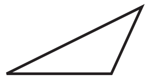
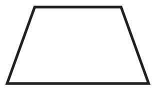
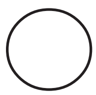
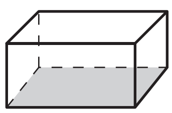
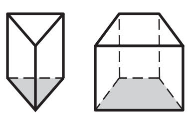
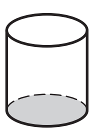
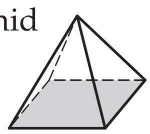
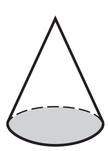
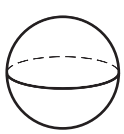
Formula Reference Sheet

Shape	Formulas for Area (A) and Circumference (C)
Triangle 	$A = \frac{1}{2}bh = \frac{1}{2} \times$ base $\times$ height
Rectangle 	$A = lw =$ length $\times$ width
Trapezoid 	$A = \frac{1}{2}(b_1 + b_2)h = \frac{1}{2} \times$ sum of bases $\times$ height
Parallelogram 	$A = bh =$ base $\times$ height
Circle 	$A = \pi r^2 = \pi \times$ square of radius $C = 2\pi r = 2 \times \pi \times$ radius $C = \pi d = \pi \times$ diameter
Figure	**Formulas for Volume (V) and Surface Area (SA)**
Rectangular Prism 	$V = lwh =$ length $\times$ width $\times$ height $SA = 2lw + 2hw + 2lh$ $= 2$(length $\times$ width) $+ 2$(height $\times$ width) $+ 2$(length $\times$ height)
General Prisms 	$V = Bh =$ area of base $\times$ height $SA =$ sum of the areas of the faces
Right Circular Cylinder 	$V = Bh =$ area of base $\times$ height $SA = 2B + Ch =$ (2 $\times$ area of base) + (circumference $\times$ height)
Square Pyramid 	$V = \frac{1}{3}Bh = \frac{1}{3} \times$ area of base $\times$ height $SA = B + \frac{1}{2}P\ell$ $=$ area of base + ($\frac{1}{2} \times$ perimeter of base $\times$ slant height)
Right Circular Cone 	$V = \frac{1}{3}Bh = \frac{1}{3} \times$ area of base $\times$ height $SA = B + \frac{1}{2}C\ell =$ area of base + ($\frac{1}{2} \times$ circumference $\times$ slant height)
Sphere 	$V = \frac{4}{3}\pi r^3 = \frac{4}{3} \times \pi \times$ cube of radius $SA = 4\pi r^2 = 4 \times \pi \times$ square of radius

theorem, $a^2 + b^2 = c^2$. Because 13 is the largest value, we let $c = 13$ and check the theorem:

$$\begin{aligned} a^2 + b^2 &= 5^2 + 12^2 \\ &= 25 + 144 \\ &= 169 \\ &= 13^2 = c^2 \end{aligned}$$

The sides satisfy the Pythagorean Theorem; therefore, a right angle is formed at the vertex opposite the side of length 13.

b. The sides of the triangle have lengths 2, 3, and 4. Let $a = 2$ and $b = 3$ (the two shortest sides), and check the Pythagorean Theorem:

$$\begin{aligned} a^2 + b^2 &= 2^2 + 3^2 \\ &= 4 + 9 \\ &= 13 \\ &\neq 4^2 = c^2 \end{aligned}$$

The lengths do not satisfy the Pythagorean Theorem; no right angle is formed.

Units of Measurement

The basic unit used by the ancient Egyptians for measuring length was the cubit. A *cubit* (*cubitum* is Latin for "elbow") is the distance from a person's elbow to the end of the middle finger. Just as a yard can be subdivided into smaller units of feet and inches, a cubit can be subdivided into smaller units of *palms* and *fingers*. One "royal" cubit (the unit used in official land measurement) equals seven palms, whereas one "common" cubit equals six palms; a royal cubit is longer than a common cubit. (In this book, we will take each cubit to be a royal cubit.) In either case, one palm equals four fingers. Since a cubit is a relatively small length, it is an inconvenient unit to use in measuring large distances. Consequently, the Egyptians defined a *khet* to equal 100 cubits; khets were used when land was surveyed.

The basic unit of area used by the Egyptians was the setat. A *setat* is equal to one square khet; a square whose sides each measure one khet (100 cubits) has an area of exactly one setat (or 10,000 square cubits). (See Figure 8.45.) One setat is approximately two-thirds of an acre.

If lengths are measured in terms of feet, volume is calculated in terms of cubic feet. Since the Egyptians measured lengths in terms of cubits, we would expect volume to be expressed in terms of cubic cubits. However, the basic unit of volume used by the Egyptians was the *khar;* one khar equals two-thirds of a cubic cubit (or 1 cubic cubit = $\frac{3}{2}$ khar). The Egyptian units of measurement are summarized in the following box.

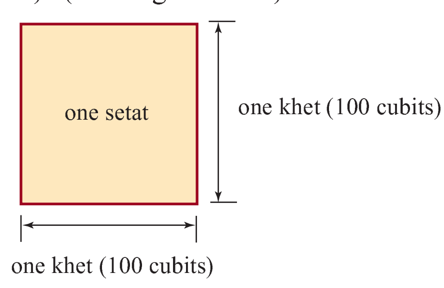


FIGURE 8.45
1 setat = 1 square khet
= 10,000 square cubits.

EGYPTIAN UNITS OF MEASUREMENT

1 cubit = 7 palms	1 setat = 1 square khet = 10,000 square cubits
1 palm = 4 fingers	1 khar = $\frac{2}{3}$ cubic cubit
1 khet = 100 cubits	