Unit 6: Geometry

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 24**
Length: **7 weeks**
Status: **Published**

Unit Overview

In this unit, students will learn about geometric principles including angles relationships, properties of circles, and volume/surface area of 3-D objects. This unit will begin with a simple review of measuring angles using a protractor. This allows us to also spend a little time classifying an angle. Next, students will learn about specific angle relationships such as adjacent, complementary, supplementary, and vertical angles. While learning about specific angle relationships, students will learn how to apply the given relationship to creating an algebraic equation modeling the given angle relationship. After completing the angle relationships aspect of this unit, students will learn about the characteristics of circles. Students will learn the basic terminology of circles and use this information to calculate the radius and diameter (including algebraic examples) of circles. Students will then learn how to calculate the circumference and area of a circle (decimal answers and answers in terms of Pi). Students will then take the information of circumference and area of circles and apply it to comparing the area to the circumference (including giving students the circumference and asking them to calculate the area). After completing the circles aspect of the unit, students will learn how to calculate the area/volume of 3-D prisms and pyramids. Students will begin by reviewing how to classify a solid followed by calculating the surface area/volume for any type of right prism or pyramid. Many questions from this part of the unit will be asked in the context of a real world problem.

Standards

MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
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.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.

Essential Questions

- Why must you have a strong foundation in solving equations in order to be able to solve angle relationship problems?
- In what careers would you need to have a strong foundation in geometric principles?
- How does knowing the relationship between different angles allow one to create an equation to calculate a missing value?

Application of Knowledge: Students will know that...

- A right angle measures exactly 90 degrees.
- Adjacent angles are angles that have a common vertex and share a common side. They can not be inside one another.
- An acute angle has a measure less than 90 degrees.
- An obtuse angle has a measure greater than 90 degrees.
- Classifying solids is always done by the figure of the base.
- Complementary angles are angles whose sum is 90 degrees. These angles come together to form a right angle.
- If the circumference of a circle is given to you, then you can work backwards to calculate the area.
- In order to calculate the volume of an irregular solid you add the volume of each separate solid that creates the irregular solid.
- Knowing an angle relationship will help one come up with an equation to calculate a missing value.
- Pyramids have 1/3 the volume of a prism that has the same base and height.
- Supplementary angles are angles whose sum is 180 degrees. These angles come together and form a straight angle.
- The area of a circle is the space inside of the circle.
- The circumference and area of a circle can be written either as a decimal or in terms of Pi.
- The circumference of a circle is the distance around the outside of the circle.
- The diameter of a circle is a line that goes from one side of the circle to the other. The line must go through the center of the circle.
- The radius of a circle is a line drawn from the center to the outside of the circle. The radius is always half of the diameter.
- The surface area of any figure is sum of the area of all the faces of the solid.
- The volume of a solid represents how much substance a solid can hold.
- Using a protractor will give you the specific number of degrees of a given angle.
- Vertical angles are angles that are directly across from each other and share a vertex, but not a side. These angles form a perfect "X" when put together.
- Vertical angles are congruent to one another.

Application of Skills: Students will be able to...

- Apply the idea of surface area and volume to solving real world problems.
- Calculate the area of a circle when given the circumference.
- Calculate the circumference/area of a given circle (including leaving your answer in terms of Pi).
- Calculate the radius/diameter for a given circle (including algebraic examples).
- Calculate the surface area of right prisms and pyramids.
- Calculate the surface area of right prisms and pyramids.
- Calculate the volume/surface area of irregular solids.
- Classify a solid based on given characteristics.
- Classify an angle measure based on the number of degrees.
- Create an equation based on a given angle relationship.
- Find the measure of an angle by using a protractor.
- Identify the angle relationship being presented (adjacent, complementary, supplementary, or vertical).
- Solve real world problems involving circumference/area of circles.

Assessments

- Do Now's: Will be used to check for prior knowledge and to determine mastery of particular topics. If needed the teacher will remediate the previous lesson before continuing.
- Tickets to leave: Will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- Communicator Practice: Will be used as a quick whole-class assessment tool to check for complete comprehension.
- Unit Quiz: focusing only on angle relationships
- Checkpoint Quiz: focusing on angle relationships and circles.
- Unit test: focusing on all concepts covered within the "Geometry" unit. More focus will be placed on 3-D objects.
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment. From this unit, students will be asked to solve angle relationship problems and answer a real world problem involving surface area/volume.

Suggested Activities

- Digits launch activities (Topics 10 - 13).
- Review games using communicators.
- Student centered SMART Board lessons: students will manipulate irregular solids to "pull apart" the different solids that created the irregular solid.
- Geometry Poster: Students will work with a partner to calculate the surface area/volume of a right prism and pyramid. Students will neatly show their work and add creativity to the poster. These will then be displayed around the room.
- Partner practice where students answer one column of a worksheet and their partner answers the other.

They compare answers because each row will get the same answer even though they are different problems.
- Students will develop a playground that must satisfy a given set of geometric conditions. Students will then calculate the area, surface area, or volume for the given figures.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
  - Modifications & accommodations as listed in the student's IEP
  - Assign a peer to help keep student on task
  - Modified or reduced assignments
  - Reduce length of assignment for different mode of delivery
  - Increase one-to-one time
  - Working contract between you and student at risk
  - Position student near helping peer or have quick access to teacher
  - Break tests down in smaller increments
- **Content specific modifications may include:**
  - Personal handout for remembering integer rules (can be taped to desk).
  - Graphic organizer for remembering integer rules.
  - Provide completed examples for practice work and homework.
  - Calculator to assist with calculations.
  - Drastically cut down the amount of problems required to complete.
  - Provide students with a formula sheet with one type of problem for each formula worked out for them already.

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan
- **Content specific vocabulary important for ELL students to understand include:**
  - Protractor, degrees, acute angle, right angle, obtuse angle, adjacent, complementary, supplementary, vertical, radius, diameter, center, circumference, area, surface area, volume, prism, pyramid, base, height

Differentiation to extend learning for gifted students may include:

- As a challenge provide students with non-conventional pyramids and prisms (such as hexagonal or octagonal).
- When discussing circles include semi-circles in the discussion.
- Determine the characteristics of a shape within a shape (e.g. what is the maximum area of a circle contained within a square with a side length of "x" inches)

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

ELA: Practice formulating complete and grammatically correct responses to open-ended questions.

Designing: Have students develop a playground that must contain different geometric shapes. Students will then calculate the area, volume, or surface area for each item in the playground.

Resources

Digits teacher materials and support: www.pearsonrealize.com

Digits student access and support: www.mymathuniverse.com

IXL practice: www.ixl.com

Digits video examples

SMART Board lessons

Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.

CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.