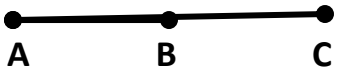
Midpoint

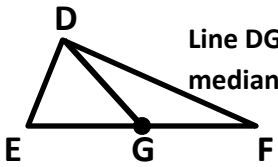
The point in the middle of a line segment:



B is the midpoint of line AC

Median

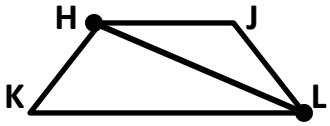
A line segment joining a vertex of a triangle to the opposite side's midpoint.
Each triangle can have 3 medians.



Line DG is one of the medians of ΔDEF

Diagonal

A line joining two vertices of a polygon that are not next to each other.



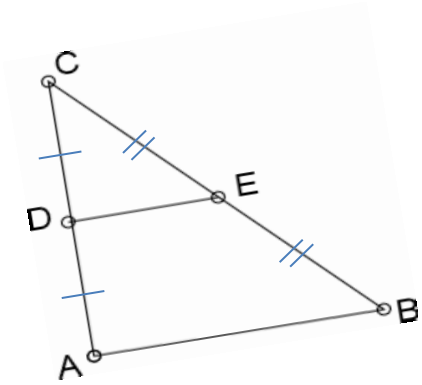
Midpoints in Triangles

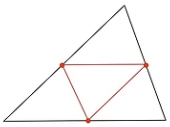
If you connect the midpoints on 2 sides of a triangle,
the following will all be true:

Line DE is half the length of line AB

DE is parallel to AB

The distance between C and line DE is the same as the distance between line DE and line AB



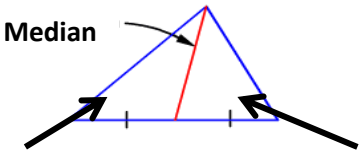


Connecting all 3 midpoints will give you 4 smaller triangles that have the same size and shape

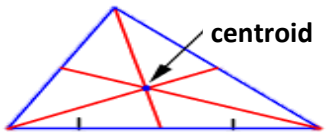
Medians in Triangles

A median in a triangle connects a vertex of a triangle to the midpoint on the opposite side.

A median of a triangle **bisects its area**.



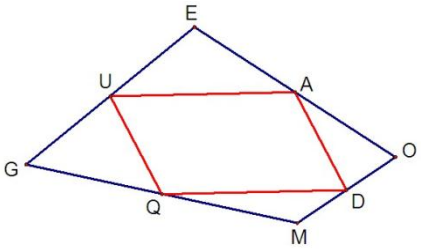
This side has the same area as this side.



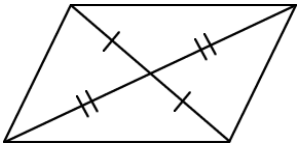
If you draw all 3 medians of a triangle, they will all intersect at the same point. This point is called the **centriod**

Midpoints in Quadrilaterals

If you join the midpoints of the sides of any quadrilateral, it will create a parallelogram.



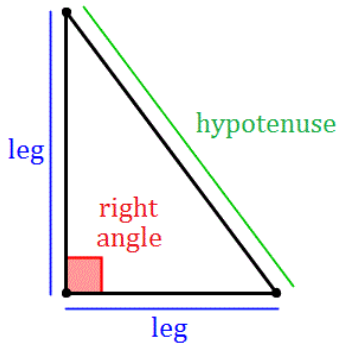
Diagonals in Quadrilaterals



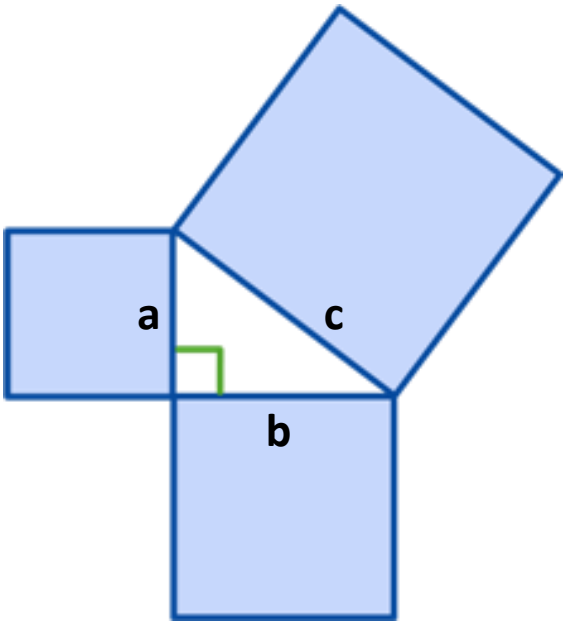
The diagonals of a parallelogram bisect each other

The Pythagorean Theorem

When you have a right angled triangle, the **longest side** (across from the right angle) is called the **hypotenuse**. The other two sides are called "legs".



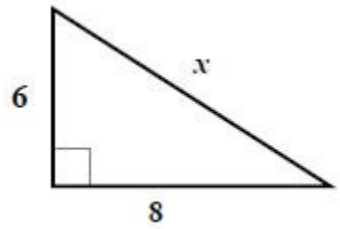
The Pythagorean Theorem only works for right angled triangles. It says that if you square each of the legs (we'll call them "a" and "b"), and add them together, you will get the hypotenuse squared (we'll call the hypotenuse "c").



$$a^2 + b^2 = c^2$$

Examples:

1. Find the value of x.



$a^2 + b^2 = c^2$

$6^2 + 8^2 = x^2$

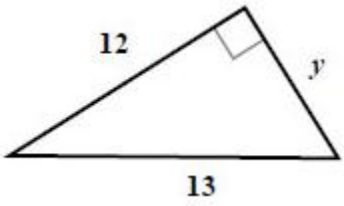
$36 + 64 = x^2$

$100 = x^2$

$\sqrt{100} = \sqrt{x^2}$

$10 = x$

2. Find the value of y.



$a^2 + b^2 = c^2$

$12^2 + y^2 = 13^2$

$144 + y^2 = 169$

$y^2 = 169 - 144$

$y^2 = 25$

$\sqrt{y^2} = \sqrt{25}$

$y = 5$