Math 6 Unit 5
Area and Volume

Volume 1 Issue 5

References

Helpful Links:

www.khanacademy.org/math/basic-geo/basic-geo-volume-surface-area/basic-geo-volume/v/volume-of-a-rectangular-prism-with-fractional-cubes

www.onlinemathlearning.com/prism-surface-area.html

www.geogebra.org/en/upload/files/english/Victoria/TriangleArea.html

www.ixl.com/math/grade-6/volume-and-surface-area

http://www.learner.org/interactives/geometry/3d_prisms.html

Georgia Math Textbook Connection:

Ch. 8: Lessons 1-5
Ch. 9: Lessons 1-5

Textbook Online: Georgia Math
http://connected.mcgraw-hill.com/connected/login.do

Dear Parents

In this unit students will learn about finding the area of polygons, the surface area of prisms and pyramids, and the volume of prisms with fractional edges.

Concepts Students will Use and Understand

- The area of irregular and regular polygons can be found by decomposing the polygon into rectangles, triangles and other shapes.
- Manipulatives and the construction of nets may be used in computing the surface area of rectangular and triangular prisms, and volume of right rectangular prism.
- Formulas may be used to compute the areas of polygons, surface areas of rectangular and triangular prisms, and volumes of right rectangular prisms.
- Appropriate units of measure should be used when computing the area (square units) of polygons, and surface area (square units) and volume of prisms (cubic units).
- Views of rectangular and triangular prisms may be interpreted and sketched to provide a 2-dimensional representation of a three dimensional figure.
- Fractional edge lengths are equivalent to the dimensions of solid figures
- The volume of a solid figure is the number of same sized cubes filling the space so that there are no gaps and overlaps.

Vocabulary

- **Area:** The number of square units it takes to completely fill a space or surface.
- **Bases of a Prism:** The two faces formed by congruent polygons that lie in parallel planes, all of the other faces being parallelograms.
- **Cubic Units:** Volume of the solids is measured in Cubic Units.
- **Edge:** The intersection of a pair of faces in a three-dimensional figure.
- **Equilateral Triangle:** A triangle which has all three of its sides equal in length.
- **Face:** One of the polygons that makes up a polyhedron.
- **Fractional edge length:** The length of each edge of the cube is a fraction.
- **Isosceles Triangle:** A triangle which has two of its sides equal in length.
- **Kite:** A quadrilateral with two distinct pairs of equal adjacent sides.
  A kite-shaped figure.
- **Lateral Faces:** In a prism, a face that is not a base of the figure.
- **Net:** A two-dimensional figure that, when folded, forms the surfaces of a three-dimensional object.
- **Parallelogram:** A quadrilateral with both pairs of opposite sides parallel.
- **Polygon:** A number of coplanar line segments, each connected end to end to form a closed shape. A *regular polygon* has all sides equal and all interior angles equal. An *irregular polygon* sides are not all the same length nor does the interior angles have the same measure.
- **Polyhedron:** A 3-dimensional figure that has polygons as faces.
- **Prism:** A polyhedron with two parallel and congruent faces, called bases, and all other faces that are parallelograms.
- **Quadrilaterals:** Four coplanar line segments linked end to end to create a closed figure.
  A 4-sided polygon.
- **Rectangle:** A 4-sided polygon where all interior angles are 90°.
- **Rectangular prism:** A solid (3-dimensional) object which has six faces that are rectangles.
- **Rhombus:** A quadrilateral with all four sides equal in length.
- **Right Triangle:** A triangle where one of its interior angles is a right angle (90 degrees).

- **Right rectangular prism:** In a right prism, the lateral faces are each perpendicular to the bases.
- **Scalene Triangle:** A triangle where all three sides are different in length.
- **Square:** A quadrilateral that has four right angles and four equal sides.
- **Surface area:** The total area of the 2-dimensional surfaces that make up a 3-dimensional object.
- **Trapezoid:** A quadrilateral which has one pair of parallel sides.
- **Triangles:** A closed figure consisting of three line segments linked end-to-end.
  A 3-sided polygon
- **Triangular prism:** A prism whose bases are triangles. A solid (3-dimensional object what has five faces: three rectangles and two bases.
- **Vertices:** The common endpoint of two or more rays or line segments
- **Volume:** The amount of space occupied by an object.
- **Volume of a Prism**: The area of a base times the height. The number of cubic units to fill a prism.

Try http://intermath.coe.uga.edu/dictnary/homepg.asp or http://www.amathsdictionaryforkids.com/ for further examples.

Formulas

Area

Parallelogram

$A = bh$

Triangle

$A = \frac{1}{2}bh$

Volume

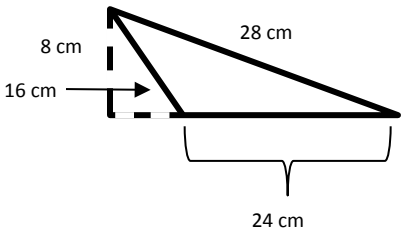
Rectangular Prism

$V = lwh$

$V = Bh$

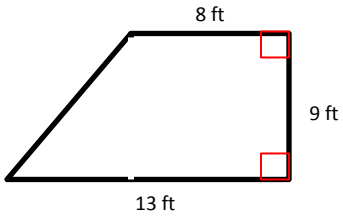
Example 1

What is the area of this triangle?

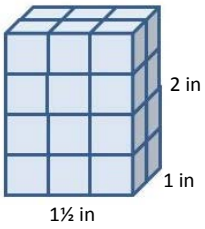


Example 2

What is the area of this flower garden?



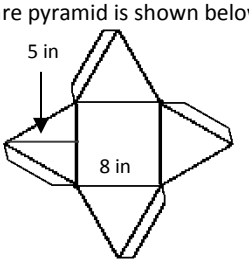
Example 3



What is the volume of the rectangular prism?

Example 4

The net of a square pyramid is shown below.



What is the surface area of the pyramid?

Key

Example 1

$A = \frac{1}{2}bh$
$A = \frac{1}{2} \cdot b \cdot h$
$A = \frac{1}{2} \cdot 24 \cdot 8$
$A = \frac{1}{2} \cdot 192$
$A = 96$

The area of the triangle is $96\ cm^2$.

Example 2

$A = \frac{1}{2}bh$
$A = \frac{1}{2} \cdot b \cdot h$
$A = \frac{1}{2} \cdot 9 \cdot 5$
$A = \frac{1}{2} \cdot 45$
$A = 22.5$

$A = bh$
$A = b \cdot h$
$A = 9 \cdot 8$
$A = 72$

$22.5 + 72.0 = 94.5$

The area of the garden is $94.5\ ft^2$.

Example 3

$V = lwh$
$V = l \cdot w \cdot h$
$V = 1\frac{1}{2} \cdot 1 \cdot 2$
$V = 1\frac{1}{2} \cdot 2$
$V = 3\ in^3$

Example 4

$A = b^2$
$A = b \cdot b$
$A = 8 \cdot 8$
$A = 64$

$A = \frac{1}{2}bh$
$A = \frac{1}{2} \cdot b \cdot h$
$A = \frac{1}{2} \cdot 8 \cdot 5$
$A = \frac{1}{2} \cdot 40$
$A = 20$
$20 \times 4 = 80$

$80 + 64 = 144$

The surface area of the pyramid is $144\ in^2$.