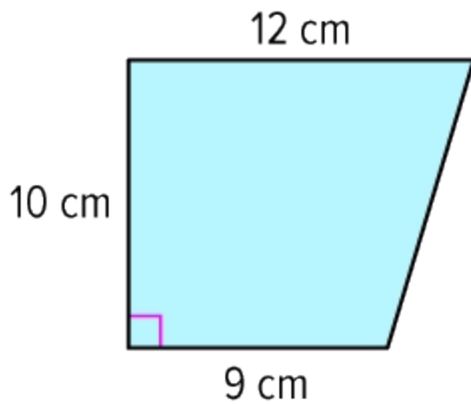


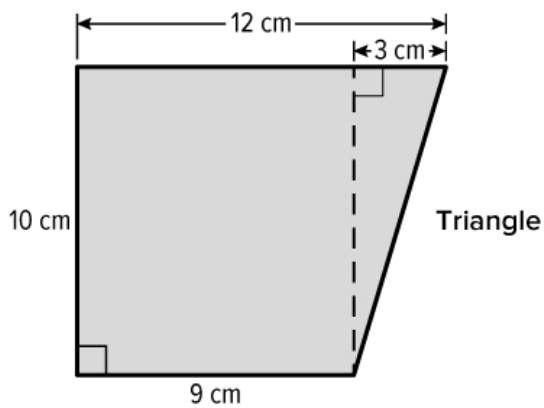
8-3 Area of Trapezoids

1. Decompose the trapezoid to find its area.



SOLUTION:

The trapezoid is decomposed into a rectangle and a triangle.



Find the area of each shape.

Rectangle:

$$\begin{aligned} A &= \ell w \\ &= 9(10) \\ &= 90 \end{aligned}$$

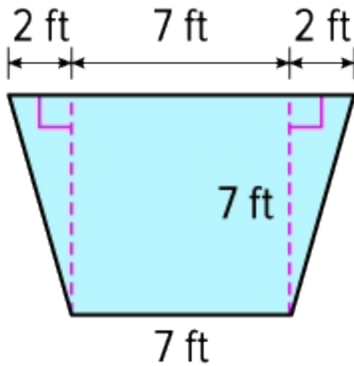
Triangle:

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}(3)(10) \\ &= 15 \end{aligned}$$

The total area is $90 + 15$ or 105 cm^2 .

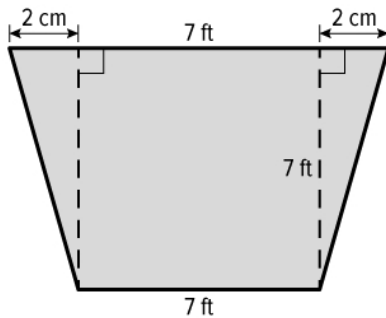
8-3 Area of Trapezoids

2. Decompose the trapezoid to find its area.



SOLUTION:

The trapezoid is decomposed into a square and two congruent triangles.



Find the area of each shape.

Square:

$$\begin{aligned} A &= \ell w \\ &= 7(7) \\ &= 49 \end{aligned}$$

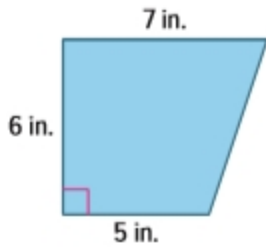
Triangle 1 and Triangle 2:

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2}(2)(7) \\ &= 7 \end{aligned}$$

The total area is $49 + 7 + 7$ or 63 ft^2 .

8-3 Area of Trapezoids

3. Find the area of the trapezoid.



SOLUTION:

$$A = \frac{1}{2}h(b_1 + b_2)$$

Area of a trapezoid

$$A = \frac{1}{2}(6)(5 + 7)$$

Replace h , b_1 , and b_2 with the known values.

$$A = \frac{1}{2}(6)(12)$$

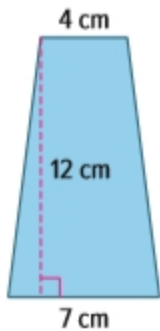
Add.

$$A = 36$$

Multiply.

The area is 36 in^2 .

4. Find the area of the trapezoid.



SOLUTION:

$$A = \frac{1}{2}h(b_1 + b_2)$$

Area of a trapezoid

$$A = \frac{1}{2}(12)(7 + 4)$$

Replace h , b_1 , and b_2 with the known values.

$$A = \frac{1}{2}(12)(11)$$

Add.

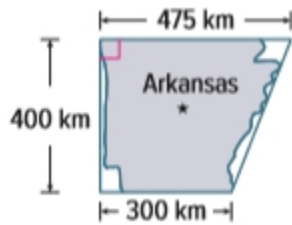
$$A = 66$$

Multiply.

The area is 66 cm^2 .

8-3 Area of Trapezoids

5. The shape of Arkansas resembles a trapezoid. What is the approximate area of Arkansas?



SOLUTION:

$$A = \frac{1}{2}h(b_1 + b_2)$$

Area of a trapezoid

$$A = \frac{1}{2}(400)(300 + 475)$$

Replace h , b_1 , and b_2 with the known values.

$$A = \frac{1}{2}(400)(775)$$

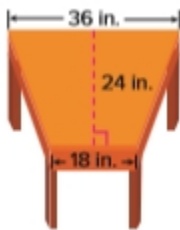
Add.

$$A = 155,000$$

Multiply.

The area is 155,000 km².

6. The top of the desk shown is in the shape of a trapezoid. What is the area of the top of the desk?



SOLUTION:

$$A = \frac{1}{2}h(b_1 + b_2)$$

Area of a trapezoid

$$A = \frac{1}{2}(24)(18 + 36)$$

Replace h , b_1 , and b_2 with the known values.

$$A = \frac{1}{2}(24)(54)$$

Add.

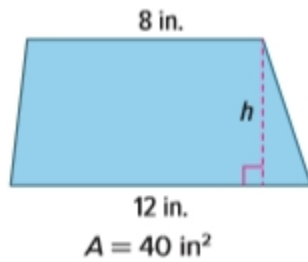
$$A = 648$$

Multiply.

The area is 648 in².

8-3 Area of Trapezoids

7. Find the missing dimension of the trapezoid.



SOLUTION:

$$A = \frac{1}{2}h(b_1 + b_2)$$

Area of a trapezoid

$$40 = \frac{1}{2}h(12 + 8)$$

Replace A , b_1 , and b_2 with the known values.

$$40 = \frac{1}{2}h(20)$$

Add.

$$40 = h10$$

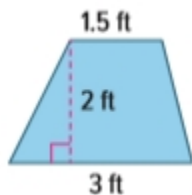
Multiply.

$$4 = h$$

Divide each side by 10.

The height is 4 inches.

8. Open Response Ciro made a sign in the shape of a trapezoid. What was the area of Ciro's sign?



SOLUTION:

$$A = \frac{1}{2}h(b_1 + b_2)$$

Area of a trapezoid

$$A = \frac{1}{2}(2)(3 + 1.5)$$

Replace h , b_1 , and b_2 with the known values.

$$A = \frac{1}{2}(2)(4.5)$$

Add.

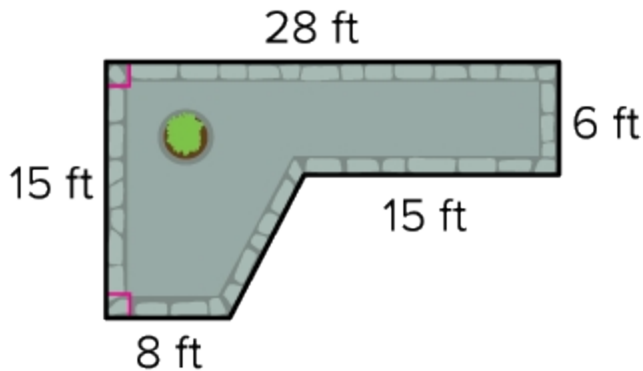
$$A = 4.5$$

Multiply.

The area is 4.5 ft^2 .

8-3 Area of Trapezoids

9. Greta has budgeted \$1,500 to have a concrete patio poured in her backyard like the one shown. The cost per square foot of the cement is \$5.50. Find the cost of the patio to determine if Greta has budgeted enough money to complete the project.



SOLUTION:

The patio is composed of a rectangle and a trapezoid.
Find the area of each shape.

Rectangle:

$$\begin{aligned} A &= \ell w \\ &= 28(6) \\ &= 168 \end{aligned}$$

Trapezoid:

$$\begin{aligned} A &= \frac{1}{2}h(b_1 + b_2) && \text{Area of a trapezoid} \\ &= \frac{1}{2}(9)(8 + 13) && \text{Replace } h, b_1, \text{ and } b_2 \text{ with the known values.} \\ &= \frac{1}{2}(9)(21) && \text{Add.} \\ &= 94.5 && \text{Multiply.} \end{aligned}$$

The total area is $168 + 94.5$ or 262.5 square feet.

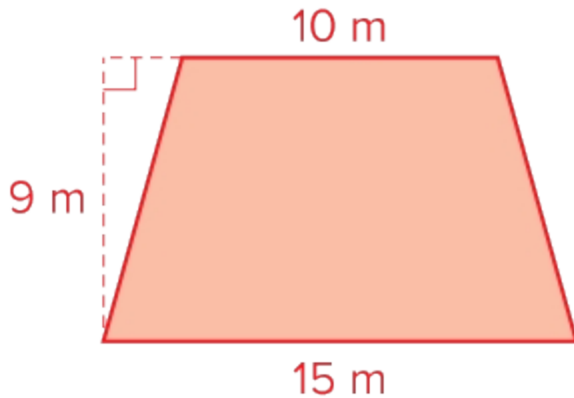
The cost of the patio is $262.5 \times \$5.50$ or \$1,443.75. Because this is less than \$1,500, Greta has budgeted enough money.

8-3 Area of Trapezoids

10. **Create** Draw and label a trapezoid that has no right angles and an area greater than 75 square meters.

SOLUTION:

Sample answer:



$$\begin{aligned} A &= \frac{1}{2}h(b_1 + b_2) && \text{Area of a trapezoid} \\ &= \frac{1}{2}(9)(10 + 15) && \text{Replace } h, b_1, \text{ and } b_2 \text{ with the known values.} \\ &= \frac{1}{2}(9)(25) && \text{Add.} \\ &= 112.5 && \text{Multiply.} \end{aligned}$$

The area of the trapezoid is 112.5 m^2 .

11. Explain the steps needed to rewrite the formula for the area of a trapezoid to find b_2 .

SOLUTION:

Start with the area formula: $A = \frac{1}{2}h(b_1 + b_2)$

Multiply each side by 2: $2A = h(b_1 + b_2)$

Multiply each side by $\frac{1}{h}$: $\frac{2A}{h} = b_1 + b_2$

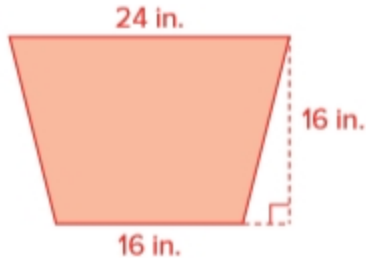
Subtract b_1 from each side: $\frac{2A}{h} - b_1 = b_2$

8-3 Area of Trapezoids

12. **Create** Write and solve a real-world problem where you need to find the area of a trapezoid.

SOLUTION:

A tray in a school cafeteria has the dimensions shown. Find the area of the tray.



$$\begin{aligned} A &= \frac{1}{2}(16)(16 + 24) && \text{Area of a trapezoid} \\ &= \frac{1}{2}(16)(40) && \text{Add.} \\ &= 320 \text{ in}^2 && \text{Multiply.} \end{aligned}$$

13. **Reason Inductively** The area of a trapezoid is 48 square centimeters. The height is 6 centimeters and one base is 3 times the length of the other base. What are the lengths of the bases?

SOLUTION:

Sample method:

$$\begin{aligned} A &= \frac{1}{2}bh && \text{Area of a trapezoid} \\ 48 &= \frac{1}{2}(6)(b + 3b) && \text{Replace the known values.} \\ 48 &= \frac{1}{2}(6)(4b) && \text{Add.} \\ 48 &= 12b && \text{Multiply.} \\ 4 &= b && \text{Divide.} \end{aligned}$$

The base is 4 cm and the other base is 3(4) or 12 cm.