



Springfield Public Schools
Springfield, New Jersey 07081

Mathematics Strategies

Curriculum Guide

2025

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

*Springfield Board of Education
Approved December 15, 2025*

Springfield Public Schools

Cultivating compassionate and extraordinary learners!

EXTRACT OF THE MINUTES OF A MEETING OF
THE BOARD OF EDUCATION OF
THE TOWNSHIP OF SPRINGFIELD
COUNTY OF UNION, NEW JERSEY
AS RECORDED IN THE OFFICIAL MINUTE BOOK

Resolution: 15
Introduced By: Mrs. Turnbull
Seconded By: Mrs. Murphy
Adopted: December 15, 2025

Curriculum Adoption

To approve the following new and revised curriculum:

1. Middle School Level
 - a. Financial Literacy
2. High School
 - a. AP Calculus BC
 - b. AP Statistics - *New*
 - c. Mathematics Strategies - *New*
 - d. English and Language Arts Strategies

I, Michelle Calas, School Business Administrator/ Board Secretary of the Springfield Board of Education, hereby certify that the extract from the minutes of a meeting of the Board of Education duly called and held on December 15, 2025 has been compared by me with the original minute book of said Board of Education, and is a true, complete and exact copy thereof, as far as the same relates to the subject matter to on said extract.

In WITNESS THEREOF, I have hereunto set my hand and seal of the Springfield Board of Education, this 16th day of December 2025.

SEAL



Michelle Calas
School Business Administrator/ Board Secretary



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

**Springfield Public Schools
Springfield, New Jersey**

**Dr. Rachel Goldberg
Superintendent of Schools**

**Erica Scudero
Assistant Superintendent**

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Dr. Norman Francis ~ Principal of Jonathan Dayton High School

Gregory Salmon ~ District STEM Supervisor

Mary Ellen Powers ~ Math Teacher



Introduction

This template is the product of an initiative led by the New Jersey Department of Education, Office of Academic Standards, in partnership with the New Jersey Association for Supervision and Curriculum Development (NJASCD) and the New Jersey Principals and Supervisors Association (NJPSA). The project was undertaken with the assistance of New Jersey content area supervisors, curriculum coordinators, and teachers during spring-summer 2009. The goal of the project was to design exemplar unit plans and accompanying lesson plans aligned with the New Jersey Student Learning Standards that may be used by districts as models for the development of local curricula.

The Unit Overview Template, which follows, is a tool that can help districts define one unit plan or several that comprise a specific course in the curriculum for any content area. It is designed, once completed, to summarize the content and objectives for the unit, outline lessons and assessments that support the unit, and provide links to documents that facilitate delivery of the unit, such as student materials, background information, resources, and performance rubrics. To see how the units fit together in the design of a course, see the Curriculum Design Template included at the end of this document.

Seven content area Unit Overviews were created as part of the project to serve as exemplar unit plans that are aligned with the New Jersey Student Learning Standards and that assist in achieving the goal of engaging students, fostering achievement, and cultivating 21st-century global skills. The units stress the integration of 21st-century themes and skills, global perspectives, technology, and cross-curricular connections.

We encourage districts to use the exemplars in conjunction with the curriculum development tools and templates that emanated from this project as models for teaching and learning based on the New Jersey Student Learning Standards.



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Numerical Operations

Unit Summary: This unit focuses on strengthening students' fluency with integers, rational numbers, and the order of operations. Students review foundational numerical skills and explore addition, subtraction, multiplication, and division of both positive and negative numbers, as well as operations with fractions and decimals. Lessons emphasize recognizing common errors, applying rules systematically, and checking the reasonableness of answers. Students work through targeted group instruction, math centers, and vertical learning activities to reinforce accuracy and fluency, while also engaging in problem-solving tasks that require multi-step operations.

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 will equip students with foundational knowledge and practical skills to apply to solving applications of number systems and numerical operations.

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: Mathematics

Content Statements: N, A, F, G, S

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

N-Q.A Reason quantitatively and use units to solve problems.



N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-RN.B	Use properties of rational and irrational numbers.
A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
A-SSE.B	Write expressions in equivalent forms to solve problems.
A-APR.C	Use polynomial identities to solve problems.
A-CED.A	Create equations that describe numbers or relationships.
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, as well as 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.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V=IR$ to highlight resistance R .
A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning.
A-REI.B	Solve equations and inequalities in one variable.
A-REI.C	Solve systems of equations.
A-REI.D	Represent and solve equations and inequalities graphically.
F-IF.A	Understand the concept of a function and use function notation.
F-IF.B	Interpret functions that arise in applications in terms of the context.
F-BF.B.4	Find inverse functions.
G-CO.A	Experiment with transformations in the plane
G-CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
G-CO.B	Understand congruence in terms of rigid motions
G-SRT.C	Define trigonometric ratios and solve problems involving right triangles
G-GMD.A	Explain volume formulas and use them to solve problems
G-MG.A	Apply geometric concepts in modeling situations
S-ID.A	Summarize, represent, and interpret data on a single count or measurement variable
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.C	Interpret linear models



S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
S-CP.A	Understand independence and conditional probability and use them to interpret data
S-MD.B	Use probability to evaluate outcomes of decisions
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How do different number systems relate to one another?
- Why is the order of operations important when solving numerical expressions?
- How do integers, fractions, and decimals interact in computations?
- How can estimation help check the reasonableness of a solution?
- When is it important to apply different strategies for addition, subtraction, multiplication, and division?
- How do sign rules affect operations with negative numbers?
- What patterns can we identify when performing operations on rational numbers?

Unit Enduring Understandings:

- Numbers can be represented in multiple forms, each with specific properties.
- The order of operations is essential for obtaining consistent results.
- Operations with integers and rational numbers follow predictable rules that can be modeled visually or numerically.
- Estimation is a valuable tool for verifying answers and improving computational reasoning.
- Understanding the properties of operations strengthens problem-solving and critical thinking skills.
- Errors often reveal misconceptions about fundamental operations and number relationships.

Unit Learning Targets:

Students will fluently perform operations with integers, fractions, decimals, and rational numbers and apply the order of operations in multi-step problems. Students will analyze and justify computational strategies to solve real-world problems with accuracy and efficiency.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculator, iPads

Teacher: Calculator, iPad or laptop

Resources:

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Numerical Operations	3 hours/days
Lesson 2 Ratios	3 hours/days
Lesson 3 Proportions	3 hours/days

Teacher Notes:

This unit provides students with a strong foundation in number systems and operations, ensuring they are prepared for problem solving in all future units. Emphasize real-world applications and mental math strategies.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Numerical Operations Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads, Google Sheets, Google Docs

Equipment Needed: Calculators, iPads, textbook, Google Sheets, Google Docs

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - accurately use numerical operations - use properties of exponents	Lesson Sequence - Homework check and brief review of previously practiced numerical skills, including a warm-up question such as "Evaluate $-8 \div 2$" or "Which operation should you use first in $3 + 5 \times 2$?" - The teacher models several example problems involving integer and rational number operations, such as "Simplify $-12 + 7$" and "Evaluate 4.5×0.2," while thinking aloud about sign rules and place value. - Class discusses common error patterns, such as sign confusion and missing steps in order of	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- operations, and students reflect on why mistakes happen.
4. Students rotate through math centers focusing on specific skills: integer operations, rational multiplication/division, and order of operations practice with mini-tasks.
 5. The teacher meets with a small targeted group to model strategies using number lines and visual fraction/decimal models for students who need extra support.
 6. Student groups work at vertical whiteboards to solve multi-step problems such as "Evaluate $3 - 2(-4 + 1)$ " and compare approaches across groups.
 7. Students complete a short independent practice to reinforce accuracy and fluency using mixed-operation problems.
 8. Class reviews one or two challenging items together, discussing multiple solution paths and how to check answers for reasonableness.
 9. Closure activity asking students to write one sentence describing how they decide which operation to use first when evaluating expressions.



Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template		
Content Area: Mathematics	Lesson Title: Ratios	Time Frame: 3 hours/days
Lesson Components		
<u>21st Century Themes</u> ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☒ Civic Literacy ☐ Health Literacy		
<u>21st Century Skills</u> ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy		
Interdisciplinary Connections: Science		
Integration of Technology: Calculators, laptops, or pads		
Equipment Needed: Calculators, iPads		

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • use ratios • simplify ratios • solve equations with ratios • solve applications with ratios	Lesson Sequence 1. Homework check reviewing basic ratio identification, using questions such as "Write the ratio of red tiles to blue tiles if a pattern has 3 red and 5 blue." 2. The teacher introduces ratio language using visuals (e.g., colored counters or images), modeling statements like "The ratio of cats to dogs is 2 to 3," and rewriting them in fraction and colon form. 3. Class practices generating equivalent ratios with a prompt such as "If the ratio is 4:6,	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



- what does that tell us about the relationship, and how do we find another equivalent ratio?"
4. Students rotate through math centers: one center simplifying ratios, one center using ratio tables, and one center interpreting real-life ratio scenarios such as recipes or maps.
 5. Targeted small-group instruction focuses on students who struggle with distinguishing part-to-part vs. part-to-whole ratios, using guided examples from visuals and tables.
 6. Pairs work at vertical whiteboards to compare ratios, solving prompts like "Is 6:9 equivalent to 2:3? Show your reasoning."
 7. Students complete an independent mini-practice converting between different forms of ratios and using ratio tables.
 8. Class shares sample solutions, focusing on how scaling up or down helps identify equivalent ratios, and students compare strategies.
 9. Closure activity asking students to quickly create their own real-world ratio (e.g., "markers to notebooks in your



	backpack”) and explain it to a partner.	
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Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Proportions Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • use proportions • simplify proportions • write proportions to model relationships • solve applications with proportions	Lesson Sequence 1. Homework check reviewing ratio and proportion basics using quick prompts such as "Are the ratios 5:10 and 1:2 proportional? Explain." 2. The teacher models solving proportions using cross multiplication and unit-rate approaches with examples like "Solve $x/3 = 8/12$" and discusses when each method is efficient. 3. Class discusses how to determine whether two ratios form a true proportion by testing for equality or comparing unit rates (e.g., "Does 9 miles in 3 hours match 15 miles in 5 hours?").	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



4. Students rotate through math centers: solving word problems, matching equivalent ratios to true proportions, and checking proportionality using tables and graphs.
5. Targeted group time focuses on students needing additional support, modeling step-by-step checks for proportionality using diagrams or ratio strips.
6. Student groups work at vertical whiteboards solving prompts such as "Set up and solve a proportion for this scenario: If 3 notebooks cost \$6, how much do 8 notebooks cost?" and comparing solution strategies.
7. Students complete an independent practice set including proportion equations, scaling problems, and short contextual word problems.
8. Class reviews solutions together, highlighting multiple strategies such as scaling factors versus formal proportion equations.
9. Closure activity where students write a brief explanation of how to recognize a proportion and why cross-multiplying works.



Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Numerical Operations
Created: 2025 Board Approved on:		



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Algebraic Equations

Unit Summary: This unit introduces students to linear equations, writing equations from tables, graphs, and verbal descriptions, and graphing linear relationships. Students learn to solve one-step and two-step equations, model relationships, identify slope and intercept, and connect algebraic equations to real-world scenarios. Lessons include targeted group work to reinforce foundational algebra skills, vertical learning activities to practice graphing and equation creation, and math centers for practice in solving, writing, and graphing equations. Students develop both procedural fluency and conceptual understanding of linear relationships.

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 builds students' skills in writing, solving, and graphing linear equations, fostering fluency with algebraic reasoning and representation of relationships.

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: Mathematics

Content Statements: N, A, F

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



N-Q.A	Reason quantitatively and use units to solve problems.
N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-RN.B	Use properties of rational and irrational numbers.
A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
A-SSE.B	Write expressions in equivalent forms to solve problems.
A-APR.C	Use polynomial identities to solve problems.
A-CED.A	Create equations that describe numbers or relationships.
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, as well as 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.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V=IR$ to highlight resistance R .
A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning.
A-REI.B	Solve equations and inequalities in one variable.
A-REI.C	Solve systems of equations.
A-REI.D	Represent and solve equations and inequalities graphically.
F-IF.A	Understand the concept of a function and use function notation.
F-IF.B	Interpret functions that arise in applications in terms of the context.
F-BF.B.4	Find inverse functions.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can we represent relationships between quantities using equations?
- Why is isolating the variable an effective strategy for solving equations?
- What patterns emerge when solving similar types of equations?
- How can equations be modeled from verbal descriptions or tables?
- What strategies help determine the most efficient method for solving an equation?
- How does the graph of a linear equation reflect its algebraic form?

Unit Enduring Understandings:

- Equations provide a systematic way to model relationships between quantities.
- One-step and multi-step equation-solving strategies rely on inverse operations.



- Translating between representations (tables, graphs, verbal descriptions) strengthens understanding of linear relationships.
- Graphing linear equations reveals the slope and intercept, connecting algebraic and geometric interpretations.
- Flexibility in strategy choice improves efficiency and accuracy in solving equations.

Unit Learning Targets:

Students will solve one-step and multi-step linear equations and write equations from verbal, tabular, and graphical representations. Students will interpret solutions in context, identify patterns, and connect algebraic solutions to their graphical representations.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculators, iPads

Teacher: Calculator, iPad or laptop

Resources:

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Linear Equations	3 hours/days
Lesson 2 Writing Linear Equations and Inequalities	3 hours/days
Lesson 3 Graphing Equations	3 hours/days

Teacher Notes:

Focus on developing students' skills in solving linear and simple nonlinear equations while reinforcing the connections between expressions and their graphical representations. Encourage checking solutions and reasoning through multiple methods.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Linear Equations Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Differentiate between equations and inequalities - Solve linear equations - Solve inequalities	Lesson Sequence - Homework check reviewing basic equation-solving skills with a warm-up such as "Solve $2x + 5 = 15$" or "What value of x makes $x - 7 = 3$ true?" - The teacher models solving one-step and two-step linear equations, thinking aloud through steps such as isolating the variable and checking solutions using examples like "$3x - 4 = 11$." - Class discusses why inverse operations work, using a prompt such as "Why do we add 4 to both sides instead of subtracting 4 here?" - Students rotate through math centers: solving	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- one-step equations, solving two-step equations, and checking solutions using substitution.
5. The teacher meets with a targeted small group to review foundational skills such as using inverse operations with integers or correctly distributing negatives.
 6. Groups work at vertical whiteboards to solve problems such as " $5(x - 2) = 20$ " while comparing different solving paths.
 7. Students complete a brief independent practice set mixing one-step, two-step, and distributive-property equations.
 8. Class reviews solutions to highlight common errors such as sign mistakes or distribution errors.
 9. Closure activity asking students to write one sentence explaining how they know an equation is solved correctly.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template

Content Area: Mathematics Lesson Title: Writing Linear Equations and Inequalities Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Write equations in slope-intercept form • Write equations in point-slope form • Write equations in standard form • Write inequalities	Lesson Sequence 1. Homework check reviewing basic linear relationships with a warm-up such as "Is $y = 3x + 2$ proportional?" or "Write an inequality that means 'x is greater than 5'." 2. The teacher models how to write linear equations and inequalities from tables, graphs, and verbal descriptions using examples such as "Write an equation for a line with slope 4 and y-intercept -3" and "Write an inequality representing a cost that must stay under \$20." 3. Class discusses the meaning of slope,	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



intercepts, and inequality symbols using prompts such as “What does the symbol $\geq$ tell us about the solutions?” or “How does the slope describe how two quantities change together?”

4. Students rotate through math centers: writing equations from tables, writing inequalities from scenarios, and matching graphs to linear equations and inequalities.
5. The teacher meets with a targeted group to reinforce identifying slope and intercept from tables or two points and to clarify inequality direction and boundary meaning.
6. Pairs work at vertical whiteboards to complete prompts such as “Write an equation for a line that passes through (2, 7) and (6, 15)” and “Write an inequality for the statement: A student must score at least 70% to pass.”
7. Students complete a short independent practice set converting descriptions, graphs, and tables into linear equations and inequalities.
8. The teacher leads a class review highlighting common errors such as reversing slope signs,



- misidentifying intercepts,
or flipping inequality
symbols.
9. Closure activity where
students write one
sentence explaining how
they decide whether to
use an equation or an
inequality when
modeling a real-world
situation.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Graphing Equations Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Graph linear equations - Graph inequalities - Graph piecewise functions	Lesson Sequence - Homework check reviewing coordinate plane basics with a warm-up question like "Plot the point $(-2, 4)$" or "What does $y = 2x$ look like?" - The teacher models graphing equations using slope-intercept form, starting with a problem such as "Graph $y = -1/2x + 3$," and explains how slope and intercept shape the graph. - Class discusses how the slope indicates direction and steepness, using the prompt "If slope is -3, what does that tell us about the line?"	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



4. Students rotate through math centers: graphing in slope-intercept form, graphing from tables, and graphing from two points using slope triangles.
5. The teacher meets with a targeted group to reinforce identifying slopes visually and plotting intercepts accurately.
6. Groups work at vertical whiteboards to graph equations such as " $y = 2x - 5$ " and compare how different slopes and intercepts change the appearance.
7. Students complete a short independent practice graphing linear equations from multiple forms.
8. Class reviews common challenges like reversing rise/run or misplacing intercepts and corrects sample mistakes together.
9. Closure activity where students describe in one sentence how they know whether a line is increasing or decreasing.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Algebraic Equations
Created: 2025	Board Approved on:	



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Systems of Equations

Unit Summary: Students in this unit learn to solve systems of linear equations using three methods: graphing, substitution, and elimination. Lessons emphasize understanding the meaning of solutions, choosing appropriate solving strategies, and checking solutions for accuracy. Students work in targeted groups to strengthen algebraic reasoning and procedural skills, and engage in math centers and vertical learning tasks to practice different approaches. Real-world problem-solving and comparing solution strategies reinforce both conceptual understanding and application of methods.

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 teaches students to solve systems of linear equations using multiple strategies, deepening their understanding of relationships between variables and solution interpretation.

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: Mathematics

Content Statements: N, A, F

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



N-Q.A	Reason quantitatively and use units to solve problems.
N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-RN.B	Use properties of rational and irrational numbers.
A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
A-SSE.B	Write expressions in equivalent forms to solve problems.
A-APR.C	Use polynomial identities to solve problems.
A-CED.A	Create equations that describe numbers or relationships.
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, as well as 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.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V=IR$ to highlight resistance R .
A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning.
A-REI.B	Solve equations and inequalities in one variable.
A-REI.C	Solve systems of equations.
A-REI.D	Represent and solve equations and inequalities graphically.
F-IF.A	Understand the concept of a function and use function notation.
F-IF.B	Interpret functions that arise in applications in terms of the context.
F-BF.B.4	Find inverse functions.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can systems of equations represent multiple constraints in real-world problems?
- What strategies exist for solving systems graphically, by substitution, or by elimination?
- How do the number and type of solutions reflect the relationship between two lines?
- When is one method for solving a system more efficient than another?
- How can we verify solutions to a system of equations?
- What connections exist between algebraic solutions and their graphical representations?

Unit Enduring Understandings:

- Systems of equations model scenarios with multiple simultaneous constraints.
- The solution of a system corresponds to points of intersection in a graph.



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- Substitution and elimination offer alternative strategies depending on system structure.
- Verifying solutions ensures accuracy and reinforces understanding of system relationships.
- Connecting algebraic and graphical methods strengthens problem-solving flexibility.

Unit Learning Targets:

Students will solve systems of equations using graphing, substitution, and elimination, verifying solutions in context. Students will analyze relationships between equations and interpret the meaning of one, none, or infinitely many solutions.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculator, iPads

Teacher: Calculator, iPad or laptop

Resources:

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Solving Systems of Equations Graphically	3 hours/days
Lesson 2 Solving Systems of Equations by Substitution	3 hours/days
Lesson 3 Solving Systems of Equations by Elimination	3 hours/days

Teacher Notes:

Students explore solving multiple equations simultaneously using substitution, elimination, and graphing. Highlight real-life contexts where systems of equations are applied.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Solving Systems of Equations Graphically Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Graphing systems with slope-intercept form - Graphing equations using intercepts - Graphing systems of equations - Finding solutions graphically - Testing solutions	Lesson Sequence - Homework check reviewing graphing basics with a warm-up such as "Graph $y = 2x - 1$" or "Plot two points for the line $y = -x + 3$." - The teacher models how to graph two linear equations on the same coordinate plane and identify the intersection point using an example like "Graph $y = x + 1$ and $y = -x + 5$." - Class discusses what the point of intersection represents, using a prompt such as "What does the intersection tell us about solutions to both equations?"	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



4. Students rotate through math centers: graphing systems in slope-intercept form, graphing from tables, and interpreting intersections from already-drawn graphs.
5. The teacher meets with a targeted small group to review slope, intercepts, and consistent graphing techniques for students who need foundational support.
6. Groups work at vertical whiteboards to graph systems such as " $y = 3x - 2$ " and " $y = -x + 6$," comparing accuracy and identifying intersections.
7. Students complete a short independent practice set identifying the solution of simple graphed systems and explaining their reasoning.
8. The teacher leads a brief class review highlighting common graphing errors such as inaccurate slopes or axis scaling.
9. Closure activity where students write one sentence explaining how they know when a system has one solution, no solution, or infinitely many solutions based on the graph.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.



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Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template

Content Area: Mathematics Lesson Title: Solving Systems of Equations by Substitution Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Rewriting equations in terms of a variable - Substituting equations - Testing solutions	Lesson Sequence - Homework check reviewing substitution skills with a warm-up such as "If $y = 4x$ and $x = 3$, what is y?" or "Evaluate $y = 2x + 1$ for $x = -2$." - The teacher models how to substitute one equation into another using a clear example like "Solve the system $y = 2x + 3$ and $3x + y = 12$." - Class discusses why substitution works, using a prompt such as "Why does replacing y with $2x + 3$ help us solve for x?" - Students rotate through math centers: solving basic substitution	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- systems, identifying which equation is easiest to substitute, and rearranging equations to isolate variables.
5. The teacher works with a targeted group that needs help isolating variables or organizing work, using step-by-step substitution with simple systems.
 6. Pairs work at vertical whiteboards solving systems such as " $x = 5 - y$ " and " $2x + y = 10$," comparing strategies for isolating and substituting variables.
 7. Students complete a short independent practice solving increasingly complex substitution problems.
 8. The teacher reviews selected problems with the class, highlighting errors such as distributing incorrectly or forgetting to substitute back to find the second variable.
 9. Closure activity where students write one sentence explaining when substitution might be easier than graphing.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Solving Systems of Equations by Elimination Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Graphing systems of equations - Finding solutions graphically - Testing solutions	Lesson Sequence - Homework check reviewing integer operations and combining like terms with warm-up questions such as "Simplify $2x - 5x$" or "What is $3x + 7x$?" - The teacher models solving systems by elimination using an example like "Solve $2x + y = 7$ and $-2x + 3y = 1$," demonstrating how adding equations eliminates a variable. - Class discusses why elimination works, using a prompt such as "What makes a pair of equations 'ready' for elimination?" - Students rotate through math centers: systems	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- already aligned for elimination, systems requiring multiplying one equation, and word problems translated to elimination form.
5. The teacher meets with a targeted group to reinforce aligning equations, matching coefficients, and deciding which variable to eliminate.
 6. Student groups work at vertical whiteboards solving elimination systems such as " $3x - 2y = 4$ " and " $3x + y = 10$," comparing methods for adjusting coefficients.
 7. Students complete a short independent practice set including straightforward and coefficient-adjustment elimination problems.
 8. The teacher leads a class review analyzing sample solutions and explaining how to check answers by substituting them back into the original equations.
 9. Closure activity where students explain in writing how they decide whether to eliminate x or y first in a given system.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad

Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Systems of Equations
Created: 2025		Board Approved on:



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Polynomial Operations

Unit Summary: This unit focuses on writing, adding, subtracting, and multiplying polynomials. Students learn to identify terms, coefficients, and degrees, write polynomials from word problems and tables, and perform arithmetic operations on polynomials using vertical and horizontal methods. Targeted group work addresses common challenges such as combining like terms and distributing correctly. Math centers and vertical whiteboard activities reinforce conceptual understanding and fluency with polynomial operations while encouraging students to explore multiple problem-solving strategies.

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 equips students with skills to write, add, subtract, and multiply polynomials, laying the groundwork for advanced algebraic manipulation and modeling.

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: Mathematics

Content Statements: N, A, F



CPI#:	Cumulative Progress Indicator (CPI):
N-Q.A	Reason quantitatively and use units to solve problems.
N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-RN.B	Use properties of rational and irrational numbers.
A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
A-SSE.B	Write expressions in equivalent forms to solve problems.
A-APR.C	Use polynomial identities to solve problems.
A-CED.A	Create equations that describe numbers or relationships.
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, as well as 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.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V=IR$ to highlight resistance R .
A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning.
A-REI.B	Solve equations and inequalities in one variable.
A-REI.C	Solve systems of equations.
A-REI.D	Represent and solve equations and inequalities graphically.
F-IF.A	Understand the concept of a function and use function notation.
F-IF.B	Interpret functions that arise in applications in terms of the context.
F-BF.B.4	Find inverse functions.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
Unit Essential Questions: • How can expressions be represented using polynomials? • What rules govern adding, subtracting, and multiplying polynomials? • How does the degree of a polynomial affect its operations? • Why is factoring an important skill when working with polynomials? • How can visual models assist in understanding polynomial multiplication? • What patterns emerge when combining like terms or applying the distributive property?	
Unit Enduring Understandings: • Polynomials provide a flexible way to model algebraic relationships.	



- Combining like terms and applying properties of operations ensures correct simplification.
- Multiplication and factoring reveal structure and allow for solving equations.
- Visual and symbolic strategies complement one another in understanding polynomial operations.
- Understanding degree and coefficients is essential for predicting outcomes of polynomial operations.

Unit Learning Targets:

Students will perform operations with polynomials, including addition, subtraction, and multiplication, using symbolic and visual methods. Students will identify patterns and apply factoring to simplify and solve polynomial expressions.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculator, iPads

Teacher: Calculator, iPad or laptop

Resources:

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Writing Polynomials	3 hours/days
Lesson 2 Add and Subtract Polynomials	3 hours/days
Lesson 3 Multiply Polynomials	3 hours/days

Teacher Notes:

This unit strengthens understanding of addition, subtraction, multiplication, and division of polynomials. Reinforce patterns, structure, and connections to factoring and functions.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Writing Polynomials Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Model applications using polynomials - Write polynomials in standard form - Find the degree and leading coefficient of a polynomial	Lesson Sequence - Homework check reviewing basic algebraic expressions with a warm-up such as "Identify the terms in $5x - 3$" or "What is the degree of $7x^2$?" - The teacher models how to write polynomials from verbal descriptions, tables, and simplified expressions using examples such as "Write a polynomial representing the area of a rectangle with length x and width $x + 3$." - Class discusses key vocabulary—term, coefficient, degree—with prompts like "How do you know which term is the leading term?"	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



4. Students rotate through math centers: identifying polynomial terms, writing polynomials from word descriptions, and rewriting expressions in standard form.
5. The teacher meets with a targeted small group to reinforce identifying degrees and arranging polynomials in descending order.
6. Pairs work at vertical whiteboards generating polynomials from prompts such as "Write a polynomial with three terms, a degree of 3, and a constant term of -5."
7. Students complete a short independent practice writing polynomials from descriptions, tables, and simplified expressions.
8. The teacher leads a brief review highlighting common issues such as mixing up coefficients and exponents.
9. Closure activity where students write one sentence explaining how they determine the degree of a polynomial.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad

Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template

Content Area: Mathematics Lesson Title: Add and Subtract Polynomials Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Add polynomials - Subtract polynomials	Lesson Sequence - Homework check reviewing combining like terms with a warm-up such as "Simplify $3x^2 + 5x^2$" or "Combine $7x - 3x$." - The teacher models adding and subtracting polynomials horizontally and vertically using examples like "$(3x^2 + 2x - 5) + (4x^2 - x + 3)$." - Class discusses why only like-terms can be combined, using a prompt such as "Why can't we combine x^2 and x?" - Students rotate through math centers: combining like terms with color-coding, adding/subtracting	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- polynomials in vertical format, and applying operations to simple word problems.
5. The teacher meets with a targeted group needing support in identifying like terms or handling integer operations.
 6. Groups work at vertical whiteboards solving expressions such as $(5x - 3) - (2x + 7)$ and compare strategies for organizing work.
 7. Students complete a short independent practice set adding and subtracting polynomials of different degrees.
 8. The teacher leads a class review showing sample work and discussing common errors such as sign mistakes when subtracting.
 9. Closure activity where students write one sentence explaining why parentheses matter when subtracting polynomials.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Multiply Polynomials Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Multiply monomials and polynomials • Multiply binomials • Multiply trinomials	Lesson Sequence 1. Homework check reviewing distributive property with a warm-up like "Simplify $4(x + 3)$" or "Multiply $x(2x - 5)$." 2. The teacher models multiplying monomials and binomials using the box method and distributive property with examples like "$(x + 4)(x - 2)$." 3. Class discusses how multiplying affects degrees and coefficients using a prompt such as "What happens to the degree when you multiply x^2 and x?" 4. Students rotate through math centers: monomial $\times$ polynomial	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



- multiplication, binomial $\times$ binomial using the box method, and interpreting multiplication in context (e.g., area models).
5. The teacher works with a targeted group practicing step-by-step multiplication using visual models for students needing additional structure.
 6. Groups work at vertical whiteboards multiplying expressions such as $(2x - 3)(x + 5)$ and comparing both box method and distributive approaches.
 7. Students complete a short independent practice with monomial, binomial, and simple trinomial multiplication.
 8. The teacher leads a class review analyzing common errors such as missing middle terms or incorrect sign distribution.
 9. Closure activity where students explain in one sentence why binomial multiplication often produces a middle term.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad

Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Polynomial Operations
Created: 2025	Board Approved on:	



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Factoring Polynomials

Unit Summary: In this unit, students explore factoring techniques, including finding the greatest common factor, factoring binomials, and factoring trinomials. Lessons highlight recognizing patterns, applying GCF and difference-of-squares strategies, and factoring more complex expressions. Students engage in math centers to practice factoring in various contexts, work at vertical whiteboards to demonstrate reasoning, and participate in targeted small-group instruction to address common difficulties. By the end of the unit, students develop proficiency in simplifying polynomials and solving problems using factoring techniques.

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 develops students' ability to factor polynomials efficiently, enhancing problem-solving, simplification, and preparation for solving higher-level equations.

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: Mathematics

Content Statements: N, A, F

CPI#: Cumulative Progress Indicator (CPI):



N-Q.A	Reason quantitatively and use units to solve problems.
N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-RN.B	Use properties of rational and irrational numbers.
A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
A-SSE.B	Write expressions in equivalent forms to solve problems.
A-APR.C	Use polynomial identities to solve problems.
A-CED.A	Create equations that describe numbers or relationships.
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, as well as 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.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V=IR$ to highlight resistance R .
A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning.
A-REI.B	Solve equations and inequalities in one variable.
A-REI.C	Solve systems of equations.
A-REI.D	Represent and solve equations and inequalities graphically.
F-IF.A	Understand the concept of a function and use function notation.
F-IF.B	Interpret functions that arise in applications in terms of the context.
F-BF.B.4	Find inverse functions.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- Why is factoring an essential tool for simplifying expressions?
- How can we identify the greatest common factor of numbers and polynomials?
- What strategies help factor binomials and trinomials efficiently?
- How does factoring reveal relationships between terms in an expression?
- How can factoring be used to solve equations or check equivalence?

Unit Enduring Understandings:

- Factoring simplifies expressions and reveals underlying mathematical structure.
- The greatest common factor provides a first step for breaking down polynomials.
- Recognizing patterns allows for efficient factoring of binomials and trinomials.
- Factoring connects to solving equations and verifying equivalence.



- Strategic thinking and organization improve accuracy in factoring.

Unit Learning Targets:

Students will factor polynomials using the greatest common factor, difference of squares, and trinomial strategies. Students will apply factoring to simplify expressions and solve polynomial equations.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculator, iPads

Teacher Resources: Calculator, iPad or laptop

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Finding the Greatest Common Factor	3 hours/days
Lesson 2 Factoring Binomials	3 hours/days
Lesson 3 Factoring Trinomials	3 hours/days

Teacher Notes:

Focus on recognizing factorable patterns and applying strategies such as GCF, trinomials, and special products. Emphasize step-by-step reasoning and checking work for accuracy.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Finding the Greatest Common Factor Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Finding constant factors - Finding common variable factors of the highest degree	Lesson Sequence - Homework check reviewing multiplication and division of integers with a warm-up such as "List all factors of 24" or "Find the GCF of 18 and 30." - The teacher models how to find the greatest common factor (GCF) of monomials and polynomials using examples like "Find the GCF of $12x^2$ and $18x^3$." - Class discusses why the GCF is important for factoring, with a prompt such as "How does factoring out the GCF make expressions simpler to work with?"	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



4. Students rotate through math centers: finding GCF of numbers, finding GCF of monomials, and factoring simple polynomials using the GCF.
5. The teacher meets with a targeted small group to reinforce identifying coefficients and variable exponents for students who need extra support.
6. Pairs work at vertical whiteboards factoring expressions such as " $6x^2y + 9xy^2$ " and comparing strategies.
7. Students complete a short independent practice set finding the GCF and factoring out the common factor in polynomials.
8. The teacher leads a class review highlighting common mistakes such as forgetting to include variables in the GCF or factoring incorrectly.
9. Closure activity where students write one sentence explaining why factoring out the GCF is the first step in simplifying polynomials.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad

Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template

Content Area: Mathematics Lesson Title: Factoring Binomials Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Understand the purpose of factoring binomials - Factor by difference of two squares - Factor binomials	Lesson Sequence - Homework check reviewing difference of squares and simple multiplication patterns with a warm-up such as "Simplify $(x + 5)(x - 5)$" or "What is $(x + 3)^2$?" - The teacher models factoring binomials using examples of difference of squares and common patterns, such as "Factor $x^2 - 16$" and "Factor $9y^2 - 25$." - Class discusses how to recognize patterns in binomials with a prompt like "What clues tell you this is a difference of squares?" - Students rotate through math centers: factoring difference of squares,	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- factoring perfect square binomials, and matching expanded forms to factored forms.
5. The teacher works with a targeted group needing extra support recognizing squares and coefficients.
 6. Groups work at vertical whiteboards factoring expressions such as " $4x^2 - 49$ " or " $25y^2 - 1$ " and explain each step to a partner.
 7. Students complete a short independent practice set factoring binomials of various types.
 8. The teacher reviews common errors with the class, such as treating sums of squares incorrectly or miscalculating square roots of coefficients.
 9. Closure activity where students write one sentence explaining how to identify a difference of squares.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Factoring Trinomials Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Factor with leading constant coefficient equal to 1 - Factor with leading constant coefficient not equal to 1 - Factor special cases	Lesson Sequence - Homework check reviewing distributive property and multiplication of binomials with a warm-up like "Expand $(x + 3)(x + 2)$" or "Simplify $x^2 + 5x + 6$." - The teacher models factoring trinomials with leading coefficient 1 using examples such as "Factor $x^2 + 7x + 12$" and explains how to identify two numbers that multiply to the constant term and add to the middle coefficient. - Class discusses strategies for checking work with prompts like "How can	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- you verify your factored trinomial is correct?"
4. Students rotate through math centers: factoring trinomials with leading coefficient 1, factoring trinomials with leading coefficient >1 , and solving word problems that require factoring.
 5. The teacher meets with a targeted group to guide step-by-step factoring for trinomials with larger coefficients or special patterns.
 6. Pairs work at vertical whiteboards factoring expressions such as " $2x^2 + 9x + 10$ " and share strategies for identifying factor pairs.
 7. Students complete a short independent practice set including both leading coefficient 1 and greater than 1 trinomials.
 8. The teacher leads a class review highlighting common mistakes such as overlooking factor combinations or sign errors.
 9. Closure activity where students write one sentence explaining the process for factoring trinomials.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Factoring Polynomials
Created: 2025	Board Approved on:	



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Geometry

Unit Summary: This unit introduces students to lines, angles, triangles, and quadrilaterals, focusing on classification, properties, congruence, and transposition. Students explore angle relationships, triangle types, congruence criteria (SSS, SAS, ASA), and quadrilateral properties while performing translations on a coordinate plane. Math centers and vertical whiteboard activities support hands-on practice, and targeted group work reinforces reasoning and problem-solving strategies. Students develop spatial reasoning and geometric understanding, applying concepts to identify, analyze, and manipulate shapes in a plane.

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 strengthens students' understanding of shapes, angles, and transformations, enabling them to classify, analyze, and manipulate geometric figures with precision.

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: Mathematics

Content Statements: G

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



G-CO.A	Experiment with transformations in the plane
G-CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
G-CO.B	Understand congruence in terms of rigid motions
G-SRT.C	Define trigonometric ratios and solve problems involving right triangles
G-GMD.A	Explain volume formulas and use them to solve problems
G-MG.A	Apply geometric concepts in modeling situations
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can we classify shapes based on angles and sides?
- What properties are shared by congruent shapes?
- How can transformations such as translation affect a shape's location and orientation?
- Why is it important to understand relationships between angles and lines?
- How can reasoning and proof support geometric problem solving?
- What strategies help identify unknown angles or side lengths in polygons?

Unit Enduring Understandings:

- Shapes can be classified and analyzed based on consistent properties.
- Congruence preserves shape size and structure during transformations.
- Geometric reasoning allows for predictions and justifications of properties.
- Understanding angle relationships supports solving multi-step geometric problems.
- Visual and symbolic representations complement one another in geometry.

Unit Learning Targets:

Students will identify triangles, quadrilaterals, and angle relationships, solve congruence problems, and apply transformations in the coordinate plane. Students will justify geometric reasoning using properties, congruence criteria, and transformations.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculator, iPads

Teacher Calculator, iPad or laptop

Resources:

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Lines and Angles	3 hours/days
Lesson 2 Triangles	3 hours/days
Lesson 3 Quadrilaterals	3 hours/days

Teacher Notes:

Students develop skills in reasoning about lines, angles, triangles, and quadrilaterals. Encourage the use of diagrams, accurate measurement, and logical justification for conclusions.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Lines and Angles Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Use properties of lines and line segments to solve problems • Use properties of angles and pairs of angles to solve problems	Lesson Sequence 1. Homework check reviewing basic angle and line terms with a warm-up such as "Identify the vertical angles in the diagram" or "Classify the angle as acute, right, or obtuse." 2. The teacher models identifying parallel, perpendicular, and intersecting lines and finding missing angles using examples like "Two parallel lines cut by a transversal: find all angles if one is 50°." 3. Class discusses angle relationships using prompts such as "How do you know two angles are supplementary or complementary?"	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



4. Students rotate through math centers: measuring and classifying angles, solving missing angle problems, and identifying line relationships in diagrams.
5. The teacher meets with a targeted small group to reinforce reasoning with angle pairs such as vertical, corresponding, and alternate interior angles.
6. Groups work at vertical whiteboards solving prompts like "Find x if two parallel lines are cut by a transversal and angle $3 = 2x + 10$, angle $4 = 3x - 5$ " and explain their reasoning.
7. Students complete a short independent practice set identifying angles and solving for missing measures.
8. The teacher leads a class review highlighting common mistakes such as confusing adjacent and vertical angles.
9. Closure activity where students write one sentence explaining the difference between complementary and supplementary angles.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template		
Content Area: Mathematics	Lesson Title: Triangles	Time Frame: 3 hours/days
Lesson Components		
<u>21st Century Themes</u> ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☒ Civic Literacy ☐ Health Literacy		
<u>21st Century Skills</u> ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy		
Interdisciplinary Connections: Science		
Integration of Technology: Calculators, iPads		
Equipment Needed: Calculators, iPads		

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Identity types of triangles by angles • Identity types of triangles by sides • Solve problem with triangle congruence • Transpose triangles in a plane	Lesson Sequence 1. Homework check reviewing basic triangle terminology with a warm-up such as "Classify this triangle by angles and sides." 2. The teacher models identifying triangles by angles (acute, obtuse, equiangular) and by sides (scalene, isosceles, equilateral) using examples like "Classify a triangle with angles 50°, 60°, 70°" and "Classify a triangle with sides 5 cm, 5 cm, 8 cm." 3. Class discusses triangle congruence, using prompts such as "How can we determine if two triangles are congruent"	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



- without measuring every side?”
4. Students rotate through math centers: classifying triangles by angles and sides, comparing triangle diagrams for congruence, and transposing triangles on a coordinate plane using grid paper.
 5. The teacher meets with a targeted group to reinforce strategies for identifying congruent triangles using criteria such as SSS, SAS, and ASA.
 6. Groups work at vertical whiteboards solving prompts like “Draw a triangle with sides 6 cm, 6 cm, 9 cm and transpose it 3 units right and 2 units up” and check for congruence with another group’s triangle.
 7. Students complete a short independent practice set identifying triangle types, checking congruence, and performing simple transpositions in a plane.
 8. The teacher leads a class review highlighting common mistakes such as mislabeling triangle types or confusing congruence criteria.
 9. Closure activity where students write one sentence explaining how they can tell two triangles are congruent and how



	transposing affects the triangle's properties.	
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Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Quadrilaterals Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Identity types of quadrilaterals • Solve problem with quadrilateral congruence • Transpose quadrilaterals in a plane	Lesson Sequence 1. Homework check reviewing basic quadrilateral terminology with a warm-up such as "Classify this quadrilateral by sides and angles." 2. The teacher models identifying quadrilaterals (parallelogram, rectangle, rhombus, square, trapezoid) and solving congruence problems using examples like "Determine if two given quadrilaterals are congruent based on side lengths and angles." 3. Class discusses transposing quadrilaterals on a coordinate plane using prompts such as "What	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



- stays the same when a quadrilateral is translated, and what changes?"
4. Students rotate through math centers: classifying quadrilaterals by sides and angles, solving congruence problems, and performing translations on graph paper.
 5. The teacher meets with a targeted small group to reinforce reasoning for congruence and strategies for accurately transposing shapes.
 6. Groups work at vertical whiteboards solving prompts such as "Translate this parallelogram 4 units right and 3 units up and check congruence with the original" and explain the steps taken.
 7. Students complete a short independent practice set identifying quadrilateral types, verifying congruence, and transposing figures in a plane.
 8. The teacher leads a class review highlighting common mistakes such as misclassifying quadrilaterals or forgetting to preserve angles and side lengths when transposing.
 9. Closure activity where students write one sentence explaining how



	to determine congruence for quadrilaterals and what happens to the shape during transposition.	
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Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Geometry
Created: 2025		Board Approved on:



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Right Triangles

Unit Summary: This unit focuses on properties of right triangles, including the Pythagorean Theorem, trigonometric ratios (sine, cosine, tangent), and real-world applications. Students use the distance formula and the Pythagorean Theorem to find side lengths, prove triangles are right triangles, and apply trigonometric formulas to solve for missing sides or angles. Lessons include targeted small-group instruction, math centers, and vertical learning tasks to reinforce problem-solving and reasoning skills. Students also explore application problems that connect right triangle concepts to practical scenarios, further developing analytical and spatial reasoning.

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 teaches students to apply the Pythagorean Theorem and trigonometric ratios to solve right triangle problems, fostering connections between geometry, algebra, and real-world applications.

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: Mathematics

Content Statements: G, A, N

CPI#: Cumulative Progress Indicator (CPI):



N-Q.A	Reason quantitatively and use units to solve problems.
N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-RN.B	Use properties of rational and irrational numbers.
A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
A-SSE.B	Write expressions in equivalent forms to solve problems.
A-APR.C	Use polynomial identities to solve problems.
A-CED.A	Create equations that describe numbers or relationships.
A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V=IR$ to highlight resistance R .
A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning.
G-CO.A	Experiment with transformations in the plane
G-CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
G-CO.B	Understand congruence in terms of rigid motions
G-SRT.C	Define trigonometric ratios and solve problems involving right triangles
G-GMD.A	Explain volume formulas and use them to solve problems
G-MG.A	Apply geometric concepts in modeling situations
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can the Pythagorean Theorem be applied to solve real-world problems?
- When can the distance formula verify right triangle side lengths?
- What strategies help determine side lengths using trigonometric ratios?
- How do sine, cosine, and tangent relate angles to side lengths?
- How can right triangles be used to model real-world contexts?
- Why is it important to check solutions for accuracy and reasonableness?

Unit Enduring Understandings:

- Right triangles have predictable relationships among their sides and angles.
- The Pythagorean Theorem and distance formula provide methods for solving lengths.
- Trigonometric ratios connect angles and sides in a systematic way.
- Right triangles serve as models for many practical applications.
- Checking work ensures accuracy and builds mathematical confidence.



Unit Learning Targets:

Students will solve right triangles using the Pythagorean Theorem, distance formula, and trigonometric ratios. Students will apply right triangle concepts to real-world problems and justify solutions with reasoning.

Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculator, iPads

Teacher Calculator, iPad or laptop

Resources:

Formative Assessments:

- Homework review
- Lesson opener or daily quiz
- Guided practice exercises
- Closure discussion



Lesson Plans

Lesson	Time Frame
Lesson 1 Pythagorean Theorem	3 hours/days
Lesson 2 Trigonometry	3 hours/days
Lesson 3 Applications	3 hours/days

Teacher Notes:

This unit focuses on applying the Pythagorean Theorem and basic trigonometry to solve problems. Stress visualizing triangles, using formulas correctly, and connecting algebraic and geometric reasoning.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Pythagorean Theorem Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Use the distance formula to find side lengths • Use the Pythagorean Theorem to solve problems • Prove triangles are right triangles	Lesson Sequence 1. Homework check reviewing coordinate points and basic square roots with a warm-up such as "Find the distance between (2, 3) and (5, 7)" or "Simplify $\sqrt{49}$." 2. The teacher models using the distance formula with examples like "Find the length of the segment between (1, 2) and (7, 5)" and connects it to the Pythagorean Theorem. 3. Class discusses why the Pythagorean Theorem works, with a prompt such as "How do we know $c^2 = a^2 + b^2$ only applies to right triangles?" 4. Students rotate through math centers: one finding	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



- distances between points, one using the Pythagorean Theorem in real-world problems, and one proving triangles are right triangles using side lengths.
5. The teacher meets with a targeted small group to reinforce calculating square roots, organizing work, and identifying legs versus hypotenuse.
 6. Groups work at vertical whiteboards solving prompts such as "Given a triangle with sides 8, 15, and 17, prove whether it is a right triangle."
 7. Students complete a short independent practice set using the distance formula, calculating missing sides, and checking for right triangle classification.
 8. The teacher leads a class review highlighting common errors such as mixing up which side is c or forgetting to square root at the end.
 9. Closure activity where students write one sentence explaining how to use side lengths to prove a triangle is a right triangle.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template		
Content Area: Mathematics	Lesson Title: Trigonometry	Time Frame: 3 hours/days
Lesson Components		
<u>21st Century Themes</u> ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☒ Civic Literacy ☐ Health Literacy		
<u>21st Century Skills</u> ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy		
Interdisciplinary Connections: Science		
Integration of Technology: Calculators, iPads		
Equipment Needed: Calculators, iPads		

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Use the sine formula to find solutions - Use the cosine formula to find solutions - Use the tangent formula to find solutions	Lesson Sequence - Homework check reviewing SOHCAHTOA with a warm-up such as "Identify the opposite and adjacent sides to angle A in the triangle shown." - The teacher models using sine, cosine, and tangent to find missing sides or angles with examples like "Find x if $\sin(30^\circ) = x/10$" or "Use $\tan(40^\circ)$ to find the height of a ladder leaning against a wall." - Class discusses how to choose the correct trig ratio using a prompt such as "If you know the adjacent side and hypotenuse, which ratio should you use and why?"	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



4. Students rotate through math centers: sine problems, cosine problems, and tangent problems, with each center including calculator-based and non-calculator tasks.
5. The teacher meets with a targeted small group to reinforce identifying sides relative to angles and setting up correct proportions.
6. Pairs work at vertical whiteboards solving prompts such as "Find the length of the missing side given angle 52° and an adjacent side of 14 units" and compare chosen ratios.
7. Students complete a short independent practice using all three trig ratios in a variety of contexts.
8. The teacher leads a class review highlighting common mistakes such as mixing up opposite and adjacent or forgetting to set calculators to degree mode.
9. Closure activity where students write one sentence explaining how they decide whether to use sine, cosine, or tangent in a problem.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.



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Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template		
Content Area: Mathematics	Lesson Title: Applications	Time Frame: 3 hours/days
Lesson Components		
<u>21st Century Themes</u> ☒ Creativity and Innovation ☒ Life and Career Skills ☒ Critical Thinking and Problem Solving ☒ Communication and Collaboration ☐ Information Literacy ☐ ICT Literacy		
<u>21st Century Skills</u> ☒ Creativity and Innovation ☒ Life and Career Skills ☒ Critical Thinking and Problem Solving ☒ Communication and Collaboration ☐ Information Literacy ☐ ICT Literacy		
Interdisciplinary Connections: Science		
Integration of Technology: Calculators, iPads		
Equipment Needed: Calculators, iPads		

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Use right triangle concepts to solve real-world problems • Model real-world situations with right triangles • Justify the choice of trigonometric or Pythagorean methods	Lesson Sequence 1. Homework check reviewing right triangle vocabulary with a warm-up such as "Sketch a right triangle that could represent a ramp rising 3 ft over 12 ft." 2. The teacher models real-world applications of right triangles, using examples such as "Find the height of a kite if the string is 60 m and the angle of elevation is 35°." 3. Class discusses when to apply Pythagorean Theorem versus trigonometry using prompts like "How do you know whether this problem needs trig ratios or $a^2 + b^2 = c^2$?"	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



4. Students rotate through math centers: angle of elevation and depression problems, indirect measurement problems, and modeling everyday objects (ramps, ladders, shadows) using right triangles.
5. The teacher meets with a targeted group to reinforce choosing appropriate strategies and translating verbal descriptions into diagrams.
6. Groups work at vertical whiteboards solving prompts such as "A building casts a 48 ft shadow at a 52° angle of elevation. Find the building's height."
7. Students complete a short independent practice set applying right triangle methods to real-world modeling questions.
8. The teacher leads a class review highlighting common mistakes such as drawing inaccurate diagrams or misidentifying angles.
9. Closure activity where students write one sentence explaining which right triangle strategy they find most useful for real-world problems and why.

Differentiation:

TIndividual or small group facilitation and additional review videos and practice on the iPad.



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Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Right Triangles
Created: 2025	Board Approved on:	



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Probability

Unit Summary: This unit introduces students to the foundational concepts of probability, including theoretical, experimental, and compound probability. Students learn to calculate the likelihood of single and multiple events, interpret probability as a fraction, decimal, or percent, and analyze outcomes using probability models. Lessons emphasize reasoning about independent and dependent events, using tree diagrams, tables, and sample spaces. Students engage in targeted small-group instruction, math centers, and vertical learning activities to reinforce conceptual understanding, problem-solving, and real-world applications of probability. By the end of the unit, students develop the ability to predict outcomes, justify probabilities, and solve problems involving multiple-step probability scenarios.

Primary Interdisciplinary Connections: *Science and Engineering*

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

Unit Rationale: This unit develops students' understanding of chance and uncertainty, enabling them to calculate probabilities, analyze outcomes, and make informed predictions.

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: Mathematics

Content Statements: S



CPI#:	Cumulative Progress Indicator (CPI):
S-ID.A	Summarize, represent, and interpret data on a single count or measurement variable
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.C	Interpret linear models
S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
S-CP.A	Understand independence and conditional probability and use them to interpret data
S-MD.B	Use probability to evaluate outcomes of decisions
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can probability be used to predict outcomes?
- What is the difference between theoretical and experimental probability?
- How does understanding probability help in making decisions?
- How do compound events affect probability calculations?
- How can probability be represented visually and numerically?
- How can probability models be applied to real-world scenarios?
- Why do some events have more likely outcomes than others?

Unit Enduring Understandings:

- Probability measures the likelihood of events occurring.
- Theoretical probability is based on all possible outcomes, while experimental probability is based on actual trials.
- Probability can be represented as fractions, decimals, or percentages.
- Compound events require understanding combinations and independent/dependent relationships.
- Probability is a useful tool for predicting outcomes in uncertain situations.
- Real-world decision making often relies on probabilistic reasoning.
- Probability models can be visualized using diagrams, tables, and simulations.

Unit Learning Targets:

Students will be able to calculate and compare theoretical and experimental probabilities, interpret probability in real-world contexts, and use probability models to predict outcomes. Students will



apply probability rules to independent, dependent, and compound events using multiple representations.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculator, iPads

Teacher Calculator, iPad or laptop

Resources:

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Probability	3 hours/days
Lesson 2 Permutations	3 hours/days
Lesson 3 Combinations	3 hours/days

Teacher Notes:

Students learn to calculate probabilities and understand chance in real-world contexts. Emphasize careful reasoning, listing outcomes systematically, and interpreting results critically.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Probability Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Compute single stage probability • Compute independent probability events • Compute dependent probability	Lesson Sequence 1. Homework check reviewing basic fraction concepts with a warm-up such as "What is the probability of rolling a 3 on a standard number cube?". 2. The teacher models single-stage probability using examples like "What is the probability of drawing a red card from a deck with 20 red and 30 blue cards?". 3. Class discusses the difference between independent and dependent events using prompts such as "How does replacing or not replacing an item change the probability?". 4. Students rotate through math centers:	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



- single-stage spinners and dice, independent events with replacement scenarios, and dependent events using bags of colored tiles.
5. The teacher meets with a targeted group to reinforce converting between ratios, fractions, and decimals when expressing probability.
 6. Groups work at vertical whiteboards solving prompts such as “Two coins are flipped. What is the probability of getting two heads?” and “A card is drawn and not replaced; what is the probability of drawing a second heart?”.
 7. Students complete a short independent practice set including single-stage, independent, and dependent probability problems.
 8. The teacher leads a class review highlighting common mistakes such as mixing up sample space size after non-replacement.
 9. Closure activity where students write one sentence explaining how to tell whether two events are independent or dependent.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.



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Resources Provided:

- Calculators
- iPads



Lesson Plan 2 Template

Content Area: Mathematics Lesson Title: Permutations Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Recognize permutations - Compute permutations - Compute probability of events with permutations	Lesson Sequence - Homework check reviewing factorial notation with a warm-up such as "Evaluate 5!" - The teacher models recognizing permutations using examples like "How many ways can 3 students be arranged in a line from a group of 5?" and explains order sensitivity. - Class discusses why order matters in permutations using prompts such as "Why is selecting president, vice president, and secretary different from choosing a committee of three?" - Students rotate through math centers: identifying permutation scenarios,	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- computing permutations using nPr , and solving probability problems involving ordered arrangements.
5. The teacher meets with a targeted small group to reinforce evaluating factorials and setting up expressions like $P(6, 2)$.
 6. Groups work at vertical whiteboards solving prompts such as “How many 4-digit codes can be made from the digits 1–7 with no repeats?” and checking their reasoning.
 7. Students complete a short independent practice set computing permutations and applying them to probability situations.
 8. The teacher leads a class review highlighting common mistakes such as using combinations when order matters.
 9. Closure activity where students write one sentence explaining how they know when a situation represents a permutation.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Combinations Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Recognize combinations • Compute combinations algebraically • Present combinations graphically as trees • Compute probability of events with combinations	Lesson Sequence 1. Homework check reviewing combination language with a warm-up such as "Is choosing 2 toppings out of 5 a permutation or a combination?" 2. The teacher models combinations using examples like "How many ways can a group of 3 students be selected from a class of 10?" and introduces the nCr formula without overloading notation. 3. Class discusses why order does not matter in combinations using prompts such as "Why are the groups $\{A, B, C\}$ and $\{C, B, A\}$ considered the same outcome?"	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



4. Students rotate through math centers: computing combinations using nCr , representing combinations with tree diagrams, and solving probability problems involving selections where order does not matter.
5. The teacher meets with a targeted small group to reinforce identifying when order matters and how to compute combinations step-by-step.
6. Groups work at vertical whiteboards drawing tree diagrams for scenarios such as "Choose 2 fruits from apples, bananas, grapes, and oranges" and comparing their graphical representations.
7. Students complete a short independent practice set computing combinations and applying them to probability questions.
8. The teacher leads a class review highlighting common errors such as reversing when to use permutations versus combinations.
9. Closure activity where students write one sentence explaining why combinations are used when order does not matter.



Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Probability
Created: 2025	Board Approved on:	



Unit Overview Template

Content Area: Mathematics **Grade Level:** 9-12 **Unit Title:** Statistics

Unit Summary: In this unit, students explore the collection, organization, representation, and interpretation of data. Students work with various types of graphs, including histograms, box plots, and scatterplots, and learn to calculate measures of central tendency (mean, median, mode) and measures of variation (range, interquartile range, standard deviation). Lessons emphasize analyzing data to make informed conclusions and recognize patterns or outliers. Targeted group work, math centers, and vertical whiteboard tasks provide opportunities to practice data analysis, interpret graphical representations, and communicate statistical reasoning. Students develop skills in organizing and interpreting data sets, identifying trends, and applying statistics to real-world problems.

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 teaches students to collect, organize, and interpret data, fostering skills in representing information, identifying patterns, and drawing conclusions from real-world contexts.

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: Mathematics

Content Statements: S

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

S-ID.A Summarize, represent, and interpret data on a single count or measurement variable

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.C Interpret linear models

S-IC.B Make inferences and justify conclusions from sample surveys, experiments, and observational studies

S-CP.A Understand independence and conditional probability and use them to interpret data

S-MD.B Use probability to evaluate outcomes of decisions

SEL.PK-12.2.2 Recognize the skills needed to establish and achieve personal and educational goals.

SEL.PK-12.4.1 Develop, implement and model effective problem-solving, and critical thinking skills.

HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can data be collected, organized, and interpreted effectively?
- What do measures of central tendency reveal about a data set?
- How can measures of variability inform our understanding of data?
- How can graphs and charts best represent different types of data?
- Why is it important to summarize data before drawing conclusions?
- How can statistical reasoning be applied to solve real-world problems?
- What are the limitations of data analysis in representing populations?

Unit Enduring Understandings:

- Organizing data helps reveal patterns and trends.
- Measures of central tendency (mean, median, mode) summarize key characteristics of data.
- Measures of variability (range, interquartile range, standard deviation) indicate spread and consistency.
- Graphical representations provide visual insight into data distribution and relationships.
- Proper data analysis requires critical interpretation and context awareness.
- Statistical reasoning is essential for making informed decisions based on data.
- Limitations in data or collection methods affect the reliability and conclusions of analyses.

Unit Learning Targets:

Students will be able to collect, organize, and represent data using tables, graphs, and charts, calculate and interpret measures of central tendency and variability, and use statistical reasoning to analyze



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and draw conclusions from data. Students will critically evaluate data and communicate findings in clear, accurate ways.



Evidence of Learning

Summative Assessment: 1 day

Equipment Needed: Calculators, iPads

Teacher Resources: Calculators, iPads

Formative Assessments:

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



Lesson Plans

Lesson	Time Frame
Lesson 1 Measures of Central Tendency	3 hours/days
Lesson 2 Graphical Representations of Data	3 hours/days
Lesson 3 Statistics Applications	3 hours/days

Teacher Notes:

Focus on collecting, organizing, and interpreting data, including measures of central tendency and variability. Encourage students to make predictions, draw conclusions, and communicate findings clearly.

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.khanacademy.org/math/>

<http://deltamath.com/>

<https://desmos.com>

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

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



Lesson Plan 1 Template

Content Area: Mathematics Lesson Title: Measures of Central Tendency Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Compute mean of data • Identify median of data • Identify mode of data	Lesson Sequence 1. Homework check reviewing basic number sets with a warm-up such as "Given the data set {4, 7, 7, 9, 10}, identify the mode." 2. The teacher models calculating mean, median, and mode using examples like "Find the mean, median, and mode of the test scores 72, 85, 90, 90, 95." 3. Class discusses when each measure is most useful using prompts such as "Why might the median be more representative than the mean in some situations?" 4. Students rotate through math centers: one	• Homework review • Lesson opener or daily quiz • Guided practice exercises • Closure discussion



- computing mean from small data sets, one identifying median and mode from mixed data, and one adjusting data to change measures (e.g., “What value would you add to change the mean?”)
5. The teacher meets with a targeted small group to reinforce ordering data correctly and using efficient strategies to compute the mean.
 6. Groups work at vertical whiteboards solving prompts such as “Create a data set of five numbers with a mean of 12 and a mode of 8.”
 7. Students complete a short independent practice set identifying all three measures from multiple data sets.
 8. The teacher leads a class review highlighting common mistakes such as forgetting to divide by the number of data points when computing mean.
 9. Closure activity where students write one sentence explaining which measure of central tendency best fits skewed data and why.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators



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- iPads



Lesson Plan 2 Template

Content Area: Mathematics Lesson Title: Graphical Representations of Data Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Interpret and create linear graphs of data - Interpret and create box plots of data - Interpret and create histograms of data	Lesson Sequence - Homework check reviewing coordinate basics with a warm-up such as "Plot the point (4, 7) on the coordinate plane." - The teacher models creating linear graphs from a table using examples like "Graph the relationship shown in the data table of time vs. temperature." - Class discusses how to interpret trends using prompts such as "What does a steeper line tell us about the data shown?" - Students rotate through math centers: one constructing box plots,	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



- one creating histograms from frequency tables, and one interpreting linear graphs with real-world contexts.
5. The teacher meets with a targeted small group to reinforce identifying quartiles and interpreting spread in box plots.
 6. Groups work at vertical whiteboards constructing visual representations for prompts such as "Create a histogram of the number of books read by students in one month."
 7. Students complete a short independent practice set creating and interpreting each type of graph.
 8. The teacher leads a class review highlighting common errors such as unequal bin widths in histograms or misplacing quartiles.
 9. Closure activity where students write one sentence explaining which type of graph best represents large data sets and why.

Differentiation:

Individual or small group facilitation and additional review videos and practice on the iPad.

Resources Provided:

- Calculators
- iPads



Lesson Plan 3 Template

Content Area: Mathematics Lesson Title: Statistics Applications Time Frame: 3 hours/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

Integration of Technology: Calculators, iPads

Equipment Needed: Calculators, iPads

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Read and extract significant data - Compute and present measures of central tendency	Lesson Sequence - Homework check reviewing graph reading skills with a warm-up such as "What is the highest value shown in this line graph?" - The teacher models reading real-world data displays and extracting meaningful information using examples like "Identify the median income from this box plot and describe the spread." - Class discusses how measures of central tendency help summarize data using prompts such as "What does the mean tell us about this situation, and what does it not tell us?"	- Homework review - Lesson opener or daily quiz - Guided practice exercises - Closure discussion



4. Students rotate through math centers: one analyzing real-world data sets, one computing measures of central tendency for provided tables, and one creating short written summaries of findings.
5. The teacher meets with a targeted group to support organizing data, computing accurate means, and interpreting what the measures reveal.
6. Groups work at vertical whiteboards solving prompts such as "Analyze this data set of daily step counts and summarize the most significant trends."
7. Students complete a short independent practice set requiring them to compute measures and interpret what the results mean in context.
8. The teacher leads a class review highlighting common mistakes such as misreading scale values or misplacing data in summaries.
9. The students work through a problem set on biostatistics in small groups.
10. Closure activity where students write one sentence describing how a measure of central tendency can help make a real-world decision.



Differentiation:		
Individual or small group facilitation and additional review videos and practice on the iPad.		
Resources Provided:		
• Calculators • iPads		



Lesson Reflection

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

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

Curriculum Design Template

Content Area: Mathematics	Grade Level: 9-12	Unit Title: Statistics
Created: 2025		Board Approved on:



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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



TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

- Untimed tests
- Read test prompts and directions to student
- Test in alternative site
- Preview test procedures

ACCOMMODATIONS AND MODIFICATIONS FOR ELL STUDENTS

- Explain tests orally
- Explain instructions/directions in writing and orally
- Allow use of bilingual/translation dictionary
- Allow errors in speaking
- Allow errors in writing
- Highlight key vocabulary
- Assess comprehension through demonstration or other alternative means (gestures, drawings)
- Rephrase questions, directions, and explanations
- Provide study guides and outlines
- Allow extended time for test/project completion
- Use of graphic organizers
- Use visuals/pictures throughout the lesson/unit/assignment
- Provide hands-on activities and explanations
- Use of translation dictionaries to locate words in the native language
- Use anecdotal records and a portfolio of work as forms of assessment
- Use story retellings to assess comprehension



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

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

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

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

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

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

BEHAVIOR ACCOMMODATIONS MODIFICATIONS:



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GLOBAL SKILLS**

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



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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



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

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

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

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

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

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



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

Pass/no pass option
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS FOR STUDENTS:

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



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



Cultivating compassionate and extraordinary learners!

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.