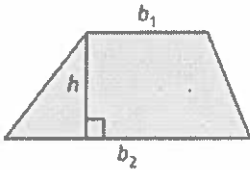# 4.3 AREA OF TRAPEZOIDS

ESSENTIAL QUESTION: How do you find the area of a trapezoid?

AREA OF TRAPEZOID

The area *A* of a trapezoid is one-half the _product_ of its _height_ *h* and the _sum_ of its _bases_ b_1 and b_2.

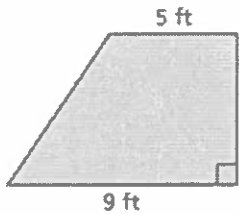Trapezoid has __1 pair__ of __parallel__ sides.

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

EXAMPLE 1
Find the area of the trapezoid.

1)

$h = 6$

$b_1 = 5$

$b_2 = 9$

5 ft
6 ft
9 ft

$A = \frac{6(9+5)}{2}$

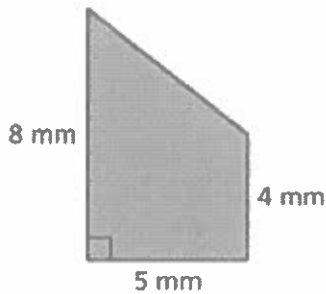$A = \frac{6(14)}{2}$

$A = \frac{84}{2}$

$A = 42 ft^2$

2)

8.5 m
5 m
11.5 m

$h = 5$

$b_1 = 8.5$

$b_2 = 11.5$

$A = \frac{5(8.5+11.5)}{2}$

$A = \frac{5(20)}{2}$

$A = \frac{100}{2}$

$A = 50 m^2$

ON YOUR OWN
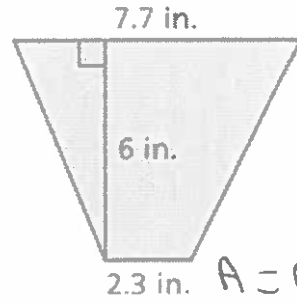Find the area of the trapezoid.

1)

$h = 5$

$b_1 = 8$

$b_2 = 4$

8 mm
4 mm
5 mm

$A = \frac{5(8+4)}{2}$

$A = \frac{5(12)}{2}$

$A = \frac{60}{2}$

$A = 30 mm^2$

2)

7.7 in.
6 in.
2.3 in.

$h = 6$

$b_1 = 7.7$

$b_2 = 2.3$

$A = \frac{6(7.7+2.3)}{2}$

$A = \frac{6(10)}{2}$

$A = \frac{30}{2}$

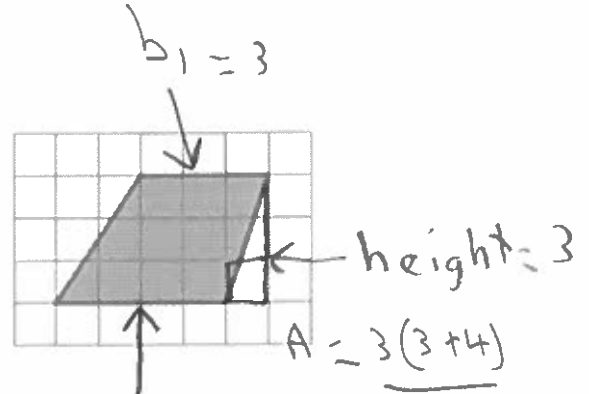$A = 30 in^2$

EXAMPLE 2
Find the area of the trapezoid
1)

$b_1 = 2$

$b_2 = 1$

height = 6
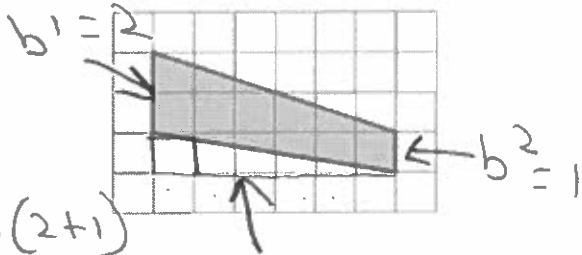
$A = \dfrac{6(2+1)}{2}$

$A = \dfrac{6(3)}{2}$ $A = \dfrac{18}{2}$ $A = 9 \text{ units}^2$

2)

$b_1 = 3$

height = 3

$b_2 = 4$

$A = \dfrac{3(3+4)}{2}$

$A = \dfrac{3(7)}{2}$

$A = \dfrac{21}{2}$ $A = 10.5 \text{ units}^2$

EXAMPLE 3
You can use a trapezoid to approximate the shape of Scott County, Virginia. The population is about 23,200. About how many people are there per square mile?
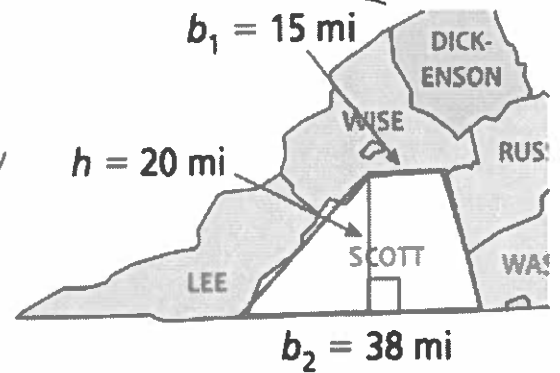
$b_1 = 15$ mi

$h = 20$ mi

$b_2 = 38$ mi

DICK-ENSON WISE RUS SCOTT WA LEE

① Find Area of Scott County

$A = \dfrac{20(15+38)}{2}$

$A = \dfrac{20(53)}{2}$

$A = \dfrac{1060}{2}$

$A = 530 \text{ m}^2$

There are about 44 people per square mile.

② Divide Population by the area to find the number of people per square mile

$\begin{array}{r} 43.7 \\ 530 \overline{\smash{)}23{,}200.0} \\ \underline{21\ 20\ }\downarrow \\ 1\ 80\ 0\ 0 \\ \underline{-1\ 590\ }\downarrow \\ 1\ 4100 \\ 3710 \\ \hline 390 \end{array}$

Round to nearest whole number.