

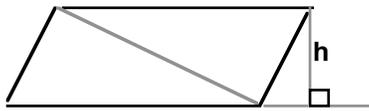
Geometry, You Can Do It !

Area - triangles & trapezoids

by Bill Hanlon

Last time we found the formulas to find areas of rectangles and parallelograms. More importantly, we saw the formula for a parallelogram came directly from the area formula of a rectangle.

Today, we'll look for more relationships. If I were to play with parallelograms, I might find that if I cut one diagonally, it would cut the parallelogram into two congruent polygons called triangles.

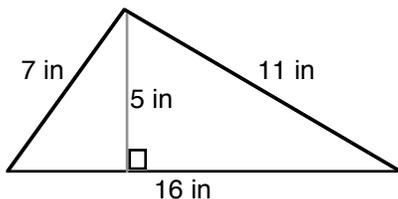


That means these two triangles would fit right on top of each other, they coincide, they would have the same area. If the area of the parallelogram is given by the formula bh , then each triangle would be half that. So we find the formula for the area of a triangle is given by the formula :

$$A = \frac{1}{2} bh$$

Just like for parallelograms, the height is always the shortest distance from top to bottom.

Example Find the area.



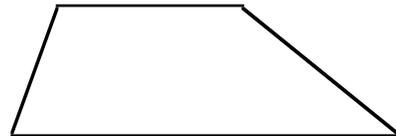
First thing you have to know is the polygon is a triangle. The area formula for a triangle is

$$A = \frac{1}{2} bh$$

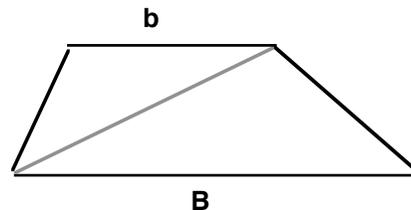
The base is 16 inches, the height is 5 inches. Filling those values into the formula, I have the area is 40 square inches. Notice the answer is given in square measure. That's because we are measuring

how many squares will fit inside the triangle. Also notice I did not use the 7 or 11. The 5 was the shortest distance from top to bottom, therefore 5 was the height.

Moving on, if I have a quadrilateral with one set of parallel sides, that's called a **TRAPEZOID**



Get out your scissors. If I were to cut a trapezoid along its diagonal, two triangles would be formed.



That means if I could find the area of each triangle, then add them together, I would have found the area of the trapezoid. Don't you just love math?

What's interesting is the two triangles have the same height. The parallel sides are called the **bases**.

The area of the triangle on the left is $\frac{1}{2} bh$. The area of the triangle on the right is $\frac{1}{2} Bh$. That means the area of the trapezoid is given by

$$\frac{1}{2} Bh + \frac{1}{2} bh$$

Factoring out $\frac{1}{2} h$, I have $\frac{1}{2} h (B + b)$. Putting that in alphabetical order, we now have the formula for a trapezoid

$$A = \frac{1}{2} (B + b) h$$

Notice that this formula is related to the area formula for a triangle, the triangle was derived from the parallelogram, and the parallelogram from the shortcut we learned about rectangles.