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

Geometry

Curriculum Guide

2024

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

*Springfield Board of Education
Approved on August 26, 2024*



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Springfield, New Jersey**

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Unit Overview Template

Content Area: Math	Grade Level(s) : 9 - 10	Unit Title: Tools of Geometry
Unit Summary: Students begin their study of geometry by learning to reason inductively. They will use the undefined terms point, line, and plane in postulates about segments, rays, lines, planes, and angles. Students will learn how to measure segments and angles, and how to use a compass and straightedge to construct geometric figures. Students will apply knowledge to finding areas and the study of solids. Finally, they will find distance on the coordinate plane algebraically and calculate the circumference, perimeter, and area of geometric figures.		
Primary Interdisciplinary Connections: <i>Science and Engineering</i> 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 provide students with the fundamental building blocks for the study of geometry.		
Career Readiness (Standard 9): 9.4.12.CI.1 - Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a). 9.4.12.CT.2 - Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.TL.3 - Analyze the effectiveness of the process and quality of collaborative environments.		

Learning Targets

Standards: G.CO; G.GPE; G.GMD; G.MG	
Content Statements: Experiment with transformations in the plane; Make geometric constructions; Use coordinates to prove simple geometric theorems algebraically; Explain volume formulas and use them to solve problems; Visualize relationships between two-dimensional and three-dimensional objects; Apply geometric concepts in modeling situations.	
CPI#:	Cumulative Progress Indicator (CPI):
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.D.12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.
G.CO.D.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
G.GPE.B.4	Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate



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	plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$.
G.GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
G.GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and limit arguments.
G.GMD.A.2	Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
G.GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
G.GMD.B.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
G.MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
G.MG.A.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
G.MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can inductive reasoning be used to identify patterns and solve problems?
- How can basic geometric figures be described and quantified?
- How can we use simple tools to create simple geometric figures and constructs?

Unit Enduring Understandings:

- Points, lines, and planes are the fundamental building blocks of geometry, from which all geometric figures can be created.
- The set of accepted postulates and proven theorems form the logical basis for the study of geometry and the development of proof.

Unit Learning Targets:

Students will....

- Use inductive reasoning to make conjectures



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- Make isometric drawings, orthographic drawings, and nets of three-dimensional figures
- Identify and understand the basic undefined terms and postulates of geometry
- Identify and name segments, rays, lines, planes, and angles
- Distinguish between skew, parallel, and intersecting lines and segments
- Find the lengths of line segments and measurements of angles
- Classify angles and identify special angle pairs
- Construct congruent segments and angles and bisect segments and angles
- Find the distance between two points and the midpoint of a segment in the coordinate plane
- Find perimeter and area of rectangles, circles, and squares; find areas and volumes of solids
- Climate Change Example: Students may use circles, their measures, and their properties to describe the cross section of a tree and compare changes in radial diameter or circumference variations of tree trunks when considering changes in seasonal weather patterns over time.
- Climate Change Example: Students may apply the concept of population density of different urban areas, including calculations of population density, and discuss different environmental factors (e.g., air and water quality, waste disposal, energy consumption) that might be exacerbated by increased population density.
- Climate Change Example: Students may apply geometric methods to solve design problems such as increasing access to green spaces in cities given physical and cost constraints.



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Evidence of Learning

Summative Assessment: A quiz will be given about halfway through the unit (approximately 5 days). A unit test will be given at the end of the unit (approximately 10 days).

Equipment Needed: Compasses, straightedge, graph paper, textbook, laptops, Geogebra, Desmos

Teacher Resources: Teacher's edition textbook, quizzes, chapter test.

Formative Assessments:

- Homework
- Classwork
- Geogebra assignments
- Exit/entry tickets
- Class participation during discussion
- Desmos Activities



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Lesson Plans

Lesson	Time Frame
Lesson 1 Patterns and Inductive Reasoning	1 class period
Lesson 2 Deriving the Formula for the Area of a Circle	1 class period
Lesson 3 Linking the Distance Formula and the Pythagorean Theorem	1 class period

Teacher Notes: Allow students to explore on Desmos and get proficient in the program.

Curriculum Development Resources/Technology Resources:

http://www.shldirect.com/inductive_reasoning.html

http://www.mathsteacher.com.au/year8/ch12_area/07_circle/circle.htm

<http://filebox.vt.edu/users/wilkerme/MathwithTechnology/geometer.html>

<http://www.desmos.com>

<http://www.geogebra.org>

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

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

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



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Lesson Plan 1 Template

Content Area: Math Lesson Title: Patterns and Inductive Reasoning Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Be able to create sequences using alphanumeric symbols and graphics. - Use inductive reasoning to find the next two terms or figures in a sequence.	Lesson Sequence - Introduce the idea of sequences using several alphanumeric examples and several graphical examples. - Pair off students—each student is to generate 5 sequences, at least one of which must be graphical. - Students trade sequences within each pair and must provide the next two terms of each. - Students then show their partner the solutions they came up with to determine whether they are correct. - As groups finish, they are to work together on a problem set to demonstrate mastery.	- Students respond to verbal prompts during initial discussion. - Circle the room as students are creating sequences to check for understanding. - Talk to each group during the process or after they finish to assess understanding. - Have students present solutions to interesting or unsolved sequences that were created. - Collect problems set to assess mastery.



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- | | | |
|--|---|--|
| | 6. Any unsolved sequences are then presented to the class who must work together to find solutions. | |
|--|---|--|

Differentiation:

Students may be paired so that they are working with partners at similar ability levels. Problem sets may be modified to address the needs of individual learners. Provide additional scaffolded examples of sequences.

Resources Provided:

- Sample sequences
- Problem set



Lesson Plan 2 Template

Content Area: Math Lesson Title: Deriving the Formula for the Area of a Circle Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Derive the formula for the area of a circle. - Use the formula for area of a circle to calculate the area of given figures.	Lesson Sequence - Using the compass, draw a circle of radius 7 cm. Then mark the circle's center and draw its radius. - Place the center of the protractor at the center of the circle and the zero line along the radius. Then mark every 30° around the circle. - Using a ruler and a pencil, draw lines joining each 30° mark to the center of the circle to form 6 diameters. - Color the top six segments one color and the bottom six another color.	- Creation of parallelogram from segmented circle. - Students will recall the formula for the area of a parallelogram. - Students are able to explain why the base of the parallelogram is equal to half the diameter. - Completion of problem set.



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5. Cut out the circle and then cut along the diameters so that all parts (i.e. sectors) are separated.
6. Arrange all of the sectors to make a shape that approximates a parallelogram.
7. Lead discussion that relates base and height of the parallelogram to the circle that enables students to discover the formula for area of a circle.
8. Students then complete a problem set to show application of the formula.

Differentiation:

Some students may be allowed to work in small groups if necessary. Modify the task by having sectors prepared ahead of time.

Resources Provided:

- Problem set
- Scissors, protractor, compass



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Lesson Plan 3 Template

Content Area: Math Lesson Title: The Distance Formula Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Find the distance between two points using the Distance Formula and the Pythagorean Theorem. - Relate the Pythagorean Theorem to the Distance Formula.	Lesson Sequence - Students will place two points on a grid on Desmos and create a right triangle. - Students will use Desmos to measure the length of the segment connecting two original points. - Students will use Pythagorean Theorem to confirm length. - Teacher will use guided questioning about how students arrived at lengths for sides of the triangle to have students reach the conclusion that lengths of the sides are $(x_2 - x_1)$ and $(y_2 - y_1)$. - Teacher will use guided questioning to have students ultimately	- Students plot points and measure distance using Desmos. - Students use Pythagorean Theorem to calculate distance. - Students are able to explain how they figured out the lengths of triangle's sides. - Students are able to connect Pythagorean Theorem and Distance Formula.



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derive the Distance
Formula

Differentiation:

Some students may be allowed to work in groups if necessary. The teacher can prepare a Desmos activity to scaffold the task.

Resources Provided:

- Desmos.com
- Calculators
- Examples at <http://filebox.vt.edu/users/wilkerme/MathwithTechnology/geometer.html>



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Lesson Reflection

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

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

Curriculum Design Template

Content Area: Math	Grade Level: 9-10	Unit Title: Tools of Geometry
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level(s) :** 9-10 **Unit Title:** Modeling with Geometry: Reasoning and Proof

Unit Summary: Students are introduced to the concept of proof—both formal and informal, which is a fundamental part of the study of geometry. Students will learn how to write conditional and biconditional statements as well as strong definitions. The use of deductive reasoning is introduced and is used to link geometry with algebra. Students will conclude the unit by studying elementary proofs in order to form their first significant conclusions about geometric 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 will introduce students to the language of proof and establish the connection between geometry and algebra.

Career Readiness (Standard 9):

9.4.12.CI.1 - Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).

9.4.12.CT.2 - Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

9.4.12.TL.3 - Analyze the effectiveness of the process and quality of collaborative environments.

Learning Targets

Standards: G.CO

Content Statements: Prove geometric theorems.

CPI#:	Cumulative Progress Indicator (CPI):
G.CO.C.9	Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.
G.CO.C.10	Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.
G.CO.C.11	Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.



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SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How are basic logical and geometric statements written?
- How are geometric proofs developed?
- How are geometry and algebra connected?

Unit Enduring Understandings:

- Proof is fundamental to the study of mathematics—without it, there is no certainty in any results that are achieved.
- Algebra and geometry are inexorably linked—reasoning from one is applicable in many ways to the other.

Unit Learning Targets:

Students will....

- Write and recognize conditional and biconditional statements
- Write the converse, inverse, and contrapositive of a conditional statement
- Differentiate between good and bad definitions
- Use the Law of Detachment and the Law of Syllogism to draw conclusions
- Connect geometric and algebraic reasoning to solve problems
- Write basic geometric proofs
- Prove and apply theorems about angles

Evidence of Learning

Summative Assessment: A quiz will be given about halfway through the unit (approximately 5 days). A unit test will be given at the end of the unit (approximately 10 days).

Equipment Needed: Textbook, laptops, Geogebra, markers

Teacher Resources: Teacher's edition textbook, quizzes, chapter test

Formative Assessments:

- Homework
- Classwork
- Geogebra assignments
- Class participation during discussion
- Exit/entry tickets



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Lesson Plans

Lesson	Time Frame
Lesson 1 Conditional Statements	2 class periods
Lesson 2 Vertical Angles	1 class period
Lesson 3 Laws of Detachment and Syllogism	1 class period

Teacher Notes: Ensure students understand the theorems fully.

Curriculum Development Resources/Technology Resources:

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

http://ritter.tea.state.tx.us/math/training/materials/MTR/9-12/lessons/geometry1_2.pdf

<http://www.desmos.com>

<http://www.geogebra.org>

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

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

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



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Lesson Plan 1 Template

Content Area: Math Lesson Title: Conditional Statements Time Frame: 2 class periods

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Be able to identify the vocabulary that is used in writing logical statements. - Be able to deduce the truth value of converses, inverses, and contrapositives - Be able to write their own conditional statements.	Lesson Sequence - Introduce the new vocabulary: conditional statement, converse, inverse, contrapositive, counterexample, biconditional statement, hypothesis, conclusion, and negation. - Divide students into groups of 3 or 4 and have them work through the Conditionals activity sheet. - Bring the class together to discuss the statements and the solutions. - Students then work in teams to create their own Conditional Statement Books which they will present to the class.	- Students respond to verbal prompts during initial discussion. - Students complete the problem set, showing a mastery of the basic concepts - Students participate in discussion of Internet work - Students create Conditional Statement Books - Students present their work and are able to answer questions pertaining to it



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Differentiation:

Students may be paired so that they are working with partners at similar ability levels. Some groups may be asked to complete shorter books than others as necessary. Alternatively, pre-made books can be scaffolded.

Resources Provided:

- Web-based problem set / Conditional Statement Book
- Google Docs



Lesson Plan 2 Template

Content Area: Math Lesson Title: Vertical Angles Time Frame: 1 day

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Learn how to measure angles using a protractor. - Make conjectures about the measurements of vertical angles. - Use technology to verify their conjectures. - Apply their findings to problems that integrate algebra and geometry.	Lesson Sequence - Prior to activity, the teacher demonstrates for the class how to use a protractor. - Students work in groups of 3. Ask each student to use a ruler to draw an “X” on their paper—leave the “width” of the X up to the students. - Students then pass their X to another person in their group, and each group member uses a protractor to measure each angle in the X they received. - When measurement is complete, ask students what the relationship between angles that are	- Each student successfully uses a protractor to measure angles. - Student groups arrive at the appropriate conjecture about vertical angles. - Students are able to verify their conjectures using Geogebra. - Students successfully complete the problem set.



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“across” from each other in the X appears to be.

5. Students then repeat the activity using Desmos to verify that the angles across from each other have equal measurements.
6. Students finish the activity by completing a problem set that makes them integrate algebra and their new knowledge of vertical angles.

Differentiation:

Problem set may be modified to accommodate students with different needs.

Resources Provided:

- Problem set
- Ruler, protractor
- Desmos.com



Lesson Plan 3 Template

Content Area: Math Lesson Title: Law of Detachment and Law of Syllogism Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Use the Laws of Detachment and Syllogism to solve problems.	Lesson Sequence - Break students into groups of five—one detective and four suspects. - Each suspect is given three statements—three of the suspects will have logically sound alibis for a crime; the fourth will have a statement that violates one of the two laws being studied. - The detective will question each suspect and have to determine which suspect is actually guilty of the crime. - Repeat the process with varying answers until each person in the group	- Each student deduces the guilty party when they are playing the role of the detective. - Students are able to successfully complete the problem set.



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has had a chance to be the detective.

5. Follow up with a problem set that requires students to use the Law of Detachment and Law of Syllogism.

Differentiation:

Break down the problem set into smaller chunks with additional resources.

Resources Provided:

- Questions and answers for detective game, follow-up problem set.



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Lesson Reflection

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

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

Curriculum Design Template

Content Area: Math
Reasoning and Proof

Grade Level: 9-10

Unit Title: Modeling with Geometry:

Created: 2024

Board Approved on:



Unit Overview Template

Content Area: Math **Grade Level(s) :** 9-10 **Unit Title:** Similarity, Parallel and Perpendicular Lines

Unit Summary: Students complete a rigorous study of parallel and perpendicular lines as well as similar figures. They begin by learning the basic properties of each, which will ultimately allow them to prove lines either parallel or perpendicular. Students will then apply their knowledge of parallel lines to prove and apply the Triangle-Sum and Polygon Angle-Sum Theorems. The unit continues with the study of parallel and perpendicular lines in the coordinate plane and the construction of parallel and perpendicular lines using the tools known in antiquity. Similar figures will then be explored, leading to derivations of trigonometric ratios and equations.

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: Properties of parallel lines and perpendicular lines, similar figures, and trigonometry are fundamental to the study of geometry and all other fields of mathematics.

Career Readiness (Standard 9):

9.4.12.CI.1 - Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).

9.4.12.CT.2 - Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

9.4.12.TL.3 - Analyze the effectiveness of the process and quality of collaborative environments.

Learning Targets

Standards: G.SRT; G.GPE

Content Statements: Understand similarity in terms of similarity transformations; Prove theorems involving similarity; Define trigonometric ratios and solve problems involving right triangles; Apply trigonometry to general triangles; Use coordinates to prove simple geometric theorems algebraically.

CPI#:	Cumulative Progress Indicator (CPI):
G.SRT.A.1	Verify experimentally the properties of dilations given by a center and a scale factor: - A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. - The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
G.SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all



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	corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
G.SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
G.SRT.B.4	Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.
G.SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
G.SRT.C.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
G.SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
G.SRT.D.9	Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
G.SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.
G.SRT.D.11	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).
G.GPE.B.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
G.GPE.B.6	(+) Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- What are the major properties of parallel and perpendicular lines?
- How can the properties of parallel and perpendicular lines be applied to coordinate geometry?
- How do the properties of parallel lines lead to the development of the Triangle Sum Theorem and ultimately the Polygon Angle-Sum Theorem?
- What are similar figures?
- What is meant by scale factor?



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Unit Enduring Understandings:

- Parallel lines are two lines in a plane that never meet, and when intersected by a transversal, form sets of angles that have specific relationships to one another.
- The sum of the interior angles of a triangle is 180° --a fact that can be used to develop theorems about more complex geometric figures
- Similar figures are figures with corresponding angles congruent and corresponding sides in proportion

Unit Learning Targets:

Students will....

- Identify and classify angles formed by two parallel lines and a transversal.
- Prove and use properties of parallel lines.
- Classify triangles and find the measures of their angles.
- Solve problems involving exterior angles of triangles.
- Classify and find the sums of interior and exterior angles of polygons.
- Graph lines in the coordinate plane given their equations.
- Write equations of lines.
- Classify lines as parallel, perpendicular, or neither based on their slopes.
- Construct parallel and perpendicular lines.



Evidence of Learning

Summative Assessment: A quiz will be given about halfway through the unit (approximately 5 days). A unit test will be given at the end of the unit (approximately 10 days).

Equipment Needed: Textbook, laptops, Geogebra, markers

Teacher Resources: Teacher's edition textbook, quizzes, chapter test.

Formative Assessments:

- Homework
- Classwork
- Geogebra assignments
- Class participation during discussion
- Exit/entry tickets



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Lesson Plans

Lesson	Time Frame
Lesson 1 Parallel Lines and Related Angles	1 class period
Lesson 2 Polygon Interior Angle-Sum Theorem	1 class period
Lesson 3 Parallel and Perpendicular Lines	1 class period

Teacher Notes: Students will need to recall slope-intercept form of a line from Algebra 1. They will also need to review using slope-intercept form to generate the graphs of lines. Students' ability level to recall this information will vary, but this skill is extremely important and should not be in any way minimized.

Curriculum Development Resources/Technology Resources:

<http://www.desmos.com>

<http://www.geogebra.org>

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

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

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

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



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Lesson Plan 1 Template

Content Area: Math Lesson Title: Parallel Lines and Related Angles Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop, graph paper

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Be able to create two parallel lines and a transversal using Desmos and Geogebra. • Be able to measure angles using Desmos and Geogebra. • Be able to verbalize the properties of angles formed by two parallel lines and a transversal based on their observations.	Lesson Sequence 1. Introduce the following terms: alternate interior angles, alternate exterior angles, corresponding angles, and same-side interior angles. Work through a few problems where students simply identify angles by type. 2. Demonstrate for students creating lines and measuring angles using Geogebra. 3. Present students with the purpose of the lesson—to discover properties of angles formed by two parallel lines and a transversal. Give students a Desmos that simply reads: Alternate Interior	• Students are able to respond to questions after terms are introduced. • Students are able to create lines and measure angles using Geogebra. • Students complete the fill-in-the-blank rules for the angles. • Students compare answers with partners. • Students present their work to the class.



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Angles _____,
etc. and instruct them
that they will need to fill
in the blanks based on
what they find using
Geogebra.

4. Instruct students to use Geogebra to create two parallel lines and a transversal. They are to measure each angle and try to determine the relationships. Students should move the transversal to ensure that properties do not change when the transversal is moved.
5. Students then compare with a partner and present their findings to the class.

Differentiation:

Students may be paired so that they are working with partners at similar ability levels. Vary the given information on Desmos.

Resources Provided:

- Desmos and Geogebra activity



Lesson Plan 2 Template

Content Area: Math Lesson Title: Polygon Interior Angle-Sum Theorem Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop, graph paper

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Apply the triangle sum theorem to solve more complex problems. • Make a conjecture/develop a theorem about the interior angles of any polygon. • Use their conjecture to solve application problems.	Lesson Sequence 1. Prior to the activity, the teacher reviews the Triangle-Sum Theorem. Students complete an entry ticket to ensure mastery of the topic. 2. Divide the class into groups of 2 or 3. Each member of a group will be asked to draw a polygon with a certain number of sides on Geogebra (from 4-12 sides or so). Each group will be assigned a different number of sides. 3. Task the groups to find the largest number of non-overlapping triangles that they can create by drawing in the	• Groups find the appropriate numbers of triangles in their polygon. • Groups are able to identify the relationship between the number of sides and the number of triangles. • Groups can make the connection between the number of triangles and sum of interior angles. • Students successfully complete the problem set.



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diagonals of their polygons.

4. After students have had time, lead a discussion with students offering how many triangles they were able to find. Students should present diagrams by drawing on board or utilizing Desmos.
5. Once each group has presented their diagrams, have students make conjectures relating the number of triangles to the number of sides in the polygon.
6. Once students have correctly identified the relationship, have them present conjectures regarding the sum of the interior angles of each polygon.
7. Students demonstrate their mastery of the topic by completing a problem set or exit ticket with problems that ask them to apply their learnings

Differentiation:

Problem set may be modified to accommodate students with different needs by using Desmos to help guide students.

Resources Provided:

- Problem set
- Ruler, protractor
- Calculators
- Desmos activity



Lesson Plan 3 Template

Content Area: Math Lesson Title: Parallel and Perpendicular Lines Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop, graph paper

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Determine the relationship between slopes of lines and whether the lines are parallel, perpendicular, or neither.	Lesson Sequence - Review how to use the slope-intercept form to graph a line. Ensure students have mastery. - Each student is given a list of 5 lines to graph, each on the same graph. Two of the lines should be parallel to each other and two should be perpendicular. The 5th line will be neither parallel nor perpendicular to any of the other lines. Teacher circles about the room as students complete this task. - Once students have finished, students are asked to write the equations of the two lines	- Each student is able to graph lines. - Students are able to identify the parallel lines and the perpendicular lines from their group of 5 equations. - Students are able to make conjectures about slopes of parallel and perpendicular lines. - Students are able to complete problem sets.



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- in their set that are parallel on the board.
4. Students are then asked to study the pairs that are parallel and come up with a conjecture about the slopes of parallel lines.
 5. Repeat steps 3 and 4 for perpendicular lines.
 6. Students follow up their learning by completing a problem set that asks them to identify and generate equations for parallel and perpendicular lines.
 7. Students demonstrate their findings on Desmos.

Differentiation:

Problem sets may be modified for different ability levels, e.g. additional examples given for analysis.

Resources Provided:

- Sets of 5 lines (all different) for each student.
- Graph paper and rulers.
- Desmos activity



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Lesson Reflection

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

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

Curriculum Design Template

Content Area: Math **Grade Level:** 9-10 **Unit Title:** Similarity, Parallel and Perpendicular Lines

Created: 2024

Board Approved on:



Unit Overview Template

Content Area: Math	Grade Level(s) : 9 - 10	Unit Title: Congruence
Unit Summary: Students learn what is meant by congruent figures. Armed with this knowledge, they begin a comprehensive study of congruent triangles involving both problems that link algebra to geometry and problems that further develop their abilities to write correct geometric proofs. Students apply their knowledge of congruence to the study of isosceles and equilateral triangles and are able to solve problems involving corresponding parts of congruent triangles. Students will work with congruent shapes in the context of transformations.		
Primary Interdisciplinary Connections: <i>Science and Engineering</i> 21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ ICT Literacy ☐ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy		
Unit Rationale: The study of congruent figures allows for the further development of the linkage between algebra and geometry, and the further development of students' ability to reason through proofs.		
Career Readiness (Standard 9): 9.4.12.CI.1 - Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CT.2 - Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.TL.3 - Analyze the effectiveness of the process and quality of collaborative environments.		

Learning Targets

Standards: G.CO	
Content Statements: Experiment with transformations in the plane; Understand congruence in terms of rigid motion	
CPI#:	Cumulative Progress Indicator (CPI):
G.CO.A.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
G.CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
G.CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
G.CO.A.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
G.CO.B.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.



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G.CO.B.7	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
G.CO.B.8	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.

Unit Essential Questions:

- What is meant by congruent figures and what properties do congruent figures have?
- What methods can be used to prove two triangles are congruent?
- If two figures are congruent, how can we apply this knowledge to solve problems regarding the dimensions and angle measurements of the figures?

Unit Enduring Understandings:

- Two figures are congruent if and only if all sides and angles of one figure are congruent to all sides and angles of the second figure.
- There are “shortcuts” to proving two triangles are congruent. These shortcuts can be used to write efficient geometric proofs.

Unit Learning Targets:

Students will....

- Recognize congruent figures and their corresponding parts.
- Prove two triangles congruent using SSS, SAS, ASA, AAS and HL postulates/theorems.
- Use and apply the properties of isosceles and equilateral triangles.
- Use properties of congruence to solve problems involving corresponding parts of congruent triangles.
- Identify congruent overlapping triangles.
- Prove two triangles congruent by first proving two other triangles congruent.



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Evidence of Learning

Summative Assessment: A quiz will be given about halfway through the unit (approximately 5 days). A unit test will be given at the end of the unit (approximately 10 days).

Equipment Needed: Textbook, laptops, Geogebra, markers

Teacher Resources: Teacher's edition textbook, quizzes, chapter test.

Formative Assessments:

- Homework
- Classwork
- Geogebra assignments
- Class participation during discussion
- Exit/entry tickets



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Lesson Plans

Lesson	Time Frame
Lesson 1 Building Congruent Triangles	1 class period
Lesson 2 Exploring AAA and SSA	1 class period
Lesson 3 Writing Formal Proofs	1 class period

Teacher Notes: Ensure students understand which congruence shortcuts work and which do not, and why.

Curriculum Development Resources/Technology Resources:

<http://www.desmos.com>

<http://www.geogebra.org>

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

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

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

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



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Lesson Plan 1 Template

Content Area: Math Lesson Title: Building Congruent Triangles Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop, tracing paper

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Create triangles with given side lengths. • Make conjectures regarding SSS and SAS postulates for congruent triangles.	Lesson Sequence 1. Split the class into groups of two. Provide each group with two sets of paper strips. 2. Students use the paper strips to create a triangle on top of tracing paper. They mark the vertices and then connect them with a ruler. 3. Students then try to match up their triangle with their partner's. Each group is asked to show whether or not they were able to match up the two triangles. 4. Students then make a conjecture about what seems to be true about two triangles where the three sides in one triangle	• Students are able to form triangles on the tracing paper. • Students present their findings to the class. • Students formulate conjectures about both sets of triangles. • Students successfully complete the exit ticket.



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are congruent to the three sides in the other triangle.

5. Still working in pairs, one student draws an angle and measures the legs and the angle. Students write down measurements and pass them to their partner who draws the same angle. Both students then connect the ends of the legs and compare the triangles they have created.
6. Students then make a conjecture about what seems to be true about two triangles where two sides and the included angle are congruent.
7. Students verify their conjectures through a Geogebra and Desmos activity.
8. Students work on an exit ticket that has them identify which pairs of triangles they can conclude are congruent.

Differentiation:

Desmos activity can include more scaffolded analysis. Exit tickets may be modified to accommodate students with varying ability levels.

Resources Provided:

- Strips of paper
- Tracing paper, ruler, protractor.
- Desmos activity



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Lesson Plan 2 Template

Content Area: Math Lesson Title: Exploring AAA and SSA Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Explore the inability to use AAA and SSA to prove triangles congruent. - Identify triangle pairs that are congruent.	Lesson Sequence - Students use Geogebra and Desmos to construct angle BAC, then connect AC to make a triangle. Inside the triangle, construct DE so that it is parallel to BC. - Students then measure the angles of ABC and ADE. Students then move BC and DE, but keep them parallel and then remeasure angles. - Students then make a conjecture about the AAA rule for congruence. - Students then use Geogebra to construct circle C with secant AB and connect A and C. Students then create radius CE.	- Students are able to use Geogebra to create the appropriate figures. - Students are able to make appropriate conjectures about AAA and SSA “rules” for congruence. - Students successfully complete the exit ticket.



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5. Students locate E in the two places where AB intersects the circle and take measurements of the sides and angles of the triangle.
6. Each group shares their results with the class.
7. Students then make a conjecture about SSA rule for congruence.
8. Students demonstrate their mastery of the topic by completing a problem set or exit ticket with problems that ask them to apply their learnings

Differentiation:

Prepare a scaffolded Desmos activity. Exit tickets may be modified to accommodate students with varying ability levels.

Resources Provided:

- Desmos activity
- Exit ticket



Lesson Plan 3 Template

Content Area: Math Lesson Title: Writing Formal Proofs Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop, protractors

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Be able to write proofs using the flow proof format in addition to the traditional two column proof.	Lesson Sequence - Provide students with a completed two column proof for either triangle congruence or CPCTC. - Assign small groups to rewrite the two column proof as a flow proof, then review as a class. - Provide students with another completed proof and have them work in groups to convert it to a flow proof. - Students present work to the class. - Students then are given a set of proof problems to complete using the flow proof format using Desmos. - Students share work with the class.	- Students are able to convert two column proofs to flow proofs. - Students are able to complete proofs in flow proof format.



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Differentiation:

Problem sets may be modified for different ability levels. The Desmos activity can be scaffolded.

Resources Provided:

- Desmos Activity



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Lesson Reflection

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

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

Curriculum Design Template

Content Area: Math	Grade Level: 9-10	Unit Title: Congruence
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level(s) :** 9- 10 **Unit Title:** Circles and Conics

Unit Summary: Students will build on their knowledge of circles by studying properties of tangents, secants, chords, and arcs. They will prove properties of tangents and establish properties of chords and their relationships with arcs. Then they will study angles formed by chords, tangents, and secants, the relationships among segments of intersecting chords, tangents, and secants. Students will use coordinate geometry to describe the standard form of an equation of a circle and apply the concept of locus to the geometry they have studied up to this point. Students will study other conic shapes such as parabolas, ellipses, and hyperbolas.

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: In this unit students will learn how to apply properties of tangents, secants, chords, and arcs of circles. They will also learn how to apply coordinate geometry to describe the standard form of an equation of a circle, parabola, ellipse, and hyperbola.

Career Readiness (Standard 9):

9.4.12.CI.1 - Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

9.4.12.CT.2 - Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

9.4.12.TL.3 - Analyze the effectiveness of the process and quality of collaborative environments.

Learning Targets

Standards: G.C; G.GPE

Content Statements: Understand and apply theorems about circles; Find arc lengths and areas of circles; Translate between the geometric description and the equation for a conic section.

CPI#:	Cumulative Progress Indicator (CPI):
G.C.A.1	Prove that all circles are similar.
G.C.A.2	Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.
G.C.A.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
G.C.A.4	Construct a tangent line from a point outside a given circle to the circle.
G.C.B.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
G.GPE.A.1	(+) Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.



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SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.

Unit Essential Questions:

- What are the properties of circles and of lines and segments that intersect circles?
- When these lines and segments meet to form angles, how are the angles related to the arcs they intercept on the circle?

Unit Enduring Understandings:

- Students will get an understanding about tangents, secants, chords, arcs, and angles they form.
- Students will learn how to write an equation of a circle knowing its center and its radius.

Unit Learning Targets:

Students will....

- Use the relationship between a radius and a tangent
- Use the relationship between two tangents from one point
- Use congruent chords, arcs, and central angles
- Recognize properties of lines through the center of a circle
- Find the measure of an inscribed angle
- Find the measure of an angle formed by a tangent and a chord
- Find the measure of angles formed by chords, secants, and tangents
- Find the lengths of segments associated with circles
- Find the center and radius of a circle



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Evidence of Learning

Summative Assessment: A quiz will be given about halfway through the unit (approximately 5 days). A unit test will be given at the end of the unit (approximately 10-11 days).

Equipment Needed: Compasses, straightedge, graph paper, textbook, laptops, Desmos, Geogebra

Teacher Resources: Teacher's edition textbook, quizzes, chapter test.

Formative Assessments:

- Homework
- Classwork
- Desmos assignments
- Class participation during discussion
- Exit/entry tickets
- Group work assignments



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Lesson Plans

Lesson	Time Frame
Lesson 1 Tangent Lines	1 class period
Lesson 2 Inscribed Angles	1 class period
Lesson 3 Angle Measurement and Segment Lengths	1 class period

Teacher Notes: Allow students ample time to discover the difference between the conic equations. Allow them to use the software “Grapher” on their laptops or Desmos for this.

Curriculum Development Resources/Technology Resources:

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

<http://www.desmos.com>

<http://www.geogebra.org>

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

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

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

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



Lesson Plan 1 Template

Content Area: Math Lesson Title: Tangent Lines Time Frame: 1 period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Be able to use the relationship between a radius and a tangent. - Be able to use the relationship between tangents from one point.	Lesson Sequence - Introduce students to a tangent to a circle and a point of tangency. - Break students into small groups. Ask each group to use Geogebra to draw a circle and a tangent to it. - Students will be asked to draw a radius from the center of the circle to the point of tangency. - Students will be asked to measure the angle formed by the tangent and the radius. They will share the results via Desmos and make a conjecture. - Ask students to work together on a problem set to demonstrate mastery.	- Students respond to verbal prompts during initial discussion. - Circle the room as students are working to check for understanding. - Talk to each group during the process or after they finish to assess understanding. - Collect problem set to assess mastery.



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Differentiation:

Students may be grouped so that they are working with partners at similar ability levels. Problem sets may be modified to address needs of individual learners e.g. students will be asked to find the length of the radius of a circle inscribed in an equilateral triangle with sides of length s .

Resources Provided:

- Problem set
- Rulers
- Compasses
- Desmos



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Lesson Plan 2 Template

Content Area: Math Lesson Title: Inscribed Angles Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Find the measure of an inscribed angle. - Find the measure of an angle formed by a tangent and a chord.	Lesson Sequence - Students will be working in pairs on the Desmos activity. - Students will be asked to use Geogebra to draw two large circles and label the centers X and Y. - On the circles, they will need to copy the given diagram. This diagram shows different inscribed angles. - In circle X, students will be asked to measure angle AXB and each numbered angle. They will be asked to measure arc AB. They will need to record results and look for the pattern.	- Students respond to verbal prompts during initial discussion. - Circle the room as students are working to check for understanding. - Talk to each pair during the process or after they finish to assess understanding. - Collect problem set to assess mastery.



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5. Students will be asked to compare the results with others.
6. Students will be asked to do similar activities for circle Y.
Students will be asked to write a conjecture about an angle whose vertex is on a circle and whose sides intersect the endpoints of a diameter of the circle.
7. Ask students to develop a definition of an inscribed angle. Introduce the Inscribed Angle Theorem.
8. Introduce students to Corollaries to the Inscribed Angle Theorem. Show some examples.
9. Ask students to complete Exit Card problems.

Differentiation:

Allow students who need it to use colored pencils to trace intercepted arcs from one endpoint to the other. This will help them to identify arcs intercepted by inscribed angles, especially when several chords are shown.

Advanced Learners: students will use a right triangle inscribed in a circle to prove that the median draw to the hypotenuse of a right triangle forms two isosceles triangles

Resources Provided:

- Problem set
- Rulers
- Compasses and protractors
- Desmos activity



Lesson Plan 3 Template

Content Area: Math Lesson Title: Angle Measurements and Segment Lengths Time Frame: 1 class period

Lesson Components

21st Century Themes

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

21st Century Skills

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

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Desmos, Geogebra

Equipment Needed:

Paper, pencil, smartboard, laptop, compass, protractor

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Be able to find the measures of angles formed by chords, secants, and tangents. - Be able to find the lengths of segments associated with circles.	Lesson Sequence - Introduce students to a definition of a secant and show some examples via Desmos. - Students will be working in small groups. They will be asked to use Geogebra and draw two circles X and Y. - Students will be asked to draw two intersecting secants and measure the angles they form and the intercepted arcs. - Students will be asked to change the secants' positions and do the same measurements again.	- Students respond to verbal prompts during initial discussion. - Circle the room as students are working to check for understanding. - Talk to each group during the process or after they finish to assess understanding. - Collect problem set to assess mastery.



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5. Students will be asked to compare the results and make a conjecture.
6. Students will be asked to work with circle Y, construct two secants, and measure the segments according to the given diagram. Multiply the segments and discover the pattern.
7. Students will then solve an example problem set.

Differentiation:

Students may be grouped so that they are working with partners at similar ability levels. Create the Desmos activity to help scaffold, e.g. students can work with secants to access prior knowledge.

Resources Provided:

- Rulers
- Compasses
- Desmos activity



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Lesson Reflection

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

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

Curriculum Design Template

Content Area: Math	Grade Level: 9-10	Unit Title: Circles and Conics
Created: 2024	Board Approved on:	



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

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

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



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GLOBAL SKILLS**

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

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

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

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

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

BEHAVIOR ACCOMMODATIONS MODIFICATIONS:



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GLOBAL SKILLS**

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



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GLOBAL SKILLS

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

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



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

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

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

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

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

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



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GLOBAL SKILLS**

Pass/no pass option

Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS FOR STUDENTS:

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



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GLOBAL SKILLS

Accommodations and Modifications for ESL Students

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

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

Mission Statement

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

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

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

Goals:

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

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

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

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

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

Early Childhood Center **Edward V. Walton**

Schoolwide Virtual Enrichment

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

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

Gifted and Talented Teacher as a Resource

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

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

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

Enrichment Experience Grade 3

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

Targeted Gifted and Talented Programing Grades 4-5

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

Strategies and Practices that Support Gifted and Talented Students

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

Schoolwide Virtual Enrichment

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

Gifted and Talented Teacher as a Resource

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

Additional Enrichment Opportunities

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

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

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

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

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

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

Gifted and Talented Identification Criteria

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

Multiple Measures of Eligibility

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

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

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

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

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

Procedures

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

Gifted and Talented Program Identification Matrix

Minimum Score Required for Consideration: 14 Points

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

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

Resource Links

https://riversideinsights.com/cognitive_abilities_test

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

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

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

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

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

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

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

NJDOE Fast Facts

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

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

Supplemental Resources/Programming for Gifted Students

Edward V. Walton

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

James Caldwell and Thelma L. Sandmeier

Math/ELA

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

STEM

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

Enrichment Events

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