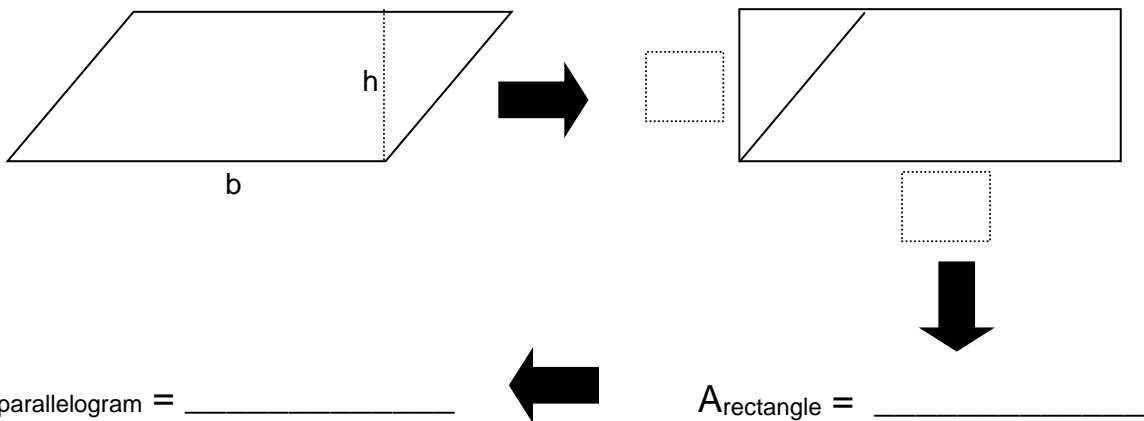


Area of a Parallelogram and a Trapezium

We can discover the formula for the area of a parallelogram and for the area of a trapezium for ourselves.

Area of a parallelogram

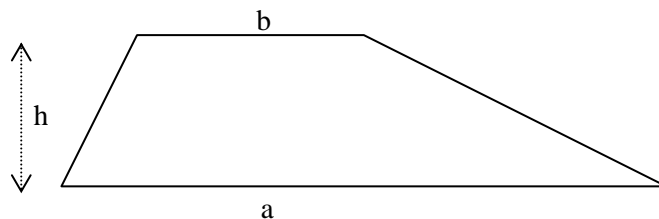
1. Study the diagram below.
 - a. Explain how the *parallelogram* on the left was changed into the *rectangle* on the right.
.....
 - b. What are the length and width of the rectangle?
.....
 - c. Write the formula for the area of the rectangle, using b and h .
.....
 - d. What is the formula for the area of the parallelogram?
.....



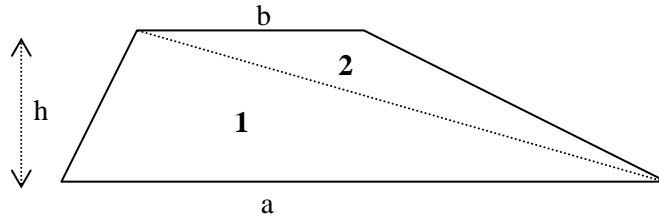
Area of a trapezium

Recall - a trapezium is a parallelogram with at least one pair of parallel sides.

2. Consider the trapezium below. It has parallel sides with lengths a and b , and perpendicular height h .



Divide the trapezium into two triangles.



a. Explain each line of this logical argument, using full sentences.

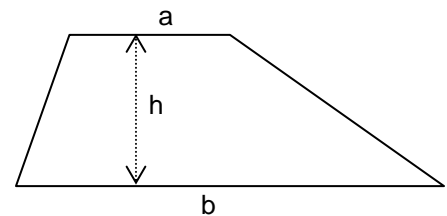
Step	Reason
$Area_{Triangle1} = \frac{ah}{2}$
$Area_{Triangle2} = \frac{bh}{2}$
$Area_{Trapezium} = \frac{ah}{2} + \frac{bh}{2}$
$Area_{Trapezium} = \frac{ah + bh}{2}$
$Area_{Trapezium} = \frac{h(a + b)}{2}$

b. Does this formula apply to *all* trapeziums? Explain.

.....

c. Here is a neat way to understand the formula for the area of a trapezium:

Write the expression for the average of the lengths of the sides *a* and *b*:



.....

Now multiply the height of the trapezium by the average length:

.....

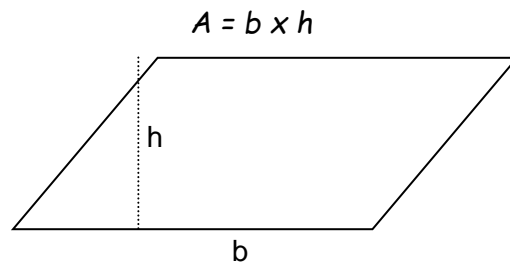
What can you conclude?

.....

SUMMARY

We have deduced that

The formula for the area A of a parallelogram with base b and perpendicular height h is



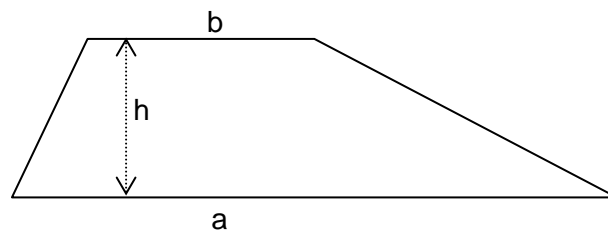
The area A of a trapezium with parallel sides a and b and perpendicular height h is given by

$$A = \frac{h \times (a + b)}{2}$$

OR

The area of a trapezium is:

$$A = \text{average base} \times \text{height}$$



THE MAGIC AREA FORMULA!

3. I claim that this formula for the area of a trapezium:

$$A = \text{average base} \times \text{height}$$

also works for

- squares
- rectangles
- parallelograms
- triangles

If my claim is true, then you only need one formula for all these shapes!

Investigate my claim. Write a report on what you discover.