The surface area of a solid is measured in square units. The **lateral area** (L.A.) of a prism is the sum of the areas of its lateral faces. The **total area** (T.A.) is the sum of the areas of all its faces. Using B to denote the area of a base, we have the following formula.

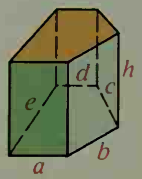
$$\text{T.A.} = \text{L.A.} + 2B$$

If a prism is a right prism, the next theorem gives us an easy way to find the lateral area.

Theorem 12-1

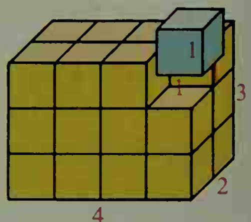
The lateral area of a right prism equals the perimeter of a base times the height of the prism. (L.A. = ph)

The formula for lateral area applies to any right prism. The right pentagonal prism can be used to illustrate the development of the formula:



$$\begin{aligned}\text{L.A.} &= ah + bh + ch + dh + eh \\ &= (a + b + c + d + e)h \\ &= \text{perimeter} \cdot h \\ &= ph\end{aligned}$$

Prisms have *volume* as well as area. A rectangular solid with square faces is a **cube.** Since each edge of the blue cube shown is 1 unit long, the cube is said to have a volume of 1 cubic unit. The larger rectangular solid has 3 layers of cubes, each layer containing $(4 \cdot 2)$ cubes. Hence its volume is $(4 \cdot 2) \cdot 3$, or 24 cubic units.



$$\begin{aligned}\text{Volume} &= \text{Base area} \times \text{height} \\ &= (4 \cdot 2) \cdot 3 \\ &= 24 \text{ cubic units}\end{aligned}$$

The same sort of reasoning is used to find the volume of any right prism.

Theorem 12-2

The volume of a right prism equals the area of a base times the height of the prism. ($V = Bh$)

Volume is measured in cubic units. Some common units for measuring volume are the cubic centimeter (cm^3) and the cubic meter (m^3).