Unit 05: Geometry

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **7 Weeks**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

MA.7.G	Geometry
MA.7.G.A	Draw, construct, and describe geometrical figures and describe the relationships between them.
MA.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MA.7.G.A.2	Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.7.G.B	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
MA.7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MA.7.G.B.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
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.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
TECH.8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

Capacities of the Literate Individual
Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

They demonstrate independence.

They build strong content knowledge.

They respond to the varying demands of audience, task, purpose, and discipline.

They comprehend as well as critique.

They value evidence.

They use technology and digital media strategically and capably.
They come to understand other perspectives and cultures.

LA.K-12.NJSLSA.R	Reading

MATH.K-12.1	Make sense of problems and persevere in solving them
	Key Ideas and Details
LA.RL.7.1	Cite several pieces of textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
MATH.K-12.2	Reason abstractly and quantitatively
LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
MATH.K-12.3	Construct viable arguments and critique the reasoning of others
MATH.K-12.4	Model with mathematics
MATH.K-12.5	Use appropriate tools strategically
MATH.K-12.6	Attend to precision
MATH.K-12.7	Look for and make use of structure
MATH.K-12.8	Look for and express regularity in repeated reasoning
LA.K-12.NJSLSA.W	Writing
	Text Types and Purposes
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.W.7.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.W.7.1.A	Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.
LA.W.7.1.B	Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
LA.K-12.NJSLSA.SL	Speaking and Listening
LA.W.7.1.C	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence.
LA.W.7.1.D	Establish and maintain a formal style/academic style, approach, and form.
	Comprehension and Collaboration
LA.W.7.1.E	Provide a concluding statement or section that follows from and supports the argument presented.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.7.1.A	Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
LA.SL.7.1.B	Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.
LA.SL.7.1.C	Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
LA.SL.7.1.D	Acknowledge new information expressed by others and, when warranted, modify their own views.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit…

The purpose of this unit is to extend student knowledge of angle relationships, properties of polygons--specifically triangles and quadrilaterals, area and perimeter of circles and composite figures, and properties of three dimensional figures including volume and surface area. Students will learn the importance of a variety of geometric formulas that can be used to solve real-world problems.

Meaning

Essential Questions

Essential Questions

- How can we use knowledge of angle relationships in order to calculate unknown angle measurements?

- What are the properties of triangles and quadrilaterals and how do these properties help to classify, analyze, and

calculate missing values?

- How are the formulas for area and circumference of a circle related to the circle's radius and diameter, and how can we use these formulas to calculate unknown areas and circumferences/perimeters of circles and composite figures?

- How are the formulas for surface area and volume created for prisms, pyramids, and cylinders and how can we use these formulas to solve a variety of problems?

- What strategies can be used to determine the cross section of a three-dimensional figure?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- Understanding the relationship and classification among a variety of angles can be used to draw conclusions and missing calculations in order to solve a variety of problems.

- The properties of a triangle's or quadrilateral's sides and angles in order to classify, construct, analyze, and calculate missing values.

- Area and circumference/perimeter of circles and composite figures including using such knowledge to estimate the area and perimeter of irregular composite figures.

- Understanding of surface area and volume of prisms, pyramids, and cylinders and strategies to assess the two-

dimensional cross-sections of such three-dimensional figures.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

- Definition of adjacent, vertical, congruent, complementary, and supplementary angles

- Identification of angles using angle notation (ex: <ABC or m<1)

- How to use a protractor and estimation to identify the degree of an angle

- How to create an equation from the relationship among angles and solve the equation

- How to find the value of a missing angle given sufficient information

- The relationship between a triangle's sides and a triangle's angles

- The types of triangles based on sides and types of angles

- The different classifications of quadrilaterals based on sides and angles

- The different parts of a circle including radius, diameter, pi, center, area, and circumference

- The relationship between a circle's radius and diameter

- The formulas for calculating a circle's or composite figure's area or circumference/perimeter

- The formulas for calculating the surface area and volume of a prism, pyramid, and cylinder

- The difference between a three-dimensional object's surface area and volume

- Cross-sections of three-dimensional figures

- How to apply the GIWAR method or other problem solving strategies to investigate real-world problems

Skills

Skills

Student will be skilled at …

- Determine the relationship between a set of angles

- Analyze angle relationships in order to solve for a missing angle measurement

- Calculate and angle's measurement by use of a protractor or estimation

- Construct angles or pairs of angles based on a variety of qualifications

- Construct triangles and quadrilaterals given angle measures or side lengths

- Describe the type of triangle or quadrilateral based on the angle measurements and side lengths

- Calculate missing angle measurements based on the classification of a triangle or quadrilateral

- Use the formulas for area and circumference of a circle to find a missing value

- Apply the formulas for area and circumference/perimeter of circles and polygons in order to find the area and perimeter of a composite figure

- Evaluate the surface area and volume of a prism, pyramid, and cylinder

- Determine the type of formula needed to evaluate a real-world problem

- Establish the two-dimensional shape formed by a cross-section of a three-dimensional object

- Interpret the question and solution of a real-world problem by applying strategies such as GIWAR or other problem solving methods.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Unit 5 activities.docx
Unit 5-PARCC.docx

Formative Assessment Strategies

Formative Assessment Strategies

- ixl.com scores
- tenmarks.com scores
- teacher center observation
- STEM projects

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Geometry: Approximately 6 Cycles

Cycle 1: Topics Covered

- Adjacent and vertical angles
- Congruent angles
- Constructing angles
- Complementary and supplementary angles

- Activities/Centers
    - IXL.com centers
        - X.3 Name, measure, and classify angles

        - X.4 Identify complementary, supplementary, vertical, adjacent, and congruent angles
        - X.5 Find measures of complementary, supplementary, vertical, and adjacent angles
    - Tenmarks centers
        - 7.G.5 Solving for Unknown Angles
        - 7.G.2 Geometric Constructions
    - Hands-On/Creative Centers
        - Construct angles with a protractor and compare angles with a partner http://www.gscdn.org/library/cms/87/25187.pdf?_ga=1.202145042.281960619.1468523750
    - Online games
        - Complementary and supplementary http://www.xpmath.com/forums/arcade.php?do=play&gameid=104
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 24—page 187-188
        - Bellringers: Week 24—page 185-186
        - Teacher created problems: “find x given particular angles” on white boards
- STEM activity: Using all types of angles activity http://www.pbslearningmedia.org/resource/mapt-math-ee-intangles/looking-at-math-from-different-angles-complementary-supplementary-vertical-and-adjacent/

Cycle 2: Topics Covered

- Classifying triangles
- Classifying quadrilaterals
- Angle measures of quadrilaterals

- Activities/Centers
    - IXL.com centers
        - X.7 Classify triangles
        - X.8 Classify quadrilaterals
        - X.9 Find missing angles in triangles and quadrilaterals
        - X.10 Identify and classify polygons
    - Tenmarks centers
        - 7.G.5 Solving for Unknown Angles
    - Hands-On/Creative Centers
        - Sort triangles based on sides and angles http://www.doe.virginia.gov/testing/solsearch/sol/math/5/mess_5-12ab.pdf
        - Sort quadrilaterals based on sides and angles http://www.doe.virginia.gov/testing/solsearch/sol/math/7/mess_7-7.pdf
    - Online games
        - Finding values of missing angles http://www.mathgames.com/skill/8.62-find-missing-angles-in-triangles-and-quadrilaterals
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 23—page 183-184
        - Bellringers: Week 23—page 181-182
        - Teacher created problems on missing quadrilateral angles on white boards

Cycle 3: Topics Covered

- Circumference of circles and semi-circles
- Radius and diameter

- Perimeters of composite figures

- Activities/Centers
    - IXL.com centers
        - X.17 Perimeter
        - X.20 Area and perimeter: word problems
        - X.21 Parts of a circle
        - X.22 Circles: calculate area, circumference, radius, and diameter
        - X.31 Semicircles: calculate area, perimeter, radius, and diameter
    - Tenmarks centers
        - 7.G.6 Finding Perimeter
        - 7.G.4 Area and Circumference of a Circle
    - Hands-On/Creative Centers
        - Several circumference center activities http://www.fortheloveofteachingmath.com/wp-content/uploads/2012/05/Circumference-Packet.pdf
    - Online games
        - https://www.studyladder.com/games/activity/circumference-of-a-circle-13144
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 23—page 179-180
        - Bellringers: Week 23—page 177-178
        - Teacher created find the circumference problems on white boards
- STEM activity: http://www.redtedart.com/2016/04/04/straws-circle-paper-planes-s-t-e-m-kids/

Cycle 4: Topics Covered

- Area of circles and semi-circles
- Area of composite figures

- Activities/Centers
    - IXL.com centers
        - X.22 Circles: calculate area, circumference, radius, and diameter
        - X.23 Circles: word problems
        - X.31 Semicircles: calculate area, perimeter, radius, and diameter
        - X.33 Area of compound figures with triangles, semicircles, and quarter circles
        - X.34 Area between two shapes
    - Tenmarks centers
        - 7.G.4 Area and Circumference of a Circle
        - 7.G.6 Finding Area
        - 7.G.6 Finding Area, Volume, Surface Area of Composite Figures
    - Hands-On/Creative Centers
        - Discovering area of circles using a parallelogram http://www.fredonia.edu/department/math/Methods%20Class/AMTNYS%20Lesson%20Plans/Brian%20R.%20&%20Julie%20R.pdf
    - Online games
        - Partner game https://www.quia.com/cb/10522.html
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 22—page 175-176
        - Bellringers: Week 22—page 173-174
        - Teacher created find the area problems on white boards

Cycle 5: Topics Covered

- Surface area of prisms
- Surface area of pyramids
- Surface area of cylinders

- Activities/Centers
    - IXL.com centers
        - X.27 Nets of 3-dimensional figures
        - X.28 Surface area
    - Tenmarks centers
        - 7.G.6 Finding Surface Area
    - Hands-On/Creative Centers
        - All wrapped up! http://www.cpalms.org/Public/PreviewResourceLesson/Preview/29255
    - Online games
        - https://www.brainingcamp.com/legacy/content/concepts/surface-area/problems.php
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 22—page 171-172
        - Bellringers: Week 22—page 169-170

Cycle 6: Topics Covered

- Volume of prisms
- Volume of pyramids

- Activities/Centers
    - IXL.com centers
        - X.29 Volume
    - Tenmarks centers
        - 7.G.6 Volume
    - Hands-On/Creative Centers
        - Fun volume activity http://www.mathactivities.net/lessons/volume-activity.htm
    - Online games
        - http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/VolumeShapesShoot.htm
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 21—page 167-168
        - Bellringers: Week 21—page 165-166
- STEM activity: Box activity surface area and volume https://www.teachengineering.org/lessons/view/duk_boxes_mary_less

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, GIfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of

using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.