

Ocean Academy Charter High School
Curriculum Guide
Grade 11



Original Adoption:	August, 2026
Created by:	Math Committee

Ocean Academy Charter High School Algebra 2 Curriculum	
Content Area: Mathematics	
Course Title: Algebra 2	
Grade Level: 11	
Unit Title	Pacing Guide in Days
Unit Plan 1: Complex Numbers, Exponents, and Mathematical Modeling	25
Unit Plan 2: Exploring Polynomials and Nonlinear Functions	20
Unit Plan 3: Exploring Periodic Functions and the Unit Circle	25
Unit Plan 4: Data, Probability, and Statistical Inference	20

OCEAN ACADEMY CHARTER HIGH SCHOOL MATHEMATICS CURRICULUM	
Unit 1 Overview	
Content Area: Algebra 2 Mathematics	
Unit 1: Complex Numbers, Exponents, and Mathematical Modeling	Duration: Days 25
Target Course/Grade Level: 11	

Unit 1 Introduction

This unit focuses on analyzing and applying functions and algebraic relationships in a variety of mathematical contexts. Students will explore how linear, quadratic, and exponential functions can be used to represent and compare relationships between quantities, while developing functions to model real-world situations. They will also examine functions through multiple representations, including equations, tables, graphs, and verbal descriptions. In addition, students will strengthen their algebraic reasoning by rewriting expressions in equivalent forms, extending exponent rules to rational exponents, and applying complex numbers to polynomial equations and identities. Through these concepts, students will develop strategies for interpreting, manipulating, and solving increasingly complex algebraic problems.

Disciplinary Concepts for the Unit

Amistad Law: N.J.S.A. 18A 52:16A-88 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.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide 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.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 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.

Diversity and Inclusion

C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

1. The instruction shall:
 - (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
 - (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
 - (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

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Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 1 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

Content Standards with Statement	Critical Knowledge and Skills Objectives
N.CN.A.1. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. (Additional) N.CN.A.2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers (Additional)	Learning Goal 1- Add, subtract, and multiply complex numbers using the commutative, associative and distributive properties. - Complex number i is defined such that $i^2 = -1$. - Every complex number has the form $a + bi$ with a and b real. $i^2 = -1$ and the commutative, associative properties to add and subtract complex numbers are to be used. - determine that $i^2 = -1$ and the commutative, associative, and distributive properties to multiply complex numbers.
N.CN.C.7. Solve quadratic equations with real coefficients that have complex solutions. (Additional)	Learning Goal 2-Solve quadratic equations with real coefficients that have complex solutions by taking square roots, completing the square and factoring. As with real solutions, complex solutions to quadratic equations may be determined by taking square roots, factoring, and completing the square.

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A.REI.B.4. Solve quadratic equations in one variable. (Supporting) A.REI.B.4b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	○ solve quadratic equations in one variable that have complex solutions by taking square roots. ○ solve a quadratic equations in one variable that have complex solutions by completing the square. ○ solve a quadratic equations in one variable that have complex solutions by factoring. ○ write complex solutions in $a \pm bi$ form.
A.REI.C.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. <i>For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$</i> (Additional)	Learning Goal 3-Solve simple systems consisting of a linear and quadratic equation in two variables algebraically and graphically. ● Solutions of linear systems contain different function types. ○ solve a system containing one linear equation and one quadratic equation algebraically. ○ graph a system containing one linear equation and one quadratic equation to determine a solution.
A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. (Additional)	Learning Goal 4-Solve algebraically a system of three linear equations ● use the substitution method and/or elimination method to find the solution of a system containing three linear equations.
F.BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. (Major) F.LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). (Supporting) F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context. (Additional)	Learning Goal 5- Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. ● Recursion ○ distinguish between recursive and explicit formulas. ○ represent geometric and arithmetic sequences recursively. ○ represent geometric and arithmetic sequences with explicit formulas. ○ translate between recursive form and explicit form of geometric and arithmetic sequences.

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	○ recognize explicit formula for geometric sequences as exponential functions containing a domain in the integers only. ○ interpret the parameters of an exponential function representing a geometric sequence. ○ interpret the parameters of a linear function representing an arithmetic sequence.
A.SSE.B.4. Derive and/or explain the derivation of the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. <i>For example, calculate mortgage payments. (Major)</i>	Learning Goal 6- Use the formula for the sum of a finite geometric series to solve problems [for example, calculate mortgage payments; derive the formula for the sum of a finite geometric series (when the common ratio is not 1). ● Series as a sum of a sequence ○ derive or explain the derivation of the formula for the sum of a finite geometric series. ○ use the formula for the sum of a finite geometric series to solve problems.
N.RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. <i>For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)^3}$ to hold, so $(5^{1/3})^3$ must equal 5. (Major)</i> N.RN.A.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. (Major)	Learning Goal 7- Use properties of integer exponents to explain and convert between expressions involving radicals and rational exponents. ● Properties of integer exponents extends to rational exponents (<i>for example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)^3}$ to hold, so $(5^{1/3})^3$ must equal 5</i>) ● Radical notation is a representation of rational exponents ○ rewrite expressions containing rational exponents into radical form. ○ rewrite expressions containing radical notation into exponential expressions containing rational exponents
A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression (Major)	Learning Goal 8-Use the properties of exponents to transform expressions for exponential functions, explain properties of the quantity revealed in the transformed expression or different properties of the function. ● Alternate, equivalent forms of an exponential expression containing rational

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A.SSE.B.3c: Use the properties of exponents to transform expressions for exponential functions. <i>For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</i> F.IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. (Supporting) F.IF.C.8b: Use the properties of exponents to interpret expressions for exponential functions. <i>For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.</i>	exponents may reveal specific attributes of the function that it defines. ○ use properties of exponent transform/rewrite an exponential expression for an exponential function. ○ explain the properties of the quantity or the function.
F.LE.A.4. Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. (Supporting)	Learning Goal 9- Express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology ● Exponents and logarithms have an inverse relationship. ● Solutions to an exponential equation in one variable can be written as a logarithm
Unit 1 Interdisciplinary Standards NJSLs ELA	
New Jersey Student Learning Standards: Interdisciplinary Connections	
● RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text. ● RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem. ● L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies. A. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. B. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).	

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C. Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper). D. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. E. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).	
- RI.CT.9-10.8. Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) seminal and informational text of historical and scientific significance, including how they relate in terms of themes and significant concepts. - RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning. - RI.IT.9-10.3. Analyze how an author unfolds ideas throughout the text, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.	
Unit 1 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills	
Disciplinary Concepts Credit and Debt Management 9.1 Career Awareness and Planning 9.2 Critical Thinking and Problem Solving 9.4 Technology Literacy 9.4	
Core Ideas	Performance Expectations (Identified with Standard Number and statement)
There are ways to evaluate loans and their impact on one's personal financial plan	9.1.12.CDM.5: Identify the types of characteristics of predatory lending practices and the importance of collateral (e.g., payday loans, car title loans, high-risk mortgages). 9.1.12.CDM.6: Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (e.g., student loans, credit cards, auto loans, mortgages, etc.). 9.1.12.CDM.7: Calculate a mortgage payment based on type of loan, down payment, credit score, and loan interest rate. 9.1.12.CDM.8: Compare and compute interest and compound interest and develop an amortization table using business tools.
There are strategies to improve one's professional value and marketability.	9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political

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	conditions of a time period are affected by a recession.
Career planning requires purposeful planning based on research, self-knowledge, and informed choices.	9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment. 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans. 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills. 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them. 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
Multiple solutions often exist to solve a problem.	9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 1 New Jersey Student Learning Standards: <u>Computer Science and Design Thinking</u>	
Disciplinary Concepts Computing Systems Impacts of Computing Data and Analysis Engineering Design	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)

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Successful troubleshooting of complex problems involves multiple approaches including research, analysis, reflection, interaction with peers, and drawing on past experiences.	8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors
The design and use of computing technologies and artifacts can positively or negatively affect equitable access to information and opportunities.	8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. • 8.1.12.IC.2: Test and refine computational artifacts to reduce bias and equity deficits. 8.1.12.IC.3: Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Large data sets can be transformed, generalized, simplified, and presented in different ways to influence how individuals interpret and understand the underlying information.	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
The accuracy of predictions or inferences made from a computer model is affected by the amount, quality, and diversity of data.	8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

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Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
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Unit 1 Knowledge and Skills

Unit Learning Targets (Objectives):

Students will be able to...

- **Analyze and transform exponential expressions** using the properties of exponents and explain how different forms reveal characteristics of an exponential function.
- **Represent and analyze arithmetic and geometric sequences** using both recursive and explicit formulas, and apply these representations to model real-world situations.
- **Apply geometric series formulas** to solve problems involving finite sums, including real-world applications such as financial models.
- **Convert between radical expressions and rational exponents** by applying the properties of integer and rational exponents.
- **Use logarithms to represent and solve exponential equations** and evaluate logarithmic expressions using technology for common bases such as 2, 10, and e .
- **Solve systems of three linear equations algebraically** and interpret the solutions within a given context.
- **Solve systems involving linear and quadratic equations** using both algebraic and graphical methods.
- **Solve quadratic equations with complex solutions** using methods such as square roots, completing the square, and factoring.
- **Perform operations with complex numbers** by applying the commutative, associative, and distributive properties to add, subtract, and multiply complex expressions.

Unit Enduring Understandings:

Students will know...

- Complex numbers can be represented in the form $(a+bi)$, where (a) and (b) are real numbers and $(i^2=-1)$.
- Complex solutions to quadratic equations can be found using methods such as taking square roots, factoring, and completing the square.
- Systems of equations can involve different types of functions, and their solutions represent the points or values that satisfy all equations in the system.
- The properties and rules of integer exponents can be extended to rational exponents.
- Rational exponents and radical expressions are equivalent representations of the same mathematical relationship.
- Equivalent forms of exponential expressions can highlight different characteristics and properties of the function they represent.
- Exponential functions and logarithmic functions are inverse relationships that can be used to solve equations and interpret relationships.

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- Solutions to exponential equations can be expressed using logarithms, providing a way to determine unknown exponents.

Unit Essential Questions:

- How can a quadratic expression be rewritten by completing the square?
- How can a general formula be developed to solve any quadratic equation?
- How are the different subsets of the complex number system connected?
- How can quadratic equations with complex solutions be solved and interpreted?
- How can systems of linear and nonlinear equations be solved using algebraic and graphical methods?
- How can linear functions be used to model and interpret real-world situations?
- How can the number of solutions to a linear system be determined?

Unit 1 Instructional Plan

Students will develop an understanding of the relationship between radicals and rational exponents by extending the properties of integer exponents to rational exponents. They will develop and apply appropriate notation for radicals and rational exponents and demonstrate fluency in converting between the two forms. Students will explain their reasoning orally and in writing using precise mathematical language and notation.

Students will also develop an understanding of polynomials and complex numbers and apply the properties of addition, subtraction, and multiplication to perform operations with each. They will simplify and communicate solutions using appropriate polynomial and complex-number forms. Students will recognize that polynomial expressions are closed under addition, subtraction, and multiplication and use this understanding to justify their algebraic procedures and solutions.

Resources & Text

- Big Ideas Platform
- Big Ideas Textbook
- Calculator
- Graphing Paper

Suggested Activities

- IXL
- KhanAcademy
- DESMOS
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software

Unit 1 Suggested Options for Differentiation

Modifications

Special Education

- Work toward longer passages as skills in English increase
- Use visuals

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- Introduce key vocabulary before lesson
- Teacher reads aloud daily
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Choral reading
- Chants, songs
- Preferential seating
- Assign a picture or movement to vocabulary words
- Small group instruction-guided reading and guided writing
- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications
- Scribe for students who can’t write
- Augmentative communication system

Students with 504 Plans

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow 504 plan
- Scribe for students who can’t write
- Augmentative communication system
- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

Students at Risk of School Failure

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher reads aloud daily
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- choral reading
- chants, songs
- preferential seating
- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers

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- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

Gifted and Talented:

- Ask open-ended questions
- Encourage upper level intellectual behavior based on Bloom's Taxonomy (analyzing, evaluating, creating)
- Do not always be explicit, allow for discovery
- Use centers and group students according to ability or interest
- Propose interest-based extension activities
- Use leveled texts and offer an advanced reader reading list
- Ask "why" and "what if" questions
- Use varied modes of pre-assessment and assessment
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Debrief students
- Propose interest-based extension activities
- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

Multilingual Learners:

- Small group instruction-guided reading and guided writing
- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Assign a picture or movement to vocabulary words
- Pre Teach vocabulary
- Label items in classroom
- Provide clear and specific directions

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- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions
- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

Diversity and Inclusion:

- Involve families in student learning
- Respect cultural traditions
- Provide students with necessary academic resources and materials
- Allow for alternative assignments
- Provide visuals
- Assign peer tutor
- Collaborate with language professionals and ESL teachers
- Encourage parents to help children maintain their native language at home, while the school helps the child attain proficiency in English.
- Establish a positive connection with parent
- Utilize closed captioning when available
- Provide road maps or outlines for difficult concepts
- Provide sufficient wait time before calling on any student to help keep students who may need more time engaged
- Display a word wall with current academic vocabulary in each subject
- Speak clearly and slowly, avoid slang and idiomatic expressions
- Create a nurturing environment with structured routines

Unit 1 Supplemental Resources

N.CN.A.1 Complex number patterns
N.CN.A.2 Powers of a complex number
N.CN.C.7, A.REI.B.4b Completing the square
A.REI.C.7 Linear and Quadratic System
A.REI.C.6 Pairs of Whole Numbers
F.BF.A.2 Snake on a Plane
F.LE.A.2 Rumors
F.LE.B.5, F.LE.A.2 Exponential Parameters
A.SSE.B.4 Course of Antibiotics
N.RN.A.1 Evaluating Exponential Expressions
N.RN.A.2 Rational or Irrational?
A.SSE.B.3c Forms of exponential expressions
F.IF.C.8b Carbon 14 dating in practice I
F.LE.A.4 Carbon 14 dating

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Unit 1 Teacher Notes

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Unit 2 Overview

Content Area: Algebra 2 Mathematics

Unit 2: Exploring Polynomials and Nonlinear Functions

Duration: Days 20

Target Course/Grade Level: 11

Unit 2 Introduction

In this unit, students will develop their ability to analyze and interpret nonlinear functions using multiple representations and algebraic strategies. They will examine the structure of polynomial expressions, explore the relationship between the zeros and factors of polynomials, and apply polynomial identities to solve mathematical problems. Students will strengthen their algebraic reasoning by rewriting rational expressions and viewing equation solving as a process that requires justification and clear explanation. They will also interpret functions within real-world contexts and connect geometric descriptions of conic sections to their corresponding equations. Throughout the unit, students will use graphical representations to analyze and solve equations and inequalities, while making connections among algebraic, graphical, and geometric representations of mathematical relationships.

Disciplinary Concepts for the Unit

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Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide 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.

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21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 2 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

Content Standards with Statement	Critical Knowledge and Skills Objectives
A.APR.B.2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.	Learning Goal 1: Apply the Remainder Theorem in order to determine the factors of a polynomial. • Polynomial division: For a polynomial $p(x)$ and a number a: $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$ $(x - a)$ is a factor of $p(x)$ if and only if $p(a) = 0$ ○ use the Remainder Theorem to determine factors of a polynomial.

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A.SSE.A.2. Use the structure of an expression to identify ways to rewrite it. <i>For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.</i> A.APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	Learning Goal 2: Use an appropriate factoring technique to factor polynomials. Explain the relationship between zeros and factors of polynomials, and use the zeros to construct a rough graph of the function defined by the polynomial ● Factors of polynomials can be used to identify zeros to be used to develop a rough graph of the polynomial function. ○ factor polynomials. ○ analyze a table of values to determine where the polynomial is increasing and decreasing. ○ use the zeros of the polynomial to create rough graph.
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	Learning Goal 3: Graph polynomial functions from equations; identify zeros when suitable factorizations are available; show key features and end behavior. ● Factors of polynomials can be used to identify zeros to be used to develop a rough graph of the polynomial function ○ graph a polynomial function given its equation. ○ identify zeros from the graph and using an appropriate factoring technique. ○ show key features of the graph, including end behavior. ○ use technology to graph and describe key features of the graph for complicated cases.
A.APR.C.4. Prove polynomial identities and use them to describe numerical relationships. <i>For example, the difference of two squares; the sum and difference of two cubes; the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.</i>	Learning Goal 4: Use polynomial identities to describe numerical relationships and prove polynomial identities ● Polynomial identities can be used to describe numerical relationships. ○ show that the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples. ○ prove polynomial identities.

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A.APR.D.6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	Learning Goal 5: Rewrite simple rational expressions in different forms using inspection, long division, or, for the more complicated examples, a computer algebra • Rational expressions can be written in different forms. ◦ write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$. ◦ use inspection, factoring and long division to rewrite rational expressions. ◦ use technology to rewrite rational expressions for more complicated cases.
A.REI.A.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i>	Learning Goal 6: Solve simple rational and radical equations in one variable, use them to solve problems and show how extraneous solutions may arise. Create simple rational equations in one variable and use them to solve problems • • Inverse relationships exist between roots and powers. • • Extraneous solutions do not result in true statements.
F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> F.IF.B.6. Calculate and interpret the average rate of change of a function (presented	Learning Goal 7: For radical functions, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship

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symbolically or as a table) over a specified interval. Estimate the rate of change from a graph	
G.GPE.A.2. Derive the equation of a parabola given a focus and directrix	Learning Goal 8: Derive the equation of a parabola given a focus and directrix
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	Learning Goal 9: Graph logarithmic functions expressed symbolically and show key features of the graph (including intercepts and end behavior).
A.REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	Learning Goal 10: Find approximate solutions for $f(x) = g(x)$, using technology to graph, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, logarithmic and exponential functions

Unit 2 Interdisciplinary Standards [NJSLs ELA](#)

New Jersey Student Learning Standards: Interdisciplinary Connections

- RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.
- RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.
- L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.
 - A. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
 - B. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
 - C. Analyze the cumulative impact of specific word choices on meaning and tone

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(e.g., how the language of a court opinion differs from that of a newspaper). D. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. E. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).	
- RI.CT.9-10.8. Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) seminal and informational text of historical and scientific significance, including how they relate in terms of themes and significant concepts. - RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning. - RI.IT.9-10.3. Analyze how an author unfolds ideas throughout the text, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.	
Unit 2 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills	
Disciplinary Concepts Credit and Debt Management 9.1 Career Awareness and Planning 9.2 Critical Thinking and Problem Solving 9.4 Technology Literacy 9.4	
Core Ideas	Performance Expectations (Identified with Standard Number and statement)
There are ways to evaluate loans and their impact on one's personal financial plan	9.1.12.CDM.5: Identify the types of characteristics of predatory lending practices and the importance of collateral (e.g., payday loans, car title loans, high-risk mortgages). 9.1.12.CDM.6: Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (e.g., student loans, credit cards, auto loans, mortgages, etc.). 9.1.12.CDM.7: Calculate a mortgage payment based on type of loan, down payment, credit score, and loan interest rate. 9.1.12.CDM.8: Compare and compute interest and compound interest and develop an amortization table using business tools.
There are strategies to improve one's professional value and marketability.	9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.

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Career planning requires purposeful planning based on research, self-knowledge, and informed choices.	● 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment. ● 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans. ● 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills. ● 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them. ● 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
Multiple solutions often exist to solve a problem.	● 9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	● 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). ● 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	● 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. ● 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 2 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Computing Systems Impacts of Computing Data and Analysis Engineering Design	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)

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Successful troubleshooting of complex problems involves multiple approaches including research, analysis, reflection, interaction with peers, and drawing on past experiences.	8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors
The design and use of computing technologies and artifacts can positively or negatively affect equitable access to information and opportunities.	8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. • 8.1.12.IC.2: Test and refine computational artifacts to reduce bias and equity deficits. 8.1.12.IC.3: Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Large data sets can be transformed, generalized, simplified, and presented in different ways to influence how individuals interpret and understand the underlying information.	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
The accuracy of predictions or inferences made from a computer model is affected by the amount, quality, and diversity of data.	8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback

New Jersey Student Learning Standards: [Climate Change Mandate](#)

Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

Unit 2 Knowledge and Skills

Unit Learning Targets (Objectives):

Students will be able to...

- Analyze polynomial functions by factoring, identifying zeros, and using key features and end behavior to sketch their graphs.
- Apply the Remainder Theorem and appropriate factoring techniques to identify factors and zeros of polynomials.
- Use polynomial identities to describe numerical relationships and justify algebraic reasoning.
- Solve rational and radical equations in one variable, including identifying and checking for extraneous solutions.
- Interpret radical functions using graphs, tables, and key features, and sketch graphs from verbal descriptions.
- Derive and interpret the equation of a parabola given its focus and directrix.
- Graph logarithmic functions and identify key features, including intercepts and end behavior.
- Use technology and numerical methods to approximate solutions to equations involving linear, polynomial, rational, absolute value, logarithmic, and exponential functions.

Unit Enduring Understandings

Students will know...

- Rational expressions can be rewritten in equivalent forms to simplify and solve problems.
- Roots and powers are inverse operations and provide equivalent representations of radical expressions.
- Extraneous solutions can arise when solving equations and must be verified in the original equation.
- Polynomial factors and zeros are connected and can be used to analyze and graph polynomial functions.
- Polynomial identities can represent and justify numerical relationships.
- Radical functions can be analyzed using their graphs, equations, and key features.
- Every point on a parabola is equidistant from its focus and directrix.

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- Logarithmic functions are inverses of exponential functions and can be used to solve exponential equations.
- Systems of nonlinear functions can be solved or approximated using graphical representations.

Unit Essential Questions:

- How can equivalent forms of rational and radical expressions be used to simplify and solve equations?
- How can polynomial factors and zeros be used to analyze and graph polynomial functions?
- How can polynomial identities be used to represent and justify mathematical relationships?
- How can extraneous solutions arise, and how can they be identified?
- How can radical functions be represented, graphed, and interpreted in context?
- How can the focus and directrix be used to define and derive the equation of a parabola?
- How are exponential and logarithmic functions related, and how can logarithms be used to solve equations?
- How can technology and graphical methods be used to approximate solutions to systems of nonlinear equations?

Unit 2 Instructional Plan

Students will develop proficiency in solving polynomial equations and analyzing nonlinear functions through factoring, graphing, and multiple representations. They will connect these skills to real-world applications, recognizing how polynomial and nonlinear models are used to describe and solve problems in mathematics, science, and everyday contexts.

Resources & Text	Suggested Activities
• Big Ideas Platform • Big Ideas Textbook • Calculator • Graphing Paper	• IXL • KhanAcademy • DESMOS • Nearpod • Edpuzzle • Kahoot • Quizizz • Blooket

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- Kuta Software

Formative Assessments:

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games
- Self-assessment

Summative Assessments

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

Benchmark Assessments:

- State Standardized Assessments
- Quarterly Benchmark Assessment

Alternative Assessments

- Portfolio Project
- Modified assignments

Performance Tasks:

- www.mathxlforschool.com
- www.khanacademy.com
- www.desmos.com
- www.kahoot.com
- www.quizizz.com

Unit 2 Suggested Options for Differentiation: Content-specific Accommodations and Modifications for Subgroups

Special Education

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher reads aloud daily
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Choral reading
- Chants, songs
- Preferential seating
- Assign a picture or movement to vocabulary words
- Small group instruction-guided reading and guided writing

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- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications
- Scribe for students who can't write
- Augmentative communication system

Students with 504 Plans

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow 504 plan
- Scribe for students who can't write
- Augmentative communication system
- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

Students at Risk of School Failure

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher reads aloud daily
- Provide peer tutoring
- Use a strong student as a "buddy" (does not necessarily have to speak the primary language)
- choral reading
- chants, songs
- preferential seating
- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

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Gifted and Talented:

- Ask open-ended questions
- Encourage upper level intellectual behavior based on Bloom's Taxonomy (analyzing, evaluating, creating)
- Do not always be explicit, allow for discovery
- Use centers and group students according to ability or interest
- Propose interest-based extension activities
- Use leveled texts and offer an advanced reader reading list
- Ask "why" and "what if" questions
- Use varied modes of pre-assessment and assessment
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Debrief students
- Propose interest-based extension activities
- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

Multilingual Learners:

- Small group instruction-guided reading and guided writing
- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Assign a picture or movement to vocabulary words
- Pre Teach vocabulary
- Label items in classroom
- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions
- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

Diversity and Inclusion:

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- Involve families in student learning
- Respect cultural traditions
- Provide students with necessary academic resources and materials
- Allow for alternative assignments
- Provide visuals
- Assign peer tutor
- Collaborate with language professionals and ESL teachers
- Encourage parents to help children maintain their native language at home, while the school helps the child attain proficiency in English.
- Establish a positive connection with parent
- Utilize closed captioning when available
- Provide road maps or outlines for difficult concepts
- Provide sufficient wait time before calling on any student to help keep students who may need more time engaged
- Display a word wall with current academic vocabulary in each subject
- Speak clearly and slowly, avoid slang and idiomatic expressions
- Create a nurturing environment with structured routines

Unit 2 Supplemental Resources

www.illuminations.nctm.org
 A.APR.B.2 The Missing Coefficient
 A.SSE.A.2 A Cubic Identity
 A.APR.B.3 Graphing from Factors III
 F.IF.C.7c Graphs of Power Functions
 A.APR.C.4 Trina's Triangles
 A.APR.D.6 Combined Fuel Efficiency
 A.REI.A.1 Products and Reciprocals
 A.REI.A.2 Radical Equations
 A.REI.A.2, A.CED.A.1 An Extraneous Solution
 G.GPE.A.2 Defining Parabolas Geometrically
 F.IF.C.7e Logistic Growth Model
 A.REI.D.11 Ideal Gas Law

**OCEAN ACADEMY CHARTER HIGH SCHOOL
MATHEMATICS CURRICULUM
Unit 3 Overview**

Content Area: Algebra 2 Mathematics

Unit 3: Exploring Periodic Functions and the Unit Circle

Duration: Days 25

Target Course/Grade Level: 11

Unit 3 Introduction

This unit builds on students' prior knowledge of functions, trigonometric ratios, and circles from Geometry to extend their understanding of trigonometry and its applications. Students will use the unit circle to extend the domain of trigonometric functions and analyze functions using multiple representations. They will build and transform functions, including creating new functions from existing ones, and use trigonometric functions to model and interpret periodic phenomena in real-world contexts. Students will also prove and apply trigonometric identities to deepen their understanding of relationships among trigonometric functions. In addition, students will summarize, represent, and interpret data involving two categorical and quantitative variables to identify and analyze relationships between quantities.

Disciplinary Concepts for the Unit

Amistad Law: N.J.S.A. 18A:52:16A-88 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.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide 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.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 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.

Diversity and Inclusion

C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

1. The instruction shall:
 - (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;
 - (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and
 - (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

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Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.”

Unit 3 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

Content Standards with Statement	Critical Knowledge and Skills Objectives
LG1 and LG2 F.TF.A.1. Understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle. F.TF.A.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	LG1 & LG 2 Use the radian measure of an angle to find the length of the arc in the unit circle subtended by the angle and find the measure of the angle given the length of the arc. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. Radian measure of an angle as the length of the arc on the unit circle that is subtended by the angle Relationship between degrees and radians • find the measure of the angle given the length of the arc. • find the length of an arc given the measure of the central angle. • convert between radians and degrees.

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	use the unit circle to evaluate sine, cosine and tangent of standard reference angles.
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>	LG 3 Graph trigonometric functions expressed symbolically, showing key features of the graph, by hand in simple cases and using technology for more complicated cases. Relationship between the unit circle in the coordinate plane and graph of trigonometric functions. graph trigonometric functions, showing period, midline, and amplitude
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative;</i>	LG 4 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. Periodic functions may model real-world scenarios - use characteristics of real world phenomena to select a trigonometric model. - identify amplitude, frequency and midline appropriate for the model

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<i>relative maximums and minimums; symmetries; end behavior; and periodicity.</i>	
F.TF.C.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle Supportive Content F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. G.GPE.A.2. Derive the equation of a parabola given a focus and directrix	LG 5 Use the Pythagorean identity $(\sin \theta)^2 + (\cos \theta)^2 = 1$ to find $\sin \theta$, $\cos \theta$, or $\tan \theta$, given $\sin \theta$, $\cos \theta$, or $\tan \theta$, and the quadrant of the angle. • prove the Pythagorean identity: $\sin^2(\theta) + \cos^2(\theta) = 1$. • use the Pythagorean identity to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ when given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. Supportive Content Any point on a parabola is equidistant between the focus and the directrix • use the distance formula to write an equation of a parabola when the focus and directrix are given. • determine key features including intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior.
S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related 6a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	LG 6 Represent nonlinear (exponential and trigonometric) data for two variables on a scatter plot, fit a function to the data, analyze residuals (in order to informally assess fit), and use the function to solve problems. Use given functions or choose a function suggested by the context; emphasize exponential and trigonometric models. • fit exponential and trigonometric functions to data using technology. • solve problems using functions fitted to data (prediction equations).

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	• interpret the intercepts of models in context. • Plot residuals of non-linear functions. • Analyze residuals in order to informally evaluate the fit of exponential and trigonometric functions.
F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.</i>	LG 7 Analyze and compare properties of two functions when each is represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions.) • compare key attributes of functions each represented in a different way (i.e zeros, end behavior, periodicity, asymptotes).
F.BF.A.1. Write a function that describes a relationship between two quantities. F.BF.A.1b. Combine standard function types using arithmetic operations. <i>For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.</i> N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.	LG 8 Construct a function that combines, using arithmetic operations, standard function types to model a relationship between two quantities. Functions of various types can be combined to model real world situations. • use arithmetic operations to combine functions of varying types in order to model relationships between quantities
F.BF.B.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. <i>Include recognizing even and odd functions from their graphs and algebraic expressions for them.</i>	LG 9 • perform transformations on graphs of polynomial, exponential, logarithmic, or trigonometric functions. • identify the effect on the graph of replacing $f(x)$ by $f(x) + k$; $k f(x)$;

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	$f(kx)$; and $f(x + k)$ for specific values of k (both positive and negative).
F.BF.B.4. Find inverse functions. F.BF.B.4a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. <i>For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.</i> [*note: composition of functions is not introduced here]	LG 10 Determine the inverse function for a simple function. For a function $f(x)$ that has an inverse, the domain/input for $f(x)$ is the inverse function's range/output and that the range/output for $f(x)$ is the inverse function's domain/input. • use function notation to represent the inverse of a function - $f^{-1}(x)$. • transform an equation in order to isolate the independent variable, recognizing that the domain/input for $f(x)$ is the inverse function's range/output and that the range/output for $f(x)$ is the inverse function's domain/input.

Unit 3 Interdisciplinary Standards [NJSLs ELA](#)

New Jersey Student Learning Standards: Interdisciplinary Connections

- RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.
- RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.
- L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.
 - A. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
 - B. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
 - C. Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

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- D. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- E. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

- RI.CT.9-10.8. Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) seminal and informational text of historical and scientific significance, including how they relate in terms of themes and significant concepts.
- RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
- RI.IT.9-10.3. Analyze how an author unfolds ideas throughout the text, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

Unit 3 New Jersey Student Learning Standards: [Career Readiness, Life Literacies, and Key Skills](#)

Disciplinary Concepts

Credit and Debt Management 9.1

Career Awareness and Planning 9.2

Critical Thinking and Problem Solving 9.4

Technology Literacy 9.4

Core Ideas

Performance Expectations

(Identified with Standard Number and statement)

There are ways to evaluate loans and their impact on one's personal financial plan

- 9.1.12.CDM.5: Identify the types of characteristics of predatory lending practices and the importance of collateral (e.g., payday loans, car title loans, high-risk mortgages).
- 9.1.12.CDM.6: Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (e.g., student loans, credit cards, auto loans, mortgages, etc.).
- 9.1.12.CDM.7: Calculate a mortgage payment based on type of loan, down payment, credit score, and loan interest rate.
- 9.1.12.CDM.8: Compare and compute interest and compound interest and develop an amortization table using business tools.

There are strategies to improve one's professional value and marketability.

- 9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social,

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	and political conditions of a time period are affected by a recession.
Career planning requires purposeful planning based on research, self-knowledge, and informed choices.	● 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment. ● 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans. ● 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills. ● 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them. ● 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
Multiple solutions often exist to solve a problem.	● 9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	● 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.). • ● 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	● 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. ● 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
Unit 3 New Jersey Student Learning Standards: Computer Science and Design Thinking	
Disciplinary Concepts Computing Systems Impacts of Computing Data and Analysis Engineering Design	
Core Ideas	Performance Expectations

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	(Identified with Standard Number and Statement)
Successful troubleshooting of complex problems involves multiple approaches including research, analysis, reflection, interaction with peers, and drawing on past experiences.	8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors
The design and use of computing technologies and artifacts can positively or negatively affect equitable access to information and opportunities.	8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. • 8.1.12.IC.2: Test and refine computational artifacts to reduce bias and equity deficits. 8.1.12.IC.3: Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Large data sets can be transformed, generalized, simplified, and presented in different ways to influence how individuals interpret and understand the underlying information.	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
The accuracy of predictions or inferences made from a computer model is affected by the amount, quality, and diversity of data.	8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback

New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

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people interpret and understand the underlying information.	
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Unit 3 Learning Targets:

Students will be able to...

- Use radian measure to determine arc length and angle measure on the unit circle.
- Explain how the unit circle extends trigonometric functions to all real numbers.
- Graph and interpret trigonometric functions using key features and multiple representations.
- Analyze and compare functions represented algebraically, graphically, numerically, or verbally.
- Describe how transformations affect polynomial, exponential, logarithmic, and trigonometric functions.
- Identify even and odd functions from graphs and equations.
- Use the Pythagorean identity to determine missing trigonometric values given a known value and quadrant.
- Model periodic phenomena with trigonometric functions using specified amplitude, frequency, and midline.
- Build functions using arithmetic operations and combinations of standard function types to model relationships between quantities.
- Determine the inverse of a simple function and interpret the relationship between a function and its inverse.

Represent and analyze nonlinear data using scatter plots, fitted functions, and residuals to assess model fit and solve problems.

Unit 3 Enduring Understandings:

Students will know...

- Radians measure angles based on arc length on the unit circle.
- Degrees and radians are equivalent measures of the same angle.
- The unit circle connects angle measures to the graphs and values of trigonometric functions.
- Trigonometric functions can be used to model periodic real-world phenomena.

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- Functions can be combined and transformed to model relationships between quantities.
- Function transformations can be represented using function notation and interpreted graphically.
- A function and its inverse interchange their domains and ranges.

Unit Essential Questions:

- How can the unit circle help us understand and represent trigonometric functions?
- How can we use multiple representations to analyze and compare functions?
- How do transformations change the behavior and characteristics of functions?
- How can trigonometric functions be used to model periodic phenomena?
- How can functions be combined to model real-world relationships?
- What is the relationship between a function and its inverse?
- How can scatter plots, fitted functions, and residuals help us evaluate nonlinear models?

Unit 3 Instructional Plan

Students will build on their understanding of geometric interpretations of sine and cosine, the unit circle, and functions to develop a deeper understanding of trigonometry and periodicity. They will connect these representations as different expressions of the same underlying mathematical relationships and apply transformations to analyze trigonometric functions. Students will use trigonometric functions to model and interpret periodic phenomena in real-world contexts while strengthening their understanding of functions and their properties. Throughout the unit, students will develop connections that prepare them for calculus, including the analysis of rate of change and accumulation, while also exploring the broader applications and significance of trigonometric functions.

Resources & Text

- Big Ideas Platform
- Big Ideas Textbook
- Calculator
- Graphing Paper

Suggested Activities

- IXL
- KhanAcademy
- DESMOS
- Nearpod
- Edpuzzle

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	• Kahoot • Quizizz • Blooket • Kuta Software
Formative Assessments: • Observation • Homework • Class Participation • Whiteboards/communicators • Think-Pair-Share • Do-Now • Notebook Checks • Writing Prompts • Exit Tickets • Classroom Games • Self-assessment Summative Assessments • Chapter/Unit Test • Quizzes • Presentations • Unit Projects Benchmark Assessments: • State Standardized Assessments • Quarterly Benchmark Assessment Alternative Assessments • Portfolio Project • Modified assignments Performance Tasks: • www.mathxlforschool.com • www.khanacademy.com • www.desmos.com • www.kahoot.com • www.quizizz.com	
Unit 3 Suggested Options for Differentiation: Content-specific Accommodations and Modifications for Subgroups	
Special Education • Work toward longer passages as skills in English increase • Use visuals • Introduce key vocabulary before lesson • Teacher reads aloud daily • Provide peer tutoring • Use a strong student as a “buddy” (does not necessarily have to speak the primary language) • Choral reading • Chants, songs • Preferential seating	

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- Assign a picture or movement to vocabulary words
- Small group instruction-guided reading and guided writing
- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications
- Scribe for students who can't write
- Augmentative communication system

Students with 504 Plans

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow 504 plan
- Scribe for students who can't write
- Augmentative communication system
- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

Students at Risk of School Failure

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher reads aloud daily
- Provide peer tutoring
- Use a strong student as a "buddy" (does not necessarily have to speak the primary language)
- choral reading
- chants, songs
- preferential seating
- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling

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- Technology Integration
- Assistive Technology

Gifted and Talented:

- Ask open-ended questions
- Encourage upper level intellectual behavior based on Bloom's Taxonomy (analyzing, evaluating, creating)
- Do not always be explicit, allow for discovery
- Use centers and group students according to ability or interest
- Propose interest-based extension activities
- Use leveled texts and offer an advanced reader reading list
- Ask "why" and "what if" questions
- Use varied modes of pre-assessment and assessment
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Debrief students
- Propose interest-based extension activities
- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

Multilingual Learners:

- Small group instruction-guided reading and guided writing
- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Assign a picture or movement to vocabulary words
- Pre Teach vocabulary
- Label items in classroom
- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

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- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

Diversity and Inclusion:

- Involve families in student learning
- Respect cultural traditions
- Provide students with necessary academic resources and materials
- Allow for alternative assignments
- Provide visuals
- Assign peer tutor
- Collaborate with language professionals and ESL teachers
- Encourage parents to help children maintain their native language at home, while the school helps the child attain proficiency in English.
- Establish a positive connection with parent
- Utilize closed captioning when available
- Provide road maps or outlines for difficult concepts
- Provide sufficient wait time before calling on any student to help keep students who may need more time engaged
- Display a word wall with current academic vocabulary in each subject
- Speak clearly and slowly, avoid slang and idiomatic expressions
- Create a nurturing environment with structured routines

Unit 3 Supplemental Resources

F.TF.A.1 Bicycle Wheel
F.TF.A.2 What exactly is a radian?
F.TF.A.2 Trigonometric functions for arbitrary angles (radians)
F.TF.A.2 Trig Functions and the Unit Circle
F.IF.B.4, F.IF.C.7e Model airplane acrobatics
F.TF.B.5 As the Wheel Turns
F.TF.C.8 Trigonometric Ratios and the Pythagorean Theorem
F.IF.C.9 Throwing Baseballs
F.BF.A.1b A Sum of Functions
F.BF.B.3 Exploring Sinusoidal Functions
F.BF.B.3 Transforming the graph of a function
F.BF.B.4a Temperatures in degrees Fahrenheit and Celsius

Teacher Notes

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Unit 4 Overview

Content Area: Algebra 2 Mathematics

Unit 4: Data, Probability, and Statistical Inference

Duration: Days 20

Target Course/Grade Level: 11

Unit 4 Introduction:

This unit develops students' understanding of statistical reasoning, probability, and inference. Students will begin by summarizing, representing, and interpreting data from a single variable and examining random processes that underlie statistical experiments. They will then explore the rules of probability, including compound events, independence, and conditional probability, and apply these concepts to interpret data and real-world situations. Building on these ideas, students will make inferences and justify conclusions from sample surveys, experiments, and observational studies, developing an understanding of how statistical evidence can be used to draw meaningful conclusions about populations.

Disciplinary Concepts for the Unit

Amistad Law: N.J.S.A. 18A:52:16A-88 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.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocide 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.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 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.

Diversity and Inclusion

C.18A:35-4.36a Curriculum to include instruction on diversity and inclusion.

1. The instruction shall:

(1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance;

(2) examine the impact that unconscious bias and economic disparities have at both an individual level

and on society as a whole; and

(3) encourage safe, welcoming, and inclusive environments for all students regardless of race

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or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Asian Americans and Pacific Islanders (AAPI)

Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416).

21st Century Themes and Skills

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility. Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Unit 4 Focus Standards (Major Standards) [New Jersey Student Learning Standards-Mathematics](#)

Content Standards with Statement	BIM Resource	Suggested Mathematical Practices	Critical Knowledge and Skills Objectives
LG1 S.ID.A.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables	11.1	MP.2 Reason abstractly and quantitatively • MP.4 Model with mathematics	LG1 Mean and standard deviation are used to fit in a normal distribution Population percentages may be estimated when the data are approximately normally distributed. - identify data sets as approximately normally distributed or not. - explain the 68-95-99.7 rule for normal distributions (approximately 68% of the area under a normal distribution curve is within one standard deviation, approximately 95% of the area under a normal distribution curve is within two standard deviations, etc).

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			• use the mean and standard deviation of a normal distribution to estimate population percentages. • use calculators, spreadsheets, and tables to estimate areas under the normal curve and interpret in context.
LG2 S.IC.A.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.		MP.2 Reason abstractly and quantitatively • MP.4 Model with mathematics.	Statistics is a process for making inferences about a population based on analysis of a random sample from the population. • identify and evaluate random sampling methods. • explain the importance of randomness to sampling and inference making. • explain the difference between values that describe a population and a sample, in context
LG3 S.IC.A.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?	11.2 11.5 11.6	MP.2 Reason abstractly and quantitatively • MP.4 Model with mathematics.	LG 3 Random processes can be described mathematically by using a model: a list or description of possible outcomes. • determine whether a given model is consistent with results from and experiment. • know the difference between experimental and theoretical modeling. • know how far predictions can be projected based on sample size. • design simulations of random sampling.
LG4 S.IC.B.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how	11.3 11.4	MP.4 Model with mathematics.	LG 4 Collecting data from a random sample of a population makes it possible to draw conclusions about the whole population. Randomly assigning individuals to different treatments allows a fair comparison of the effectiveness of those treatments.

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randomization relates to each.			Sample surveys, experiments, and observational studies serve different statistical purposes allowing for different statistical analyses. - distinguish between sample surveys, experiments, and observational studies. - explain the importance of randomization in each of these processes. - identify voluntary response samples and convenience samples. - describe simple random samples, stratified random samples, and cluster samples. - explain how under coverage, nonresponse, and question wording can lead to bias in a sample survey.
LG5 S.IC.B.4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling	11.5	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	LG 5 Appropriately drawn samples of a population may be used to estimate a population mean or population proportion. Relationship between margin of error, variation with a data set, and variability in the population - conduct simulations of random sampling to gather samples. - estimate population means with sample means. - estimate population proportions with sample proportions. - calculate margins of error for the estimates. - explain how the results relate to variability in the population.
LG6	11.6	MP.1 Make sense of	LG6

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S.IC.B.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant S.IC.B.6. Evaluate reports based on data.		problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	A statistically significant outcome is one that is unlikely to be due to chance alone. • conduct a t-test to evaluate the effectiveness and differences in two treatments. • use simulations to generate data simulating applying two treatments. • use the results of simulations to determine if the differences are significant. • read and explain, in the context of the situation, data from outside reports - discussing experimental study design, drawing conclusions from graphical and numerical summaries, and identifying characteristics of the experimental design.
LG7 S.CP.A.1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).	10.1 10.2 10.4	MP.4 Model with mathematics. MP7 Look for and make use of structure	LG7 Events are described as subsets of a sample space. • identify a sample space, recognizing it as the set of all possible outcomes. • identify and describe subsets of a sample space as events. • describe unions, intersections and complements of events. • visualize unions, intersections and complements of events with Venn diagrams.
LG8 S.CP.A.2. Understand that two events A and B are independent if the probability of A and B occurring together is the	10.2 10.4 10.3	MP.3 Construct viable arguments and critique	LG 8 Two events A and B are independent if the probability of A and B occurring together is the product of their probabilities.

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product of their probabilities, and use this characterization to determine if they are independent. S.CP.A.3. Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. S.CP.A.4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. <i>For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.</i>		the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Independence of event A and event B means that the conditional probability of A given B is the same as the probability of, and the conditional probability of B given A is the same as the probability of B. • identify events as independent or dependent. • interpret the conditional probability of A given B as answering the question ‘now that B has occurred, what is the probability that event A will occur?’. • determine the conditional probability of A given B using $P(A \text{ and } B)/P(B)$. • represent conditional probability of A given B as $P(A B)$. • calculate conditional probabilities. • construct two-way frequency tables for two categorical variables. • calculate probabilities from the two-way frequency table. • use the probabilities to assess independence of two variables.
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S.CP.A.5. Recognize and explain the NEW Concepts of conditional probability and independence in everyday language and everyday situations. <i>For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer</i>			
LG9 S.CP.B.6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. S.CP.B.7. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.	10.2	MP.1 Make sense of problems and persevere in solving them. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	LG 9 Mutually exclusive events exist. - analyze event B's outcomes to determine the proportion of B's outcomes that also belong to event A. - interpret this proportion as conditional probability of A given B. - identify two events as mutually exclusive (disjoint). - calculate probabilities using the Addition rule $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

Unit 4 Interdisciplinary Standards [NJSLs ELA](#)

New Jersey Student Learning Standards: Interdisciplinary Connections

- RI.CR.9-10.1. Cite a range and thorough textual evidence and make clear and relevant connections, to strongly support an analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.
- RI.MF.9-10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.
- L.VL.9-10.3. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, including technical meanings, choosing flexibly from a range of strategies.
 - A. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
 - B. Identify and correctly use patterns of word changes that indicate different

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meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy). C. Analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper). D. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. E. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).	
- RI.CT.9-10.8. Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) seminal and informational text of historical and scientific significance, including how they relate in terms of themes and significant concepts. - RI.AA.9-10.7. Describe and evaluate the argument and specific claims in an informational text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning. - RI.IT.9-10.3. Analyze how an author unfolds ideas throughout the text, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.	
Unit 4 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills Disciplinary Concepts Credit and Debt Management 9.1 Career Awareness and Planning 9.2 Critical Thinking and Problem Solving 9.4 Technology Literacy 9.4	
Core Ideas	Performance Expectations (Identified with Standard Number and statement)
There are ways to evaluate loans and their impact on one's personal financial plan	9.1.12.CDM.5: Identify the types of characteristics of predatory lending practices and the importance of collateral (e.g., payday loans, car title loans, high-risk mortgages). 9.1.12.CDM.6: Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (e.g., student loans, credit cards, auto loans, mortgages, etc.). 9.1.12.CDM.7: Calculate a mortgage payment based on type of loan, down payment, credit score, and loan interest rate. 9.1.12.CDM.8: Compare and compute interest and compound interest and develop an amortization table using business tools.

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There are strategies to improve one's professional value and marketability.	9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.
Career planning requires purposeful planning based on research, self-knowledge, and informed choices.	9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment. 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans. 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills. 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them. 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
Multiple solutions often exist to solve a problem.	9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1)
Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Unit 4 New Jersey Student Learning Standards: [Computer Science and Design Thinking](#)

Disciplinary Concepts
Computing Systems
Impacts of Computing
Data and Analysis

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Engineering Design	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Successful troubleshooting of complex problems involves multiple approaches including research, analysis, reflection, interaction with peers, and drawing on past experiences.	8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors
The design and use of computing technologies and artifacts can positively or negatively affect equitable access to information and opportunities.	8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. • 8.1.12.IC.2: Test and refine computational artifacts to reduce bias and equity deficits. 8.1.12.IC.3: Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other people interpret and understand the underlying information.	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
Large data sets can be transformed, generalized, simplified, and presented in different ways to influence how individuals interpret and understand the underlying information.	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
The accuracy of predictions or inferences made from a computer model is affected by the amount, quality, and diversity of data.	8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback

New Jersey Student Learning Standards: Climate Change Mandate	
Core Ideas	Performance Expectations (Identified with Standard Number and Statement)
Individuals select digital tools and design automated processes to collect, transform, generalize, simplify, and present large data sets in different ways to influence how other	8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

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people interpret and understand the underlying information.	
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Unit 4 Learning Targets:

Students will be able to...

- Analyze and compare functions represented algebraically, graphically, numerically, or verbally.
- Use radian measure to determine arc length and angle measure on the unit circle.
- Explain how the unit circle extends trigonometric functions to all real numbers.
- Graph and interpret trigonometric functions using key features and multiple representations.
- Apply transformations to polynomial, exponential, logarithmic, and trigonometric functions, including identifying even and odd functions.
- Use the Pythagorean identity to determine missing trigonometric values given a known value and quadrant.
- Model periodic phenomena with trigonometric functions using specified amplitude, frequency, and midline.
- Construct functions by combining standard function types and arithmetic operations to model relationships between quantities.
- Represent and analyze nonlinear data using scatter plots, fitted functions, and residuals to assess model fit and solve problems.
- Determine the inverse of a simple function and interpret the relationship between a function and its inverse.

Unit 4 Enduring Understandings:

Students will know...

- Radians and degrees are equivalent measures of angles.
- Radian measure relates an angle to the length of its intercepted arc on the unit circle.
- The unit circle connects angle measures to the values and graphs of trigonometric functions.
- Trigonometric functions can model periodic phenomena in real-world contexts.
- Functions can be combined and transformed to model relationships between quantities.
- Function notation can be used to represent and analyze transformations.
- A function and its inverse interchange their domains and ranges.

Unit 4 Essential Questions:

- How can probability help us make informed decisions in situations involving uncertainty?
- How does conditional probability help us understand relationships between events?

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- How can probability be used to evaluate the reliability of evidence, such as medical test results?
- How can data from surveys, experiments, and observational studies be used to make inferences about a population?
- How can we determine whether a statistical conclusion is justified by the evidence?
- How do sampling methods and study design affect the conclusions we can draw from data?
- How can statistical reasoning help us distinguish meaningful relationships from conclusions based on chance?

Unit 4 Instructional Plan

This unit develops students' understanding of probability and statistical inference as tools for reasoning about uncertainty and making informed decisions. Students will explore experimental and conditional probability, with an emphasis on real-world applications such as medical testing. They will use probability to evaluate evidence, consider relationships between events, and move beyond intuition when interpreting uncertain situations. Building on these concepts, students will analyze data from surveys, experiments, and observational studies to make and justify statistical conclusions.

Resources & Text

- Big Ideas Platform
- Big Ideas Textbook
- Calculator
- Graphing Paper

Suggested Activities

- IXL
- KhanAcademy
- DESMOS
- Nearpod
- Edpuzzle
- Kahoot
- Quizizz
- Blooket
- Kuta Software

Formative Assessments:

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games
- Self-assessment

Summative Assessments

- Chapter/Unit Test
- Quizzes

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- Presentations
- Unit Projects

Benchmark Assessments:

- State Standardized Assessments
- Quarterly Benchmark Assessment

Alternative Assessments

- Portfolio Project
- Modified assignments

Performance Tasks:

- www.mathxlforschool.com
- www.khanacademy.com
- www.desmos.com
- www.kahoot.com
- www.quizizz.com

Unit 4 Suggested Options for Differentiation: Content-specific Accommodations and Modifications for Subgroups

Special Education

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher reads aloud daily
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- Choral reading
- Chants, songs
- Preferential seating
- Assign a picture or movement to vocabulary words
- Small group instruction-guided reading and guided writing
- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications
- Scribe for students who can’t write
- Augmentative communication system

Students with 504 Plans

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow 504 plan
- Scribe for students who can’t write
- Augmentative communication system
- Utilize graphic organizers to help provide a purpose for reading and increase comprehension

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- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

Students at Risk of School Failure

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher reads aloud daily
- Provide peer tutoring
- Use a strong student as a “buddy” (does not necessarily have to speak the primary language)
- choral reading
- chants, songs
- preferential seating
- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

Gifted and Talented:

- Ask open-ended questions
- Encourage upper level intellectual behavior based on Bloom’s Taxonomy (analyzing, evaluating, creating)
- Do not always be explicit, allow for discovery
- Use centers and group students according to ability or interest
- Propose interest-based extension activities
- Use leveled texts and offer an advanced reader reading list
- Ask “why” and “what if” questions
- Use varied modes of pre-assessment and assessment
- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts

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- Organize integrated problem-solving simulations
- Debrief students
- Propose interest-based extension activities
- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

Multilingual Learners:

- Small group instruction-guided reading and guided writing
- Use books on tape
- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Assign a picture or movement to vocabulary words
- Pre Teach vocabulary
- Label items in classroom
- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions
- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

Diversity and Inclusion:

- Involve families in student learning
- Respect cultural traditions
- Provide students with necessary academic resources and materials
- Allow for alternative assignments
- Provide visuals
- Assign peer tutor
- Collaborate with language professionals and ESL teachers
- Encourage parents to help children maintain their native language at home, while the school helps the child attain proficiency in English.
- Establish a positive connection with parent
- Utilize closed captioning when available
- Provide road maps or outlines for difficult concepts
- Provide sufficient wait time before calling on any student to help keep students who may need more time engaged
- Display a word wall with current academic vocabulary in each subject
- Speak clearly and slowly, avoid slang and idiomatic expressions
- Create a nurturing environment with structured routines

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Unit 4 Supplemental Resources

www.illuminations.nctm.org
S.ID.A.4 Do You Fit in This Car?
S.IC.A.1 School Advisory Panel
S.IC.A.2 Sarah, the chimpanzee
S.IC.B.3 Strict Parents
S.IC.B.4 Margin of Error for Estimating a Population Mean
S.CP.A.1 Describing Events
S.CP.A.2 Cards and Independence
S.CP.A.3 Lucky Envelopes
S.CP.A.4 Two-Way Tables and Probability
S.CP.A.5 Breakfast Before School
S.CP.B.6 The Titanic 1
S.CP.B.7 The Addition Rule
S.CP.B.7 Rain and Lightning

Teacher Notes