Unit: 5 Geometry

Content Area: **Generic Content Area**
Course(s): **Generic Course**
Time Period: **2 marking periods**
Length: **19 Weeks**
Status: **Published**

Unit Overview

To review Geoemtry concepts students have been/are being exposed to in their regularly scheduled math course in preparation for the Geometry PARCC.

Transfer

Students will be able to independently use their learning to...

- Relate geometric terminology to real-world settings.
- Describe the relationships between basic geometric figures.
- Solve real-life and mathematical problems involving line and angle relationships, triangles, and area.
- Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
- Use available information to reach logical conclusions and construct logical arguments.
- Critique the reasoning of others, providing counterexamples as appropriate.
- Transform figures in a plane.
- Use proportional reasoning to solve applied problems as they arise.
- Solve for unknown measurements in right triangles.
- Solve applied problems involving right triangles, sketching diagrams as needed.
- Use the equation of a circle to identify its center and radius, or derive the equation when these values are given.
- Use the relationships between the angles, arcs, and segments of circles to solve applied problems.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- Specific angle relationships can be used to distinguish between parallel and non-parallel lines. Conversely, when parallel lines are intersected by a transversal, unique relationships exist between specific angle pairs.
- The relationships that exist between specific angle pairs are used in solving for unknown measures.
- The patterns that exist in Special Right Triangles allow us to solve quickly for unknown measurements in these triangles.
- Right triangle trigonometry is useful in solving a variety of problems.
- Relationships exist between the angle and arc measures of circles.
- Angles can be measured in degrees or radians.
- Sectors and arcs are portions of circles.

Essential Questions

Students will keep considering...

- How can geometric figures and their properties be described through careful use of geometric language?
- How can the unique properties of geometric figures be used to determine new information?
- What relationships exist between the sides and/or angles of a triangle?
- What relationships exist between the side lengths and angle measures of right triangles?
- How can right triangle relationships be used to calculate inaccessible measurements?
- How are the relationships between the angles, arcs, and segments of circles applied in solving problems?
- How should I decide what method to use when solving problems involving circles?

Application of Knowledge and Skill

Students will know...

Students will know...

- The meanings of basic geometric terminology and symbols.
- Which angle pairs are congruent and which are supplementary when parallel lines are intersected by a transversal.
- That specific angle relationships formed when two lines are interesected by a transversal can be used to show that two lines are parallel.
- That transformations are functions that take points in the plane as inputs and give other points as outputs.
- The definitions of reflections, rotations, translations, and symmetry.

- Identifying congruent figures.
- Using the SSS, SAS & ASA postulates, as well as the AAS & HL theorems to demonstrate triangle congruence.
- That transformations produce similar figures.
- The definition and properties of similar polygons.
- That the AA Postulate, SAS and SSS Similarity Theorems can be used to prove triangles similar.
- The unique relationships that exist within 45-45-90 and 30-60-90 triangles.
- The definitions of the sine, cosine, and tangent ratios.
- That right triangles are useful in solving a variety of real-world problems.
- That equations can be written to describe circles in the coordinate plane.
- The definitions of the terminology related to circles.
- That the relationships that exist between the angles, segments, and arcs associated with circles can be used to solve for unknown measures.

Students will be skilled at...

Students will be skilled at...

- Using geometric symbols and terminology correctly
- Using the segment and angle addition postulates to write accurate equations and solve for unknowns.
- Solving for unknowns when parallel lines and a transversal are given, writing and using equations as needed.
- Using known angle relationships to determine when two lines are parallel or perpendicular.
- Using proportional relationships to solve for unknowns.
- Using Special Right Triangle relationships to solve for unknown measurements.
- Using trigonometric ratios to solve for unknown side lengths and angle measures.
- Choosing the most efficient method to solve various right triangles.
- Creating sketches appropriate to solving applied problems involving right triangles.
- Writing and graphing equations of circles in the coordinate plane.
- Using the relationships between angles, arcs and segments of circles to solve for unknown measures.
- Calculating arc lengths and areas of sectors of circles.

Academic Vocabulary

angle	right angle	transformations	Pyramid
complementary angles	right triangle	tanslation	Cylinder
congruent angles	same side exterior/interior angles	reflection	Volume
corresponding angles	supplementary angles	rotation	Circle
transversal	vertical angles	proportion	Chord
exterior and interior angles	30-60-90 triangle	ratio	Secant
isosceles triangle	45-45-90 triangle	hypotenuse	Tangent
equilateral triangle	sine, cosine, tangent	Pythagorean Thm	
linear pair	special right triangles	Sphere	
obtuse angle	trigonometric ratios	Cone	

Learning Goal 1 (Angle relationships)

- To apply theorems involving parallel lines, transversals, and perpendicular lines.

Target 1 (Level of Difficulty: Comprehension, DOK: 2 - Skill)

- SWBAT calculate segment lengths and angle measures, as well as use the Segment and Angle Addition Postulates to solve for unknown measurements.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.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.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.

Target 2 (Level of Difficulty: Retrieval, DOK: 1 - Recall)

- SWBAT define parallel and perpendicular lines, as well as describe and identify each of the following: parallel planes skew lines transversals corresponding angles alternate interior angles alternate exterior angles same-side interior angles same-side exterior angles

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.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.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Learning Goal 2 (Triangles)

- To understand similarity, right triangles, and trigonometry

Target 1 (Level of Difficulty: Comprehension, DOK: 2 - Strategic Skill)

- SWBAT identify and determine unknown side lengths in 30-60-90 triangles.
- SWBAT identify and determine unknown side lengths in 45-45-90 triangles.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.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.

Target 2 (Level of Difficulty: Analysis, DOK: 3 - Strategic Thinking)

- SWBAT solve right triangles (determine all side lengths and all angle measures) using trigonometric ratios and the Pythagorean Theorem.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Target 3 (Level of Difficulty: Analysis, DOK: 3 - Strategic Thinking)

- SWBAT use the properties of similarity transformations to establish the AA, SSS, and SAS criterion for two triangles to be similar.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.G-SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Target 4 (Level of Difficulty: Knowledge Utilization, DOK: 4 - Extended Thinking)

- SWBAT sketch and use right triangles to solve applied problems efficiently (proportional word problems).

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Learning Goal 3 (Transformations)

- Experiment with Transformations in the Plane

MA.G-CO.A	Experiment with transformations in the plane

Target 1 (Level of Difficulty: Comprehension)

- SWBAT translate, reflect, and rotate a geometric figure

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.G-CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
MA.G-CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MA.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.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.

Learning Goal 4 (Volume)

- Use volume formulas for cones, spheres, pyramids, cylinders to solve problems

Target 1

- SWBAT use formulas for cylinders, pyramids, cones, and spheres to solve problems

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.G-GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Learning Goal 5 (Circles)

- Understand and apply theorems of circles

MA.G-C.A	Understand and apply theorems about circles

Target 1 (Level of Difficulty: Retrieval to Analysis)

- SWBAT identify relationships among angles, lines, arc length and area of a sector of a circle

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.

MA.K-12.7	Look for and make use of structure.
MA.G-C.A	Understand and apply theorems about circles
MA.G-C.A.1	Prove that all circles are similar.
MA.G-C.A.2	Identify and describe relationships among inscribed angles, radii, and chords.
MA.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.
MA.G-C.A.4	Construct a tangent line from a point outside a given circle to the circle.
MA.G-C.B.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Summative Assessment

- End of year projects
- Performance tasks
- Quizzes
- Tests
- Unit exams

21st Century Life and Careers

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.

Formative Assessment and Performance Opportunities

- Academic games
- Classroom discussions
- Classwork
- Closures
- Do-nows
- Groupwork
- Homework
- Partner work

- Presentations
- Stations
- Student-teacher discussions
- think-pair-share

Differentiation/Enrichment

- 504 Accommodations
- Challenge problems
- Grouping
- IEPs
- Problem of the week
- Projects
- Scaffolding questions
- Small group instruction
- Use of technology

Unit Resources

- Illustrative mathematics
- Kahn Academy
- KUTA
- PARCC released problems