Rumson-Fair Haven Regional High School

Course: *Math Analysis*
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Section I: Course Description

Math Analysis is a year-long, student-centered course designed to deepen understanding of algebraic functions while reinforcing and extending key concepts from Algebra, Geometry, and Statistics. Emphasizing reasoning, problem solving, and mathematical modeling, the course takes a thematic approach grounded in the Standards for Mathematical Practice.

Students explore major topics from Number and Quantity, Algebra, Functions, Geometry and Statistics, and Probability - building essential skills for college entrance exams and career readiness. The curriculum focuses on analyzing functions both numerically and graphically through a multi-representational lens, helping students make meaningful connections between real-world phenomena and mathematical concepts.

Hands-on, data-driven activities and modeling tasks allow students to engage with practical applications of mathematics, such as financial literacy, design, and decision making. Technology, including graphing calculators and digital tools, supports visualization, experimentation, and interpretation throughout the course.

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

1. ***2023 New Jersey Student Learning Standards – Math:***
    - "Successful teaching and learning of mathematics play an important role in ensuring that students have the right skills required to compete in a 21st-century global economy. When properly implemented and coupled with opportunities for students to engage in mathematical investigation, communication and problem solving, rigorous mathematics standards hold the promise of elevating the mathematical knowledge and skill of every learner to levels competitive with the best in the world, of preparing our college entrants to undertake advanced work in the mathematical sciences, and of readying the next generation for the jobs their world will demand."
2. ***2023 New Jersey Student Learning Standards – English Language Arts:***
    - "The New Jersey Student Learning Standards for English Language Arts (NJSLS-ELA) build on the best of existing standards and reflect the skills and knowledge students need to succeed in college, career, and life. They define general, cross-disciplinary literacy expectations that must be met for students to be prepared to enter college and workforce training programs ready to succeed. The K–12 grade-specific standards define end-of-year expectations and a cumulative progression designed to enable students to meet college and career readiness expectations no later than the end of high school."
3. ***2020 New Jersey Student Learning Standards – Science:***
    - "Scientific and technological advances have proliferated and now permeate most aspects of life in the 21st century. It is increasingly important that all members of our society develop an understanding of scientific and engineering concepts and processes. Learning how to construct scientific explanations and how to design evidence-based solutions provides students with tools to think critically about personal and societal issues and needs. Students can then contribute meaningfully to decision-making processes, such as discussions about climate change, new approaches to health care, and innovative solutions to local and global problems."
4. ***2020 New Jersey Student Learning Standards – Visual and Performing Arts:***
    - "Throughout time, the arts have served as a distinctive vehicle for self-discovery and a means of understanding the world in which we live. As the state of New Jersey continues to transform public education to meet the needs of a changing world and the 21st-century workforce, capitalizing on the unique ability of the arts to develop creativity, critical thinking, and innovation skills is critical to the success of our students. A well-designed sequential arts program promotes responsible decision making, enhances self-awareness, builds self-esteem and self-management skills, and helps students build relationship and collaboration skills; all of which are essential to prepare New Jersey students for postsecondary success."
5. ***2020 New Jersey Student Learning Standards: Comprehensive Health and Physical Education:***
    - "Successful preparation of students for the opportunities, rigors, and advances of the 21st Century cannot be accomplished without a strong and sustained emphasis on the health and wellness of all students. Today's students are continually bombarded with physical, mental, and social influences that affect not only learning in school, but also the lifelong health of the citizens that schools are preparing for graduation. To that end, the New Jersey Student Learning Standards - Comprehensive Health and Physical Education (NJSLS-CHPE) were revised to address the need for students to gain knowledge and skills in caring for themselves, interact effectively with others, and analyze the impact of choices and consequences."
6. ***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."

7. ***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."
8. ****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."
9. ****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."
10. ****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."
11. ****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."
12. 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 *Math Analysis* curriculum is subject to case-by-case modifications to support/advance the needs of all students, including special education students, multilingual learners, gifted students, students not at grade level proficiency and those at risk of school failure. These modifications are based on Individualized Learning Programs (IEPs), recommendations made by the district's Multilingual Learners (ML) 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 *Math Analysis* 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: *Math Analysis*	**Grade Level:** *11-12*
Unit I: Problem Solving [Introduction to Mathematical Practices]	Weeks 1 - 3
Unit II: Number and Quantity	Weeks 4 - 8
Unit III: Functions - Part 1	Weeks 9 - 14
Unit IV: Functions - Part 2	Weeks 15 -19
Unit V: Geometry	Weeks 20 - 24
Unit VI: Statistics	Weeks 25 - 29
Unit VII: Probability	Weeks 30 - 34
Unit VIII: Applications of Number and Quantity and Statistics	Weeks 35 - 40

Section VI: Primary Texts and Year-Long Instructional Resources

The following texts and instructional resources are employed for all students in *Math Analysis* :

- Google Classroom
- *Common Sense Education* (www.commonsense.org)
- Desmos Graphing Calculator/Activities
- Pear Assessment
- Math XL
- Edpuzzle
- Estimation 180
- Polypad
- Mathematics Assessment Project
- Next Gen Personal Finance

Section VII: Grading Formula and Assessment Modes

Marking period grades in *Math Analysis* 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 *Math Analysis* 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 *Math Analysis* instructional team to inform future learning and to measure student growth.

Section VIII: Unit Templates

The following unit templates have been established for the *Math Analysis* curriculum by the *Math Analysis* instructional team:

Unit I: Problem Solving [Introduction to Mathematical Practices]		
Unit Summary		
In this introductory unit, students will build foundational problem-solving skills by interpreting complex, unfamiliar situations and choosing appropriate strategies. Emphasis is placed on reasoning, modeling, and justifying solutions using multiple representations. Various routines will be implemented in this unit, which will set the foundation for future units of study in this course.		
Standards/Core Ideas/Performance Expectations/Progress Indicators		
The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Math Analysis:* ● *2023 New Jersey Student Learning Standards for Mathematics* ○ MP.1-8 ● *2020 New Jersey Student Learning Standards for Science* ○ HS-ETS1-1 ● *2023 New Jersey Student Learning Standards for English Language Arts* ○ SL.1 ● *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking* ○ 8.1.12.DA.5 ● *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills* ○ 9.4.12.CI.1, 9.4.12.CT.2		
Unit Essential Questions	**Unit Enduring Understandings**	
● How can math be applied to solve real-world problems? ● How do assumptions influence outcomes?	● Problem solving is an iterative process that requires clear communication and multiple solutions. ● Assumptions shape mathematical models and their outcomes; critically evaluating these assumptions ensures more reliable and accurate solutions.	
Evidence of Learning		
Formative & Alternative Assessments: ● STEM Marshmallow Challenge ● 100 Numbers Collaboration Activity ● "I notice, I wonder…" Tasks ● Number Talks Routine ● Non-curricular Tasks ● Individual student check-ins	**Benchmark & Summative Assessments:** ● Mathematical Mindsets Four 4's Task ● Mathematical Proof	**Resources Needed:** ● 100 Numbers Worksheet ● Marshmallows ● Toothpicks ● Notice/Wonder Routine Tasks ● 3-Acts Math Tasks ● Tiger Video Clip ● Thin Slicing Tasks ● Number Talks

Unit II: Number and Quantity
Unit Summary
In this unit, students will learn how to represent real-world situations by working with quantities, rates, and proportional reasoning. They will create, analyze, and interpret models using units and measurements to understand relationships and solve meaningful problems. Through contexts like personal finance, budgeting, and resource management, students will connect mathematical ideas to everyday decision-making.
Standards/Core Ideas/Performance Expectations/Progress Indicators
The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Math Analysis:* ● *2023 New Jersey Student Learning Standards for Mathematics* ○ MP.1-8, N.Q.1-3, A.CED.1 & 4, F.BF.1, G.MG.3, A.REI.1, A.SSE.3, S.ID.9 ● *2020 New Jersey Student Learning Standards for Science* ○ HS-PS1-7, HS-ESS3-6 ● *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*

- 8.1.12.DA.6
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  - 9.4.12.TL.3, 9.4.12.CT.2

Unit Essential Questions	Unit Enduring Understandings
• How can unit conversions and dimensional analysis help solve real-world problems accurately? • What strategies can be used to make informed financial decisions involving budgeting, purchasing, and credit? • How can mathematical models be created and used to represent and analyze real-life scenarios? • In what ways can ratios, rates, and proportional reasoning be used to compare quantities and make predictions? • Why is it important to critically evaluate the reasoning and methods used in quantitative problem solving? • How can mathematics be used to evaluate the environmental impact of our travel choices?	• Accurate unit conversions and dimensional analysis are essential tools for solving measurement-based problems in a real-world context. • Understanding financial tools, such as budgets, interest rates, and credit options, allows individuals to evaluate and manage personal finances responsibly. • Mathematical models such as spreadsheets, equations, and proportional reasoning help us make informed decisions about cost, value, and efficiency. • Ratios and rates allow for meaningful comparisons across different contexts and support analysis in mechanics, travel, and finance. • Clear communication, sound reasoning, and critique of mathematical thinking are key components of effective problem solving. • Quantitative analysis and modeling allow us to evaluate how travel behaviors affect emissions and make informed decisions about sustainability and cost.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Remodeling the Classroom • Gear Ratios • Driving for Gas • Credit Cards • The Bean Game • Individual student check-ins	• Planning a Roadtrip • Check For Understanding Benchmarks • Unit 2 Test	• Problem-Solving Task Cards • Glowforge (gear creation) • Wooden Boards • Chromebook (Google Sheets) • Tape Measure • Graphing Calculator

Unit III: Functions

Unit Summary

In this unit, students will explore real-world situations by building models with linear and exponential functions. They will create equations, interpret rates of change, and analyze how different functions behave. Through examples like tracking salary growth, calculating depreciation, modeling population changes, and understanding interest rates, students will learn how key features of functions connect to everyday experiences.

Standards/Core Ideas/Performance Expectations/Progress Indicators

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

- *2023 New Jersey Student Learning Standards for Mathematics*
  - MP.1-8, A.APR.3, A.REI.4, 6 & 10, F.LE.1,3 & 5, A.CED.2-3, A.SSE.1 & 3, F.IF.1 & 4-7, F.BF.1, S.ID.6 & 8-9
- *2020 New Jersey Student Learning Standards for Science*
  - HS-ESS3-1 & 4
- *2023 New Jersey Student Learning Standards for English Language Arts*
  - SA.R7
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.DA.5
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  - 9.4.12.IML.6

Unit Essential Questions	Unit Enduring Understandings
• How can real-world situations be modeled using different types of functions? • In what ways do linear, exponential, and quadratic functions differ, and when is each most appropriate? • How do linear and exponential models help	• Real-world situations can be modeled by different functions based on patterns and relationships, allowing us to analyze, predict, and solve practical problems. • Each type of function (linear, exponential, and quadratic) has distinct characteristics that make each suitable for modeling different types of real-world behavior and situations.

us understand and respond to climate change? ● How can data collection and analysis inform decisions and predictions in everyday contexts? ● How do different representations of functions (graphs, tables, equations, verbal descriptions) connect and provide insight into mathematical behavior? ● What mathematical tools can help optimize solutions and support decision-making?	● Functions provide tools to model environmental trends like temperature rise or CO_2 growth, helping us to evaluate potential responses and predict future conditions. ● Mathematical modeling involves collecting and analyzing data, recognizing patterns, and constructing functions that best fit each scenario. ● Multiple representations of functions reveal different insights and deepen understanding of mathematical relationships. ● Optimization and systems of equations/inequalities provide powerful methods for comparing outcomes and making informed decisions.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
● Function Representations Matching Activity ● Bungee Jump Project ● Bouncing Ball Data Analysis Lab (Linear Functions with extension to Quadratic Functions) Day 1 and Day 2 ● Map Optimization Task ● Individual student check-ins	● Buying a Car Task ● Check For Understanding Benchmarks ● Unit 3 Test ● Summative #1 (Units 1 - 3)	● Matching Activity Cards ● Task Cards ● Barbie/Rubber Bands (Bungee Project) ● Tennis Ball (Bouncing Ball Lab) ● Timer ● Tape Measure ● Graphing Calculator ● Maps ● Highlighters

Unit IV: Functions - Part 2

Unit Summary

In this unit, students will collect, represent, and analyze data involving two variables to model real-world relationships. They will explore scatterplots, correlation, regression models, and analyze nonlinear patterns such as quadratic and exponential relationships. Through a variety of real-world contexts related to motion, growth, financial decision-making, and environmental modeling, students will strengthen their ability to interpret data and construct meaningful mathematical models.

Standards/Core Ideas/Performance Expectations/Progress Indicators

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

- *2023 New Jersey Student Learning Standards for Mathematics*
  - MP.1-8, A-CED.1-3, F.BF.1-2, F.IF.3-4 & .8-9, F.LE.1-2 & 5, N.Q.1-3, A.SSE.1 & 4, A.REI.1, S.ID.6
- *2020 New Jersey Student Learning Standards for Science*
  - HS-ESS3-6
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.DA.5
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  - 9.4.12.TL.4, 9.4.12.CT.2

Unit Essential Questions	Unit Enduring Understandings
● How can different types of functions model real-world phenomena, and how is it determined which type fits best? ● What can the structure of a function tell about the situation it represents? ● How can mathematical models be used to make predictions and informed decisions? ● How can data modeling be used to uncover patterns in environmental change? ● How do recursive and explicit representations of functions help to understand change over time? ● How can mathematical models be used to support or refute claims in real-world scenarios?	● Real-world situations often follow predictable patterns of change that can be modeled using linear, quadratic, exponential, or recursive formulas. ● Different representations of a function (graph, table, equation, context) provide unique insights and help verify understanding. ● Functions help to analyze how one quantity changes in relation to another, supporting informed decisions about personal finance, safety, and science. ● Data regression and correlation allow the evaluation of relationships among environmental variables and assess the effectiveness of mitigation strategies. ● Recursive and explicit formulas provide different ways to describe and analyze sequences, which are essential in fields such as ecology, computer science, and finance. ● Constructing and interpreting mathematical models supports effective problem solving, justification of claims, and decision making in real-world contexts.

Evidence of Learning		
Formative & Alternative Assessments: • Catapult Project • M&M Cancer Cell Lab • Buying a House Thinking Task • Skid Mark Trial • Individual student check-ins	**Benchmark & Summative Assessments:** • The Big Fish Story Task • Check for Understandings • Unit 4A Quiz • Unit 4B Quiz	**Resources Needed:** • Dry Erase Markers • Poster Post-it Paper • Ping Pong balls • Craft Sticks • Hot Glue • Rubberbands • M&Ms

Unit V: Geometry

Unit Summary

In this unit, students will apply geometric concepts to design and analyze real-world projects. They will explore transformations, angles, and side lengths to model situations involving symmetry and spatial reasoning. Through contexts such as designing logos, creating a mini golf course, and understanding the unit circle, students will deepen their understanding of geometry while developing critical thinking and problem-solving skills.

Standards/Core Ideas/Performance Expectations/Progress Indicators

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

- *2023 New Jersey Student Learning Standards for Mathematics*
  - MP.1-8, N.Q.2-3, G.CO.2-3,.5 & 12, G.C.5, G.SRT.4-5, F.BF.1, F.IF.7, G.GMG.3, G.GMD.1, G.SRT.4-5, 7.G.1 & 6, F.TF.2 & 5, G.MG.3, S.ID.1-9, S.IC.1 & .3-5
- *2020 New Jersey Student Learning Standards for Visual and Performing Arts: 9-12*
  - 1.3A.12prof.Cr1a
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  - 9.4.12.CI.2, 9.4.12.CT.2

Unit Essential Questions	Unit Enduring Understandings
• How can geometric properties and relationships be used to design and solve real-world problems? • What role do symmetry and transformation play in the design of visual elements like logos or patterns? • How do angle relationships, similarity, and the Pythagorean Theorem help understand and model physical space? • What is the purpose of the unit circle, and how does it connect geometry to trigonometric functions? • In what ways can geometry be applied creatively to make decisions and communicate ideas?	• Geometry helps model and solve real-world design problems by analyzing spatial relationships, measurements, and properties of figures. • Transformations and symmetry are fundamental tools in understanding and creating visual balance, especially in a design context. • Right triangles, the Pythagorean Theorem, and similar triangles are essential in understanding distance, angles, and proportions in theoretical and applied settings. • The unit circle provides a foundation for understanding trigonometric functions, their periodic nature, and how they model real-world phenomena. • Geometry is a tool for creating, designing, and explaining solutions in fields ranging from art to engineering.

Evidence of Learning		
Formative & Alternative Assessments: • Logo Design with Circle Task • Triangle Practice Sets • Unraveling the Unit Circle • Individual student check-ins	**Benchmark & Summative Assessments:** • Mini-Golf Design Project • Unit 5A Quiz • Check for Understandings • Unit 5B Quiz • Summative #2 (Units 4 - 5)	**Resources Needed:** • Graphing Calculator • Compass/Ruler/Protractor • Practice Tasks • Paper Plates • Laminating Sheets

Unit VI: Statistics

Unit Summary

In this unit, students will explore statistical concepts through real-world data collection and analysis. They will investigate how data can be misleading, apply the central limit theorem, and explore normal distribution. Students will use techniques such as dot plots and sampling to analyze various phenomena, including the Stroop effect and the accuracy of product labeling. Through these investigations, students will develop a deeper understanding of data representation, variability, and statistical inference.

Standards/Core Ideas/Performance Expectations/Progress Indicators

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

- *2023 New Jersey Student Learning Standards for Mathematics*
  - MP.1-8, N.Q.2-3, S.ID.1-4 & 7-9, S.IC.1-6
- *2020 New Jersey Student Learning Standards for Science*
  - HS-LS2-6, HS-ETS1-3, HS-ESS3-1 & 6
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.DA.5-6, 8.2.12.ED.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  - 9.4.12.IML.2, 9.4.12.CT.2, 9.4.12.TL.3

Unit Essential Questions	Unit Enduring Understandings
• How can the collection and analysis of data accurately represent and facilitate an understanding of real-world phenomena? • What are common ways that statistics and graphs can be misleading, and how can we recognize them? • How do statistical tools help make inferences about a population from a sample? • What is the role of variability and distribution when interpreting and comparing data? • How can the reliability and fairness of conclusions drawn from data be evaluated? • How can statistical analysis help evaluate claims about climate change?	• Statistics provides a powerful lens through which we can describe, analyze, and make sense of real-world data. Effective data collection and clear representation are essential for valid interpretation. • Graphs and statistics can be manipulated to tell different stories, where understanding structure, scale, and context help detect and prevent misleading interpretations. • Random sampling and the use of sampling distributions allow us to make reliable inferences about a larger population, even when working with limited data. • Measures of center and spread are essential tools for summarizing data and understanding its distribution. • Evaluating the quality of data and the validity of statistical claims requires a critical eye toward sampling methods, potential bias, variability, and experimental design. • Understanding distribution, variability, and trends in climate data empowers students to critically assess media claims and scientific reports about global change.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Flinging Frogs + Dot Plots • Candy Sampling Activity • What does popping popcorn sound like? • Color Changing • Are Double Stuffed Oreos really double stuffed? • Individual student check-ins	• Check for Understandings • Unit 6 Test	• Rulers • Graph Paper • Frogs • Popcorn Video Clip (or popcorn/microwave) • M&Ms and Skittles • Oreos (Regular & Double Stuffed) • Scales • Paper Towels • Graphing Calculator

Unit VII: Probability

Unit Summary

In this unit, students will explore probability through hands-on experiments and simulations. They will design and analyze experiments, such as a soda taste test, and assess the accuracy of real-world phenomena, like free-throw shooting. Students will calculate probabilities, including the likelihood of false positives in medical screenings, and apply their knowledge to develop games of chance. Through these activities, students will deepen their understanding of probability and how it can be used to model uncertainty in real-world situations.

Standards/Core Ideas/Performance Expectations/Progress Indicators

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

- *2023 New Jersey Student Learning Standards for Mathematics:*
  - MP.1-8, S.IC.2-3, S.MD.1 & 3-7, S.CP.1 & .3-6
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.DA.5-6, 8.2.12.ED.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  - 9.4.12.IML.2, 9.4.12.CT.2, 9.4.12.TL.3

Unit Essential Questions	Unit Enduring Understandings

• How can probability be used to make informed decisions in real-world scenarios? • What is the difference between theoretical and experimental probability, and when is each more appropriate to use? • How do probability simulations help model and foster understanding of complex situations? • What are the ethical and practical implications of using probability in areas such as medicine, gaming, or marketing? • How can probability distributions be used to predict outcomes and evaluate risk?	• Probability provides a framework for quantifying uncertainty and making data-informed predictions in everyday contexts such as sports, taste tests, and medical decisions. • Theoretical probability is based on known possible outcomes, while experimental probability relies on data from real or simulated experiments. Both are tools for understanding chance and should be chosen based on context. • Simulations allow for the analysis in outcomes in complex situations where theoretical probability is difficult to calculate or validate. Repeated trials are one way to develop a further understanding. • Probability plays a powerful role in decision-making, but misuse or misinterpretation can lead to harmful or misleading conclusions. • Probability distributions, such as binomial distributions, model real-world scenarios, allow for anticipated results, and help to determine expected values and fairness in games or policies.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Cola Wars Experiment • Free Throws for the Win • Random Babies Simulation Activity • Cancer False Positives • Individual student check-ins	• Carnival Games STEM Fair • Check for Understandings • Unit 7A Quiz	• Rulers • Graph Paper • Index Cards • Random Babies Applet • Small Cups • Various Brands of Cola • Saltines • Paper Towels • Graphing Calculator

Unit VIII: Applications of Number Quantity, and Statistics

Unit Summary

In this unit, students will apply concepts of number and quantity and statistics to explore real-world issues such as inflation, the consumer price index, and public policy. They will analyze data to understand how economic indicators influence decision-making and public opinion. Through these investigations, students will develop the skills to interpret and use statistical data to make informed judgments about economic and societal trends.

Standards/Core Ideas/Performance Expectations/Progress Indicators

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

- *2023 New Jersey Student Learning Standards for Mathematics:*
  - MP.1-8, A.CED.1-4, S.IC.1 & 6
- *2020 New Jersey Student Learning Standards for Science*
  - HS-ESS3-4
- *2020 New Jersey Student Learning Standards for Comprehensive Health & Physical Education*
  - 2.1.12.EH.1, 2.2.12.MSC.3, 2.2.12.PF.2 & 5, 2.2.12.LF.1-3 & 5
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.DA.5-6, 8.2.12.ED.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  - 9.4.12.IML.2, 9.4.12.CT.2, 9.4.12.TL.3

Unit Essential Questions	Unit Enduring Understandings
• How does inflation affect the purchasing power of money over time? • What role does the Consumer Price Index (CPI) play in understanding economic trends and individual financial decisions? • How do inflation and economic policies impact groups of people in society (eg. business owners, wage earners, retirees) • How can mathematical models and simulations be used to evaluate the effectiveness of public policies?	• Inflation decreases the purchasing power of money, meaning that over time, the same amount of money buys fewer goods and services. • The Consumer Price Index (CPI) is a key indicator used to measure inflation and assess changes in the cost of living, as it provides valuable insight for government, businesses, and individuals. • Inflation impacts various populations differently, benefiting borrowers, harming those on fixed incomes, and eroding savings for retirees.

• How can mathematics be used to evaluate the effectiveness of climate-related public policy? • In what ways does analyzing real-world data support better financial and civic decision-making?	• Mathematical simulations and statistical analysis allow us to evaluate the long-term effects of policies. • Using financial modeling and statistical analysis allows students to assess the long-term environmental and economic outcomes of public policy decisions. • Analyzing and interpreting statistical data empowers individuals to make informed personal financial decisions and evaluate public policies critically and responsibly.

Evidence of Learning		
Formative & Alternative Assessments: • The Price is Correct Activity • Analyzing Public Policy Activity • War Activity	**Benchmark & Summative Assessments:** • Checks for Understanding • Unit 8 Test • Summative #3 (Units 6 - 8)	**Resources Needed:** • Chromebook • Glowforge • PBS Report "The Population Bomb" • Time's One-Child Policy

Section IX: Unit Reflection

The *Math Analysis* instructional team must confer upon the completion of each instructional unit in the *Math Analysis* curriculum and rate the degree 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 *Math Analysis* curriculum.

Unit Reflection Form: *Math Analysis*			
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 the 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)