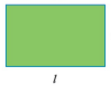
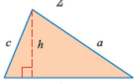
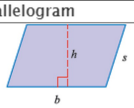
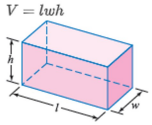
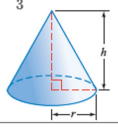
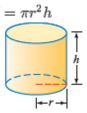
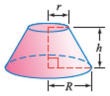
1.2 Formulas and Applications

A **formula** is an equation that expresses known relationships between two or more variables.

Table 1.2 Formulas from Geometry

Rectangle	Square	Triangle	Circle	Parallelogram
$P = 2l + 2w$ $A = lw$ 	$P = 4s$ $A = s^2$ 	$P = a + b + c$ $A = \frac{1}{2}bh$ 	$C = \pi d = 2\pi r$ $A = \pi r^2$ 	$P = 2b + 2s$ $A = bh$ 
Rectangular Solid	**Right Circular Cone**	**Sphere**	**Right Circular Cylinder**	**Frustum of a Cone**
$S = 2(wh + lw + hl)$ $V = lwh$ 	$S = \pi r\sqrt{r^2 + h^2} + \pi r^2$ $V = \frac{1}{3}\pi r^2 h$ 	$S = 4\pi r^2$ $V = \frac{4}{3}\pi r^3$ 	$S = 2\pi rh + 2\pi r^2$ $V = \pi r^2 h$ 	$S = \pi(R + r)\sqrt{h^2 + (R - r)^2} + \pi r^2 +$ $V = \frac{1}{3}\pi h(r^2 + rR + R^2)$ 

It may be necessary to rewrite the equation in terms of a specific variable.

- Isolate any terms that contain the specific variable
- Factor out that variable (if needed)
- Divide by the coefficient if any, to solve for the specified variable

Example 1

Solving an equation for a specific variable

1. Solve $S = 2(wh + lw + hl)$ for h

2. Solve $2l + 2w = P$ for l.

Example 2

Rectangle Dimensions *(Use the formula for perimeter: P = 2L + 2W)*

1. The ratio of the length (including the end zone) to the width of an NFL football field is 2.25. If the perimeter of the field is 1040 feet, what are the dimensions of the field?

2. The length of a rectangle is 3 ft. less than the width of the rectangle.
   If the perimeter of the rectangle is 174 feet, find the width and the length.

Example 3

Business applications *(many can be solved by using the equation:* ***Profit = Revenue - Cost****)*

It costs a tennis shoe manufacturer $37.15 to produce a pair of tennis shoes that sell for $69.95. How many pairs of tennis shoes must be the manufacturer sell to make a profit of $20,172.00?