

09 Geometry and Measurement

Content Area: **Mathematics**
Course(s):
Time Period: **Week1**
Length: **1 Week**
Status: **Published**

Stage 1: Desired Results

Unit Overview/ Rationale

Students will identify solids and use the Pythagorean Theorem and other formulas to calculate their volume. They will use proportions to find missing measurements of similar solids, including surface area and volume.

Standards & Indicators

Common Core: Mathematics, Common Core: Grade 8 Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

MA.8.8.G.C.9

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

MA.8.8.G.B.7

Apply the Pythagorean Theorem to determine unknown side lengths in right

triangles in real-world and mathematical problems in two and three dimensions.

Big Ideas - Students will understand that...

- Two dimensional figures lie in a plane; three dimensional figures lie in space, having length, width, and height.
- Prisms and pyramids have polygons, which are plane figures, for each face, and are polyhedrons; cylinders and cones have curved surfaces and are not polyhedrons.
- Volume is an amount of three-dimensional space. You can also
- Think of it as a measure of capacity.
- When you find the volume of a solid, the height is measured as perpendicular to the base. If slant height is given use the Pythagorean Theorem to find the height of the prism.
- A sphere has no edges or vertices and is not a polyhedron.
- Every cross section of a sphere is a circle.
- If you change each dimension of a solid by a given amount , the surface area changes by that amount squared, and the volume changes by that amount cubed.

Essential Questions - What provocative questions will foster inquiry and transfer of learning

- What does each part of a volume formula mean?
- How can you prove the volume of a cone is $\frac{1}{3}$ the volume of a cylinder with the same radius and height?
- How can you prove the volume of a pyramid is $\frac{1}{3}$ of the volume of a prism with the same base and height?
- What are examples of real world problems that are solved by finding the volume or surface area of a cone, cylinder or sphere?

Content - Students will know...

Keywords:

Cone, cylinder, polyhedron, prism, pyramid, similar solids, skew lines, solids, sphere, volume

Skills - Students will be able to...

- To identify solids, parts of solids, and skew line segments.
- To find the volume of prisms and cylinders.
- To find the volumes of pyramids and cones.
- To find the surface area and volume of a sphere.
- To use proportions to find missing measurements of similar solids, including surface area and volume.

Stage 2: Assessment Evidence

Assessment

Stage 3: Learning Plan

Learning Activities

Activities:

Students will identify solids, parts of solids, and skew line segments.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to identify solids, parts of solids, and skew line segments.

Example:

For a given solid, describe the shape of the base(s) and the lateral surface(s). For Ex: rectangular prism

Sample Solution:

rectangle, parallelograms

Activities:

Students will find the volume of prisms and cylinders.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to find the volume of prisms and cylinders.

Example:

Find the volume to the nearest whole number of a cylinder of diameter 5 and height 10 cm.

Sample Solution: 196 cm^3

Activities:

Students will find the volumes of pyramids and cones.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to find the volumes of pyramids and cones.

Example:

Find the volume to the nearest whole number of a cone whose diameter is 8 cm, height is 16 cm, and slant height is 16.5 cm.

Sample Solution:

268 cm^3

Activities:

Students will find the surface area and volume of a sphere.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to find the surface area and volume of a sphere.

Example:

Find the spheres surface area and volume to the nearest whole number if the radius is 6 cm.

Sample Solution:

S.A. = 452 cm^2 ; $V=905 \text{ cm}^3$

Activities:

Students will use proportions to find missing measurements of similar solids, including surface area and volume.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to use proportions to find missing measurements of similar solids, including surface area and volume.

Example:

Find the surface area and volume of a similar solid whose dimensions are $\frac{4}{5}$ of the given rectangular prism with length 6 in., width 6 in., and height 4 in. Round to the nearest whole number.

Sample Solution:

S.A. = 108 in², V = 74 in³

Resources

Prentice Hall Course 3 Mathematics Common Core

c.2013

Chapter 9