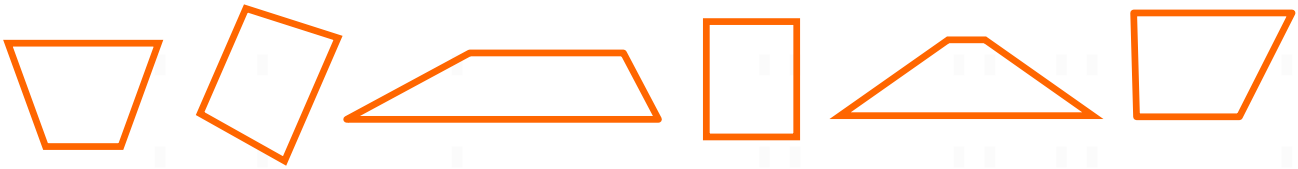
Area of a Trapezoid
A Closer Look at the Video

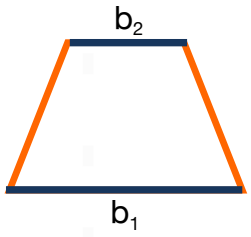
After watching the *Area of a Trapezoid* video, make sense of the mathematics by taking a closer look at the problem situation and solutions. Use the questions and comments in bold to help you understand the formula for the area of a trapezoid.

Problem: Tom's dad is looking to re-shingle his roof. The challenge is that the roof includes several sections that are shaped like trapezoids. He knows the area one bundle of shingles will cover, but he can't remember how to find the area of a trapezoid.

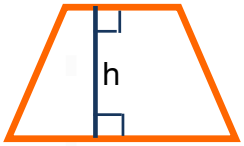
What is a trapezoid? A trapezoid is a quadrilateral with at least one pair of parallel sides. The following shapes are all trapezoids.



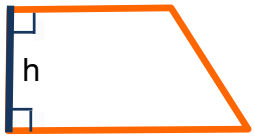
What are the bases of a trapezoid? The parallel sides, labeled b_1 and b_2, are base one and base two of the trapezoid.



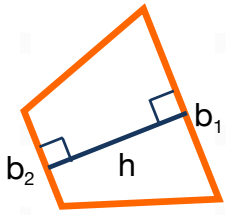
What is the height of a trapezoid? The height, labeled h, is the distance between the two bases, measured along a line that is perpendicular to the bases. Remember that perpendicular lines form right angles.

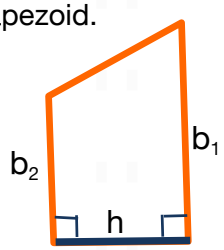


The height can also be the side of the trapezoid if that side is perpendicular to the bases.



A trapezoid is sometimes more difficult to identify when it is not sitting on a base. Remember to look for a pair of parallel sides to find the bases of a trapezoid.





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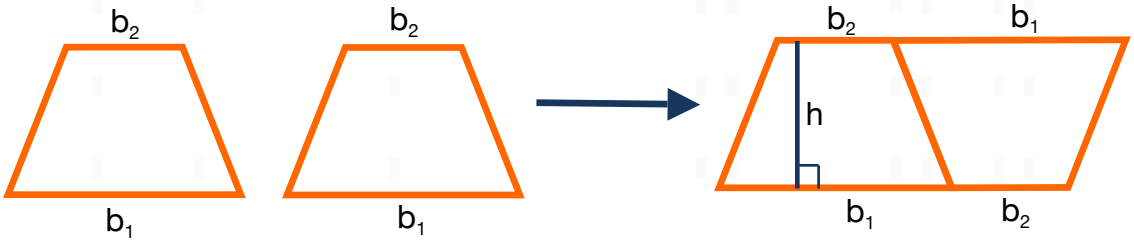
In order to make sense of the formula for area of a trapezoid, relate it to the formula for area of a parallelogram.

How do you find the area of a parallelogram? The area of a parallelogram is equal to the base times the height.

Place two congruent trapezoids together to form a parallelogram.



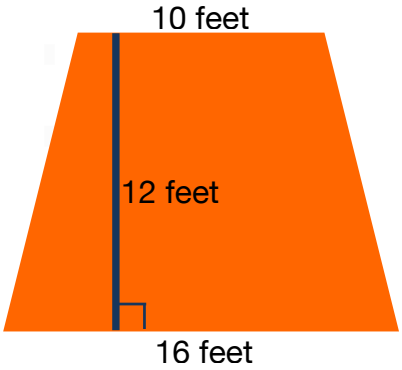
What is the base of this parallelogram? The base is the sum of base one (b_1) and base two (b_2).

What is the height of this parallelogram? The height (h) is the same as the height of the trapezoid.

What is the area of this parallelogram? The area of any parallelogram is bh, so the area of this parallelogram is $(b_1 + b_2)h$.

How can you use the area of this parallelogram to find the area of the trapezoid? Since two identical trapezoids make up the parallelogram, the area of one of the trapezoids will be ½ the area of the parallelogram, or $\frac{1}{2}(b_1 + b_2)h$. The area of a trapezoid is one-half the sum of the bases times the height.

Use this formula to find the area of one section of the roof that is shaped like a trapezoid. The two bases are 16 feet and 10 feet and the height is 12 feet.



$$A = \frac{1}{2}(b_1 + b_2)h$$
$$= \frac{1}{2}(16 + 10)12$$
$$= 156 \text{ square feet}$$

This works for any trapezoid! You can place two congruent trapezoids together to form a parallelogram with the same height. The base of the parallelogram will be the sum of the bases of the trapezoid. The area of one trapezoid will be ½ the area of the parallelogram, or $\frac{1}{2}(b_1 + b_2)h$.