

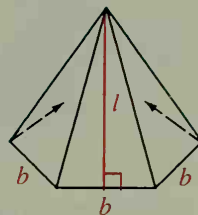
### Theorem 12-3

The lateral area of a regular pyramid equals half the perimeter of the base times the slant height. (L.A. =  $\frac{1}{2}pl$ )

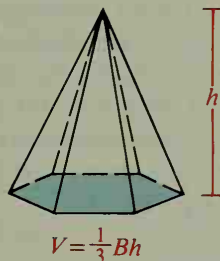
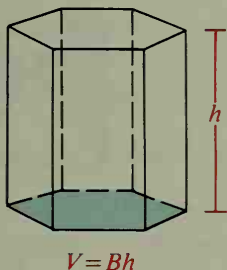
This formula is developed using Method 1 on the previous page. The area of one lateral face is  $\frac{1}{2}bl$ . Then:

$$\begin{aligned}\text{L.A.} &= (\tfrac{1}{2}bl)n \\ &= \tfrac{1}{2}(nb)l\end{aligned}$$

Since  $nb = p$ ,  $\text{L.A.} = \tfrac{1}{2}pl$



The prism and pyramid below have congruent bases and equal heights. Since the volume of the prism is  $Bh$ , the volume of the pyramid must be less than  $Bh$ . In fact, it is exactly  $\frac{1}{3}Bh$ . This result is stated as Theorem 12-4. Although no proof will be given, Classroom Exercise 1 and the Computer Key-In on pages 488–489 help justify the formula.



### Theorem 12-4

The volume of a pyramid equals one third the area of the base times the height of the pyramid. ( $V = \frac{1}{3}Bh$ )

**Example 3** Suppose the regular hexagonal pyramid shown at the right above Theorem 12-4 has base edges 6 and height 12. Find its volume.

**Solution** Find the area of the hexagonal base.

Divide the base into six equilateral triangles.  
Find the area of one triangle and multiply by 6.

$$\text{Base area} = B = 6(\tfrac{1}{2} \cdot 6 \cdot 3\sqrt{3}) = 54\sqrt{3}$$

$$\text{Then } V = \tfrac{1}{3}Bh = \tfrac{1}{3} \cdot 54\sqrt{3} \cdot 12 = 216\sqrt{3}$$

