Big Ideas Math: Advanced 2

Parent Newsletter

Chapter 14: Surface Area and Volume

Students will...

Use two-dimensional nets to represent three-dimensional solids.

Find surface areas of rectangular and triangular prisms.

Find surface areas of regular pyramids.

Find surface areas of cylinders.

Find volumes of prisms.

Find volumes of pyramids.

Describe the intersections of planes and solids.

Solve real-life problems.

Key Terms

The ***lateral surface area*** of a prism is the sum of the areas of the lateral faces.

A ***regular pyramid*** is a pyramid whose base is a regular polygon.

The height of each lateral face of a pyramid is the ***slant height*** of the pyramid.

A two-dimensional shape formed by the intersection of a plane and a solid is called a ***cross section***.

Standards

Common Core:

7.G.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.

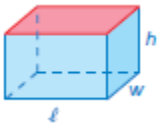
7.G.4: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

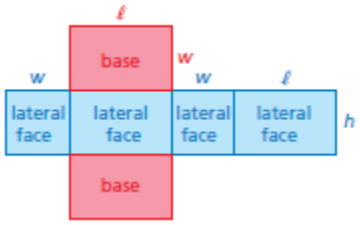
7.G.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Key Ideas

Surface Area of a Rectangular Prism

The surface area S of a rectangular prism is the sum of the areas of the bases and the lateral faces.





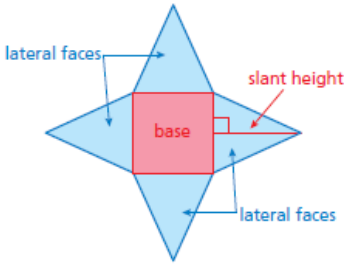
$$S = 2\ell w + 2\ell h + 2wh$$

Areas of bases + Areas of lateral faces

Surface Area of a Pyramid

The surface area S of a pyramid is the sum of the areas of the base and the lateral faces.

S = area of base + areas of lateral faces



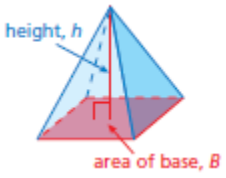
Surface Area of a Prism

The surface area S of any prism is the sum of the areas of the bases and the lateral faces.

S = areas of bases + areas of lateral faces

Volume of a Pyramid

The volume V of a pyramid is one-third the product of the area of the base and the height of the pyramid.



$$V = \frac{1}{3}Bh$$

Area of base; Height of pyramid

Essential Questions

How can you find the surface area of a prism?

How can you find the surface area of a pyramid?

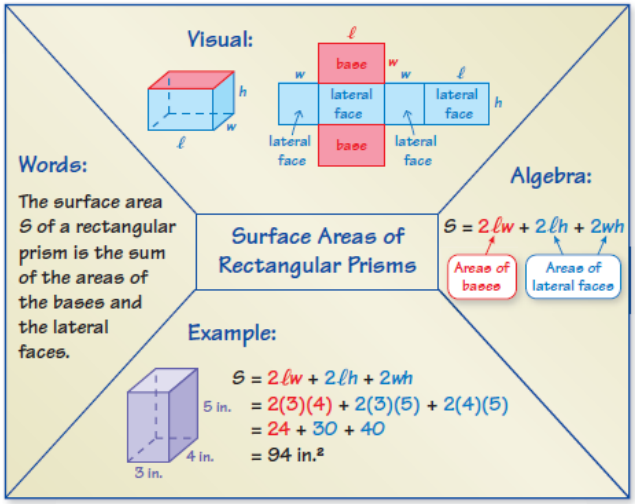
How can you find the surface area of a cylinder?

How can you find the volume of a prism?

How can you find the volume of a pyramid?

Reference Tools

An **Information Frame** can be used to help organize and remember concepts. Write the topic in the middle rectangle. Then write related concepts in the spaces around the rectangle. Related concepts can include *Words*, *Numbers*, *Algebra*, *Example*, *Definition*, *Non-Example*, *Visual*, *Procedure*, *Details*, and *Vocabulary*. Your student can place their information frames on note cards to use as a quick study reference.



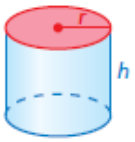
Quick Review

- Area is always measured in square units.
- The area A of a triangle with base b and height h is $A = \frac{1}{2}bh$.
- When all the edges of a rectangular prism have the same length s, the rectangular prism is a cube. The formula for the surface area of a cube is $S = 6s^2$.
- Even though many well-known pyramids have square bases, the base of a pyramid can be any polygon.
- In a regular polygon, all the sides are congruent and all the angles are congruent.
- Volume is measured in cubic units.
- The *height* of a pyramid is the perpendicular distance from the base to the vertex.

Key Ideas

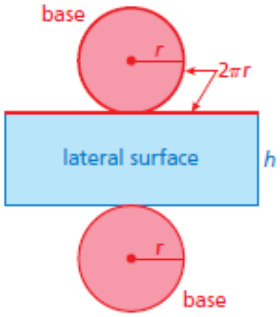
Surface Area of a Cylinder

The surface area S of a cylinder is the sum of the areas of the bases and the lateral surface.



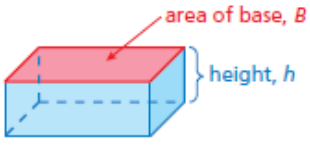
$S = 2\pi r^2 + 2\pi rh$

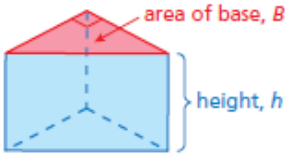
Areas of bases — Area of lateral surface



Volume of a Prism

The volume V of a prism is the product of the area of the base and the height of the prism.





$V = Bh$

Area of base — Height of prism

What's the Point?

The ability to calculate surface area and volume is very useful in real life for events like packaging a product. Have your student measure a cereal box and calculate the surface area and volume of the box. Could the box be a different size with a smaller surface area and still hold the same amount of cereal? Why do you think the company made the box the size it is?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 14: Paper Measurements STEM Video is available online at www.bigideasmath.com.