



SPRINGFIELD PUBLIC SCHOOLS
ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Springfield Public Schools
Springfield, New Jersey 07081

Algebra I

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 August 26, 2024*



SPRINGFIELD PUBLIC SCHOOLS
ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Springfield Public Schools Springfield, New Jersey

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Unit Overview Template

Content Area: Math **Grade Level:** 7-9 **Unit Title:** Reasoning With Quantities and Equations

Unit Summary: This unit represents the framework for developing a strong Algebra foundation. Emphasis is on vocabulary, correct mathematical procedures, and applications of Algebra.

Primary Interdisciplinary Connections: *Science, Engineering*

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

Unit Rationale: This unit has strong applications in the sciences, business, and engineering.

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.CED; A.REI; N.Q; N.RN

Content Statements: Interpret the structure of expressions; 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; Reason quantitatively and use units to solve problems; Extend the properties of exponents to rational exponents

CPI#:	Cumulative Progress Indicator (CPI):
A.SSE.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P .
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 .
N.Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
N.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
N.Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
N.RN.A.3	Simplify radicals, including algebraic radicals (e.g. $\sqrt[3]{54} = 3\sqrt[3]{2}$, simplify $\sqrt{32x^3}$).
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.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
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.
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.

Unit Essential Questions:

- What is an algebraic equation?
- How do we solve equations?
- How do we solve inequalities?
- What is the meaning of the absolute value?

Unit Enduring Understandings:

- Using correct terminology in algebra.
- Solving multistep equations.
- Distinguish between the solution of an equation and inequality.
- Creating equations to solve problems.

Unit Learning Targets:

- Students will be able to create and solve multi-step equations.



- Climate Change Example: Students may use units to guide the solution of multi-step problems about how variations in the flow of energy into and out of the 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.
- 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.
- Climate Change Example: Students may, when reporting quantities related to how variations in the flow of energy into and out of the Earth's systems result in climate change, choose a level of accuracy appropriate to limitations on how quantities were measured.
- 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.

Evidence of Learning

Summative Assessment: 30 days

Equipment Needed: Mimio Software, smart-board, chalkboard or whiteboard.

Teacher Resources: Mimio Software, smart-board, chalkboard or whiteboard.

Formative Assessments:

Homework, Class discussions, Classwork, Quizzes, Exams



Lesson Plans	
Lesson	Time Frame
Lesson 1 Algebraic Expressions and Equations	1 day
Lesson 2 Solving One-step and Multi-step equations	2 days
Lesson 3 Solving Inequalities in One Variable	1 day
Teacher Notes: Break students into small groups to work on problem-solving. Meet with groups during this time for mini-lessons or formative assessments.	
Curriculum Development Resources/Technology Resources: https://tasks.illustrativemathematics.org/content-standards https://www.desmos.com/ https://nj.digitalitemlibrary.com/home https://resources.newmeridiancorp.org/released-items/ https://nj.mypearsonsupport.com/practice-tests/math/	



Lesson Plan 1 Template

Content Area: Math Lesson Title: Algebraic Expressions and 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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Understand and recognize the difference between an expression and an equation. - Simplify expressions to their most simple forms. - Evaluate expressions. - Evaluate expressions with powers.	Lesson Sequence - Define the terms "expression" and "equation" on the board. - Develop examples of expressions and examples of equations. - Discuss what the most simple form of an expression is. - Simplify expressions by combining like terms. - Using substitution, discuss how to evaluate an expression when a variable is assigned a value. - Discuss what an exponent is and how to calculate an exponent. - Evaluate expressions with exponents.	- Class Work - Class Discussion - Homework - Exam



Differentiation:

Utilize color in the presentation to highlight "like" terms.

Resources Provided:

Textbook

Online Textbook



Lesson Plan 2 Template

Content Area: Math Lesson Title: Solving one-step and multi-step 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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Be able to identify and use inverse operations. • Be able to solve one-step equations. • Be able to write one-step equations given a real-life situation.	Lesson Sequence • The teacher will have four or five different one-step equations projected on the board when the students arrive to class. • The class will discuss inverse operations. • The class will use inverse operations to isolate the variable in the examples on the board. • Students will then complete a problem set with a partner consisting of additional one-step equations. After the students are finished with the problem set, the class will go over the answers and discuss any differences in answers.	• Student participation in class discussion • Students will complete sample problems under teacher observation. • Students will complete the problems created by the teacher and by their peers. • Students will complete a homework assignment, which will be graded the following day.



- Solve for homework.
- With the remaining five minutes, students will create their own one-step equations to present to their peers.

Differentiation:

If there are any students in the room who have already mastered solving one-step equations, a problem set of real-life word problems will be given to those students. They should write the equation that each situation models and then solve the equation. For any students having extreme difficulty, a review of addition and subtraction could help with the understanding of inverse operations. Utilize small group meetings to facilitate mini-lessons. Provide scaffolded examples.

Resources Provided:

Textbook



Lesson Plan 3 Template

Content Area: Math Lesson Title: Solving inequalities in one variable 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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Solve inequalities with one variable. - Graph inequalities with one variable.	Lesson Sequence - The teacher will show an inequality with one variable on the board to the class. - Students will volunteer their ideas on how to isolate the variable. - The class will examine the similarities between solving an inequality and solving an equation. - Each student will be given an index card containing a specific number. Students will open a teacher-created Google Document with a number line on it which should be projected on the board. Each student will place an "x" on the	- Student participation in class discussion - Students will complete sample problems under teacher observation. - Class discussion of shading a number line. - Students will complete an exit card, which will be returned the following day. - Students will complete a homework assignment, which will be graded the following day.



number line if their given number IS a solution to the inequality that was just solved on the board.

- After each student has made their entry on the Google Document, the class will discuss the proper shading of a number line.
- The class will solve additional inequalities as a class together.
- Students will complete an exit card with three inequalities.
- If time permits, students will begin practice problems from the textbook.

Differentiation:

For advanced students, the homework given should involve inequalities that involve multiple steps to solve. For students who are struggling, the homework given should be to either solve the inequality OR to graph a number line of an inequality that is already solved.

Resources Provided:

Projector
Textbook



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 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: 7, 8, 9	Unit Title: Reasoning With Quantities and Equations
Created: 2024	Board Approved on:	Type Here



Unit Overview Template

Content Area: Math **Grade Level:** 7-9 **Unit Title:** Linear Relationships

Unit Summary: This unit focuses on linear relationships. Specifically, writing and graphing linear equations and inequalities as individual components as well as a system of components. Various approaches will be considered.

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: This unit has strong applications in the sciences, business, and engineering.

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.REI; F.IF; F.BF; F.LE

Content Statements: Solve equations and inequalities in one variable; Solve systems of equations; Represent and solve equations and inequalities graphically; 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; Build new functions from existing functions; Construct and compare linear and exponential models and solve problems; Build a function that models a relationship between two quantities; Interpret expressions for functions in terms of the situation they model

CPI#:	Cumulative Progress Indicator (CPI):
A.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
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.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.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 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.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
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. 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 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.
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 $y = (1.02)^t$, $y = (.97)^t$, $y = (1.01)^{12t}$, $y = (1.01)^{\frac{t}{10}}$, and classify them as representing exponential growth or decay.
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.
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.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.LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
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.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
F.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.
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.
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.

Unit Essential Questions:

- How do we graph a linear equation?
- How do we write a linear equation?
- How do we solve a system of equations?
- How do we graph a system of inequalities?

Unit Enduring Understandings:

- Graphing a linear equation.
- Writing a linear equation.
- Solving a system of linear equations.
- Graphing a system of inequalities.

Unit Learning Targets:

- Students will be able to write, graph, and solve systems of equations and inequalities
- 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 relate the domain of a function $c(m)$ representing the amount of carbon dioxide produced by burning m molecules of ethane (gasoline), to its graph in order to determine the appropriate domain for $c(m)$.
- 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: 30 days

Equipment Needed: Mimio Software, smart-board, chalkboard or whiteboard.

Teacher Resources: Mimio Software, smart-board, chalkboard or whiteboard.

Formative Assessments:

Homework

Class discussions

Classwork

Quizzes

Exams



Lesson Plans

Lesson	Time Frame
Lesson 1 Graphing a Linear Equation	2 days
Lesson 2 Graphing Systems of Linear Equations	2 days
Lesson 3 Solving a System of Equations Algebraically	3-4 days

Teacher Notes:

Break students into small groups to work on problem-solving. Meet with groups during this time for mini-lessons or formative assessments.

Curriculum Development Resources/Technology Resources:

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

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

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

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

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



Lesson Plan 1 Template

Content Area: Math Lesson Title: Graphing Systems 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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Will be able to graph a system of linear equations. - Will be able to find the point of intersection.	Lesson Sequence - Do Now: Graph a line in $y=mx+b$ form. - SW put the answer to Do Now on board. - SW graph and label another line on the same set of axes. - SW find and label the intersection. - SW practice with additional examples. - SW check solutions on TI-Nspire or TI-84 PLUS CE. - Exit Card: find a solution to a system of 2 equations.	- Answers to Do Now - Guided practice - Exit Card
Differentiation: Use of the TI-Nspire;, TI-84 PLUS CE SW practice with equations written at different levels of difficulty.		



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Resources Provided:
Graph Paper, Textbook



Lesson Plan 2 Template

Content Area: Math Lesson Title: Solving a System of Equations Algebraically Time Frame: 2 days

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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Will be able to solve a system of equations using substitution. - Will be able to solve a system of equations using elimination.	Lesson Sequence - Do Now: Solve for x and y. - Discuss now. Why can't we solve it? - TW model substitution. - SW practice with additional examples. - TW model elimination. - SW practice with additional examples. - SW practice with 3 levels of difficulty on substitution and elimination. - Check answers on the problem set by graphing on the calculator and finding the point of intersection.	- Do Now discussion - Problem Set – mixed practice



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Differentiation:

A problem set with 3 levels of difficulty; calculator help.

Resources Provided:

Textbook



Lesson Plan 3 Template

Content Area: Math Lesson Title: Graphing 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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Will be able to use the slope-intercept form of a linear equation to graph linear equations. - Will be able to use the standard form of a linear equation to graph a linear equation.	Lesson Sequence - Start the lesson with the “Investigate Slope and y-intercept” activity. - Ask students how to graph equations in slope-intercept form. - Review Examples 1 and 2. - Define the standard form of a linear equation. - Ask students to discuss how to graph equations in standard form. - Review Example 3. - Ask students how to graph horizontal and vertical lines. - Review Example 4. - Students will be asked to work in pairs on a problem set.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding. - Talk to each pair during the process or after they finish to assess understanding. - Have students present solutions to problems. - Collect the problem set to assess mastery.



- Students then show their work to the partners and discuss the results.

Differentiation:

Students learn that $y=0$ at the point where the graph of a linear equation crosses the x-axis. I will point out that, for similar reasons, $x=0$ where the graph crosses the y-axis. For the given reasons, students can easily find these points and use them to draw the graph of the equation. I will encourage students to use their knowledge of opposites when graphing with slope. For example, 2 units down and 3 units right is equivalent to 2 units up and 3 left.

Resources Provided:

Problem set
Graph paper
Textbook,
Graphing calculators



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 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: 7, 8, 9	Unit Title: Linear Relationships
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level:** 7-9 **Unit Title:** Expressions and Equations

Unit Summary: This unit emphasizes one of the most important concepts in Algebra and future mathematics courses: factoring. Familiarization with polynomial work is done beforehand and the solution of quadratic equations is explored afterward.

Primary Interdisciplinary Connections: *Science and Engineering*

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

Unit Rationale: This unit has applications in the sciences, business, and engineering.

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.SSE; A.APR; A.REI

Content Statements: Interpret the structure of expressions; Write expressions in equivalent forms to solve problems; Perform arithmetic operations on polynomials; Understand the relationship between zeros and factors of polynomials; Use polynomial identities to solve problems; Solve systems of equations.

CPI#:	Cumulative Progress Indicator (CPI):
A.SSE.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.



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.SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. For example the expression $1.15t$ can be rewritten as $(1.151/12)^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.
A.APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
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.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.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 $x^2 + y^2 = 3$.
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.
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.

Unit Essential Questions:

- How do we perform operations with polynomials?
- How do we factor polynomials?
- How do we solve quadratic equations?
- How do we solve a linear/quadratic system of equations?

Unit Enduring Understandings:

- Operations with polynomials.
- Factoring polynomials.
- Solving quadratic equations.
- Solving a linear/quadratic system of equations.

Unit Learning Targets:

Students will be able to solve quadratic equations as well as solve a linear quadratic system.



Evidence of Learning

Summative Assessment: 40 days

Equipment Needed: Mimio Software, smart-board, chalkboard or whiteboard.

Teacher Resources: Mimio Software, smart-board, chalkboard or whiteboard.

Formative Assessments:

Homework

Class discussions

Classwork

Quizzes

Exams



Lesson Plans

Lesson	Time Frame
Lesson 1 Operations with Polynomials	8 days
Lesson 2 Factoring Polynomials	10 days
Lesson 3 Solving a Linear/Quadratic System of Equations	3 days

Teacher Notes:

Break students into small groups to work on problem-solving. Meet with groups during this time for mini-lessons or formative assessments.

Curriculum Development Resources/Technology Resources:

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

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

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

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

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

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



Lesson Plan 1 Template

Content Area: Math Lesson Title: Operations with Polynomials Time Frame: 8 days

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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Will understand what a polynomial is. - Will compute polynomial addition and subtraction. - Will compute polynomial multiplication. - Will understand the FOIL method of multiplying polynomials. - Will combine like terms.	Lesson Sequence - Define a polynomial starting with the binomial. Why is it called a binomial? - Have students give examples of binomials. - Model real-life expressions with binomials. - Add binomials together by combining like terms. - Multiply binomials by constants. - Multiply binomials by x. What happens? - Multiply binomials by x and add to other binomials. - Multiply binomials together.	- Class discussion - Quizzes - Pop Quizzes - Homework - Exam



- Discuss the FOIL method to organize multiplying binomials

Differentiation:

Have small groups of students use algebra tiles to combine like terms. YouTube videos to help reinforce the lesson.

Resources Provided:

Problem Set
Textbook
YouTube videos
Online notes



Lesson Plan 2 Template

Content Area: Math Lesson Title: Factoring Polynomials Time Frame: 10 days

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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Will recall operations with polynomials. - Will recall what factors of numbers are. - Will factor scalars from polynomials. - Will factor polynomials into two binomials.	Lesson Sequence - Review polynomial operations. - Review how to get factors of numbers as the product of two other numbers. - Factor the same constant out of a set of numbers. - Factor the same constant out of a set of binomials. - Factor variables out of binomials. - Factor a constant and a variable from binomials. - Factor constants out of trinomials. - Multiply binomials. - Work backward to factor trinomials. - Practice factoring trinomials.	- Class discussion - Quizzes - Pop Quizzes - Homework - Exam



- Work through cases where the binomials are the same, and the difference of perfect squares.
- Practice factoring special cases.
- Factor trinomials and use a computer graphing system to plot them. What do you notice?

Differentiation:

Algebra tiles. YouTube factoring videos.

Resources Provided:

Textbook

Online notes

Problem Set

YouTube videos



Lesson Plan 3 Template

Content Area: Math Lesson Title: Solving a Linear/Quadratic System of Equations Time Frame: 3 days

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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Solve a linear-quadratic system of equations by graphing. - Use a system of equations to model real-life situations.	Lesson Sequence - Lesson opener: review systems of equations and what a solution to a system looks like. Review graphing quadratic equations. - Introduce linear-quadratic systems of equations and discuss what a solution might look like (how many solutions there could be). - Guided practice problems: 1. Check the given point(s) is a solution; 2. Graph and check (3 problems); 3. Multi-step word problems.	- Participation in lesson opener and review of graphing quadratic equations - Observe students as they complete the guided practice problems. - Student accuracy of closure activity (whiteboard activity).



- Closure activity:
Whiteboard activity – graph and solve a linear-quadratic system of equations. Students will each use an individual whiteboard and hold up their answers once they have graphed and solved the system.

Differentiation:

Varied levels of questioning and group/partner work.

Resources Provided:

Graphing calculators
Graphing programs
Graph paper
Algebra 1 Textbook
Problem Set



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 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: 7, 8, 9	Unit Title: Expressions and Equations
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level:** 7-9 **Unit Title:** Arithmetic with Rational Expressions

Unit Summary: This unit consists of topics preparing for problems with algebraic fractions, the various types of exponents, and work with more complex equations which include rational and radical expressions.

Primary Interdisciplinary Connections: *Science and Engineering*

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

Unit Rationale: This unit has applications in the sciences, business, and engineering.

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: N.RN; A.APR

Content Statements: Extend the properties of exponents to rational exponents

CPI#:	Cumulative Progress Indicator (CPI):
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.
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.APR.D.7	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
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.
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.
Unit Essential Questions: • How do we perform operations with algebraic fractions? • What are the laws of exponents? What is meant by fractional, zero, and negative exponents? • How do we solve fractional equations? • How do we solve radical equations?	
Unit Enduring Understandings: • Operations with algebraic fractions. • Laws of exponents. • Solving fractional equations. • Solving radical equations.	
Unit Learning Targets: Students will be able to solve fractional and radical equations.	



Evidence of Learning

Summative Assessment: 40 days

Equipment Needed: Mimio Software, smart-board, chalkboard or whiteboard.

Teacher Resources: Mimio Software, smart-board, chalkboard or whiteboard.

Formative Assessments:

Homework

Class discussions

Classwork

Quizzes

Exams



Lesson Plans

Lesson	Time Frame
Lesson 1 Zero, Negative, and Fractional Exponents	2 days
Lesson 2 Solving Radical Equations	2 days
Lesson 3 Multiplying and Dividing Algebraic Fractions	2 days

Teacher Notes:

Break students into small groups to work on problem-solving. Meet with groups during this time for mini-lessons or formative assessments.

Curriculum Development Resources/Technology Resources:

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

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

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

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

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

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



Lesson Plan 1 Template

Content Area: Math Lesson Title: Zero, Negative, and Fractional Exponents Time Frame: 2 days

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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Will be able to understand and apply the concept that any number raised to the 0 power is equal to 1. - Will be able to connect and apply the relationship between negative exponents and fractional quantities. - Will be able to connect and apply the relationship between fractional exponents and radical expressions.	Lesson Sequence - The teacher will write the number “2” to various powers and ask students to come to the board to evaluate the expressions. - The teacher will then guide the students to recognize the value of the expression as the power increases. - Students will then be asked to recognize what happens to the value of the expression as the powers decrease. - Students will follow the pattern and recognize that 2 to the 0th power equals 1. - This rule will then be generalized to be valid for	- Students will participate in the discussion and provide suggested solutions. - Students will complete sample problems under teacher observation. - Students will answer teacher questions and questions from other students that have been redirected by the teacher. - Students will complete homework assignments to demonstrate mastery of the topics discussed.



any number when raised to the zero power.

- A similar pattern will be used to develop negative exponents.
- Students will be asked to recall the addition rule for exponential expressions with bases. The teacher will then present the product of two to the one half power with itself. This will provide the development of fractional exponents.
- Various types of fractional exponents would then be considered.

Differentiation:

Students with differing abilities can be given more simplistic or challenging in-class or homework problems related to this topic.

Resources provided:

Calculator
Textbook and problem set



Lesson Plan 2 Template

Content Area: Math Lesson Title: Solving Radical Equations Time Frame: 2 days

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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Solve radical equations involving radicals on one side of the equation. - Solve radical equations involving radicals (but no additional terms) on both sides of the equation. - Verify their solutions algebraically and using technology. - Identify extraneous solutions to radical equations.	Lesson Sequence - The teacher will provide students with a basic radical equation with a radical on one side of the equation. - Students will suggest strategies for solving the problem until a solution is found. - The teacher will demonstrate the use of both Grapher for the Mac and TI graphing calculators to verify the solution. - Students will be asked to solve a small (3 problems) problem set either in pairs or individually, as they are	- Students will complete two in-class problem sets. - The teacher will observe student work. - Students will present and explain solutions. - Students will complete the homework assignments.



comfortable. The teacher will circulate the room assisting and encouraging students when needed.

- Students will share their solutions with the class.
- Steps 1-4 should be repeated with an equation that involves radical expressions on both sides of the equals sign.

Differentiation:

Students with differing abilities can be given more simplistic or challenging in-class or homework problems related to radical equations. Students will be able to work individually or in pairs, whichever best suits their learning style.

Resources Provided:

Calculators
Textbook and problem sets



Lesson Plan 3 Template

Content Area: Math Lesson Title: Multiplying and Dividing Algebraic Fractions Time Frame: 2 days

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:

Smart-board, Desmos, graphing calculators

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Multiply Fractions. • Divide Fractions. • Simplify Fractions.	Lesson Sequence • Discuss different algebra operations performed on fractions. • Discuss when multiplying fractions, multiply numerators for the answer's numerator and then multiply denominators for the answer's denominator. • Develop the definition of division as multiplying the reciprocal. • Discuss when dividing fractions, multiply the first fraction by the reciprocal of the second fraction. Have students think "keep, change, flip" keep the first fraction the same, change the	• Students will participate in the discussion and provide suggested solutions. • Students will complete sample problems under teacher observation. • Students will answer teacher questions and questions from other students that the teacher has redirected. • Students will complete a homework assignment to demonstrate mastery of the topics discussed.



operation from division to multiplication, and flip the second fraction. Then, multiply the fractions.

- In both multiplication and division, all answers must be in the most simple form.
- To be in the simplest form, find the GCF (Greatest Common Factor) of the numerator and the denominator and divide it out of the numerator and denominator.

Differentiation:

Utilize color in presentation to differentiate between numerators and denominators; exit slips.

Resources Provided:

Textbook
Online Textbook



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 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: 7, 8, 9	Unit Title: Arithmetic with Rational Expressions
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level:** 7-9 **Unit Title:** Statistics

Unit Summary: This unit focuses on extending students' knowledge of dot plots, box plots, and histograms. Students use the standard deviation to compare a specific value to other values. Students analyze joint, marginal, and relative frequencies. Students interpret data displays and create inferences based on the 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: This unit has applications in the sciences, business, and engineering.

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: S.ID

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; Interpret linear models

CPI#:	Cumulative Progress Indicator (CPI):
S.ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
S.ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
S.ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).



S.ID.B.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
S.ID.B.6	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. b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology. c. Fit a linear function for a scatter plot that suggests a linear association.
S.ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
S.ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
S.ID.C.9	Distinguish between correlation and causation.
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.
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.

Unit Essential Questions:

- How do you decide which data display represents the data most clearly?
- How does sample size affect the inferences that can be made about a population?
- What is the relationship between statistical measures and real-world implications?
- How does a box plot represent the IQR?
- What do you notice about the shape of the data displayed in a histogram and the statistical measures?
- How are the calculations of relative frequencies of rows interpreted different from the relative frequencies of columns?
- What observations can you make about the relationship between the shapes of data displays?

Unit Enduring Understandings:

- Represent data using dot plots, box plots, and histograms.
- Interpret a data set displayed in dot plots, box plots, and histograms within the context it represents.
- Use measures of center to interpret and compare data sets displayed in dot plots, box plots, and histograms.
- Use measures of variability, such as the MAD (Median Absolute Distribution) and IQR (Interquartile Range), to interpret and compare data sets.
- Interpret and compare differences in the shape, center, and spread of different data sets.
- Determine the relationship between the mean and median of a data set when the shape of the data display is evenly spread, skewed right, or skewed left.



Unit Learning Targets:

- Students will be able to apply statistical analysis to data sets and make significant conclusions about the data.
- Climate Change Example: Students may represent geoscience data, with plots on the real number line, as they analyze results from global climate models.
- 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.



Evidence of Learning

Summative Assessment: 20 days

Equipment Needed: Mimio Software, smart-board, chalkboard or whiteboard.

Teacher Resources: Mimio Software, smart-board, chalkboard or whiteboard.

Formative Assessments:

Homework

Class discussions

Classwork

Quizzes

Exams



Lesson Plans

Lesson	Time Frame
Lesson 1 Analyzing Data Displays	1 day
Lesson 2 Comparing Data Sets	1 day
Lesson 3 Interpreting the Shapes of Data Displays	1 day

Teacher Notes:

Break students into small groups to work on problem-solving. Meet with groups during this time for mini-lessons or formative assessments.

Curriculum Development Resources/Technology Resources:

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

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

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

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

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

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



Lesson Plan 1 Template

Content Area: Math Lesson Title: Analyzing Data Displays 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:

Smart-board, Desmos, graphing calculators, Google Sheets

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Represent data using dot plots, box plots, and histograms. - Interpret a data set displayed in dot plots, box plots, and histograms within the context it represents.	Lesson Sequence - Present the class with the data set on car mileage from the textbook. - Student groups should discuss how to represent the data using prior knowledge. - Ask student groups to come to the board to draw their representations, then have the whole class briefly discuss each. - Utilize a dot plot to represent the data set. Discuss its strengths. - Present the class with a second data set on marketing information from the textbook. Ask students to discuss it like	- Students will participate in the discussion and provide suggested solutions. - Students will complete sample problems under teacher observation. - Students will answer teacher questions and questions from other students that have been redirected by the teacher. - Students will complete homework assignments to demonstrate mastery of the topics discussed.



before, then hold a class
discussion on histograms.

Differentiation:

Have students make a frequency table using two different intervals for organizing the data shown.
Ask: How do you decide which intervals to try?

Resources provided:

Textbook and data set



Lesson Plan 2 Template

Content Area: Math Lesson Title: Comparing Data Sets 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:

Smart-board, Desmos, graphing calculators, Google Sheets

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Use measures of center to interpret and compare data sets displayed in dot plots, box plots, and histograms. - Use measures of variability, such as the MAD (Median Absolute Distribution) and IQR (Interquartile Range), to interpret and compare data sets.	Lesson Sequence - Have students critique and explain the prices of paintings data set from the textbook. Ask students to first pair-share, then discuss as a whole class. - Discuss statistical comparisons. Discuss how data sets can be compared using displays and calculations that describe attributes of the data, such as the spread and center. - Students will calculate the mean and MAD from a dot plot, then analyze if the data supports the	- Students will analyze two in-class data sets. - The teacher will observe student work. - Students will present and explain solutions. - Students will complete the homework assignments.



	concerns from the example. • Ask students to calculate the mean and MAD without using an outlier to see that it does not significantly change the results.	
Differentiation: Utilize additional data sets to either further expand on concepts or to help reinforce concepts depending on the needs of the students.		
Resources Provided: Calculators and Google Sheets Textbook and problem sets		



Lesson Plan 3 Template

Content Area: Math Lesson Title: Interpreting the Shapes of Data Displays 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:

Smart-board, Desmos, graphing calculators, Google Sheets

Equipment Needed:

Chalkboard/whiteboard, smart-board, graphing calculators, and laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Interpret and compare differences in the shape, center, and spread of different data sets. - Determine the relationship between the mean and median of a data set when the shape of the data display is evenly spread, skewed right, or skewed left.	Lesson Sequence - Students will access prior knowledge and calculate the median and mode of a data set on the current weather forecast. Ask: which is the most accurate measure of center to describe the data? - Discuss: What do the mean and median tell you about data? What about the mode? - Introduce how to interpret and compare histograms by asking students in small groups to analyze two example data sets from the textbook.	- Students will analyze two in-class data sets. - The teacher will observe student work. - Students will present and explain solutions. - Students will complete the homework assignments.



- Ask students to then analyze skewed data sets. Discuss how the mean and median can change or not be affected by skewed data.

Differentiation:

Students having difficulty seeing skewed graphs may need additional time working with data sets. Plan to meet with small groups of struggling students based on formative assessments.

Resources Provided:

Textbook
Online Textbook



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 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: 7, 8, 9	Unit Title: Statistics
Created: 2024	Board Approved on:	



SPRINGFIELD PUBLIC SCHOOLS

**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



SPRINGFIELD PUBLIC SCHOOLS

**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:



SPRINGFIELD PUBLIC SCHOOLS

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



SPRINGFIELD PUBLIC SCHOOLS

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
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



SPRINGFIELD PUBLIC SCHOOLS

**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



SPRINGFIELD PUBLIC SCHOOLS

**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



SPRINGFIELD PUBLIC SCHOOLS

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
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.