

MATH 78 Unit 6

Geometric Applications of Exponents

Dear Parents,

Below are examples of what your child is learning in Unit 6. Look for future newsletters.



Students will be able to:

- Explain the proof of the Pythagorean Theorem and its converse.
- Apply the Pythagorean Theorem to determine lengths of sides of right triangles with 2 or 3 dimensions or the distance between 2 coordinates.
- Apply the formulas for volumes of cones, cylinders and spheres
- Use volume formulas to solve real-world problems.
- Use square roots and cube roots to represent solutions to equations.

Vocabulary

Altitude of a triangle: The perpendicular distance between a vertex of a triangle and the side opposite that vertex. Sometimes called the height

Base (of a polygon): the bottom side, on which the polygon 'sits,

Cone: A three dimensional figure with a circular or elliptical base and one vertex.

Cylinder: A three dimensional object with two parallel, congruent, circular bases.

Diameter: The distance across a circle through its center. The line segment that includes the center and whose endpoints lie on the circle.

Distance: The amount of space between two points or things. Distance is always a non-negative number.

Solid: A figure that has length, width, and thickness (i.e., a figure that is 3-dimensional).

Hypotenuse: In a right triangle, the side opposite to the right angle.

Leg: Either of the two shorter sides of a right triangle. These two sides together form the right angle in the right triangle.

Pythagorean Theorem: A theorem that states that in a right triangle, the square of the length of the hypotenuse equals the sum of the squares of the lengths of the legs.

Pythagorean Triples: A set of three non-zero whole numbers, a , b , and c , such that $a^2 + b^2 = c^2$.

Sphere: The set of all points in space that are equidistant from a fixed point, called the center.

Radius: The distance from the center of a circle to any point on the circle.

Volume: The amount of space occupied by an object.

Try: <http://intermath.coe.uga.edu/>

Resources:

Glencoe/McGraw Hill Georgia Math Grade 7 Plus

Volume 2 Unit 3: Chapter 8 Lessons 1-4 and Chapter 9 Lessons 1-3

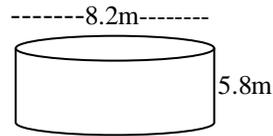
Textbook Online: connectED.mcgraw-hill.com

Web resources:

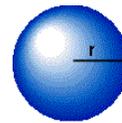
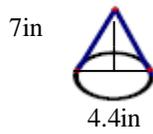
- www.aaaknow.com/geo.htm
- www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/?version=1.5.0_06&browser=MSIE&vendor=Sun Microsystems Inc.
- <http://www.factmonster.com/ipka/A0876212.html>
- <https://mathbitsnotebook.com/Geometry/3DShapes/3DCylinders.html> (exclude surface area)
- <https://mathbitsnotebook.com/Geometry/3DShapes/3DCones.html> (exclude surface area)
- <https://mathbitsnotebook.com/Geometry/3DShapes/3DSpheres.html> (exclude surface area)

Practice Problems

- 1.) For the figure below, state its mathematical name, estimate its volume, then use formulas to compute the volume.



- 2.) For each figure below, state their mathematical names, estimate the volume, then compute the volume.



The radius is 4 ft.

- 3) A football field is 360 feet by 45 feet. How long is the walk from one corner diagonally to the opposite corner?

Answers to Practice Problems

- 1.) This is a cylinder. Its estimated volume is $3(4)(4)(6)=288\text{m}^2$. The volume is
 $V = \pi r^2 h = 3.14(4.1^2)(5.8) \approx 306.144\text{m}^3$.

- 2.) This is a cone. Its estimated volume is 28in^3 . By formula,

$$V = \frac{1}{3} \pi r^2 h \approx \frac{1}{3} (3.14)(2.2^2)(7) = 35.46\text{in}^3$$

- This is a sphere. Its estimated volume is 265cm^3 . By formula,

$$V = \frac{4}{3} \pi r^3 = \frac{4}{3} \pi 4^3 = 268.08\text{ft}^3 \quad (2)(2)(3) = 4\text{cm}^3$$

- 3) Use the Pythagorean Theorem: $360^2 + 45^2 = c^2$; $129,600 + 2025 = c^2$; $131,625 = c^2$;
 $c \approx 362.8$ feet