REVIEWING MULTI-STEP AREA PROBLEMS

Finding the area of a figure is just one step in solving a multi-step area problem. The problem may also involve the following:

- finding a cost associated with the area of a figure

- finding the number of objects of a certain size that you need to cover an area

- finding an area in units that are different from the units of the given dimensions

To solve an area problem, you need to be familiar with area formulas.

Common Area Formulas

Square: $A = s^2$ **Trapezoid:** $A = \frac{1}{2}(b_1 + b_2)h$

Rectangle: $A = \ell w$ **Triangle:** $A = \frac{1}{2}bh$

Parallelogram: $A = bh$ **Circle:** $A = \pi r^2$


EXAMPLE

Ceiling tiles are being installed in a rectangular office that is 10 feet by 12 feet. Each tile is a square that has a side length of 8 inches. If the tiles are not cut, how many tiles are needed to cover the ceiling of the office?

Solution

AVOID ERRORS
The area of the ceiling and the area of the tile need to be written in the same units before dividing.

STEP 1 **Find** the area of the ceiling and the area of a tile in square inches.

Be sure to convert the office dimensions to inches.

$12\,\text{ft} \cdot \dfrac{12\ \text{in.}}{1\ \text{ft}} = 144\ \text{in.}$

12 ft
10 ft
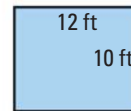
$10\,\text{ft} \cdot \dfrac{12\ \text{in.}}{1\ \text{ft}} = 120\ \text{in.}$

Area of ceiling: $A = \ell w = 144(120) = 17{,}280\ \text{in.}^2$

Area of tile: $A = s^2 = 8^2 = 64\ \text{in.}^2$

STEP 2 **Divide** the area of the ceiling by the area of a tile.

$$17{,}280\ \text{in.}^2 \div 64\ \text{in.}^2 = 270$$

▸ You need 270 tiles to cover the ceiling.

CHECK The area of the ceiling is $120\ \text{ft}^2$. The area of a tile is about $\frac{1}{2}\ \text{ft}^2$. Because $120 \div \frac{1}{2} = 120 \cdot 2 = 240$ tiles, the answer is reasonable.