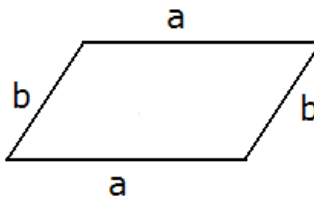
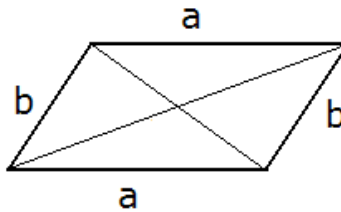


Part 4 - Parallelograms

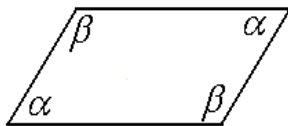
Definition: A parallelogram is a four sided polygon with two pairs of parallel sides.



It is a proven fact that the opposite sides of a parallelogram are of equal length. This is not part of the definition, but it is an important property that we need to remember. Also, we could prove that the diagonals of a parallelogram always bisect each other.



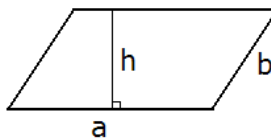
Another important property of parallelograms is the connection between its angles. In every parallelogram, the opposite angles are equal, and the two angles along each side add up to 180° . We call two such angles supplemental.



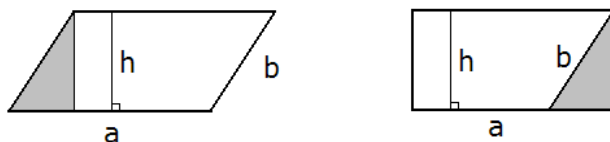
$$\alpha + \beta = 180^\circ$$

This is the property that enables us to easily compute the area of the parallelogram.

Theorem: The area of a parallelogram with sides a , b and height h belonging to a is $A = ah$.

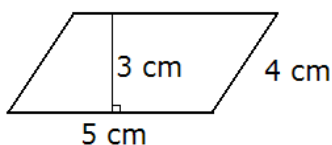


Proof: We will use (surprise, surprise!) a previously proven result. If we cut off a triangle and paste it back as show on the picture below, we obtain a rectangle.



Thus the area of the parallelogram equals to the area of a rectangle with sides a and h .

Example 4: Find the area of the parallelogram shown on the picture below.

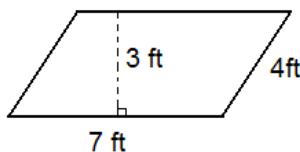


Solution: We apply the formula for the area of a parallelogram.

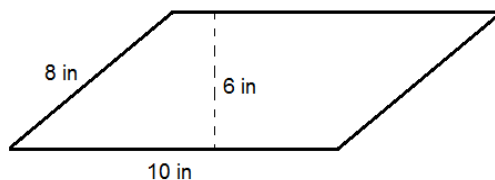
$$A = ah = 5 \text{ cm} (3 \text{ cm}) = 15 \text{ cm}^2$$

Practice Problems

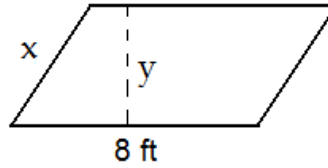
1. Find the area of the parallelogram shown on the picture.



2. Find the area of the parallelogram shown on the picture.



3. Find the values of x and y if it is given that the parallelogram shown on the picture has perimeter of 26 ft and area 24 ft^2 .



Practice Problems - Answers

1. $A = 21 \text{ ft}^2$
2. $A = 60 \text{ in}^2$
3. $x = 5 \text{ ft}$ $y = 3 \text{ ft}$

For more documents like this, visit our page at <https://teaching.martahidegkuti.com> and click on Lecture Notes. E-mail questions or comments to mhidegkuti@ccc.edu.