Volume 1 Issue 3

# MATH 8 Unit 3
# Geometric Applications of Exponents

Dear Parents,
Below are examples of what your child is learning in Unit 3. 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/

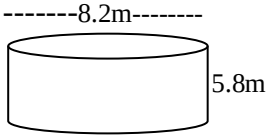
**Resources:**
***Glencoe/McGraw Hill Georgia Math Grade 8***
***Volume 2 Unit 3: Chapter 5 Lessons 1-4 and Chapter 6 Lessons 1-3***
**Textbook Online: connectED.mcgraw-hill.com**

**Web resources**:

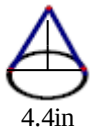
- www.aaaknow.com/geo.htm
- www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/?version=1.5.0_06&browser=MSIE&vendor=Sun_Microsystems_Inc.
- http://www.factmonster.com/ipka/A0876212.html
- https://mathbitsnotebook.com/Geometry/3DShapes/3DCylinders.html (exclude surface area)
- https://mathbitsnotebook.com/Geometry/3DShapes/3DCones.html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

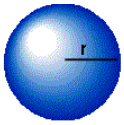
## Practice Problems

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)=288m ². The volume is V= $\pi r^2 h$ =3.14(4.1²(5.8) ≈ 306.144m³.

2.) This is a cone. Its estimated volume is 28in³. By formula,

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

This is a sphere. Its estimated volume is 265cm³. By formula,

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

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