Rumson-Fair Haven Regional High School Curriculum

Course: *Algebra I*
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Supervisor: Jon Pennetti
Board Approval: September 2023
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Section I: Course Description

Algebra I will explore the world of functions both graphically and numerically, where students will deepen their knowledge of mathematics acquired in grades 6 through 8. Students will be introduced to variables, algebraic expressions, equations, inequalities, functions and their multiple representations. This course provides a comprehensive teaching of the aspects and relationships between functions and will further develop students' ability to work collaboratively and problem-solve. Through this process, the ability to read and understand problems, break them down into their component parts, and present solutions will be developed. At the conclusion of the course, students will complete the Algebra I NJSLA.

Section II: NJSLS: New Jersey Student Learning Standards/Learning Objectives

1. ***2023 New Jersey Student Learning Standards – Mathematics:***
    - "A New Jersey education in Mathematics builds quantitatively and analytically literate citizens prepared to meet the demands of college and career, and to engage productively in an information-driven society; …A high-quality mathematics education fosters a population that…leverages data in decision-making and as a lens for discussing, analyzing, and responding to practical questions, persists to make sense of and model problems arising in everyday life, society, and the workplace, thinks critically and strategically to assess quantitative relationships and to solutions to complex problems, employs precise reasoning and constructs viable arguments to deduce conclusions, recognize false statements and assess peers' reasoning, interprets, evaluates and critiques the mathematics embedded in social, scientific and commercial systems, as well as the claims made in the private and public sectors, communicates precisely when conveying, representing, and justifying both qualitative and quantitative perspectives."
2. ***2023 New Jersey Student Learning Standards English Language Arts:***
    - A New Jersey education in English Language Arts builds readers, writers, and communicators prepared to meet the demands of college and career and to engage as productive American citizens with global responsibilities. …Students will develop the necessary skills in reading, writing, speaking, and listening that are the foundations for creative and purposeful expression in language read rich, challenging texts that build their knowledge of the world, grow their confidence and identities as readers, and develop critical thinking skills and vocabulary necessary for long-term success[; e]ngage in regular, meaningful, writing authentic tasks, exploring valued topics, writing for impact and expression, and sharing their work with others (including authentic audiences) leverage complex texts and digital media to develop comprehension, active listening, and discussion skills ground daily writing and discussion in evidence, fostering an ability to read critically, build arguments, cite evidence, and communicate ideas to contribute meaningfully as productive citizens evaluate the reliability, credibility, and perspective of authors and speakers across all forms of media express ideas and knowledge through a variety of modalities and media, and serve as effective communicators who purposefully read, write, and speak across multiple disciplines [and l]earn to persist in reading complex texts, establishing lifelong habits to read voluntarily for pleasure, for further education, for information on public policy, and for advancement in the workplace.
3. ***Standard 8.1 (Computer Science) and 8.2 (Design Thinking) of the 2020 NJSLS:***
    - "The 'Intent and Spirit of the Computer Science and Design Thinking Standards' is to focus on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers."
4. ***Standard 9.4 (Life Literacies and Key Skills) of the 2020 NJSLS:***
    - "This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy."
    - ***Climate Change:** The state of New Jersey has mandated instruction in, "Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs."
5. ***Amistad Law: N.J.S.A. 18A 52:16A-88:***

- The inclusion of lessons and resources/texts dealing with the African slave trade, slavery in America, the vestiges of slavery in this country and the contributions of African-Americans to our society will be implemented in English and Social Studies courses in accordance with state law: "Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students."

6. ***Holocaust Law: N.J.S.A. 18A 35-28:***
   - The inclusion of lessons and resources/texts that enable pupils to identify and analyze applicable theories concerning human nature and behavior; to understand that genocide is a consequence of prejudice and discrimination; and to understand that issues of moral dilemma and conscience have a profound impact on life will be implemented in English and Social Studies courses in accordance with state law: "Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens."
7. ***LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35:***
   - A transformative approach to the inclusion of lessons and resources/texts on the contributions and issues concerning the LGBTQ+ population and people with disabilities will be implemented across all core subjects in accordance with state law: "A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35."
8. ***Asian American and Pacific Islanders Legislation: N.J.S.A 4021/A6100:***
   - The inclusion of lessons and resources/texts on the history and contributions of Asian Americans and Pacific Islanders, will enable New Jersey's schools to provide a curriculum that reflects the diversity of our state. In accordance with state law: "A board of education shall include instruction on the history and contributions of Asian Americans and Pacific Islanders in an appropriate place in the curriculum of students in grades kindergarten through as part of the school district's implementation of the New Jersey Student Learning Standards in Social Studies."
9. Acquisition/development/refinement of the higher-order critical thinking skills aligned with the *Revised Bloom's Taxonomy of Cognitive Objectives*

Section III: Curriculum Modifications

The *Algebra I* curriculum is subject to case-by-case modifications to support/advance the needs of all students, including special education students, English language learners, gifted students, and those at risk of school failure. These modifications are based on Individualized Learning Programs (IEPs), recommendations made by the district's English Language Learners (ELL) coordinator, feedback from members of the Intervention & Referral Services Team (*I&RS*) for at-risk students, and 504 Plans.

Coursework and assessments will be modified on an individual basis for students when necessary. Modifications may include but are not limited to those outlined on the Modifications/Accommodations for Mathematics Courses chart.

Section IV: Preparation for Standardized Testing

Instruction in *Algebra I* is aligned with the requirements of state and national standardized assessments, including the *NJGPA, NJSLA*, the *ACT*, the *PSAT,* and the *SAT*.

Section V: Curriculum Pacing Guide

Curriculum Pacing Guide	
Course Title: *Algebra I*	**Grade Level:** 9

Unit I: Numbers & Operations	Weeks 1-3
Unit II: Expressions & Equations	Weeks 4-6
Unit III: Linear Functions	Weeks 7-10
Unit IV: Systems of Linear Equations	Weeks 11-12
Unit V: Linear Equations & Inequalities	Weeks 13-15
Unit VI: Absolute Value Equations & Functions	Weeks 16-17
Unit VII: Functions	Weeks 18-20
Unit VIII: Exponential Functions	Weeks 21-23
Unit IX: Polynomials	Weeks 24-28
Unit X: Quadratic Functions & Equations	Weeks 29-33
Unit XI: Algebraic Functions	Weeks 34-37
Unit XII: Statistics	Weeks 38-40

Section VI: Technology Skills

Students in *Algebra I* are required to complete the technology skills components of the curriculum:

- TI-83/TI-84
- Desmos/ Geogebra
- Math XL
- Edulastic
- Google Suite

Section VII: Primary Texts and Year-Long Instructional Resources

The following texts and instructional resources are employed in *Algebra I*:

- *Common Sense Education* (www.commonsense.org)
- Algebra I, by Ron Larson and Laurie Boswell
- *Math XL*
- *Illustrative Mathematics*
- *You Cubed, Stanford Graduate School of Education*
- *NRICH, University of Cambridge*

Section VIII: Grading Formula and Assessment Modes

Marking period grades in *Algebra I* are determined via a percentage weighting model. The specific grading categories and weightings of each will be determined before the start of each academic year and will be published in the posted/distributed course syllabi.

Assessments in *Algebra I* vary greatly in format, scope/content/skills assessed, and alternative assessments, differentiation in assessments and choice will be incorporated as appropriate. Preliminary assessments of each format will be used as benchmarks and summative assessments will be created/revised collaboratively each year and planned by members of the *Algebra I* instructional team to inform future learning and to measure student growth.

Section IX: Unit Templates

The following unit templates have been established for the *Algebra I* curriculum by the *Algebra I* instructional team:

<table>
<tr><th colspan="2">Unit I: Numbers & Operations</th></tr>
<tr><td colspan="2">Unit Summary</td></tr>
<tr><td colspan="2">The unit begins with a spiral review of skills established in the 8th-grade mathematics curriculum. Review topics include establishing the definition of the real number system, estimation, exponents and roots, properties of exponents, and scientific notation.</td></tr>
<tr><th colspan="2">Standards/Core Ideas/Performance Expectations</th></tr>
<tr><td colspan="2">The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in Algebra I:
2023 New Jersey Student Learning Standards: Mathematics
MP.1-8, N.RN.A.1-3
2023 New Jersey Student Learning Standards English Language Arts
RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
2020 New Jersey Student Learning Standards: Computer Science and Design Thinking
8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills
9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5</td></tr>
<tr><th>Unit Essential Questions</th><th>Unit Enduring Understandings</th></tr>
<tr><td>How can you use the properties of real numbers to classify numbers into their defined sets?
How can we use estimation to check the validity of a solution?
Why are exponent properties important in mathematics?
What is the purpose of scientific notation?</td><td>Real numbers can be classified into different sets based on their properties such as rational numbers, irrational numbers, integers, and whole numbers. Rational numbers are numbers that can be expressed as a fraction or a ratio of two integers. Irrational numbers are numbers that cannot be expressed as a fraction or a ratio of two integers. They are non-repeating and non-terminating decimals.
Estimation can be used to check the validity of a solution by approximating the answer and comparing it to the actual solution.
Exponent properties help in solving equations involving variables and unknowns, as they allow us to manipulate and rearrange the expressions more easily.
Scientific notation is used to express very large or very small numbers in a more convenient and concise format.</td></tr>
<tr><th colspan="2">Evidence of Learning</th></tr>
</table>

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Classwork/thinking tasks • Homework • Performance activities • Unit IA Quiz • Unit IB Quiz • Individual student check-ins with teacher	• Unit I Benchmark Test	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/ Red Pens

Unit II: Expressions & Equations
Unit Summary
Unit II reinforces linear expressions and equations established in the middle school mathematics curriculum. Students learn to simplify expressions by combining like terms and applying properties to write equivalent expressions, including the distributive property. Students will also solve equations starting from equations with variables on both sides and progressing to more complex equations, applying all properties of equality. The unit concludes with using the skills to transform literal equations so that they are solved for a named variable.
Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*
• *2023 New Jersey Student Learning Standards: Mathematics*
  ○ MP.1-8, 8.EE, A.SSE.A.1, A.CED.A.1 & 4, A.REI.A.1&B.3, N.Q.A.1, F.BF.A.1
• *2023 New Jersey Student Learning Standards English Language Arts*
  ○ RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
• *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  ○ 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
• *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  ○ 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
• How can you use the properties of real numbers to simplify algebraic expressions? • How do we represent unknown quantities? • How can the value of an unknown variable be found?	• Properties of real numbers, such as the commutative, associative, and distributive properties, can be used to simplify algebraic expressions. The properties of real numbers are relationships that are true for all real numbers except in one case, zero. • By applying these properties, we can combine like terms in an expression and simplify it. • Unknown quantities can be represented as variables. • Using variables, we can write equations to represent real-life situations or solve various mathematical problems and then solve equations for unknown quantities/variables.

Evidence of Learning		
Formative & Alternative Assessments:	**Benchmark & Summative Assessments:**	**Resources Needed:**
• Classwork/thinking tasks • Homework • Performance activities • Unit IIA Quiz • Unit IIB Quiz • Individual student check-ins with teacher	• Unit II Summative Assessment	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/Red Pens • Algebra Tiles • Communicator Clearboards • Common Sense Media "The Big Data Dilemma"

Unit III: Linear Functions
Unit Summary
Unit III covers how to graph linear equations and the different structures the equations can be written in, focusing on how these values transform the parent functions of a line. Students will also learn how to write the equation of a line with

specified characteristics. The relationships between vertical and horizontal lines will be covered, including key attributes of parallel and perpendicular lines. Students will extend their knowledge of linear relationships by analyzing scatter plots to determine the equation for the line of best fit and make necessary conclusions from the data set.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, 8.EE, 8.F, 8.SP, A.CED.A.2, A.REI.D.10, F.IF.C.7, F.BF.A.1, S.ID.B.6 & C.7
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
• What information does the equation of a line give you? • How are equations and graphs related? • What is meant by the slope of a line, and how can knowing a line's slope help to graph a line and find parallel and perpendicular lines?	• The equation of a line will give you all the properties of the slope of a line and its y-intercept. • Equations and graphs are related as the graph will be a visual representation of the information provided in any given equation. This includes equations with variables, which allows for predictions based on given values. • The slope of the line shows the steepness and direction of that line. Given this information, two lines with the same slope will be parallel and two lines with negative inverse slopes will be perpendicular.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Classwork/thinking tasks • Homework • Performance activities • Unit IIIA Quiz • Unit IIIB Quiz • Individual student check-in with teacher	• Linear Regression Project • Unit III Summative Assessment	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/Red Pens • Chromebooks • TI-84/Desmos • Communicator Clearboards

Unit IV: Systems of Linear Equations

Unit Summary

Unit IV uses graphing, elimination, and substitution to solve systems of equations. Real-world scenarios will be modeled and solved using systems.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, 8.EE, 8.F, A.CED.A.2, A.REI.C.5-6 & D11
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2&3, 8.1.12.DA.2 &4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
• How can real-world situations be modeled by systems?	• Real-world situations can be modeled by systems by breaking them down into smaller components or variables that interact with each other.

• How can solutions to a system be found? • What does the number of solutions (none, one, or infinite) of a system of linear equations represent? • What are the advantages and disadvantages of solving a system of linear equations graphically versus algebraically?	• Solutions to a system can be found by solving the equations or relationships between the variables. • Depending on the system and the constraints involved, there can be none, one, or infinite solutions. The number of solutions to a system can vary, depending on the specific equations and their relationships. It is possible to have no solutions, meaning the equations do not intersect. It is also possible to have one unique solution, where the equations intersect at a single point. Lastly, it is possible to have an infinite number of solutions, where the equations are identical or represent the same line. The point at which lines intersect is the solution to the system with those lines, which can be identified graphically. • The advantages of solving a system graphically would be a visual understanding and geometric insights. The disadvantages are that graphing may not be as accurate and is limited to two variables. • The advantages of algebraically solving a system are efficiency and precise solutions, however, the disadvantages are that some solutions can be complex and tend to have a lack of visual intuition.

Evidence of Learning

Formative & Alternative Assessments:	**Benchmark & Summative Assessments:**	**Resources Needed:**
• Classwork/thinking tasks • Homework • Performance activities • Unit IVA Quiz • Individual student check-ins with teacher	• Unit IV Test • Summative Assessment	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/Red Pens • Communicator Clearboards

Unit V: Linear Inequalities & Functions

Unit Summary

This unit builds on the methods of solving equations and linear systems and demonstrates the similarities and differences between solving equations and solving inequalities. The unit concludes with graphing linear inequalities and systems of linear inequalities in the coordinate plane, where students apply these skills to solving real-world tasks.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, 8.EE, 8.F, A.CED.A.2-3, A.REI.B.3 & D.12
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
• How do the tools of algebra relate to equations and inequalities? • Why do we want to solve inequalities rather than get an equation? • How do we graph a linear inequality in the coordinate plane? • How do we solve a system of linear inequalities?	• Algebra tools, such as variables, coefficients, and operations, are used to manipulate and solve equations and inequalities. Equations are statements that show equality between two expressions, while inequalities indicate a comparison between two expressions, showing a relationship of greater than, less than, or not equal to. Inequalities are used to represent a range of possible solutions. • The choice between solving an equation or inequality depends on the information needed and the context of the problem. • To graph a linear inequality in the coordinate plane, follow these steps: 1. Identify the inequality and rewrite it in slope-intercept form ($y = mx + b$), 2. Graph the corresponding equation ($y = mx + b$) as a solid line. 3. Choose a test point that is not on the line and substitute its coordinates into the inequality. 4.

	If the test point satisfies the inequality, shade the region that contains the test point. If not, shade the opposite region. 5. If the inequality includes "greater than" or "less than," use a dotted line to represent the boundary instead of a solid line. ● To solve a system of linear inequalities, graph each linear inequality on the same coordinate plane. Then, identify the region that satisfies each inequality. This can be done by shading the appropriate side of each line. Finally, the solution to the system of linear inequalities is the overlapping region or the region where all the shaded regions overlap.

Evidence of Learning

Formative & Alternative Assessments:	**Benchmark & Summative Assessments:**	**Resources Needed:**
● Classwork/thinking tasks ● Homework ● Performance activities ● Unit VA Quiz ● Individual student check-ins with teacher	● Unit V Alternate Assessment ● Summative Assessment	● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens ● Communicator Clearboards

Unit VI: Absolute Value Equations & Functions

Unit Summary

This unit reviews the inverse operations used to solve equations and inequalities. Students learn to solve absolute value equations and model their solutions on a number line. Students will explore the model for an absolute value function and how these functions can be transformed in the coordinate plane. Absolute and linear functions will be compared to identify the similarities in structure and how each function is transformed. The unit will conclude with real-world applications and the use of the absolute value function to identify the solution(s) to the problem.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, A.CED.A.1 & 3, A.REI.A.1 & B.3
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2&3, 8.1.12.DA.2 &4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
● Why do some absolute value equations and inequalities have no solution? ● How are absolute value inequalities similar/different from equations? ● How can we use absolute value to model real-world scenarios?	● Absolute value equations and inequalities can sometimes have no solution due to the nature of absolute value operations. An absolute value equation is an equation in which the variable is within an absolute value expression, like $\|x\| = a$, where 'a' is a positive constant. An absolute value inequality is an inequality that involves an absolute value expression, like $\|x\| < a$ or $\|x\| > a$. ● Both absolute value equations and regular equations involve solving for a variable to find its value. However, the key difference lies in the fact that absolute value equations and inequalities involve constraints imposed by the absolute value operation, which can lead to situations where no real number can satisfy those constraints, resulting in no solution. Regular equations, while potentially complex, do not have this same limitation since they don't have inherent constraints tied to the absolute value of a variable. ● The use of absolute values may model the following real-world scenarios: temperature deviation, financial transactions, resource allocations, position, and distance along with statistical analysis of other phenomena. Most notably, in all these applications, the absolute value operation removes the sign of a quantity and focuses on its magnitude. This can be useful when you're interested in

	measuring how much a quantity deviates from a reference point, without considering whether it's positive or negative.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Classwork/thinking tasks • Homework • Performance activities • Unit VIA Quiz • Individual student check-ins with teacher	• Unit VI Test • Summative Assessment	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/ Red Pens • Communicator Clearboards

Unit VII: Functions

Unit Summary

Unit VII defines the key features of relations and functions, spiraling knowledge developed in earlier units. Students will redefine their domain and range and learn a new representation. Students will deepen their understanding of function notation to include operations and composite functions. The unit ends with an exploration of patterns and how to classify them based on their knowledge of linear functions.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, F.IF.A.1-3 & B.5, F.BF.A.1-2
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
• How do you use a formula to identify the terms of a sequence? • How can you represent and describe functions? • How can functions describe real-world situations, model predictions and solve problems?	• To use a formula to identify the terms of a sequence, first determine the pattern or rule that governs the sequence. This can be done by examining the given terms and looking for any noticeable patterns or relationships between them. Once you have identified the pattern, you can use a formula to generate the terms of the sequence. • Representing and describing functions involves using mathematical notation to convey how one set of values (the inputs) relates to another set of values (the outputs). To represent and describe functions, you can use mathematical notation, graphs, and verbal explanations. • Functions are mathematical representations that can be used to describe real-world situations by expressing the relationship between variables. Functions allow us to make predictions and test different scenarios without having to physically carry out experiments or observe real-world situations. For example, a function can be used to simulate different investment strategies and predict the potential returns.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Classwork/thinking tasks • Homework • Performance activities • Unit VIIA Quiz • Unit VIIB Quiz	• Unit VII Summative Assessment	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/Red Pens • Communicator Clearboards

Unit VIII: Exponential Functions

Unit Summary

This unit examines exponential growth and decay. Students will create exponential models from tables, graphs, and equations with real-life context.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8. F.BF.A.1, F.IF.B.4 & C.9, F.LE.A.1-3 & B.5
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
● Why do we need exponential notation to model situations? ● How do you describe the difference between exponential growth and decay? ● What differentiates an exponential model from a linear model given a real-world set of data?	● Exponential notation is a powerful mathematical tool that allows us to model and understand a wide range of situations compactly and efficiently. It's particularly useful when dealing with quantities that grow or decay rapidly, as well as in situations where repeated multiplication or division occurs. Exponential notation offers a concise and versatile way to model various real-world phenomena and mathematical relationships. Its ability to capture rapid growth, decay, and repeated multiplicative processes makes it an indispensable tool across a wide range of disciplines. ● Exponential growth and decay are two fundamental concepts in mathematics that describe how quantities change over time. Exponential growth occurs when a quantity increases at a constant percentage rate over equal intervals of time. Exponential decay occurs when a quantity decreases at a constant percentage rate over equal intervals of time. The decay rate is proportional to the current value of the quantity. ● An exponential model and a linear model are two distinct mathematical approaches used to describe the relationships between variables in real-world datasets. The key differences between these models lie in their functional forms and the nature of the relationships they represent. An exponential model represents a relationship where a variable's rate of change is proportional to its current value. A linear model represents a relationship where the change in the dependent variable is directly proportional to the change in the independent variable.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
● Classwork/thinking tasks ● Homework ● Performance activities ● Unit VIIIA Quiz ● Individual student check-ins with teacher	● Unit VIII Test ● Summative Assessment	● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/ Red Pens ● Communicator Clearboards

Unit IX: Polynomials

Unit Summary

Unit IX explores operations that can be done with polynomials, except division. Students will first learn how to describe monomials and polynomials, then they will add, subtract, and multiply them. The unit will also explore various methods of factoring or decomposing a product of polynomials.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, A.SSE.A.2 & B.3, A.APR.A.1
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2&3, 8.1.12.DA.2 &4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
• How can polynomials be simplified in order to solve problems? • Can two algebraic expressions that appear to be different be equivalent? • How are the properties of real numbers related to polynomials?	• Simplifying polynomials is a crucial step in solving problems involving algebraic expressions. It helps in making expressions more manageable, identifying patterns, and eventually finding solutions. You may combine like terms, factor, distribute, group, substitute, and potentially use special binomials, trinomials, or the quadratic formula. • Yes, two algebraic expressions that appear to be different can indeed be equivalent. Equivalence in algebra means that two expressions have the same value for all possible values of the variables involved. This concept is important because different expressions can represent the same mathematical relationship or value, even if they are written in different forms. Equivalence is established through mathematical operations that maintain the equality of the expressions. • The properties of real numbers play a fundamental role in understanding and manipulating polynomials. Many properties of real numbers extend to polynomials because polynomials are algebraic expressions built from real number coefficients and variables. Some examples are closure properties, associative, commutative, and distributive properties.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Classwork/thinking tasks • Homework • Performance activities • Unit IXA Quiz • Unit IXB Quiz	• Unit IX Summative Assessment	• Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/Red Pens • Algebra Tiles • Communicator Clearboards

Unit X: Quadratic Functions & Equations

Unit Summary

The Quadratic Functions and Equations unit will start exploring the characteristics of a quadratic function and how to transform the parent function based on structure. Once students understand the model of a quadratic function, they can focus on the methods used to solve for the *x*-intercepts. Students will analyze the graph of a quadratic both by hand and with a calculator. Students will look at transformations, intercepts, vertices, and end behavior. The unit will conclude by analyzing real-world relationships that exist within this field of study.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, A.SSE.A.1 & B.3, A.REI.B.4, A.APR.B.3, F-IF.B.4,6 & C.8
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*

○ 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5	
Unit Essential Questions	**Unit Enduring Understandings**
• What are the advantages of a quadratic function in vertex form? In standard form? • In what ways can the zeros of a quadratic be found and can this help us find when an object is in free-fall? • How is any quadratic function related to the parent quadratic function? • How are the real solutions of a quadratic equation related to the graph of the related quadratic function?	• The vertex form of a quadratic function (f(x) = a(x-h)^2 + k) provides a clear representation of the vertex (h, k) of the parabola. • The standard form of a quadratic function (f(x) = ax^2 + bx + c) allows for easy identification of the coefficients a, b, and c, which provide information about the shape, position, and orientation of the parabola. The standard form allows for calculations of the x-intercepts of the quadratic function, which are the points where the graph intersects the x-axis. These x-intercepts are also known as the zeros or roots of the quadratic. • The zeros of a quadratic equation are the values of the variable for which the quadratic expression evaluates to zero. In the context of physics, specifically in free-fall problems, quadratic equations can help us determine various properties of falling objects, such as the time of flight, maximum height, and impact velocity. • The parent quadratic function is the simplest form of a quadratic function, which is y = x^2. It acts as a reference point for understanding the behavior and transformations of other quadratic functions. Every quadratic function is a transformation of its parent function. • The real solutions of a quadratic equation are directly related to the graph of the related quadratic function. Understanding this relationship can provide insights into the behavior of the function and the points at which it intersects the x-axis. The real solutions of a quadratic equation provide information about the x-intercepts of the related quadratic function's graph. The graph's vertex, axis of symmetry, direction of opening, and behavior above or below the x-axis are all influenced by the solutions of the quadratic equation.
Evidence of Learning	
Formative & Alternative Assessments: • Classwork/thinking tasks • Homework • Performance activities • Unit XA Quiz • Unit XB Quiz • Individual student check-ins with teacher	**Benchmark & Summative Assessments:** • Unit X Summative Assessment
Resources Needed: • Whiteboard space • Dry erase markers • Boogie Boards • Colored Pencils • Graph Paper • Highlighters/ Red Pens • Algebra Tiles • Communicator Clearboards	

Unit XI: Algebraic Functions	
Unit Summary	
Unit XI focuses on a spiral review of concepts developed earlier in the curriculum while making the necessary connections that deepen the students' understanding of Algebra. The unit reviews the domain and range of all functions, extending to piecewise functions. Students will compare critical values of multiple functions, learning to write the function that represents the model.	
Standards/Core Ideas/Performance Expectations	
The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:* • *2023 New Jersey Student Learning Standards: Mathematics* ○ MP.1-8, F.IF.B4-6 & C7-9, F.BF.A.1 & B.3, F.LE.A.3 & B.5 • *2023 New Jersey Student Learning Standards English Language Arts* ○ RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4 • *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking* ○ 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1 • *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills* ○ 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5	
Unit Essential Questions	**Unit Enduring Understandings**

● What are the key features of linear, quadratic, and exponential equations? ● How can you use your prior knowledge of graphing functions to produce a piecewise function?	● Linear equations have a constant rate of change and produce a straight line when graphed. They can be written in the form y = mx + b, where m is the slope and b is the y-intercept. ● Quadratic equations have a variable with a squared term. They have a curved graph in the shape of a parabola. ● Exponential equations have a variable as an exponent and produce a curve that increases or decreases exponentially when graphed. They can be written in the form y = ab^x, where a is the initial value, b is the growth rate or decay factor, and x is the exponent. ● Prior knowledge of graphing functions can produce a piecewise graph by combining multiple equations to create a graph with different segments. A piecewise function is a function with multiple sub-functions. Each sub-function of a piecewise function applies to a certain interval of the function's domain. A piecewise function can be composed of multiple different types of functions.

Evidence of Learning

Formative & Alternative Assessments:	**Benchmark & Summative Assessments:**	**Resources Needed:**
● Classwork/thinking tasks ● Homework ● Performance activities ● Unit XIA Quiz ● Individual student check-ins with teacher	● Unit XI Alternate Assessment ● Summative Assessment	● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens ● Communicator Clearboards

Unit XII: Statistics

Unit Summary

This unit introduces the concepts and misconceptions of statistics, reviews central tendencies and presents ways in which data can be displayed. Misleading graphs will also be examined.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Algebra I:*

- *2023 New Jersey Student Learning Standards: Mathematics*
  - MP.1-8, S.ID.A.1-3 & B.5
- *2023 New Jersey Student Learning Standards English Language Arts*
  - RL.CR.9–10.1, RI.MF.9–10.6, W.AW.9–10.1.A,B & E, SL.PE.9–10.1, SL.II.9–10.2, SL.PI.9–10.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.CS.2-3, 8.1.12.DA.2 & 4, 8.1.12.ED.3, 8.1.12.ETW.3, 8.1.12.EC.3, 8.1.12.IC.1, 8.1.12.NI.3, 8.2.12.NT.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.2.12.CAP.2 & 5, 9.4.12.IML.2, 9.4.12.DC.5

Unit Essential Questions	Unit Enduring Understandings
● How can we represent a set of data in a way that tells a story? ● What type of graphs can be used to represent data in real life? ● In what ways can graphs be misleading and how may this affect real-life situations?	● Representing a set of data in a way that tells a story involves transforming raw data into meaningful visualizations or narratives that convey insights, patterns, and trends. ● Various types of graphs can be used to effectively represent different types of data in real-life situations. The choice of graph depends on the nature of the data and the story you want to convey. Some common types of graphs include bar charts to compare the frequency, count, or value of different categories, line graphs to show trends over time, pie charts to show parts of a whole, and scatter plots to show the relationship between two variables. ● Graphs can be misleading in various ways, often unintentionally, which can lead to incorrect interpretations, miscommunication, and poor decision-making in real-life situations. The way data is displayed can either support or refute a point. The shapes of distributions, symmetric and skewed can be analyzed and compared. The impact of misleading graphs can range from poor

	decision-making in business, politics, and healthcare to misunderstandings in scientific research or public communication.

Evidence of Learning		
Formative & Alternative Assessments: ● Classwork/thinking tasks ● Homework ● Performance activities ● Unit XIIA Quiz ● Individual student check-ins with teacher	**Benchmark & Summative Assessments:** ● Unit XII Alternate Assessment ● Summative Assessment	**Resources Needed:** ● Whiteboard space ● Dry erase markers ● Boogie Boards ● Colored Pencils ● Graph Paper ● Highlighters/Red Pens ● Communicator Clearboards

Section X: Unit Reflection

The *Algebra I* instructional team must confer upon the completion of each instructional unit in the *Algebra I* curriculum and rate the degrees to which the instructional units meet performance criteria established by the New Jersey Department of Education using the Unit Reflection Form. Completed unit reflection forms must be submitted to the Department Supervisor for approval upon completion of curriculum implementation with a complementing list of suggested modifications to the *Algebra I* curriculum.

Unit Reflection Form: *Algebra I*			
Lesson Activities:	**Strongly**	**Moderately**	**Weakly**
Foster student use of technology as a tool to develop critical thinking, creativity, and innovation skills;			
Are challenging and require higher-order thinking and problem-solving skills;			
Allow for student choice;			
Provide scaffolding for acquiring targeted knowledge/skills;			
Integrate modern, global perspectives, especially those regarding diversity, genocide, global issues, and historical ones regarding racial relations;			
Integrate 21st century skills;			
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills;			
Are varied to address different student learning styles and preferences;			
Are differentiated based on student needs;			
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process;			
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives;			
Provide opportunities for student reflection and self-assessment;			
Provide data to inform and adjust instruction to better meet the varying needs of learners.			

Appendix

Writing Instruction and the RFH Community

Writing instruction should happen across the RFH Community. Writing across the curriculum is a philosophy that advances the belief that writing is a method of learning. Since all departments are committed to helping students learn, writing must be used as a methodology to advance student learning.

Each academic discipline has its own unique conventions, formats and structures. It is the responsibility of each department to agree upon domain-specific writing praxes, model them for students, and require them to utilize them on a consistent basis. Students must understand that acceptable writing in one domain may not be acceptable writing in another area. The development of domain-specific writing skills supports the overall development of the student writer because all writing is grounded in the writing situation: audience, context, purpose, subject, and writer. Representatives from the academic disciplines must share their domain-specific writing praxes with each other, identify intersections, and determine how to address perceived gaps that limit student learning.

Students must experience writing situations that help them learn how to think creatively and critically and communicate effectively in the academic disciplines. Writing instruction, regardless of the academic discipline, must always reinforce student understanding of the writing situation. When students experience writing situations, they must study examples of domain-specific writing in order to understand how writers communicate in discipline-related contexts. This does not mean information embedded in textbooks. Domain-specific writing is writing that is used to inform and influence readers as it draws them into an established circle of discourse. Students must use these non-fiction texts to develop the close reading skills that will shape their own writing. Focused engagement with domain-specific writing should not be limited to basic reading comprehension and topical understanding. It must also include the analysis of the writing situation that is represented in the text: audience, context, purpose, subject, and writer. The close reading of well-written texts—regardless of the domain—will show students the importance of writing mechanics, diction, and syntax. The development of close reading skills will also help the students grow in terms of their ability to construct and advance independent and original claims that are well-supported by evidence. Domain-specific writing is grounded in positioning of claims and the effective use of evidence.

The final written product is important; nevertheless, the learning that results in this production must not be devalued. The writing process is not limited to the basic steps of planning, drafting, revising, and editing/proofreading. It is a complex sequence of critical and creative thinking and writing that leads to the production of a text that provides evidence of learning and understanding. Students must ultimately develop the ability to self-assess the effectiveness of their writing as a representation of the writing situation. Without the use of models that evidence learning and understanding, students will not develop the ability to self-assess their own work—the true outcome of the writing process.

What types of writing situations should RFH students engage in?

RFH students should engage in writing situations across the curriculum that require them to:

- write to improve mechanical proficiency, diction usage, and syntactical sophistication
- write to narrate, describe, and reflect
- write to summarize and report
- write to classify and define
- write to explain how process leads to an outcome
- write to compare, contrast and evaluate
- write to speculate on cause and effect
- write to propose solutions and solve problems
- write to analyze

These writing situations should be positioned in a coordinated, developmental sequence that extends <u>across</u> the academic disciplines.

Upon Completion of Grade 12, RFH students must be ready to transition to the following writing situations:

- write to analyze
- write to persuade (argument)

The core foci of first-year college writing courses are analysis and argument. These courses orient the students to the demands and expectations of writing for the academic culture of college. At colleges/universities with carefully coordinated writing programs, students must demonstrate proficiency in analysis and argument before they transition to upper level courses that require them to engage in the following writing situation:

- write to investigate (research)