



Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:

Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

Curriculum Development Timeline

School: Ocean Township High School

Course: Pre-AP Geometry

Department: Mathematics

Board Approval	Supervisor	Notes
February 2012	Janet Bluefield	Born Date
August 2017	Nichole Kerney	Revisions
March 2019	Nichole Kerney	Review
August 2022	Gerard Marrone	Alignment to Standards
August 2025	Greg Colon	Course aligned to the Pre-AP Framework
August 2026	Greg Colon	Alignment to Standards & Revision

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COURSE: Pre AP Geometry

Township of Ocean Pacing Guide			
Week	Marking Period 1	Week	Marking Period 3
1	Line Segments & Angles 2.1-2.3	21	Equations of Circles 3.6
2	Line Segments & Angles 2.1-2.3	22	Equations of Circles 3.6
3	Line Segments & Angles 2.1-2.3	23	Circle Relationships and Measurement 3.7-3.8
4	Measuring Coordinate Distance 2.1-2.3	24	Circle Relationships and Measurement 3.7-3.8
5	Parallel & Perpendicular Lines 2.4	25	Circle Relationships and Measurement 3.7-3.8
6	Parallel & Perpendicular Lines 2.4	26	Surface Area 4.1
7	Triangle Similarity 2.7	27	Surface Area 4.1
8	Triangle Similarity 2.7	28	Volume of Solids 4.2
9	Measurement in Right Triangles/Trigonometric Ratios 2.7	29	Volume of Solids 4.2
10	Measurement in Right Triangles/Trigonometric Ratios 2.7	30	Volume of Solids 4.2
Week	Marking Period 2	Week	Marking Period 4
11	Measurement in Right Triangles/Trigonometric Ratios 2.8-2.9	31	Organizing & Displaying Data 1.1-1.2
12	Measurement in Right Triangles/Trigonometric Ratios 2.8-2.9	32	Describing & Comparing Data Distributions 1.3-1.4
13	Transformations & Rigid Motions 3.2-3.3	33	Describing & Comparing Data Distributions 1.3-1.4

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14	Transformations & Rigid Motions 3.2-3.3	34	Modeling Data with Functions and Normal Distribution 1.5-1.6
15	Transformations & Rigid Motions 3.2-3.3	35	Modeling Data with Functions and Normal Distribution 1.5-1.6
16	Transformations & Rigid Motions 3.4	36	Probability - Chance Events 1.7-1.11
17	Congruence & Similarity Through Transformation 3.5	37	Probability - Chance Events 1.7-1.11
18	Congruence & Similar Polygons	38	Probability - Chance Events 1.7-1.11
19	Congruence & Similar Polygons	39	Probability - Chance Events 1.7-1.11
20	Congruence & Similar Polygons	40	Measurement in Data: Inferences from Data 1.12
		41	Measurement in Data: Inferences from Data 1.12

Core Instructional & Supplemental Materials including various levels of Texts

Core Instruction: Cengage Big Ideas Learning Geometry ©2022 and College Board Pre-AP Geometry with Statistics Framework

Supplemental: IXL Math, NJSLA Released Questions, Desmos

Special Education and ELL Supplemental: [BigIdeasMath.com](https://www.bigideasmath.com) and IXL

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COURSE: Pre AP Geometry

Time Frame	3 cycles ~ 9 (56 minute) days
Topic	
Line Segments & Angles	
Alignment to Standards	
G.CO.A.1 — Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment. G.CO.C.9 — Prove theorems about lines and angles.	
Learning Objectives and Activities	
SWBAT answer the following questions: • What is the difference between a line, ray, and line segment? • How do I correctly use notation and symbols when labeling lines, rays, and segments? • What is the difference between acute, right, obtuse, and straight angles? • What does it mean for two segments or angles to be congruent? SWBAT demonstrate understanding of the following: • Describe and correctly label a line, ray, or line segment. • Describe and correctly label an angle. • Measure a line segment and angle. • Prove whether two or more line segments or angles are congruent. • Construct a congruent copy of a line segment or an angle. Learning Activities: • Guided Interactive Geometry Software activities. • Rope Activity for Angle Relations. • Construction of angle/segment bisectors, congruent angles/segments using Interactive Geometry Software or Patty Paper. • "Donut Lab" • Pre-AP worksheets • Big Ideas interactive lessons and exercises. • Students will determine the validity of several arguments by using extended error analysis that shows what they know about midpoints, angle bisectors and right triangle trigonometry.	
Assessments	

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COURSE: Pre AP Geometry

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

Science: HS-PS3-3: In this geometry unit, students apply geometric modeling (G.MG.A.1) and measurement to design a physical object (e.g., a solar panel array or insulated container) and calculate dimensions and surface area to optimize energy efficiency, aligning with students' ability to design, build, and refine a device that converts one form of energy into another.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.TL.2: Create and implement a plan to use technology to achieve personal and/or career goals.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

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DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

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

9.4.12.IML.5: Evaluate, synthesize, and apply information on a variety of topics from multiple authoritative sources to answer questions to solve problems.

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

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

Time Frame	1 cycle ~3 (56 minute days)
Topic	
Measuring Coordinate Distance	
Alignment to Standards	
G.GPE.B.4 — Use coordinates to prove simple geometric theorems algebraically. G.GPE.B.6 — Find the point on a directed line segment between two given points. G.GPE.B.7 when applied to geometric figures.)	
Learning Objectives and Activities	
SWBAT answer the following questions: • How do I find the distance between two points on a coordinate plane? • What formula can I use to calculate the distance? SWBAT demonstrate understanding of the following: • Calculate the distance between two points. • Solve problems involving segment lengths and/or angle measures.	

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COURSE: Pre AP Geometry

- Solve problems involving a segment bisector or an angle bisector.

Learning Activities:

- Guided Interactive Geometry Software activities.
- Pre-AP worksheets
- Big Ideas interactive lessons and exercises.
- Students will determine the validity of several arguments by using extended error analysis that shows what they know about midpoints, angle bisectors and right triangle trigonometry.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

Science: HS-PS3-3: In this geometry unit, students apply geometric modeling (G.MG.A.1) and measurement to design a physical object (e.g., a solar panel array or insulated container) and calculate dimensions and surface area to optimize energy efficiency, aligning with students' ability to design, build, and refine a device that converts one form of energy into another.

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9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

Technology Integration

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knowledge.

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Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.

- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

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Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

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

9.4.12.IML.5: Evaluate, synthesize, and apply information on a variety of topics from multiple authoritative sources to answer questions to solve problems.

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

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

Time Frame	2 cycles - 6 (56 minute) days
Topic	
Parallel and Perpendicular Lines	
Alignment to Standards	

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G.CO.A.1 Experiment with transformations in the plane: 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.C.9 Prove geometric theorems: 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 geometric theorems: 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.D.12 Make geometric constructions: 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.GPE.B.4: Use coordinate to prove simple geometric theorems algebraically: Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \text{square root of } 3)$ lies on the circle centered at the origin and containing the point $(0, 2)$.

G.GPE.B.5 Use coordinates to prove simple geometric theorems algebraically: 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.SRT.B.4 Prove theorems involving similarity: 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.

Learning Objectives and Activities

SWBAT answer the following questions:

- Where are parallel and perpendicular lines used in real-life?
- How can I tell if two lines are parallel or perpendicular?
- How can I use angle relationships to solve problems with parallel lines?
- What do perpendicular lines tell me about the angles formed at the intersection?
- What steps do I follow to construct a parallel line through a point?
- How does the triangle sum help me in real-world designs or constructions?
- What is a perpendicular bisector, and what does it do to a line segment?

SWBAT demonstrate understanding of the following:

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COURSE: Pre AP Geometry

- Understand properties of parallel and perpendicular lines.
- Understand angles formed by parallel lines and a transversal.
- Line relations – skew, parallel, & intersecting
- Justify the relationship between the slopes of parallel or perpendicular lines in the coordinate plane using transformations.
- Solve problems involving two or more parallel or perpendicular lines, rays, or line segments.
- Construct a line, ray, or line segments parallel to another line, ray, or line segment that passes through a point not on the given line, ray, or line segment.
- Solve problems involving the triangle sum theorem.
- Construct the perpendicular bisector of a line segment.
- Construct a line, ray, or line segment perpendicular to another line, ray, or line segment.

Learning Activities:

- Geometry Discourse Activity
- Guided discovery in textbook.
- Use colored tape on the floor as a coordinate grid.
- Perpendicular, parallel, and skew booklet of real-life examples.
- Pre-AP Worksheets
- Big Ideas interactive lessons and exercises

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

Science: HS-ETS1-2: When exploring parallel and perpendicular lines (G.CO.C.9; G.CO.D.12), students model design constraints in fields such as civil engineering and architecture. They evaluate how perpendicular supports increase structural integrity and how parallel components (like beams or roadways) are essential to system design. This supports the standard for evaluating competing design solutions based on prioritized criteria and trade-offs.

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ELA: W.9-10.1: As students justify geometric relationships (e.g., alternate interior angles or perpendicular bisectors) in writing, they develop structured arguments using logic, definitions, and theorems. This aligns with ELA standards that require students to write arguments supporting claims with valid reasoning and relevant evidence.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities (e.g., visual arts, music, athletics, STEM).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

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

9.4.12.CT.2: Explain the potential benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial

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grouping
Career Education
9.4.12.IML.5: Evaluate, synthesize, and apply information on a variety of topics from multiple authoritative sources to answer questions to solve problems. 9.4.12.CT.1: Identify problem-solving strategies used in development of an innovative product or practice. 9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive). 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.

Time Frame	2 cycles - 6 (56 minute days)
Topic	
Triangle Similarity	
Alignment to Standards	
G.SRT.A.2 — Given two figures, use similarity transformations to decide if they are similar. G.SRT.A.3 — Use properties of similarity transformations to establish AA criterion for triangles. G.SRT.B.5 — Use congruence and similarity criteria for triangles to solve problems.	
Learning Objectives and Activities	
SWBAT answer the following questions: - How do I know two triangles have the same shape, but not necessarily the same size? - How can I find a point that lies between two other points on a segment in the coordinate plane? - How can I apply this to real-world situations, like locating a point along a route or map? - What is the relationship between the sides of a right triangle and the similar triangles within it? SWBAT demonstrate understanding of the following: - Prove whether two triangles are similar using informal similarity transformations. - Determine the coordinates of a point on a line segment. - Prove the Pythagorean Theorem using similar right triangles. Learning Activities:	

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COURSE: Pre AP Geometry

- Use construction paper to make two congruent triangles and cut them to discover theorems.
- Straw and Protractor activity to measure tree, building, etc.
- Geometry Discourse Activity.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.
- Students will determine the validity of several arguments by using extended error analysis that shows what they know about midpoints, angle bisectors and right triangle trigonometry.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

ELA: W.9-10.1: As students solve problems involving right triangles, they justify their process and reasoning in written explanations, aligning with the standard to write arguments to support claims using logical reasoning and relevant evidence. For instance, explaining why a particular trigonometric function is appropriate based on a triangle's known sides and angles.

Career Readiness, Life Literacies, and Key Skills

9.3.ST-ET.5: Students will apply the knowledge learned in STEM to solve problems in this trigonometry unit involving angle of elevation/depression and side length of a triangle in a real-world application.

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

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Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally. Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.
- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

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- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

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

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

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

Time Frame	4 cycle ~ 12 (56 minute blocks)
Topic	
Measurement in Right Triangles/Trigonometric Ratios	
Alignment to Standards	
G.MG.A.1 Apply geometric concepts in modeling situations: 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.SRT.A Understand similarity in terms of similarity transformations 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	

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meaning of similarity for triangles as the equality of all 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 Prove theorems involving similarity

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 Define trigonometric ratios and solve problems involving right triangles

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 Apply trigonometry to general triangles

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.4: Use coordinate to prove simple geometric theorems algebraically: Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate 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.6: Use coordinates to prove simple geometric theorems algebraically: Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

Learning Objectives and Activities

SWBAT answer the following questions:

- How do I know two triangles have the same shape, but not necessarily the same size?
- How can I find a point that lies between two other points on a segment in the coordinate plane?
- How can I apply this to real-world situations, like locating a point along a route or map?
- What is the relationship between the sides of a right triangle and the similar triangles

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COURSE: Pre AP Geometry

within it?

- What is the difference between sine, cosine, and tangent?
- What does the inverse function tell me?
- What information in the problem helps me decide which trigonometric function to use?
- How can I use right triangles to solve problems involving height, distance, or angle of elevation

SWBAT demonstrate understanding of the following:

- Prove whether two triangles are similar using informal similarity transformations.
- Determine the coordinates of a point on a line segment.
- Prove the Pythagorean Theorem using similar right triangles.
- Associate the measures of an acute angle, $\angle A$, in a right triangle to ratios of the side lengths.
- Explain why a trigonometric ratio depends only on an angle measure of a right triangle and not on the side lengths.
- Determine an acute angle measure in a right triangle, given a ratio of its side lengths using an understanding of inverses.
- Model contextual scenarios using right triangles.

Learning Activities:

- Songs for trig ratios.
- Use construction paper to make two congruent triangles and cut them to discover theorems.
- Straw and Protractor activity to measure tree, building, etc.
- Geometry Discourse Activity.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.
- Students will determine the validity of several arguments by using extended error analysis that shows what they know about midpoints, angle bisectors and right triangle trigonometry.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

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DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

Interdisciplinary Connections

Science: HS-PS3-3: When calculating angles and side lengths in right triangles, students apply trigonometry to solve problems involving inclined planes and energy transfer. For example, they determine the mechanical advantage of a ramp by analyzing its height and base, supporting energy conversion and efficiency modeling.

ELA: W.9-10.1: As students solve problems involving right triangles, they justify their process and reasoning in written explanations, aligning with the standard to write arguments to support claims using logical reasoning and relevant evidence. For instance, explaining why a particular trigonometric function is appropriate based on a triangle's known sides and angles

Career Readiness, Life Literacies, and Key Skills

9.3.ST-ET.5: Students will apply the knowledge learned in STEM to solve problems in this trigonometry unit involving angle of elevation/depression and side length of a triangle in a real-world application.

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial

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grouping
Career Education
9.4.12.CT.1: Identify the problem-solving strategies used in the development of an innovative product or practice. 9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive). 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.

Time Frame	4 cycles ~ 12 (56 minute) blocks
Topic	
Transformations & Rigid Motions	
Alignment to Standards	
G.CO.A Experiment with transformations in the plane 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: Understand Congruence in terms of rigid motions: 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. G.SRT.A: Understand similarity in terms of similarity transformations G.SRT.A.1a: 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. G.SRT.A.1b: Verify experimentally the properties of dilations given by a center and a scale factor: 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	

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meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

G.SRT.B.5 Prove theorems involving similarity: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

G.GMD.B.4: Visualize relationships between two-dimensional and three-dimensional objects: 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.GPE.B.4: Use coordinate to prove simple geometric theorems algebraically: Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate 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 $(0, 2)$.

Learning Objectives and Activities

SWBAT answer the following questions:

- How do I verify my transformation is accurate using coordinates?
- How do I write a transformation as a function?
- How can I represent multiple transformations as a sequence of functions?
- How can I explain why a translation, reflection, or rotations keeps the size and shape of a figure the same?
- What is a rigid motion and what properties does it preserve?
- How does a dilation change a figure while keeping its shape?
- What happens to the sides and angles of a dilated figure?
- How do I find the scale factor in a dilation?
- How do these skills prepare you for future mathematics courses and art, chemistry, biology, and physics?

SWBAT demonstrate understanding of the following:

- Perform transformations on points in a plane.
- Express transformations using function notation.
- Prove that a rigid motion transformation maps an object to a congruent object.
- Solve problems involving rigid motion transformations.
- Prove that a similarity transformation maps an object to a similar object.
- Solve problems involving similarity transformations.

Learning Activities:

- Miras.
- Geometry Discourse Activities.
- World Flag Project
- Art activity - use dilations to create a picture
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.

Assessments

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COURSE: Pre AP Geometry

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

Science: HS-PS2-1: Students model motion and forces by applying transformations to represent changes in position, orientation, or velocity of an object. For instance, a reflection across an axis can show direction reversal, while a rotation can represent angular momentum, supporting analysis of Newtonian motion.

ELA: W.9-10.1: When students are asked to justify whether two figures are congruent through rigid motions, they construct written arguments using formal definitions, sequence of transformations, and logical reasoning. This supports the standard requiring arguments with valid reasoning and sufficient evidence.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities (e.g., visual arts, music, athletics, STEM).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

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

9.4.12.CT.2: Explain the potential benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a

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COURSE: Pre AP Geometry

real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping.

Career Education

9.4.12.IML.5: Evaluate, synthesize, and apply information on a variety of topics from multiple authoritative sources to answer questions or solve problems.

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

Time Frame	1 cycle ~ 3 (56 minute) blocks
Topic	
Congruence & Similarity Through Transformation	
Alignment to Standards	
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.A.2: Represent transformations in the plane using geometric descriptions and coordinates. G.CO.A.3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	

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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.

G.CO.B.6: Use geometric descriptions of rigid motions to transform figures and predict the effect of a given rigid motion on a given figure.

G.CO.B.7: Use the definition of congruence in terms of rigid motions to show that two figures are congruent if corresponding sides and corresponding angles are congruent.

G.CO.B.8: Explain how triangle congruence criteria (SSS, SAS, and ASA) follow from the definition of congruence in terms of rigid motions.

G.SRT.A.1: Verify experimentally the properties of dilations given by a center and a 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.

G.SRT.A.3: Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Learning Objectives and Activities

SWBAT answer the following questions:

- What is a transformation?
- How do translations, reflections, and rotations preserve distance and angle measure?
- What characteristics remain unchanged under rigid motions?
- How can I determine whether two figures are congruent using transformations?
- How can a sequence of transformations map one figure onto another?
- What is the difference between a rigid motion and a dilation?
- How does a dilation affect side lengths and angle measures?
- How can I determine whether two figures are similar using transformations?
- Why are congruent figures always similar?
- Why are similar figures not always congruent?
- How do transformations justify triangle congruence criteria?
- How do similarity transformations justify the AA Similarity Criterion?

SWBAT demonstrate understanding of the following:

- Perform and describe translations, reflections, rotations, and dilations.
- Identify the image of a figure after a transformation.
- Determine whether transformations preserve length, angle measure, orientation, and area.
- Write and justify sequences of transformations that map one figure onto another.
- Determine whether figures are congruent using rigid motions.
- Determine whether figures are similar using dilations and rigid motions.
- Use transformational definitions to explain congruence and similarity.
- Apply transformational reasoning to triangles, polygons, and coordinate geometry problems.

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COURSE: Pre AP Geometry

- Construct mathematical arguments and proofs involving transformations.

Learning Activities:

- Use patty paper and tracing paper to physically perform translations, reflections, and rotations.
- Investigate dilations using graph paper and coordinate grids.
- Discover invariants preserved under rigid motions.
- Explore how scale factor affects image size and orientation.
- Compare multiple transformation pathways that map one figure onto another.
- Justify why a transformation sequence proves congruence or similarity.
- Participate in mathematical debates about whether figures are congruent, similar, both, or neither.
- Transformation Stations Activity.
- Coordinate Geometry Transformation Lab.
- Similarity Transformation Investigation using Geogebra.
- Error Analysis Tasks involving incorrect transformation reasoning.
- Close-reading of mathematical arguments.
- Rich Thinking Tasks emphasizing justification.
- Multiple Representation Tasks (verbal, graphical, algebraic, geometric).
- Mathematical argument writing.
- Big Ideas interactive lessons and exercises.
- Pre-AP Geometry practice sets.
- Transformation and dilation investigations.

Assessments

Formative

- Exit Tickets
- Transformation Sorting Activities
- Classroom Observation
- Student Reflection Journals
- Geometry Discourse Discussions
- Whiteboard Checkpoints
- Targeted Practice via IXL

Summative

- Mid-Unit Quiz: Rigid Motions and Congruence
- End-of-Topic Test: Congruence and Similarity Through Transformations
- Performance Task: Design and Justify a Transformation Sequence
- Coordinate Geometry Transformation Assessment

Alternative

- NJSLA Released Problems
- College Board Pre-AP Assessment Tasks
- Digital Portfolio of Transformation Investigations

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COURSE: Pre AP Geometry

Interdisciplinary Connections

Science: HS-ETS1-2: Students use geometric transformations and scaling to evaluate and compare engineering designs and prototypes. Similarity transformations help model structures at different scales while preserving design features.

ELA: W.9-10.1: Students write mathematical arguments explaining how transformations establish congruence and similarity, using precise mathematical vocabulary and evidence-based reasoning.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities.

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

9.4.12.CT.1: Identify problem-solving strategies used in the development of innovative products or practices.

9.4.12.CT.2: Explain benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities to analyze and solve authentic problems.

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online resources to investigate transformation concepts and demonstrate understanding of standards.

9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Students will use Quizizz, Kahoot, Desmos Activities, and Quizlet Live to reflect on their learning progress.

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.12.TL.1: Assess digital tools based on accessibility, capacities, and utility.

Students will use Google Classroom to collaborate, discuss transformational reasoning, and submit mathematical arguments.

9.4.12.TL.4: Collaborate in online learning communities to analyze and propose solutions to authentic problems.

Career Education

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COURSE: Pre AP Geometry

9.4.12.IML.5: Evaluate, synthesize, and apply information from multiple authoritative sources to answer questions or solve problems.
9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

Time Frame	2 cycles ~ 6 (56 minute) blocks
Topic	
Congruence & Similar Polygons	
Alignment to Standards	
G.CO.B Understand Congruence in terms of rigid motions 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. G.CO.C.11: Prove geometric theorems. 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. G.C.A.1 Understand and apply theorems about circles. Prove that all circles are similar. G.GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, square root of 3) lies on the circle centered at the origin and containing the point (0, 2). G.SRT.A Understand similarity in terms of similarity transformations. 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 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 Prove theorems involving similarity 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.	

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COURSE: Pre AP Geometry

G.CO.A.3 Experiment with transformations in the plane: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

Learning Objectives and Activities

SWBAT answer the following questions:

- What do I need to compare to know if two triangles are congruent?
- How can I use a diagram or a coordinate plane to prove congruence?
- What does SSS, SAS, ASA, or AAS mean in triangle congruence?
- How do I know which congruence shortcut to use in a problem?
- Can two triangles have the same angle measures but still not be congruent?
- What is the difference between similar triangles and congruent triangles?
- How can I justify similarity using a sequence of transformations?
- What do I know about the sides, angles, and diagonals of a parallelogram?
- How can I prove a shape is a parallelogram using properties?

SWBAT demonstrate understanding of the following:

- Prove that two triangles are congruent by comparing their side lengths and angle measures.
- Prove that two triangles are congruent by comparing specific combinations of side lengths and angle measures.
- Prove that two triangles are similar.
- Prove theorems about parallelograms.

Learning Activities:

- Discover interior angles and their sums by dividing polygon into triangles.
- Geometry Discourse Activities.
- Use index cards to discover theorems.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

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COURSE: Pre AP Geometry

Interdisciplinary Connections

Science: HS-LS1-4: Using the concept of similarity, students model anatomical structures or biological patterns (e.g., comparing similar shapes in body parts or cellular structures) to understand how form and function are preserved across scales. This supports scientific modeling of biological systems.

ELA: W.9-10.1: When justifying whether two polygons are congruent or similar based on transformations or side/angle relationships, students write logical arguments using geometric vocabulary, definitions, and theorems. This aligns with writing standards that require valid reasoning and evidence-based conclusions.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities (e.g., visual arts, music, athletics, STEM).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

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

9.4.12.CT.2: Explain the potential benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

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COURSE: Pre AP Geometry

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping.

Career Education

9.4.12.IML.5: Evaluate, synthesize, and apply information on a variety of topics from multiple authoritative sources to answer questions or solve problems.

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

Time Frame	2 cycles ~ 6 (56 minute) blocks
Topic	
Equations of Circles	
Alignment to Standards	
G.CO.A Experiment with transformations in the plane: G.CO.A.1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. G.CO.A.4: 1. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. G.GPE.A.1 Translate between the geometric description and the equation for a conic section: (+) 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. G.GPE.B.4 Use coordinates to prove simple geometric theorems algebraically: Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, square root of 3) lies on the circle centered at the origin and containing the point (0, 2). G.C.A Understand and apply theorems about circles G.C.A.1: Prove that all circles are similar.	
Learning Objectives and Activities	
SWBAT answer the following questions:	

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COURSE: Pre AP Geometry

- How can I use the equation of a circle to check if a point is on the circle?
- How do I know if a point is inside, outside, or on the circle?
- How can I write the equation of a circle if I know the center and radius?
- What does it mean for two circles to be similar?
- How is a central angle related to the arc it creates?
- How does an inscribed angle relate to the arc it intercepts?
- How is arc length different from arc measure?
- What information do I need to calculate arc length?
- What makes a line or segment tangent to a circle?

SWBAT demonstrate understanding of the following:

- Determine whether a particular point lies on a given circle.
- Translate between the geometric and algebraic representations of a circle.
- Prove that any two circles are similar.
- Determine the measure of a central angle or the circular arc it intercepts.
- Determine the measure of an inscribed angle or the circular arc it intercepts.
- Determine the length of a circular arc.
- Construct a line, ray, or line segment tangent to a circle.
- Solve a systems of equations consisting of a linear equation and the equation of a circle.

Learning Activities:

- Reconnect incenter and circumcenter to triangle perpendicular bisectors and angle bisectors.
- Geometry Discourse Activities
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.
- Students will use their knowledge of circles to determine the range of a walkie-talkie.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

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COURSE: Pre AP Geometry

Science: HS-PS2-4: In this unit, students use concepts of circles, central angles, and arc length (G.C.B.5) to model rotational motion and centripetal force. For example, calculating the arc traveled by an object in circular motion supports scientific analysis of how net force acts on objects in a circular path.

ELA: W.9-10.1: When students justify formulas or problem-solving steps related to sector area or arc length, they write mathematical arguments using logical reasoning, appropriate vocabulary, and definitions. This supports writing standards focused on structured, evidence-based arguments.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities (e.g., visual arts, music, athletics, STEM).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

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

9.4.12.CT.2: Explain the potential benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

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DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping.

Career Education

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

9.4.12.IML.5: Evaluate, synthesize, and apply information on a variety of topics from multiple authoritative sources to answer questions or solve problems.

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

Time Frame	3 cycles ~ 9 (56 minute) blocks
Topic	
Circle Relationships and Measurement	
Alignment to Standards	
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 Find arc lengths and areas of sectors of circles: 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.SRT.B.5: Use congruence and similarity criteria for triangles to solve problems and prove relationships in geometric figures.	
Learning Objectives and Activities	
SWBAT answer the following questions: • What is the relationship between a radius and a tangent line? • How are tangents and secants used to analyze circles? • How can I determine the measure of an intercepted arc?	

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- What relationships exist among chords, tangents, secants, and angles in circles?
- How do central angles relate to arc measures?
- How can arc length be determined from the measure of a central angle?
- How is sector area related to the area of an entire circle?
- Why is radian measure useful when working with circles?
- How can circle relationships be used to solve real-world problems?
- How do similarity and proportional reasoning support arc length and sector area formulas?

SWBAT demonstrate understanding of the following:

- Identify and apply properties of tangents, secants, radii, chords, and arcs.
- Determine missing angle and arc measures in circle diagrams.
- Apply tangent properties to solve geometric problems.
- Use secant and tangent relationships to justify geometric conclusions.
- Find arc lengths using central angle measures.
- Find sector areas using central angle measures.
- Explain and apply radian measure.
- Solve real-world applications involving arcs and sectors.
- Construct mathematical arguments and proofs involving circles.

Learning Activities

- Use dynamic geometry software to investigate tangent-radius relationships.
- Explore intercepted arcs and angle measures through guided discovery.
- Investigate how changing a central angle affects arc length and sector area.
- Derive arc length and sector area formulas through proportional reasoning.
- Compare different strategies for finding arc measures.
- Justify why a tangent is perpendicular to a radius at the point of tangency.
- Explain how sector area formulas relate to area of a circle.
- Participate in mathematical discussions regarding circle theorems.
- Arc Measure Investigation.
- Arc Length and Sector Area Modeling Activity.
- Real-World Circle Applications Project.
- Rich Thinking Tasks emphasizing reasoning and proof.
- Error Analysis Activities involving circle relationships.
- Multiple Representation Tasks using diagrams, algebra, and verbal explanations.
- Mathematical argument writing using circle theorems.
- Big Ideas interactive lessons and exercises.
- Pre-AP Geometry worksheets.
- Arc length and sector area applications.
- Circle relationship problem-solving tasks.

Assessments

Formative

- Rich Thinking Tasks

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DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

- Exit Tickets
- Classroom Observation
- Student Reflection Journals
- Geometry Discourse Activities
- Whiteboard Practice Problems
- Targeted Practice via IXL

Summative

- Mid-Unit Quiz: Tangents, Secants, and Arc Measure
- End-of-Topic Test: Circle Relationships and Measurement
- Performance Task: Circle Design Project
- Application-Based Assessment involving arc length and sector area

Alternative

- NJSLA Released Problems
- College Board Pre-AP Assessment Tasks
- Digital Portfolio of Circle Investigations

Interdisciplinary Connections

Science: HS-ETS1-2: Students apply geometric measurement and proportional reasoning to model circular motion, rotational systems, and engineering designs involving gears, wheels, and rotating mechanisms.

ELA: W.9-10.1: Students write mathematical arguments explaining circle relationships and justify solutions using geometric definitions, theorems, and evidence.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities.

9.4.12.CI.3: Investigate challenges and opportunities through data collection and analysis.

9.4.12.CT.1: Identify problem-solving strategies used in the development of innovative products or practices.

9.4.12.CT.2: Explain the benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities to solve authentic problems.

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online resources to investigate circle concepts and demonstrate understanding of standards.

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COURSE: Pre AP Geometry

9.4.8.TL.3: Select appropriate tools to organize and present information digitally. Students will use Quizizz, Kahoot, Desmos Activities, and Quizlet Live to monitor and reflect on learning progress.

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.12.TL.1: Assess digital tools based on accessibility, capacities, and utility.

Students will use Google Classroom to collaborate, share mathematical reasoning, and participate in online discussions.

9.4.12.TL.4: Collaborate in online learning communities to analyze and solve authentic problems.

9.4.8.IML.3: Create digital visualizations that effectively communicate mathematical relationships and data.

Career Education

9.4.12.IML.5: Evaluate, synthesize, and apply information from multiple authoritative sources to answer questions or solve problems.

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

Time Frame	2 cycles ~ 6 (56 minute) blocks
Topic	
Surface Area	
Alignment to Standards	
G.GMD.A.1 Explain volume formulas and use them to solve problems: 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 informal limit arguments. G.C.B.5 Find arc lengths and areas of sectors of circles: 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.SRT.B.5 Prove theorems involving similarity: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G.MG.A Apply geometric concepts in modeling situations. 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).	

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COURSE: Pre AP Geometry

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).

G.GPE.B.7 Use coordinates to prove simple geometric theorems algebraically: Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula

Learning Objectives and Activities

SWBAT answer the following questions:

- Can two figures look different but still have the same area?
- How can I use Cavalieri's Principle to explain why two shapes with the same height and cross-sectional area have the same total area or volume?
- What is a sector?
- How do I use the central angle and radius to find the area of a sector?
- How does changing the radius or angle affect the area of a sector?
- How does changing the size of a figure affect its area?
- How can I predict the area of a figure after it has been transformed?

SWBAT demonstrate understanding of the following:

- Use Cavalieri's principle to solve problems involving the areas of figures.
- Determine the area of a sector.
- Determine the effect of a similarity transformation on the area of a figure.

Learning Activities:

- History/Engineering: Use dimensions of a famous building, found on the internet, to find the area of irregular shapes.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.
- Geometry Discourse Activities.
- Class discussion and exploration of real-life applications.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

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COURSE: Pre AP Geometry

Interdisciplinary Connections

Science: HS-ESS3-4: In this unit, students use area calculations to evaluate human impact on the environment (e.g., deforestation or land development). By applying formulas for the area of polygons, circles, and composite shapes, they quantify land use and analyze data to inform environmental decision-making, supporting evaluation of geoscience data to forecast impacts.

ELA: W.9-10.2: When explaining how to calculate or apply area in real-world situations, students write informative texts that convey technical processes (e.g., determining the area of irregular plots or circular sectors). This supports the development of clear, accurate explanations using appropriate mathematical language.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities (e.g., visual arts, music, athletics, STEM).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

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

9.4.12.CT.2: Explain the potential benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended

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COURSE: Pre AP Geometry

learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

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

Time Frame	3 cycles ~ 9 (56 minute blocks)
Topic	
Volume of Solids	
Alignment to Standards	
G.GMD.A: Explain volume formulas and use them to solve problems 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 informal 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.MG.A Apply geometric concepts in modeling situations. 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). G.GMD.B.4 Visualize relationships between two-dimensional and three-dimensional objects: Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	

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COURSE: Pre AP Geometry

Learning Objectives and Activities

SWBAT answer the following questions:

- Why is the volume of a pyramid or cone only one-third of the corresponding prism or cylinder?
- What happens if I double the height or the radius- how does that affect the volume?
- What does Cavalieri's Principle say about the volume of two solids?
- What is the real-world context of a volume problem?
- How do I interpret the units of my answer in context?
- How can I apply volume formulas to design, construction, or packaging problems?

SWBAT demonstrate understanding of the following:

- Justify the volume formula for a right prism, pyramid, right cylinder, and cone.
- Use Cavalieri's principle to solve problems involving volumes of solids.
- Solve contextual problems involving volume of solid figures.

Learning Activities:

- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.
- Geometry Discourse Activities.
- Class discussion and exploration of real-life applications.
- Digital simulations.
- Estimation and calculation of the volume of items around the room.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

Science: HS-PS3-3: In this unit, students calculate the volume of 3D objects to evaluate how they store or transfer energy (e.g., thermal energy in insulated containers or kinetic energy in fluids). This supports the standard for designing devices that convert energy from one form to another, requiring accurate measurement of physical space.





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COURSE: Pre AP Geometry

Science: HS-ETS1-4: Students use volume to model and assess real-world engineering solutions, such as determining material quantities for packaging, water tanks, or building components. They apply geometric modeling to test constraints related to size, capacity, and efficiency, aligning with the evaluation of complex systems and trade-offs in design.

ELA: W.9-10.2: As students explain how they determined the volume of complex 3D shapes (e.g., cylinders, cones, prisms), they write informative texts describing step-by-step procedures and reasoning, supporting clear communication of mathematical processes and real-world applications.

Career Readiness, Life Literacies, and Key Skills

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities (e.g., visual arts, music, athletics, STEM).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

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

9.4.12.CT.2: Explain the potential benefits and risks associated with data collection and analysis.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

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COURSE: Pre AP Geometry

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

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

Time Frame	1 cycle~ 3 (56 minute) blocks
Topic	
Organizing & Displaying Data	
Alignment to Standards	
S.ID.A: Summarize, represent, and interpret data on a single count or measurement variable. S.ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).	
Learning Objectives and Activities	
SWBAT answer the following questions: • What is the difference between categorical and quantitative data? • What graph is most appropriate for displaying a particular data set? • What information can a histogram reveal about a distribution? • How can a box plot summarize a data set? • How can graphical displays help identify patterns and outliers? • What does a graphical representation reveal that a table may not? SWBAT demonstrate understanding of the following: • Distinguishing between categorical and quantitative data. • Constructing and interpreting histograms. • Constructing and interpreting box plots. • Identifying outliers and unusual observations. • Comparing data sets using graphical displays. • Describing the overall shape of a distribution. Learning Activities: • Students classify real-world data as categorical or quantitative. • Create and interpret histograms and box plots from collected data.	

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DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

- Compare multiple graphical representations of the same data set.
- Interactive digital platforms.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

Science: HS-ETS1-4: In this probability unit students use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

ELA: W.9-10.1: When students are justifying their reasoning on short answer and extended constructed response questions they write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Career Readiness, Life Literacies, and Key Skills

9.4.12.DC.6: Collaborate to produce data-driven solutions of innovations that address a problem and explain the process for doing so.

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

9.4.12.IML.7: Evaluate the effectiveness of a multi-step process to complete a task.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

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

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

Technology Integration

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COURSE: Pre AP Geometry

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Students will access Big Ideas online ebook to further investigate lesson concepts and demonstrate understanding of standards.

- **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.

Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.

- **9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- **9.4.12.TL.1:** Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task

Students will use Google Classroom to collaborate, work towards solving authentic problems, or participate in an online classroom discussion utilizing pre-learned etiquette about blended learning platforms.

- **9.4.12.TL.4:** Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Students will utilize Geogebra to further investigate theorems to demonstrate and apply understanding of standards.

- **9.4.8.IML.3:** Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping

Career Education

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

9.4.12.CI.2: Identify career pathways that highlight personal talent, skills, and abilities (e.g., visual arts, music, athletics, STEM).

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COURSE: Pre AP Geometry

Time Frame	2 cycles ~ 6 (56 minute) blocks
Topic	
Describing & Comparing Data Distributions	
Alignment to Standards	
S.ID.A.2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. S.ID.A.3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	
Learning Objectives and Activities	
SWBAT answer the following questions: • What is the mean, median, and mode of a data set? • When is the mean a better measure of center than the median? • How do outliers affect measures of center? • What is variability and why is it important? • What does standard deviation tell us about a data set? • How can two data sets have the same mean but different variability? • How does the shape of a distribution influence the statistics we use? SWBAT demonstrate understanding of the following: • Calculating mean, median, and mode. • Describing distributions using measures of center. • Calculating deviations from the mean. • Calculating and interpreting standard deviation. • Comparing distributions using center and spread. • Interpreting the effects of outliers on statistical measures. Learning Activities: • Students calculate measures of center and spread from authentic data. • Investigate how outliers affect mean and median. • Compare distributions using numerical summaries. • Error analysis involving misuse of statistics. • Big Ideas interactive lessons and exercises. • Pre-AP worksheets.	
Assessments	
Formative: • Rich Thinking Tasks • Classroom Observation	

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DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

- Mid-unit Quizzes
- Topic Tests
- Performance Tasks/Projects

Alternative:

- NJSLA Released Problems

Interdisciplinary Connections

Science: HS-ETS1-4: In this probability unit students use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

ELA: W.9-10.1: When students are justifying their reasoning on short answer and extended constructed response questions they write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Career Readiness, Life Literacies, and Key Skills

9.4.12.DC.6: Collaborate to produce data-driven solutions of innovations that address a problem and explain the process for doing so.

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

9.4.12.IML.7: Evaluate the effectiveness of a multi-step process to complete a task.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

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

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

9.4.12.CI.3: Investigate new challenges and opportunities for personal or career growth through the collection and analysis of data.

Technology Integration

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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DEPARTMENT: Mathematics

COURSE: Pre AP Geometry

reflect on their learning progress.

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Time Frame	2 cycles ~ 6 (56 minute) blocks
Topic	
Modeling Data with Functions & Normal Distribution	
Alignment to Standards	
S.ID.A.4: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	

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Learning Objectives and Activities

SWBAT answer the following questions:

- How can data be represented using functions?
- What characteristics define a normal distribution?
- How do mean and standard deviation influence a normal curve?
- Why are some data sets well modeled by a normal distribution?
- How can a function model help us make predictions?
- When is a normal distribution an inappropriate model?
- What information can be inferred from areas under a normal curve?

SWBAT demonstrate understanding of the following:

- Representing data sets using functions.
- Interpreting function models in context.
- Recognizing characteristics of a normal distribution.
- Using mean and standard deviation to model data.
- Estimating percentages within intervals of a normal distribution.
- Evaluating the appropriateness of a statistical model.

Learning Activities:

- Students model real-world data using functions.
- Analyze histograms that approximate normal distributions.
- Investigate the relationship between mean, standard deviation, and shape.
- Use technology to estimate areas under normal curves.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.

Assessments

Formative:

- Rich Thinking Tasks
- Classroom Observation
- Student Reflections and Math Talks
- Targeted Practice via IXL

Summative:

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constraints on interactions within and between systems relevant to the problem.

ELA: W.9-10.1: When students are justifying their reasoning on short answer and extended constructed response questions they write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Career Readiness, Life Literacies, and Key Skills

9.4.12.DC.6: Collaborate to produce data-driven solutions of innovations that address a problem and explain the process for doing so.

9.4.12.IML.6: Use various types of thinking to create solutions (e.g., inductive, deductive).

9.4.12.IML.7: Evaluate the effectiveness of a multi-step process to complete a task.

9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations.

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

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Time Frame	2 cycles ~ 6 (56 minute) blocks
Topic	
Probability - Chance Events	
Alignment to Standards	
S.CP.A: Understand independence and probability and use them to interpret data. S.CP.A.1 (+) Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). S.CP.A. 2 (+) Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. S.CP.A.3: (+) Understand the conditional probability of A given B as $P(A \text{ and } B) / P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. S.CP.A.4: (+) Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example,	

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collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

S.CP.A.5: (+) Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

S.CP.B: Use rules of probability to compute probabilities of compound events in a uniform model

S.CP.B.6:(+) Find the conditional probability of A given B as the fraction of B 's outcomes that also belong to A , and interpret the answer in terms of the model.

S.CP.B.7:(+) Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.

S.CP.B.8:(+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A) P(B | A)$ and interpret the answer in terms of the model.

S.CP.B.9: Use permutations and combinations to compute probabilities of compound events and solve problems.

S.MD.A: Calculate expected values and use them to solve problems

S.MD.A.1: (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

S.MD.A.2: (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

S.MD.A.3: (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.

S.MD.A.4: (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?

Learning Objectives and Activities

SWBAT answer the following questions:

- How does organizing data in a table help me understand relationships between categories?
- What type of graph (bar graph, pie chart, two-way table) is best for showing this categorical data?

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- How can I describe the likelihood of this event using a number between 0 and 1?
- What does each part of the two-way table tell me (joint, marginal, conditional)?
- How does a relative frequency differ from a joint frequency?
- Does knowing one event happened affect the chance that the other happened?
- How can I use a table or probabilities to test whether two events are independent?
- How can I use the mean and standard deviation to understand the spread of data?

SWBAT demonstrate understanding of the following:

- Create or analyze a data display for a categorical data set.
- Determine the probability of an event.
- Calculate relative frequencies, joint frequencies, marginal frequencies, or conditional probabilities for a categorical data set.
- Determine if two events are independent.
- Calculate the probability of a range of values of an independent variable, given a mean, standard deviation, and normal distribution.

Learning Activities:

- Dice or Spinner Simulation to compare theoretical and experimental probability.
- Coin Flipping Activity: Students will use an online simulator to flip coins. Results will be recorded in a spreadsheet and observed.
- Guided notes with real-life examples.
- Class discussion and exploration of real-life applications.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.

Assessments

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Summative:

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Alternative:

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Interdisciplinary Connections

Science: HS-ETS1-4: In this probability unit students use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

ELA: W.9-10.1: When students are justifying their reasoning on short answer and extended

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constructed response questions they write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Career Readiness, Life Literacies, and Key Skills

9.4.12.TL.2: Create and implement a plan to use technology to achieve personal and/or career goals.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

9.4.12.IML.5: Evaluate, synthesize, and apply information on a variety of topics from multiple authoritative sources to answer questions or solve problems.

9.4.12.DC.6: Collaborate to produce data-driven solutions or innovations that address a problem and explain the process for doing so.

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Time Frame	2 cycles ~ 6 (56 minute blocks)
Topic	
Measurement in Data: Inferences from Data	
Alignment to Standards	
S.IC.A: Understand and evaluate random processes underlying statistical experiments. S.IC.A.1: (+) Understand statistics as a process for making inferences about population parameters based on a random sample from that population. S.IC.A.2: (+) Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model? S.IC.B: Make inferences and justify conclusions from sample surveys, experiments, and observational studies. S.IC.B.3: (+) Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. S.IC.B.4: (+) Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. S.IC.B.5: (+) Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. S.IC.B.6: (+) Evaluate reports based on data (e.g. interrogate study design, data sources, randomization, the way the data are analyzed and displayed, inferences drawn and methods used; identify and explain misleading uses of data; recognize when arguments based on data are flawed).	
Learning Objectives and Activities	

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SWBAT answer the following questions:

- What is the difference between accuracy and precision in data?
- How can I tell if my data is precise but not accurate, or accurate but not precise?
- What does variability in my data tell me about how trustworthy my measurements are?
- How can bias in measurement affect the accuracy of results)?
- How do I know if my sample is a good reflection of the population?
- How do I make sure my data collection method is fair and unbiased?
- How can I design a study that minimizes bias in the results?
- What clues in a study or report suggest sampling or response bias?

SWBAT demonstrate understanding of the following:

- Distinguish between accuracy and precision as measures of statistical variability and statistical bias in measurement.
- Describe how the size of a sample impacts how well it represents the population from which it was drawn.
- Design a method for gathering data that is appropriate for a given purpose.
- Identify biases in sampling methods for experiments, observational studies, and surveys.

Learning Activities:

- Designing a Study: Students conduct a survey or simulation to investigate a research question. They analyze the results and present their conclusions.
- Class discussion and exploration of real-life applications.
- Big Ideas interactive lessons and exercises.
- Pre-AP worksheets.

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Modifications (ELL, Special Education, At-Risk Students, Gifted & Talented, & 504 Plans)

ELL:

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

Supports for Students With IEPs:

- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

At-Risk Students:

- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach

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- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

Gifted and Talented:

- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

Supports for Students With 504 Plans:

- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

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