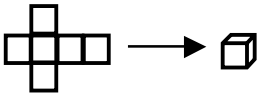
Dear Parents and Caregivers,

Thank you for supporting your child to achieve success in school. We value your input and active participation in your child's education. These letters are designed to help you understand the work your child brings home and the academic expectations of Arizona's College and Career Ready Standards. Your child is developing the necessary skills and knowledge to help them compute, think, and reason mathematically. This letter is about **area, surface area, and volume of right prisms and pyramids in seventh grade.**

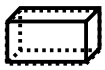
End-of-year goals

In sixth grade, students learned to find the area of triangles and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating shapes to rectangles. They also used nets to model and find the surface area of 3-dimensional figures. They learned to find the volume of rectangular prisms with fractional side lengths using formulas. In seventh grade, the students apply these understandings to solve real-world mathematical problems involving figures composed of triangles, quadrilaterals, polygons, cubes, and right prisms. They describe the 2-D figures that result from slicing 3-D figures along a plane.

Vocabulary

3-dimensional figure: figures that have length, width, and height, such as prisms and pyramids
area: the measure, in square units, of the interior region of a 2-dimensional figure (u^2)
surface area: the total area of the faces, including bases and curved surfaces of a solid figure
volume: a measure of the amount of space occupying a three-dimensional shape, expressed in cubic units (u^3)
net: a 2-dimensional shape that can be folded into a 3-dimensional figure 

prism: a solid that has two faces, which are parallel and congruent (bases). Prisms are named by the shape of their bases. A right prism's joining edges and faces are perpendicular to the bases.

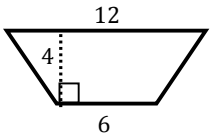
Example: rectangular prism 

pyramid: a solid with a polygon base and faces that are triangles, which meet at the top (apex)

Example: square pyramid 

Area of 2-dimensional figures

To find the area of the trapezoid below, students might see that it is made up of two triangles and a rectangle.



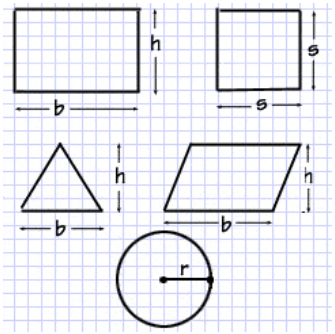
Dimensions of this figure: base$_1$ (b_1) = 6 units; base$_2$ (b_2)= 12 units; height (h) = 4 units

By applying the formulas for finding the area of a triangle and the area of a rectangle, students could find the area of the trapezoid. They also could use a formula for area of a trapezoid.

$$\text{Area of a trapezoid: } A = \frac{(b_1 + b_2) \cdot h}{2} \text{ or } A = \frac{1}{2} \cdot (b_1 + b_2) \cdot h$$

Area is always written in square units (u^2). Students can decompose a figure into polygons to find the area of more complex 2-D shapes.

Commonly used area formulas



Area of a rectangle: $A = bh$

Area of a square: $A = s^2$

Area of a triangle: $A = \frac{1}{2}bh$

Area of a parallelogram: $A = bh$

Area of a circle: $A = \pi r^2$

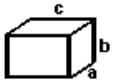
Surface area (*SA*) of 3-dimensional figures

Students will find the surface area of 3-dimensional figures composed of triangles, quadrilaterals, polygons, cubes, and right prisms. It may be helpful to think of surface area as the amount of paper one might need to cover the outside of a box, without overlaps. To determine surface area, students can draw a 2-dimensional net that represents each side of the figure. For example, to find the surface area of a cube, they could draw a net of six squares, all of the same size, to represent the six faces of a cube. Since a cube has 6 faces of equal area, they could find the area of each face by squaring the side (s) length ($A = s^2$). Then, they add each of those areas to find the total for the cube. This is the same as using the formula to find the surface area of a cube ($SA = s^2 + s^2 + s^2 + s^2 + s^2 + s^2 = 6s^2$).

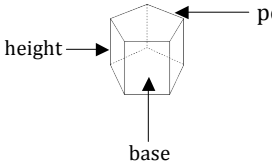
To find the surface area of 3-dimensional figures with faces that are triangles and rectangles, such as square pyramids or prisms, a student could create the net for each figure, find the areas of each face represented in the net, and add those areas together. They could also use a formula specific to that figure.

Formulas for surface area of common 3-D figures

Cube: $SA = 6s^2$
(s is the length of a side)



Rectangular Prism $SA = 2ab + 2bc + 2ac$
(a, b, and c are the lengths of the 3 sides)



Right Prism: $SA = 2B + ph$
(B is the area of the base, ph is the perimeter of the base times the height)
Regular prisms: $SA = 2B + nsh$
(B is the area of the base, n is the number of sides of the base, s is the length of sides of the base, h is the height of the prism)

Volume (*V*) of a right rectangular prism and 3-D plane sections

Students will find the volume of right rectangular prisms in real-world problems. They will use the formula for volume:

- $V = Bh$ volume equals B (area of the base) multiplied by h (height) OR
- $V = lwh$ volume equals l (length) multiplied by w (width) multiplied by h (height)

To visualize the 2-D shape created by slicing 3-D figures along a plane, students could use clay to create the 3-D figure and slice it along horizontal, vertical, and diagonal planes.

How to help at home

- Encourage your child to use a variety of strategies to solve problems and to explain the reasoning behind the strategy chosen.
- Watch these videos on using nets, finding volume, surface area and slicing 3-D figures from Learn Zillion
  http://learnzillion.com/lessonsets/278-use-nets-to-represent-threedimensional-figures-and-find-surface-area
  http://learnzillion.com/lessonsets/200-describe-the-twodimensional-figures-that-result-from-slicing-threedimensional-figures
- Remember, making mistakes is a part of learning.