

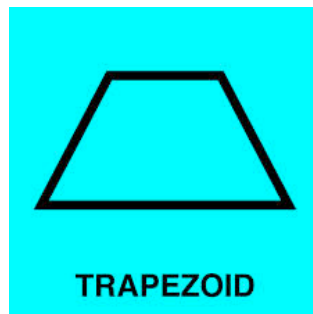
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Area of a Trapezoid

Today we talked about finding the area of a trapezoid by composing a parallelogram.

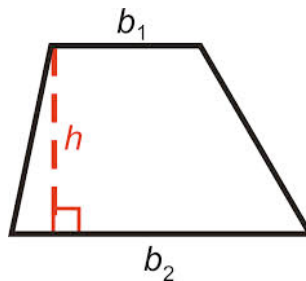
Step 1: Define the figure.

A trapezoid is a 4 sided, closed figure (quadrilateral) with one pair of parallel sides. All 4 sides are straight line segments.

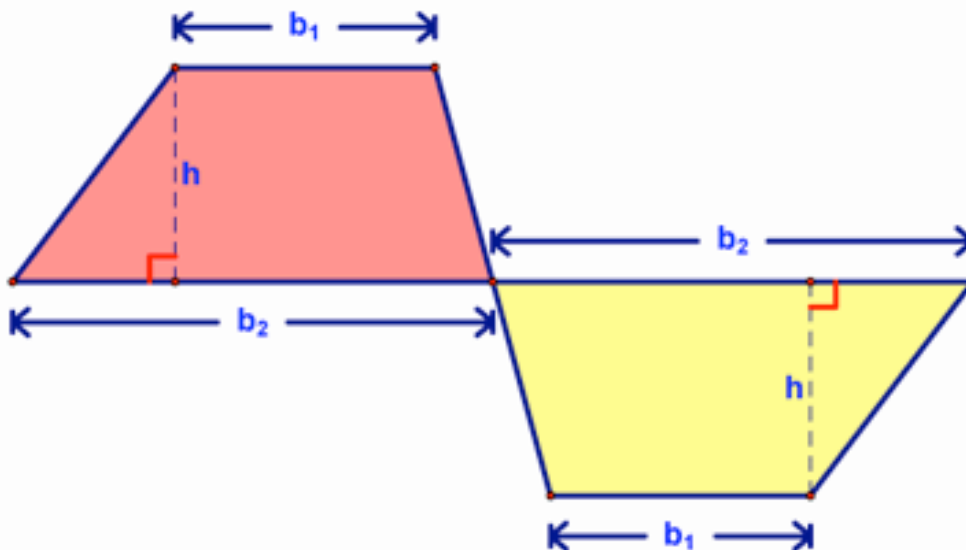


Step 2: Label the parts.

The bases of a trapezoid are the lengths of its parallel sides. The height of a trapezoid is the perpendicular distance between the bases.

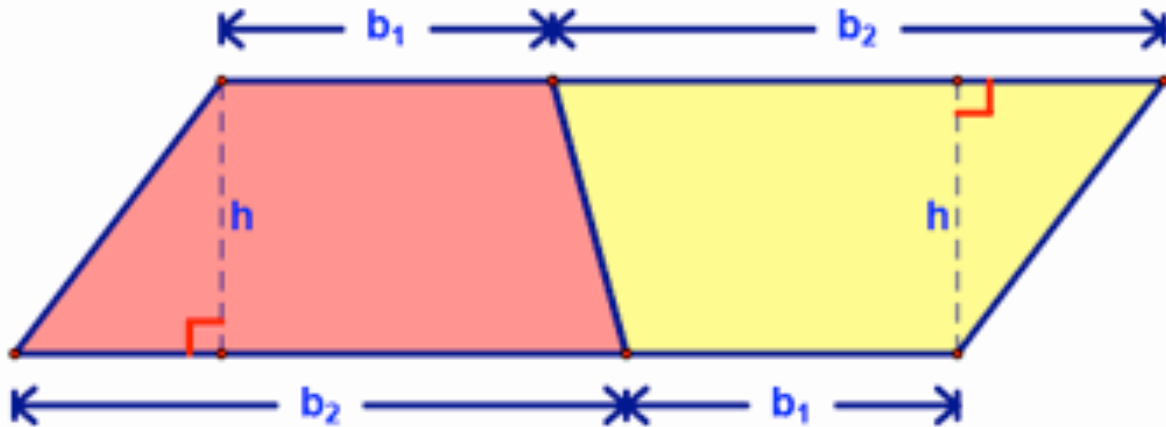


Step 3: To find the area of the trapezoid, we started with a trapezoid (the red one), made a copy of it (the yellow one), and rotated it 180 degrees:



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Step 4: Next, we translated the rotated trapezoid up to form a parallelogram (the combination of both trapezoids).



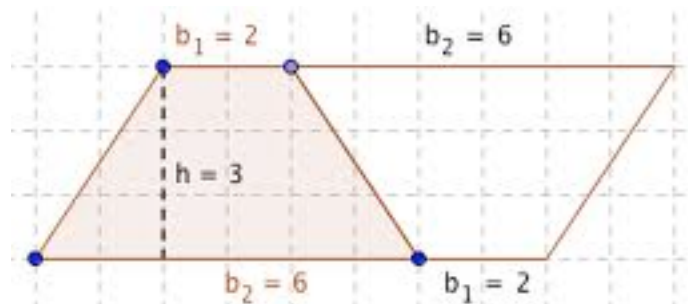
Step 5: Using the area formula for a parallelogram (base x height), we derived the formula for the area of each trapezoid, which occupies $\frac{1}{2}$ the area of the parallelogram. Helpful hint: Don't forget to add base₁ and base₂ of the trapezoid to get the total length of the base of the new parallelogram:

Theorem 100: The area of a trapezoid is given by the formula

$$A = \frac{1}{2}(b_1 + b_2)h, \text{ where } A \text{ is the area, } b_1 \text{ and } b_2 \text{ are the lengths of the two bases, and } h \text{ is the height of the trapezoid (Trapezoid Area Conjecture).}$$

<http://doversherborn.comcastbiz.net/highschool/academics/math/baroody/GeometryHonors/Class%20Notes/Chapter%202011/Lesson11-3/Lesson11-3.html>

Step 6: Example



$$\text{Area of one trapezoid} = \frac{1}{2}(2 + 6)(3) = \frac{1}{2}(8)(3) = 12 \text{ square units}$$