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Springfield Public Schools **Springfield, New Jersey 07081**

Algebra II

Curriculum Guide

2024

**This curriculum may be modified through varying materials, techniques, and strategies
as per an individual student's IEP.**

Springfield Board of Education
Approved on August 26, 2024



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Springfield, New Jersey**

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Unit Overview Template

Content Area: Math **Grade Level:** 10-11 **Unit Title:** Equations and Inequalities

Unit Summary: This unit will deal with equations and inequalities and their importance to the foundation of mathematical understanding.

Primary Interdisciplinary Connections: *Science and Engineering*

21st-Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy

Unit Rationale: The ability to model and solve numeric and algebraic expressions and to solve equalities or inequalities is essential to a further understanding of Algebra.

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

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).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S.ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: N.RN; A.REI; A.CED; A.SSE; F.IF; F.BF; F.LE; F.TF

Content Statements: Extend the properties of exponents to rational exponents; Use properties of rational and irrational numbers; Create equations that describe numbers or relationships; Understand solving equations as a process of reasoning and explain the reasoning; Solve equations and inequalities in one variable; Write expressions in equivalent forms to solve problems; Analyze functions using different representations; Build a function that models a relationship between two quantities; Build new functions from existing functions; Construct and compare linear and exponential models and solve problems; Interpret expressions for functions in terms of the situation they model; Extend the domain of trigonometric functions using the unit circle; Model periodic phenomena with trigonometric functions; Prove and apply trigonometric identities

CPI#: **Cumulative Progress Indicator (CPI):**



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N.RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5(1/3)^3$ to hold, so $(5^{1/3})^3$ must equal 5.
N.RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N.RN.A.3	Simplify radicals, including algebraic radicals (e.g. $\sqrt[3]{54} = 3\sqrt[3]{2}$, simplify $\sqrt{32x^2}$).
A.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
A.CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .
A.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
A.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.SSE.B.3c	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. c. Use the properties of exponents to transform expressions for exponential functions. 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%.
A.SSE.B.4	(+) Derive and/or explain the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.
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. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y =$



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	$(1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.
F.BF.A.1	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. 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. c. (+) Compose functions. For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of a weather balloon as a function of time, then $T(h(t))$ is the temperature at the location of the weather balloon as a function of time.
F.BF.A.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
F.BF.B.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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
F.BF.B.4a	Find inverse functions. a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.
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).
F.LE.A.4	Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $abct = d$ where a , c , and d are numbers and the base b is 2, 10, or e ; evaluate the logarithm using technology.
F.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.
F.TF.A.1	(+) Understand 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.
F.TF.B.5	(+) Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
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.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.



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HS-ETS1-2

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- What is the best problem solving approach to take?
- When is simplification helpful?
- When is simplification not helpful?

Unit Enduring Understandings:

- Algebra allows the expression and communication of ideas.
- The rules of Algebra ensure a common basis for understanding mathematics.

Unit Learning Targets:

Students will....

- Students will be able to analyze and evaluate various simple algebraic expressions.
- Students will be able to model real-life applications using algebraic expressions.
- Climate Change Example: Students may create equations and/or inequalities to represent the economic impact of climate change.
- Climate Change Example: Students may represent constraints describing the economic impact of climate change by equations, inequalities, and/or by systems of inequalities and interpret solutions as viable or nonviable options.
- Climate Change Example: Students may rearrange formulas related to the economic impact of climate change to highlight a quantity of interest, using the same reasoning as in solving equations.



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Evidence of Learning

Summative Assessment: Chapter Test (with differentiated levels)

Equipment Needed: Calculator, laptop, textbook

Teacher Resources: Calculator, laptop, textbook

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Graphing and Using Properties of Real Numbers	1 day
Lesson 2 Linear Equations	1 day
Lesson 3 Algebraic Expressions and Order of Operations	1 day

Teacher Notes:

Frequently break students into small groups to work on problem solving. During this time, meet with groups for mini-lessons and formative assessments.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>



Lesson Plan 1 Template

Content Area: Math Lesson Title: Graphing and Using Properties of Real Numbers Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Graph real numbers - Use properties of real numbers	Lesson Sequence - Ask students to work in pairs to determine how to plot a series of real numbers on the number line without a calculator. Give a variety of rational and irrational numbers in different forms. - Ask students to write solutions on the board. - After looking at some examples as a class, ask students to work in a small group to list properties of real numbers they know on a Jamboard or Google Doc. - Review the list with examples. - Students then work on the Desmos activity.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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Differentiation:

Students can use the calculator to help compare values.

The Desmos activity will offer additional support and enrichment based on student needs.

Resources Provided:

- Desmos activity



Lesson Plan 2 Template

Content Area: Math

Lesson Title: Linear Equations

Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Solve linear equations - Solve Geometric series problems	Lesson Sequence - The teacher gives the students an entrance ticket on solving linear equations. - Students will work in pairs to recall different properties of linear equations. - The students then work in small groups to solve linear equations. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket. - The students then work through a discovery problem set leading them	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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	to write a Geometric series. 5. Students then work on the Desmos activity.	
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Differentiation:

The teacher meets with small groups based on the formative assessment.

The Desmos activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- Desmos activity



Lesson Plan 3 Template

Content Area: Math Lesson Title: Algebraic Expressions and Order of Operations Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Write algebraic expressions - Use the order of operations to solve algebraic expressions	Lesson Sequence - The teacher starts the class by putting students in groups at the board to solve a large order of operations problem that utilizes each operation multiple times. - The teacher circulates the room while students solve the problem. The teacher then asks the students to debate who's solution is correct. - The groups then create their own order of operations problem to pose to another group. Each group solves their new problem.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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| | 4. The students then work through the Desmos activity. The teacher monitors students' progress and meets with small groups. | |
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Differentiation:

Students can check their work with the calculator.

The Desmos activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- Desmos activity



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☒	☐	☐
Integrate 21st-Century skills	☐	☒	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self- assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 10-11	Unit Title: Equations and Inequalities
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level:** 10-11 **Unit Title:** Linear Equations and Functions

Unit Summary: This unit will deal with linear equations and functions and their importance in representing and interpreting data.

Primary Interdisciplinary Connections: *Science and Engineering*

21st-Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy

☒ Information Literacy ☒ Life and Career Skills ☐ Communication and Collaboration ☒ Media Literacy

Unit Rationale: The ability to create and visually represent linear functions are important in presenting and understanding data trends and results.

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

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).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S.ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: F.IF

Content Statements: Understand the concept of a function and use function notation; Interpret functions that arise in applications in terms of the context; Analyze functions using different representations.

CPI#:	Cumulative Progress Indicator (CPI):
F.IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
F.IF.A.2	Use function notation, evaluate functions for inputs in their domains, and



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	interpret statements that use function notation in terms of a context.
F.IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.
F.IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
F.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
F.IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. - Graph linear and quadratic functions and show intercepts, maxima, and minima. - Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. - Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. (+) Graph exponential and logarithmic functions, showing intercepts and end behavior. - Graph trigonometric functions, showing period, midline, and amplitude.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- What can we understand by reading a graph?
- How can a correlation be determined?

Unit Enduring Understandings:

- Algebraic functions take many forms.
- Linear functions have many applications in science.
- The rules of Algebra ensure a common basis for understanding mathematics.

Unit Learning Targets:

Students will....

- Students will be able to analyze and evaluate a variety of simple algebraic expressions.
- Students will be able to model real life applications using algebraic expressions.



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- Climate Change Example: Students may use function notation to determine the amount of carbon dioxide produced by burning a given number of molecules of ethane (gasoline), m , where $c(m)$ is the number of molecules of carbon dioxide.
- Climate Change Example: Students may calculate the average rate of change of a function $c(m)$ presented symbolically or as a table, where $c(m)$ represents the amount of carbon dioxide produced by burning a given number of molecules of ethane (gasoline).

Evidence of Learning

Summative Assessment: Chapter Test (with differentiated levels)

Equipment Needed: Calculator, laptop, textbook

Teacher Resources: Calculator, laptop, textbook

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Functions and Their Graphs	1 day
Lesson 2 Slopes and Rate of Change	1 day
Lesson 3 Quick Graphs of Linear Equations	1 day

Teacher Notes:

Frequently break students into small groups to work on problem solving. During this time, meet with groups for mini-lessons and formative assessments.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>



Lesson Plan 1 Template

Content Area: Math Lesson Title: Functions and Their Graphs Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Identify and represent relations and functions - Graph linear functions - Evaluate functions	Lesson Sequence - Students will get into small groups at the board. The teacher asks the students to write their own linear equation solved for y. - The teacher then asks students to substitute a number for x and solve. The teacher circulates the room and replaces y with f(x). - The teacher then asks the students to compute f(3). After groups successfully figure out what the notation means, the students formalize the notation.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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| | 4. The teacher then asks the students to graph the line in the form $f(x)$, using a chart to notate points. | |
|--|--|--|

Differentiation:

Students can use Geogebra to assist with graphing.

A Desmos activity can provide reinforcement or enrichment based on students' needs.

Resources Provided:

- Desmos activity



Lesson Plan 2 Template

Content Area: Math Lesson Title: Slopes and Rate of Change Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Find the slope of a line - Identify parallel and perpendicular lines - Use slope to solve real-life problems	Lesson Sequence - The teacher gives an entrance ticket where students show if lines are parallel or perpendicular. - The students then get in groups and work through the discovery problem set leading them to apply the slope of a line. - The teacher meets with individuals or small groups based on the results of the formative assessment. - The students then work on a Desmos activity solving real-life application problems.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity
Differentiation: The Desmos activity provides reinforcement or enrichment based on students' needs.		
Resources Provided: Graphing calculator		



Lesson Plan 3 Template

Content Area: Math Lesson Title: Quick Graphs of Linear Equations Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Use the slope-intercept form of a linear equation to graph an equation - Use the standard form of a linear equation to graph an equation	Lesson Sequence - Students are given a problem set to work on in groups. The problems ask students to graph lines in different forms, without using a chart or rewriting the equations. - The teacher circulates the room. After groups finish, students work on the Desmos activity graphing lines digitally. - As a whole group, the students then discuss different methods of graphing the lines from the problem set without rewriting the equations (set x and $y = 0$ for standard	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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form; recognize the slope
and y-intercept; etc).

Differentiation:

The Desmos activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- Graphing calculator



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-Century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☐	☒	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self- assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 10-11	Unit Title: Linear Equations and Functions
Created: 2024		Board Approved on:



Unit Overview Template

Content Area: Math **Grade Level:** 10-11 **Unit Title:** Systems of Linear Equations and Inequalities

Unit Summary: This unit will deal with systems of equations and inequalities and their importance in modeling and understanding real applications of mathematics.

Primary Interdisciplinary Connections: *Science and Engineering*

21st-Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☐ Communication and Collaboration ☒ Media Literacy

Unit Rationale: The ability to create and visually represent linear functions are important in presenting and understanding data trends and results.

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12.prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

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).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S.ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: A.SSE; A.REI; F.IF; N.Q

Content Statements: Interpret the structure of expressions; Solve equations and inequalities in one variable; Solve systems of equations; Represent and solve equations and inequalities graphically; Interpret functions that arise in applications in terms of the context; Analyze functions using different representations; Reason quantitatively and use units to solve problems; Use polynomial identities to solve problems; Rewrite rational expressions

CPI#:

Cumulative Progress Indicator (CPI):



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A.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
A.APR.C.4	(+) Prove polynomial identities and use them to describe numerical relationships. 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.
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.
A.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.REI.C.5	(+) Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
A.REI.C.6	Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
A.REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
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.
A.REI.D.12	Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
F.IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
F.IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable



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	factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior. f. Graph trigonometric functions, showing period, midline, and amplitude.
N.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- What can we understand by reading a graph?
- How can a correlation be determined?

Unit Enduring Understandings:

- Algebra allows the expression and communication of ideas.
- The rules of Algebra ensure a common basis for understanding mathematics.

Unit Learning Targets:

Students will....

- Students will be able to analyze and evaluate a variety of simple algebraic expressions.
- Students will be able to model real life applications using algebraic expressions.
- Climate Change Example: Students may define appropriate quantities for a descriptive model of how variations in the flow of energy into and out of Earth's systems result in climate change. Note: changes in climate are limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.



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Evidence of Learning

Summative Assessment: Chapter Test (with differentiated levels)

Equipment Needed: Calculator, laptop, textbook

Teacher Resources: Calculator, laptop, textbook

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Graph and Solve Linear Equations in Two Variables	1 day
Lesson 2 Algebraic Methods and Linear Systems	1 day
Lesson 3 Graphing and Using Systems of Linear Inequalities	1 day

Teacher Notes:

Frequently break students into small groups to work on problem solving. During this time, meet with groups for mini-lessons and formative assessments.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>



Lesson Plan 1 Template

Content Area: Math Lesson Title: Graph and Solve Linear Equations in Two Variables
 Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Graph equations in two variables - Solve equations in two variables	Lesson Sequence - The teacher gives the students an entrance ticket on graphing linear equations in two variables. - The teacher then gives the students a discovery problem set leading students through writing and solving equations with two variables. E.g. The middle digit of a number between 100 and 1000 is zero and the sum of the other digit is 13. If the digits are reversed, the number so formed exceeds the original number by 495. Find the number.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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3. The teacher circulates the room and pulls students in for a mini lesson on graphing linear equations in two variables based on the results of the entrance ticket.
4. The class comes back together as a whole and discusses techniques on writing, solving, and graphing equations in two variables.

Differentiation:

Students can graph using Geogebra.

The Desmos activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- Desmos



Lesson Plan 2 Template

Content Area: Math Lesson Title: Algebraic Methods and Linear Systems Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Use algebraic methods to solve linear systems - Use linear systems to model real-life situations	Lesson Sequence - The teacher poses two problems on the board. The first is an equation with just x as the variable. The second has both x and y. The teacher asks the students to solve both equations. - The class discusses how the first problem has a distinct solution, whereas the second does not. - The teacher then breaks students into small groups, and gives a discovery problem set. Students solve the problems at the board. - The problem set will start with students solving	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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linear equations with one variable. Then, students are asked to solve a linear equation with two variables, but one of the variables has a known value.

5. The students are then asked to solve a system of equations. Students should be able to figure out how to solve using substitution.
6. The class comes back together, and the teacher leads the students to figure out how to solve using elimination.

Differentiation:

A Desmos activity will provide reinforcement or enrichment based on students' needs.

Resources Provided:

- Desmos



Lesson Plan 3 Template

Content Area: Math Lesson Title: Graphing and Using Systems of Linear Inequalities Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Graph a system of linear inequalities to find a solution to the system - Use a system of linear inequalities to model real-life situations	Lesson Sequence - The students begin the lesson solving a system of linear equations by graphing. - The teacher then asks the students to solve inequalities in one variable, and asks how to graph them on the number line. - The teacher then changes the first system of linear equations into a system of linear inequalities. The teacher breaks the students into groups to figure out how to graph the solution. The teacher circulates the room.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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- | | | |
|--|---|--|
| | <ol style="list-style-type: none">4. After a solution is discovered, the class discusses the strategies on graphing linear inequalities.5. The students then work on the Linear Programming Desmos activity. | |
|--|---|--|

Differentiation:

Students can use Desmos to graph the inequalities.

The Desmos activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- Graphing calculators, graphing programs



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	☐	☒	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☒	☐	☐
Integrate 21st-Century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☐	☒	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☐	☒	☐
Provide opportunities for student reflection and self- assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math **Grade Level:** 10-11 **Unit Title:** Systems of Linear Equations and Inequalities

Created: 2024

Board Approved on:



Unit Overview Template

Content Area: Math **Grade Level:** 10-11 **Unit Title:** Statistics and Probability

Unit Summary: Students will use means and standard deviations to analyze data sets. Students will analyze data sets to interpret if they are consistent with previously known analyses. Students will apply concepts of basic probability to real-life scenarios.

Primary Interdisciplinary Connections: *Science and Engineering*

21st-Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☐ Communication and Collaboration ☒ Media Literacy

Unit Rationale: The ability to analyze and interpret data sets allows students to explore further real life applications of math.

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

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).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S.ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: S.ID; S.IC; S.CP

Content Statements: Summarize, represent, and interpret data on a single count or measurement variable; Summarize, represent, and interpret data on two categorical and quantitative variables; Understand and evaluate random processes underlying statistical experiments; Make inferences and justify conclusions from sample surveys, experiments, and observational studies; Understand independence and conditional probability and use them to interpret data; Use the rules of probability to compute probabilities of compound events in a uniform probability model

CPI#: **Cumulative Progress Indicator (CPI):**

S.ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution



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	and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
S.ID.B.6a	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. 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 and exponential models.
S.IC.A.1	(+) Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
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?
S.IC.B.3	(+) Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
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.
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 (e.g. interrogate study design, data sources, randomization, the way the data are analyzed and displayed, inferences drawn and methods used; identify and explain misleading uses of data; recognize when arguments based on data are flawed).
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”).
S.CP.A.2	(+) Understand that two events A and B are independent if the probability of A and B occurring together is the 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. 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.
S.CP.A.5	(+) Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example,



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	compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.
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.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How is statistics used in real life?
- How can Algebra be used to find and solve problems using statistics?

Unit Enduring Understandings:

- Statistics allows the expression and communication of ideas.
- The rules of statistics ensure a common basis for understanding mathematics.

Unit Learning Targets:

Students will....

- Students will be able to analyze and interpret a variety of data sets.
- Students will be able to model real life applications using algebraic expressions.
- Climate Change Example: Students may represent geoscience data on two quantitative variables on a scatter plot and describe how the variables are related in order to analyze the data and the results from global climate models.
- Climate Change Example: Students may use linear or exponential functions fitted to geoscience data to solve problems and analyze the results from global climate models to make an evidence-based forecast of the current rate of global climate change.



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Evidence of Learning

Summative Assessment: Chapter Test (with differentiated levels)

Equipment Needed: Calculator, laptop, textbook

Teacher Resources: Calculator, laptop, textbook

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Means and Standard Deviations	1 day
Lesson 2 Probabilities of Independent Events	1 day
Lesson 3 Addition Rule	1 day

Teacher Notes:

Frequently break students into small groups to work on problem-solving. During this time, meet with groups for mini-lessons and formative assessments.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>



Lesson Plan 1 Template

Content Area: Math Lesson Title: Means and Standard Deviations Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Calculate mean of a data set - Calculate standard deviation of a data set - Interpret the mean and standard deviation of data sets	Lesson Sequence - The students collect a random sample of data (e.g. numerical birthday days). - The students calculate the mean of the data. - The students then discuss the meaning of standard deviation, and how it relates to the normal distribution. - The teacher shows the students how to calculate standard deviation. Students first calculate by hand, then the teacher shows the students how to use Google Sheets to calculate the value.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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5. The teacher asks the students to interpret the mean and standard deviation of the data set. The students then discuss how this random sample would differ from a more meaningful data set (e.g. heights of students).

Differentiation:

Students can use the calculator to calculate the mean.

A Desmos activity can help students who need reinforcement.

Resources Provided:

- Shared Google Sheets



Lesson Plan 2 Template

Content Area: Math Lesson Title: Probabilities of Independent Events Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Create a data set of independent events - Calculate the probabilities of independent events	Lesson Sequence - Students will break into small groups and discuss what independent events are. - The class will determine as a group examples of independent events. The teacher then hands out a penny to each group and asks if repeatedly flipping a coin is independent or dependent. - The students then flip the coin 10 times and record the results. - The teacher then asks the students “what are the odds that you will flip a	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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heads next?" The teacher repeats this question.

5. The students then calculate the probability of getting heads once, then twice, then three times in a row.
6. The teacher then asks the students how to keep track of the possibilities, then calculates the values with the class.

Differentiation:

Students can use the calculator to calculate the probabilities.
A Desmos activity can help students who need reinforcement.

Resources Provided:

- Graphing calculators
- Pennies



Lesson Plan 3 Template

Content Area: Math

Lesson Title: Addition Rule

Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Apply the Addition Rule to probability	Lesson Sequence - The teacher breaks the students into small groups. Students are given a list of possible outcomes for flipping a coin and rolling a die. - Students are asked to analyze the probability of each pair of events. What do you notice? - The groups report to the whole class. The teacher then asks the students to determine the probability of taking out an Ace or a Spade from a deck of cards. - Students solve that the probabilities of an Ace or	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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a Space is $P(A \text{ or } B) = P(A) + P(A) - P(A \text{ and } B)$.

5. The teacher asks students to get back in groups and come up with their own problem requiring the Addition Rule, and pose it to another group.

Differentiation:

Students can use the calculator to calculate the probabilities.
A Desmos activity can help students who need reinforcement.
Simplify the deck of cards example.

Resources Provided:

- Graphing calculators
- Desmos



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-Century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 10-11	Unit Title: Statistics and Probability
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math

Grade Level: 10-11

Unit Title: Quadratic Functions

Unit Summary: This unit includes many of the major topics involving quadratic functions. Quadratic equations are graphed. Students convert between the standard, vertex and intercept forms. Quadratic expressions are factored. Quadratic equations are solved by factoring, finding square roots, completing the square or using the quadratic formula. Factoring is also used to find the zeros of quadratic functions. Quadratic models are written using a graph or quadratic regression and are used to solve real life problems. Quadratic equations with complex solutions are solved and operations with complex numbers are performed. The discriminant is used to determine the number and nature of the solutions to a quadratic equation. Complex numbers are applied to fractal geometry. Quadratic inequalities involving two variables, including systems of inequalities are graphed, and the graphs of quadratic functions are used to solve quadratic inequalities in one variable.

Primary Interdisciplinary Connections: *Science and Engineering*

21st-Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☐ Communication and Collaboration ☒ Media Literacy

Unit Rationale: Quadratic equations have many applications in science and the natural world.

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

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).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S.ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: A.APR; A.REI; N.CN; G.GPE

Content Statements: Understand the relationship between zeros and factors of polynomials; Solve equations and inequalities in one variable; Solve systems of equations; Perform arithmetic operations with complex numbers; Use complex numbers in polynomial identities and equations; Analyze functions using different representations;



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Translate between the geometric description and the equation for a conic section

CPI#:	Cumulative Progress Indicator (CPI):
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 $p(x)$.
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.
A.REI.B.4	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. 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 .
A.REI.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.
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.
N.CN.A.2	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
N.CN.C.7	Solve quadratic equations with real coefficients that have complex solutions.
F.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
G.GPE.A.2	(+) Derive the equation of a parabola given a focus and directrix.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can we solve quadratic equations?
- How can we graph quadratic functions and inequalities
- How can we use quadratic equations to solve real life situations?

Unit Enduring Understandings:

- There are four ways to solve quadratic equations
- Quadratic equations can be represented by graphs using technology



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- Quadratic equations can be used to solve real life situations such as falling objects

Unit Learning Targets:

Students will....

- Graph quadratic function
- Use quadratic functions and equations to solve real life problems
- Factor quadratic expressions and solve quadratic equations by factoring, finding square roots, completing the square and quadratic formula
- Find zeros of quadratic functions
- Solve quadratic equations with complex solutions
- Perform operations with complex numbers
- Use completing the square to write quadratic functions in vertex form
- Use the quadratic formula in real life situations
- Graph and solve quadratic inequalities in one and two variables
- Write quadratic functions given characteristics of their graphs
- Use technology to find quadratic models for data



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Evidence of Learning

Summative Assessment: Chapter Test (with differentiated levels)

Equipment Needed: Calculator, laptop, textbook

Teacher Resources: Calculator, laptop, textbook

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Solving Quadratic Equations with Complex Solutions	1 day
Lesson 2 Graphing Quadratic Functions	1 day
Lesson 3 Perform Operations with Complex Numbers	1 day

Teacher Notes:

Frequently break students into small groups to work on problem solving. During this time, meet with groups for mini-lessons and formative assessments.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>



Lesson Plan 1 Template

Content Area: Math Lesson Title: Solving Quadratic Equations with Complex Solutions
 Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Solve quadratic equations - Manipulate complex numbers	Lesson Sequence - The teacher gives students a Do Now: Solve $x^2 - 4 = 0$. - The teacher then changes the problem to $x^2 + 4 = 0$. - The teacher gives the students the identity $i^2 = -1$. - The teacher breaks students into small groups, and gives the students a discovery problem set. - Students discover the cyclic nature of raising i to a whole number power. - Students then extend to i raised to the zero or negative integer power.	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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7. Students then solve quadratic equations with complex solutions.
8. The teacher brings the students back as a class to discuss their findings. The teacher should ensure to ask the students what they notice about the number of solutions.
9. The students then multiply a complex number by its complex conjugate, and discuss the result.

Differentiation:

For enrichment, the teacher asks the students to graph complex numbers on the complex plane.

Resources Provided:

- Problem set
- Graphing calculators



Lesson Plan 2 Template

Content Area: Math Lesson Title: Graphing Quadratic Functions Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Graph quadratic functions	Lesson Sequence - The students graph quadratic functions using a chart. - The students then discuss any patterns they see. Students should recall graphing using the vertex and symmetry. - The teacher then asks the students to solve a quadratic equation. - The teacher then replaces zero in the factored version of the equation with an $f(x)$, and asks the students to graph the values when $f(x) = 0$. - The teacher then leads the students through discovering the focus and	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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directrix. The teacher asks the students how to graph using this information.

Differentiation:

Use quadratics with a coefficient of 1 vs quadratics with coefficients greater than 1. Students can use Desmos to graph solutions during the discovery.

Resources Provided:

- Problem set
- Calculators



Lesson Plan 3 Template

Content Area: Math Lesson Title: Perform Operations with Complex Numbers Time Frame: 1 day

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Geogebra

Equipment Needed:

Graphing calculator, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Perform operations with complex numbers	Lesson Sequence - The students will solve a quadratic equation with complex solutions. The students will multiply the two solutions together and discuss the results. - The students will graph the function and look for connections between the complex roots and the graph. - Students will then add, subtract, and multiply complex numbers. - Students will then plot complex numbers on the complex plane. - Students will then complete the Desmos activity introducing them	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure activity



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to the application of
imaginary numbers (e.g.,
circuits).

Differentiation:

For enrichment, students will be asked to divide complex numbers, keeping in mind you cannot have an imaginary part left in the denominator.

Resources Provided:

- Calculators



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly, Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher-order thinking and problem-solving skills	☒	☐	☐
Allow for student choice	☐	☒	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-Century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 10-11	Unit Title: Quadratic Functions
Created: 2024	Board Approved on:	



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

IEP AND 504 ACCOMMODATIONS AND MODIFICATIONS FOR EARLY CHILDHOOD AND ELEMENTARY SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
Review of directions
Use of mnemonics
Have student restate information
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Use of a study carrel
Assistance in maintaining uncluttered space
Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Use of manipulatives
No penalty for spelling errors or sloppy handwriting
Follow a routine/schedule
Alternate quiet and active time
Teach time management skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Adjusted assignment timelines
Visual daily schedule



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Untimed tests
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book tests
Read test and directions to student
Provide study outline prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator and/or number line for math tests
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS MODIFICATIONS:



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GLOBAL SKILLS**

Breaks between tasks
Cue expected behavior
Daily feedback to student
Have contingency plans
Use de-escalating strategies
Use positive reinforcement
Use proximity/touch control
Use peer supports and mentoring
Model expected behavior by adults
Have parent sign homework
Have parent sign behavior chart
Set and post class rules
Chart progress and maintain data



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GLOBAL SKILLS

IEP AND 504 ACCOMODATIONS AND MODIFICATIONS FOR MIDDLE AND HIGH SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
A locker with adapted lock
Review of directions
Review sessions
Use of mnemonics
Have student restate information
Provision of notes or outlines
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Weekly or bi-weekly home-school communication
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Lab and math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of tape recorder for lectures
Use of Interactive notebook
Use of a scribe
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Ability to type all assignments
Follow a routine/schedule
Teach time management and organizational skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Daily check-in with case manager or special education teacher
Adjusted assignment timelines
Visual daily schedule



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book or open-note tests
Read test and directions to student
Provide study guides prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Pace long-term projects
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Allow outlining, instead of writing for an essay or major project
Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator for math tests
Film or video supplements in place of reading text
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Pass/no pass option
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS FOR STUDENTS:

- Breaks between tasks
- Cue expected behavior
- Daily feedback to student
- Have contingency plans
- Use de-escalating strategies
- Use positive reinforcement
- Use proximity/touch control
- Use peer supports and mentoring
- Model expected behavior by adults
- Have parent sign homework
- Set and post class rules
- Chart progress and maintain data



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GLOBAL SKILLS

Accommodations and Modifications for ESL Students

- Give tests orally
- Give instructions/directions in writing and orally
- Assign a peer tutor, same language or English speaking
- Allow use of bilingual/translation dictionary
- Provide summaries of text or study guides of particular chapters
- Allow errors in speaking
- Allow errors in writing
- Accept writing in first language
- Highlight key vocabulary
- Reduce amount of work required
- Assess comprehension through demonstration or other alternative means (gestures, drawings)
- Rephrase questions, directions, and explanations
- Reduce multiple choices on assessments
- Provide study guides and/ or outlines
- Shorten reading assignments
- Allow extended time for test/project completion
- Use of audio books
- Use of graphic organizers
- Use reduced text, so that print is not dense
- Use visuals/pictures throughout lesson/unit/assignment
- Adapt homework to reflect language proficiency/home support
- Adapt homework to reflect home support
- Provide hands-on activities and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Use of translation dictionaries to locate words in the native language
- Use anecdotal records and portfolio of work as forms of assessment
- Use story retellings to assess comprehension

What Does the Gifted and Talented Experience Look Like? *Springfield Public Schools*

Mission Statement

The Gifted and Talented Program of the Springfield Public Schools aims to provide a meaningful and rigorous education that instills the value of lifelong learning and empowers all students to reach their full potential and become self-fulfilled creative leaders in accordance with the comprehensive standards of our state. We accomplish this by offering challenging, real-world experiences in a student-centered environment.

We recognize that students come from diverse socioeconomic, cultural, and ethnic backgrounds, and the mission of the gifted and talented program is to provide opportunities for students to explore their intellectual, creative, and artistic gifts and talents within the classroom and with beyond-the-classroom experiences. It is essential to provide diverse, appropriate, and ongoing learning experiences and environments that incorporate students' academic, psychological, and social needs. Our responsibility is to provide students with educational alternatives that teach, challenge, and expand their knowledge, while simultaneously stressing the development of independent and self-directed learners who continuously generate questions, analyze, synthesize, and evaluate information and ideas.

New Jersey Administrative Code 6A:8-3.1 defines students who are gifted and talented as those students who possess or demonstrate high levels of ability in one or more content areas when compared to their chronological peers in the local district and who require modification of their educational program if they are to achieve in accordance with their capabilities.

Goals:

To support our mission, we have established the following goals to guide our work:

- To infuse into the general education program a broad range of activities for high-level learning that will challenge all students to perform at advanced levels, and provide extended opportunities, resources, and support in particular areas where student interest or talent is demonstrated.
- To provide a continuum of gifted education services that will strengthen the total school program, offer enriching and challenging learning opportunities for all students, and provide specialized learning experiences
- To promote achievement of students' best potentials and increased ability.

Through a productive and collaborative relationship among the building principals, classroom teachers, and the Gifted and Talented teacher, our schools can create programming that will enhance the learning experience for every student and serve the unique and specialized needs of students currently demonstrating gifted behaviors.

Elements of the Schoolwide Enrichment Model, W.I.N (What I Need), differentiated instruction, advanced classes, or individual programs into a student's regular instruction program are integral to this overarching framework for gifted education in the Springfield School District.

Reference Board Policy and Regulation 2464 – Gifted and Talented Pupils (M)

Early Childhood Center **Edward V. Walton**

Schoolwide Virtual Enrichment

All first and second grade students have access to the [Gifted and Talented Virtual Classroom](#). This virtual classroom is a space for students to complete various challenges and enrichment opportunities at their own pace. Students can receive feedback and additional adaptable resources to meet their individual learning needs. The virtual classroom design expands accessibility to enrichment resources and allows students to choose learning activities according to their unique interests and abilities. The purpose of the activities is to encourage problem-solving, develop critical thinking

skills, and expand curiosity and imagination. Activities are aligned to the New Jersey Student Learning Standards.

Gifted and Talented Teacher as a Resource

The Gifted and Talented teacher serves as a resource to all teachers within Edward V. Walton School. Teachers seeking resources for their high-ability learners will receive additional support from the Gifted and Talented teacher in various ways. This support may include additional units of study, challenging resources, and student projects.

Elementary Schools **James Caldwell** **Thelma L. Sandmeier**

The goal is to engage small groups of students in intensive learning experiences through standards-based, rigorous, and relevant units of study that supplement, not supplant, the grade-level curriculum and support students' unique learning needs.

Enrichment Experience Grade 3

Beginning in third grade, the G&T teacher will cycle through all classrooms to work on problem-solving and enrichment tasks with students. Driven by assessment data, academic performance, student interest, and teacher observation, small groups of students will meet with the G&T teacher during W.I.N. (What I Need) periods throughout the week that the teacher is assigned to their classroom teacher. Groupings will be flexible and monitored to best meet each student's needs throughout the school year. Activities will include brain teasers, puzzles, strategic thinking, problem-solving, and STEM challenges.

Targeted Gifted and Talented Programing Grades 4-5

Students may become identified as Gifted and Talented in fourth grade. Students that are identified may receive support from the G&T Teacher for up to five periods (200 minutes) a week during W.I.N. (What I Need) periods. Identified students will meet to explore grade-level content while incorporating depth and complexity in a student-centered, problem-based environment. The Gifted and Talented Program aims to provide students with various advanced and challenging learning experiences across content areas to promote independent thinking skills, refine critical thinking and communication skills, cultivate joy in learning, and expand student interests through problem-solving. The instruction that students receive incorporates 21st Century Skills and advanced content that is challenging, hands-on, and relevant to the real world.

Strategies and Practices that Support Gifted and Talented Students

- Adjusted Pace of Lessons
- Inquiry-Based Instruction
- Higher-Order Thinking Activities
- Interest-Based Content
- Real World Problem Solving/Problem Based Learning
- Independent Study/Passion Projects
- Units of Study with Like-Minded Peers

Schoolwide Virtual Enrichment

All JCS and TLS students have access to grade level-specific [Gifted and Talented Virtual Classrooms](#). These virtual classrooms are a space for students to complete various challenges and enrichment opportunities at their own pace. Students are able to receive feedback and additional opportunities based on their needs. The virtual classrooms have expanded the accessibility of enrichment resources directly to the students and allows for students to choose opportunities according to their interests and abilities. The purpose of the activities is to encourage problem solving, develop critical thinking skills, and expand curiosity and imagination in conjunction with the New Jersey Student Learning Standards.

Gifted and Talented Teacher as a Resource

In addition to classroom support, the Gifted and Talented teacher also serves as a resource to all teachers in the building. Teachers that are seeking resources for their high ability learners will receive additional support from the Gifted and Talented teacher in various ways. This may include additional units of study, challenging resources, student projects, and meeting with the G&T teacher as needed.

Additional Enrichment Opportunities

Across all grade levels 3-5, as recommended by the classroom teacher, students exhibiting a need for additional enrichment may have the opportunity to meet with the G&T teacher as the schedule allows. Groupings will be flexible and monitored to best meet the students' needs throughout the school year. Activities will include, brain teasers, puzzles, strategic thinking activities, problem-solving challenges, and STEM challenges. Students engage in an extended process of asking questions, using resources, and developing answers that lead to thinking about what and how they are learning. Students are held accountable for how they work and use their time by demonstrating their learning through products or presentations.

Students self-select to participate in individual and/or group projects based on interest and commitment. The classroom teacher and/or the enrichment teacher will help guide and monitor student exploration of chosen topics, facilitating their learning with resources and teaching of needed skills.

Secondary Schools
Florence M. Gaudineer Middle School
Jonathan Dayton High School

Grades 6-12: Access to specific content programs with higher levels of academic challenges (i.e. Pre-Algebra, Accelerated Communication Arts, and Advanced Placement Classes)

Dual Credit Courses provide students the opportunity to obtain high school credit, and college credit, simultaneously through partnerships with several institutions.

Project Lead the Way (PLTW) students become builders of technology by engaging in real world activities. Students are empowered as design thinkers collaborating on real world projects.

Gifted and Talented Identification Criteria

The Springfield Schools Gifted and Talented Program recognizes that students require differentiated learning experiences beyond the core curriculum being taught because of their advanced abilities in one or more content areas. These students may also have other cognitive qualities such as curiosity, creativity, motivation, leadership, and passion that require modifications to their academic experience.

Multiple Measures of Eligibility

Kindergarten through grade twelve identification process for gifted and talented students includes multiple measures. Multiple measures may include but are not limited to: achievement test scores; grades; student performance or products; intelligence testing; parent, student, and/or teacher recommendation; and other appropriate measures. The identification methodology is developmentally appropriate, non-discriminatory, and related to the programs and services offered by the Springfield School District. The identification procedures are reviewed annually.

According to N.J.A.C. 6A:8-3.1, all public school districts must have a board-approved gifted and talented identification process and provide services for identified students enrolled in the grades of that school district. The regulations require that identification and services be made available to students in grades K-12.

When students are recommended for the Gifted and Talented Program there are multiple measures that are considered to determine if services are necessary and appropriate. The assessments used are as follows:

- Cognitive Abilities Test (CogAT)
- Classroom Performance/Student Portfolios
- DRA2 Level
- iReady Diagnostic Scores
- Gifted Indicators Checklist
- Start Strong/NJSLA Assessment Data

The N.J.A.C. requires that students be compared to their chronological peers in the local school district. The New Jersey Department of Education has not established state-level criteria for identifying students who are gifted, such as mandated tests or assessments, grade point averages, or IQ scores. Local school districts must use multiple measures to identify students.

Procedures

<https://www.straussesmay.com/seportal/Public/DistrictPolicy.aspx?policyid=2464&id=b8a33a9f505e4998a6db3fb8e1de778b>

Gifted and Talented Program Identification Matrix

Minimum Score Required for Consideration: 14 Points

1 Point	2 Points	3 Points
Cogat Assessment Overall Stanine Score of a 7	Cogat Assessment Overall Stanine Score of an 8	Cogat Assessment Overall Stanine Score of a 9
iReady Math Assessment Just Below Current Grade Level	iReady Math Assessment On Grade Level	iReady Math Assessment ½ Year + Above Current Level
iReady ELA On Grade Level	iReady ELA ½ Year Above Current Level	iReady ELA One Full Grade Level + Above Current Level
NJSLA Math Approaching Expectations	NJSLA Math Met Expectations	NJSLA Math Exceed Expectations
NJSLA ELA Approaching Expectations	NJSLA ELA Met Expectations	NJSLA ELA Exceed Expectations
HOPE Teacher Rating Scale Raw Score: 11 - 29	HOPE Teacher Rating Scale Raw Score: 30 - 49	HOPE Teacher Rating Scale Raw Score: 50-66

Team meetings present the opportunity to review data and assess the educational needs of all students. Teacher provides examples of student work exhibiting above and beyond grade level expectations, creativity, leadership, critical and abstract thinking. Programs for gifted and talented students will be periodically evaluated for their continuing efficacy and adjusted accordingly. The parent of any student identified as gifted or talented shall be consulted regarding any program designed to address the student's particular needs.

Resource Links

https://riversideinsights.com/cognitive_abilities_test

<https://www.curriculumassociates.com/programs/i-ready-learning>

<https://www.nj.gov/education/assessment/resources/>

<https://www.routledge.com/HOPE-Teacher-Rating-Scale-Involving-Teachers-in-Equitable-Identification/Gentry-Pereira-Peters-McIntosh-Fugate/p/book/9781618214522#:~:text=The%20HOPE%20Teacher%20Rating%20Scale,making%20it%20easy%20to%20use.>

Gifted and talented student: The “*[Strengthening Gifted and Talented Education Act](#)*” defines a gifted and talented student as a “student who possesses or demonstrates a high level of ability in one or more content areas when compared to their chronological peers in the school district and who require modifications of their educational program if they are to achieve in accordance with their capabilities.”

Twice-exceptional (2E) students: A twice-exceptional (2E) student is defined as “a student who is both gifted and a student with a disability. These students may also be referred to as having dual exceptionalities or as being gifted with learning disabilities (GT/LD). This also applies to students who are gifted with ADHD or gifted with autism” (New Jersey Association for Gifted Children, www.nagc.org).

Instructional adaptation: An adjustment or modification to instruction enabling a student who is gifted and talented to participate in, benefit from, and demonstrate knowledge and application of the New Jersey Student Learning Standards in one or more content areas at the instructional level of the student, not just the student's grade level.

Identifying gifted and talented students: The focus of identification is to provide programming and services in which students' specific learning needs and potential are appropriately addressed and met. In every New Jersey school district, there are students who require modifications to the general education curriculum if they are to achieve in accordance with their abilities. By identifying a student's general intellectual ability, creativity, or specific academic area aptitudes, we are acknowledging that they need programming and services outside of the general education/grade level curriculum to advance their learning.

NJDOE Fast Facts

<https://www.nj.gov/education/standards/gifted/>

<https://www.nj.gov/education/standards/gifted/legislation.shtml>

Supplemental Resources/Programming for Gifted Students

Edward V. Walton

- PETS Program – Primary Education Thinking Skills
- Group Solutions/Group Solutions 2 – Cooperative Logic Activities
- Lollipop Logic
- Beginning Thinking Skills
- AIMS Education Programming

James Caldwell and Thelma L. Sandmeier

Math/ELA

- Project M3: Mentoring Mathematical Minds
- Junior Great Books
- AIMS Education Programming
- Borenson Hands on Equations
- BizWorld
- Perplexors
- Advanced Math Explorations grade 3-5
- Challenging Units for Gifted Learners (ELA and Math)
- Creative Curriculum Extenders
- Differentiated Lessons & Projects
- Challenge Math Grades 4+
- Differentiating Instruction with Menus (All Content Areas)
- Jacob's Ladder
- Genius Hour/Passion Project
- Spatial Reasoning
- Logic Puzzles, Brain Games, Analogies

STEM

- Engineering is Elementary
- Engineer Throughout the Year
- PBS Design Squad
- DefinedSTEM
- Project Lead the Way (PLTW)

Enrichment Events

Experience for all students to be enriched through events related to the curricular or extracurricular activities. Examples include after school clubs, PTA-sponsored events, leadership opportunities, visual and performing arts, and community service opportunities.