the maximum height of the ball?
b. How long does it take the ball to reach the ground?

2. Graph.

a. $y = x^2 + 4x + 3$

b. $f(x) = -(x-2)^2 + 3$

c. $f(x) = 2x^2 + 4x + 2$

Examples (cont)

	mapping	

1. Simplify.

a. $\pm\sqrt{0.0009}$

b. $-\sqrt{0.25}$

c. $\sqrt{18}$

d. $3\sqrt{40}$

2. Solve.

a. $x^2-12x=-11$

b. $2x^2+16x+24=0$

c. $x^3+11x^2-12x=0$

d. $3x^2 = 24$

e. $x^2 - 5x - 4 = 0$

f. The length of a rectangle is 3 meters longer than the width. If the area is $130m^2$, what are the dimensions of the rectangle?

g. The hypotenuse of a right triangle measures 10in. If the side lengths are represented by x and $x + 2$, find the length and width of the triangle using the Pythagorean theorem.

Unit 5: Statistics and Probability

Big Ideas: *Course Objectives/Content Statement(s)*

- Students should be able to gather and display data appropriately to reach conclusions and answer questions.
- Students will summarize, represent, and interpret data on a single count or measurement variable.
- Students will summarize, represent, and interpret data on two categorical and quantitative variables.
- Students will understand the basic use of probability and counting principles.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• How can different data displays affect analyses of the data? • What are possible correlations for data? • How are predictions made? • How are probabilities calculated? • What are probabilities useful for?	**Students will understand that:** • Based on context, one display may be more appropriate than another to illustrate data. For example, it may be clearer to see the percentage students spend on daily activities in a pie chart rather than a bar graph. • If the data show a linear relationship, there can either be a positive or a negative correlation. Also with a linear relationship, a line of best fit can be determined and drawn. • Data can also follow a normal distribution curve. • Predictions can be based on previously collected data or by performing experiments. Computing expected value can also help in decision-making. • Probability is calculated by counting the desired outcomes and the total number of outcomes in a situation and dividing them.
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**
Students will: **S-ID: Interpreting Categorical and Quantitative Data** A. Summarize, represent, and interpret data on a single count or measurement variable B. Summarize, represent, and interpret data on two categorical and quantitative variables C. Interpret linear models **S-IC: Making Inferences and Justifying Conclusions** A. Understand and evaluate random processes underlying statistical experiments B. Make inferences and justify conclusions from sample	• Scatter Plots • Spend time showing how to put into calculator • Lines that Best Fit • Measures of Center of Variation ○ Only do standard deviation by calculator • Box and Whisker Plots (include outliers) • Shapes of Distributions • Two-Way Tables **For conditional relative frequency, DO NOT follow the book, use joint frequency divided by relative frequency** • Choosing a Data Display

surveys, experiments, and observational studies **S-CP: Conditional Probability and the Rules of Probability** A. Understand independence and conditional probability and use them to interpret data **S-MD: Using Probability to Make Decisions** B. Use probability to evaluate outcomes of decisions **Career-Ready Practices** **CRP1**: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills. **CRP3**: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason. **CRP5**: Consider the environmental, social and economic impacts of decisions. **CRP6**: Demonstrate creativity and innovation. **CRP7**: Employ valid and reliable research strategies. **CRP8**: Utilize critical thinking to make sense of problems and persevere in solving them. **CRP9**: Model integrity, ethical leadership and effective management. **CRP10**: Plan education and career paths aligned to personal goals. **CRP11**: Use technology to enhance productivity. **CRP12**: Work productively in teams while using cultural global competence.	• Counting Principles • Permutations and Combinations • Basic Probability • Complex Probability
Differentiation	**Assessments**
Interdisciplinary Connections: • Students can study the history of statistics as it relates to other mathematics. Compared to many topics that students have learned, statistics will be the youngest branch of mathematics as it has been shaped by technology. **Technology Integration:** • Students will use the random integer generator on the graphing calculator to make predictions.	**Formative Assessments:** • Entrance and Exit Tickets • Classwork Checks • Class Discussions • Reflection Journals **Summative Assessments, Projects, and Celebrations:** • Mid and End of Unit Quiz • Google Classroom Reviews (make sure all work is complete in the students' math courses)

Media Literacy Integration:

- Students can explore specific statistics presented in national news reports to discuss how samples can be biased.

Global Perspectives:

- Students can research the central limit theorem and its correlation to examples in nature.

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks	Differentiated materials

- Chapter test corrections

Examples

1. Seven students were asked to record the number of hours spent using the internet per week. The hours were {8, 9, 8, 9, 7, 9, 6}. Compute the standard deviation of this data.

2. Describe a set of data that would show a negative correlation. Include a sketch of the graph of thedata with a possible line of best fit.

3. In the third quarter, Chris's test average was 84%, quiz average 92%, and classwork 94%. If tests are weighted 60%, quizzes 30%, and classwork 10%, compute Chris's final average for the third quarter.

4. A shoe manufacturer wants to check the quality of its shoes. Every hour, 20 pairs of shoes are taken off the assembly line and checked. Is this sample biased or unbiased?

	for understanding, feedback	
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 6: Radical Functions

Big Ideas: *Course Objectives/Content Statement(s)*

- Students will be able to add, subtract, multiply, and divide radicals. Students will solve simple radical equations in one variable and give examples showing how extraneous solutions may arise.
- Students will be able to graph a square root and cube root function.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
• When can you add, subtract, multiply and divide radical expressions? • How do you simplify radical expressions? • How do you graph square root and cube root functions? • What are the characteristics of a graph of a square and cube root function? • How do you find domain restrictions of a cube root function? • How do you solve square root equations?	**Students will understand that:** • Radicals contain the characteristics including the radicand, index, coefficient, and the radical. • Radicals are most simplified when it does not have any perfect square factors in the radicand. • You can only add and subtract radicals when they have the same index and radicals. You can only multiply and divide radicals when they have the same index. • You add/subtract radicals by keeping the radicand the same and adding/subtracting the coefficients. You multiply/divide radicals by multiplying /dividing the radicand. • Square root and cube root graphs can be graphed by transformations or using a table. • You can solve radical equations with inverse operations.
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**
Students will: **8-EE: Expressions and Equations** A. Work with radicals and integer exponents. **A-REI: Reason with Equations and Inequalities** A. Understand solving equations as a process of reasoning and explain the reasoning B. Solve equations and inequalities in one variable D. Represent and solve equations and inequalities graphically	• Simplifying Square Roots • Simplifying with Variables • Multiplying square roots • Rationalizing ** Monomial denominators ** • Simplifying Cube Roots (numbers and variables) • Adding and Subtracting Radicals • Solving Radical Equations • Only square roots • Graphing Square Roots ** Use transformations **

Career-Ready Practices

CRP1: Act as a responsible and contributing citizen and employee.
CRP2: Apply appropriate academic and technical skills.
CRP3: Attend to personal health and financial well-being.
CRP4: Communicate clearly and effectively and with reason.
CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
CRP10: Plan education and career paths aligned to personal goals.
CRP11: Use technology to enhance productivity.
CRP12: Work productively in teams while using cultural global competence.

- EASY Graphing Cube Roots *Using transformations*

Differentiation	Assessments

Interdisciplinary Connections

- **Radicals** are used is many real-life applications. Some of these include velocity, frequency, energy, right triangle applications, densities and fluid flow through a membrane.

Technology Integration

- https://www.ixl.com/math/algebra-1/simplify-radical-expressions
- https://www.ixl.com/math/algebra-1/multiply-radical-expressions
- https://www.ixl.com/math/algebra-1/add-and-subtract-radical-expressions

Media Literacy Integration

- Students will interpret graphs of radical functions and determine a situation in real life that could be represented by the graphs.

Global Perspectives

Formative Assessments:

- Entrance and Exit Tickets
- Classwork Checks
- Class Discussions
- Reflection Journals

Summative Assessments, Projects, and Celebrations:

- Mid and End of Unit Quiz
- Google Classroom Reviews (make sure all work is complete in the students' math courses)
- Chapter test corrections

Examples

1. BASEBALL "DIAMOND": The distance between each of the consecutive bases is 90 feet. How far does the catcher have to throw the ball from home plate to 2nd base?

2. Find the distance of (9, 15) and (-3, -1) without

- On a roller coaster ride, your speed in a loop depends on the height of the hill you have just come down and the radius of the loop in feet. The equation gives the velocity v in feet per second of a car at the top of the loop. Suppose the loop has a radius of 18 ft. You want the car to have a velocity of 30 ft/s at the top of the loop. How high should the hill be?

Supports for English Language Learners		
Sensory Supports	**Graphic Supports**	**Interactive Supports**
Real-life objects	Charts	In pairs or partners
Manipulatives	Graphic Organizers	In triands or small groups
Pictures	Tables	In a whole group
Illustrations, diagrams & drawings	Graphs	Using cooperative group
Magazines & Newspapers	Timelines	Structures
Physical activities	Number lines	Internet / Software support
Videos & Film		In the home language
Broadcasts		With mentors
Models & Figures		

Intervention Strategies		
Accommodations	**Interventions**	**Modifications**
Allow for verbal responses	Multi-sensory techniques	Modified tasks/expectations
Repeat/confirm directions	Increase task structure (e.g. directions, checks	Differentiated materials

graphing the points.

3. You need to put a fence around your rectangular pool and the outside cement. You are fencing an area that is 20 by 25 feet. How much material do you need for the fence?

4. Given the AB = 6, BC= 8 and AC = 10, find tangent A, sine A, cosine A.

5. Find the length of the hypotenuse if the acuteangle is 20 degrees and the leg opposite the angle measures 105 feet.

6. Suppose the angle of elevation between the ground and the top of a cliff is 70 degrees. If the base of the cliff is 25 meters from your current position, how high is the cliff?

7. Simplify.

a. $3\sqrt{40}$

b. $4\sqrt{3}\left(-2\sqrt{3}\right)$

c. $4\sqrt{3}+\sqrt{12}-10\sqrt{3}$

d. $\sqrt{48x^7y^3}$

e. Find the third side of a right triangle if one leg measures $\sqrt{7}$ units and the hypotenuse measures 4 units.

h. Find the exact area of a rectangle whose dimensions are $5\sqrt{2}$ by $2+3\sqrt{10}$. Simplify completely.

8. Solve:

a. $\sqrt{x}+4=12$

b. $\sqrt{10x-3}=\sqrt{5x+2}$

9. Analyze how the graph of $y=\sqrt{x}+2$ compares to the graph of $y=\sqrt{x}$.

10. Graph $y=\sqrt{x+7}$ and state the domain.

	for understanding, feedback	
Permit response provided via computer or electronic device	Increase opportunities to engage in active academic responding	Individualized assessment tools based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading

Unit 7: Rational Functions	
Big Ideas: *Course Objectives/Content Statement(s)* ● Students should be able to simplify rational expressions using addition, subtraction, multiplication and division. ● Students should be able to graph a simple rational function and determine the domain of the function. ● Students will solve rational equations	
Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
● How do you simplify rational expressions under multiplication and division? ● How do you simplify rational expressions under addition and subtraction? ● What are the characteristics of the graph of a rational function? ● How do you solve a rational equation?	**Students will understand that:** ● Apply rules of fractions to rational expressions and factor both the numerator and denominator in order to cross cancel. ● A rational function is a function of the form y= polynomial/polynomial where the denominator does not equal O. The most basic rational function is y=1/x ● The domain of a rational function excludes values that make the denominator 0. ● You can solve a rational equation using cross multiplication and methods to solve linear and quadratic equations.
Areas of Focus: Proficiencies **(New Jersey Student Learning Standards)**	**Lessons**
Students will: **F-BF: Building Functions** B. Build new functions from existing functions **A-APR: Arithmetic with Polynomials and Rational Expressions** D. Rewrite rational expressions **Career-Ready Practices** **CRP1**: Act as a responsible and contributing citizen and employee. **CRP2**: Apply appropriate academic and technical skills. **CRP3**: Attend to personal health and financial well-being. **CRP4**: Communicate clearly and effectively and with reason.	● Simplify Rational Expressions ● Multiply Rational Expressions ● Divide Rational Expressions ● Adding and Subtracting Rational Expressions ● Inverse Variation ● Introduce the graph of the rational function ● Graphing Rational Functions ○ BASIC - Constant / Linear - Using transformations ONLY ● Solving Rational Equations

CRP5: Consider the environmental, social and economic impacts of decisions.
CRP6: Demonstrate creativity and innovation.
CRP7: Employ valid and reliable research strategies.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9: Model integrity, ethical leadership and effective management.
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Differentiation

Interdisciplinary Connections

- To take sharp, clear pictures, a photographer must focus the camera precisely. The distance from the object to the lens *p* and the distance from the lens to the film *q* must be accurately calculated to ensure a sharp image. The focal length of the lens is *f*.
- The formula that relates these measures is $1/p+1/q=1/f$. Katanya has a camera with a focal length of 10cm. If the lens is 12cm from the film, how far should the dog be from the lens so that the picture will be in focus?

Technology Integration

- https://www.ixl.com/math/algebra-1/rational-functions-asymptotes-and-excluded-values
- https://www.ixl.com/math/algebra-1/multiply-and-divide-rational-expressions

Media Literacy Integration

- Students will use desmos to graph complicated rational functions that represent real world scenarios. They will use desmos to identify key characteristics of the graphs and explain how the function models the situation.

Global Perspectives

- Rational equations can be used to **solve a variety of problems that involve rates, times and work**

Assessments

Formative Assessments:

- Entrance and Exit Tickets
- Classwork Checks
- Class Discussions
- Reflection Journals

Summative Assessments, Projects, and Celebrations:

- Mid and End of Unit Quiz
- Google Classroom Reviews (make sure all work is complete in the students' math courses)
- Chapter test corrections

Examples

1. Simplify each.

a. $\frac{x^2-3x+2}{x^2-25}\cdot\frac{x-5}{x-1}$

b. $\frac{3x}{x^2+4x+4}\div\frac{27}{x^2+2x}$

c. $\frac{5}{x-3}+\frac{2x}{x^2-9}$

d. $\frac{4}{x-6}-\frac{1}{x+1}$

2. Graph $f(x)=\frac{x}{x+1}$ and determine the domain.

Using rational expressions and equations can help you answer questions about how to combine workers or machines to complete a job on schedule

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Permit response provided via	Increase opportunities to	Individualized assessment tools

computer or electronic device	engage in active academic responding	based on student need
Audio Books	Utilize pre-reading strategies and activities previews, anticipatory guides, and semantic mapping	Modified assessment grading