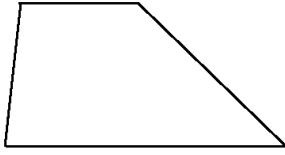
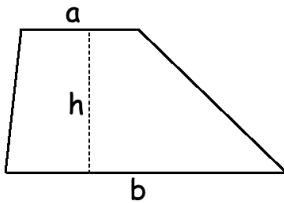


Definition: A **trapezoid** is a four sided polygon with one pair of parallel sides.

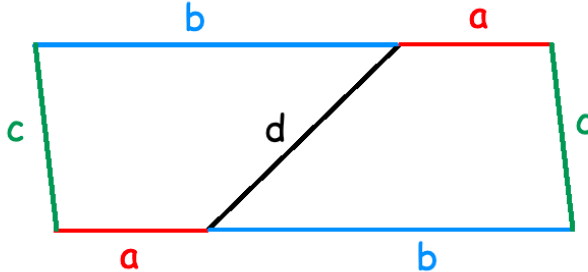


Note that having one pair of parallel sides means one or more pairs. So, even a square is a trapezoid because it does have a pair of parallel sides. We will find the area of the trapezoid using area formulas we already have. In this case, that of a parallelogram.

Theorem: The area of a trapezoid, with sides and height labeled as on the picture below, is $A = \frac{a+b}{2}h$.



Proof: If we use two identical trapezoids, we can make a parallelogram as shown on the picture below.



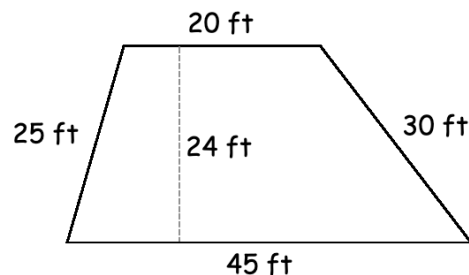
We already know that the area of this parallelogram is $A = (a+b)h$. Since our trapezoid is exactly half of the parallelogram, its area is $A = \frac{(a+b)h}{2}$.

Example 1. Find the perimeter and area of the trapezoid shown on the picture.

Solution: For the perimeter, we simply add the four sides.

$$P = 20\text{ft} + 30\text{ft} + 45\text{ft} + 25\text{ft} = 120\text{ft}$$

For the area, we apply our new formula. It is important to notice that we will not need all data given. For the area, we only need the lengths of the parallel sides and the height connecting them.



With that data, we use the formula $A = \frac{a+b}{2}h$.

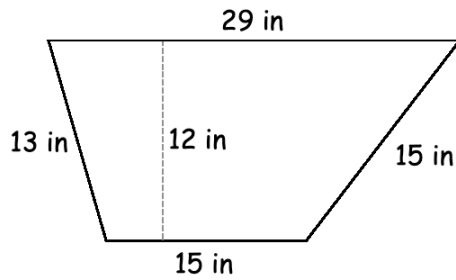
$$A = \frac{a+b}{2}h = \frac{20\text{ft} + 45\text{ft}}{2} \cdot 24\text{ft} = \frac{65\text{ft}}{2} \cdot 24\text{ft} = 780\text{ft}^2$$



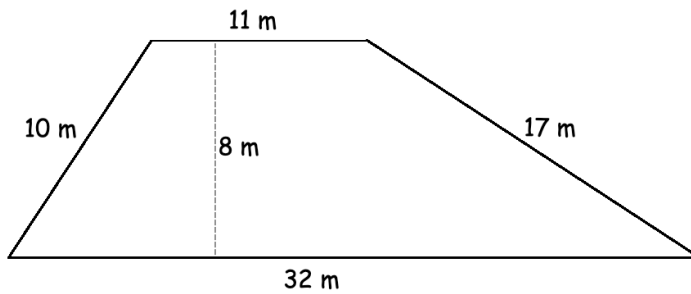
Practice Problems

Compute the perimeter and area of the given trapezoids.

1.



2.





Answers

Practice Problems

1. $P = 72\text{in}$ and $A = 264\text{in}^2$
2. $P = 70\text{m}$ and $A = 172\text{m}^2$