

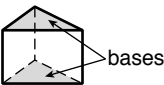
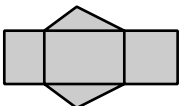
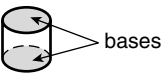
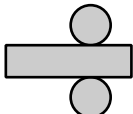

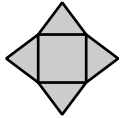
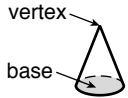
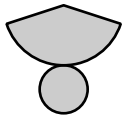
Date _____

Dear Family,

In this chapter, your child will learn about **three-dimensional figures** and **special relationships**. Your child will then learn to determine the surface areas and volumes of these three-dimensional figures.

You child will begin the lesson with a look at solid geometry.

There are four basic three-dimensional figures at which your child will be looking. These are outlined in the table below. Your child will learn more about these figures by using a **net**. A net is a diagram of a three-dimensional figure that can be folded to form the three-dimensional figure. The nets of these figures are also included in this table.

Shape	Description	Example	Net
Prism	Formed by two parallel congruent polygonal faces called <i>bases</i> connected by faces that are parallelograms		
Cylinder	Formed by two parallel congruent circular bases and a curved surface that connects the bases		
Pyramid	Formed by a polygonal base and triangular faces that meet at a common vertex.		
Cone	Formed by a circular base and a curved surface that connects the base to a vertex.		

Your child will also use formulas for these three-dimensional figures. One conjecture that your child will have to make is about the relationships between the vertices, edges, and faces of a polyhedron. A **polyhedron** is formed by four or more polygons that intersect only at their edges.

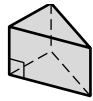
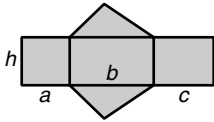
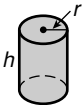
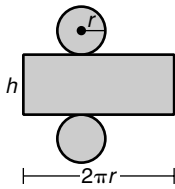
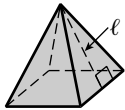
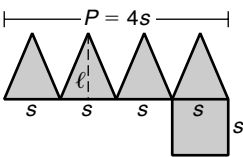
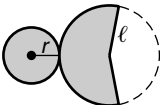
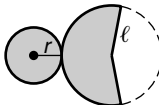
Euler's Formula says that for any polyhedron with V vertices, E edges, and F faces,

$$V - E + F = 2$$

Your child will then move on to determine the surface areas and volumes of different figures. It will be helpful to use the net of the figure to do this.

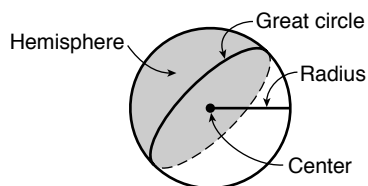
The surface area of a figure is different from the lateral area. The surface area is the total area of all faces and curved surfaces of a three-dimensional figure. The lateral area of a figure is the sum of the areas of the lateral faces. The lateral face is a face of a prism or pyramid that is not a base.

The formulas needed to find these values are outlined below.

Shape	Lateral Area	Example	Surface Area	Example	Volume
Right Prism	$L = Ph$		$S = Ph + 2B$		$V = Bh$
Right Cylinder	$L = 2\pi rh$		$S = 2\pi rh + 2\pi r^2$		$V = \pi r^2 h$
Right Pyramid	$L = \frac{1}{2}P\ell$		$S = \frac{1}{2}P\ell + B$		$V = \frac{1}{3}Bh$
Right Cone	$L = \pi r\ell$		$S = \pi r\ell + \pi r^2$		$V = \frac{1}{3}\pi r^2 h$

Your child will also learn about the unique shape of spheres. A sphere is the locus of points in space that are a fixed distance from a given point called the center of a sphere. The radius of a sphere connects the center of the sphere to any point on the sphere.

The figure below shows the parts of a labeled sphere.



The volume of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.

The surface area of a sphere with radius r is $S = 4\pi r^2$.

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