Important Solids

Objectives

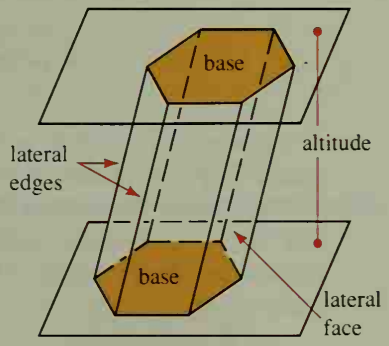
1. Identify the parts of prisms, pyramids, cylinders, and cones.
2. Find the lateral areas, total areas, and volumes of right prisms and regular pyramids.
3. Find the lateral areas, total areas, and volumes of right cylinders and right cones.

12-1 *Prisms*

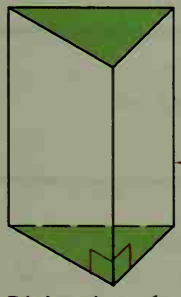
In this chapter you will be calculating surface areas and volumes of special solids. It is possible to begin with some postulates and then prove as theorems the formulas for areas and volumes of solids, as we did for plane figures. Instead, the formulas for solids will be stated as theorems, and informal arguments will be given to show you that the formulas are reasonable.

The first solid we will study is the **prism.** The two shaded faces of the prism shown are its **bases.** Notice that the bases are congruent polygons lying in parallel planes. An **altitude** of a prism is a segment joining the two base planes and perpendicular to both. The length of an altitude is the *height*, h, of the prism.

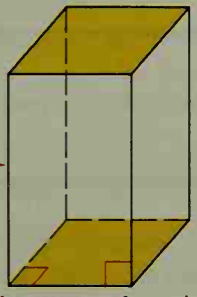
The faces of a prism that are not its bases are called **lateral faces.** Adjacent lateral faces intersect in parallel segments called **lateral edges.**



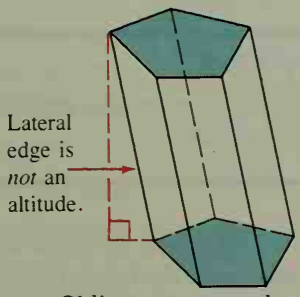
The lateral faces of a prism are parallelograms. If they are rectangles, the prism is a **right prism.** Otherwise the prism is an **oblique prism.** The diagrams below show that a prism is also classified by the shape of its bases. Note that in a right prism, the lateral edges are also altitudes.



Right triangular prism



Right rectangular prism (Rectangular solid)



Oblique pentagonal prism