Due Wed. 03 Feb:

- Ch 9 Review, pp.
- Midterm Review, pp. 330-336, #1-125

Test #4 - Thurs. 04 Feb

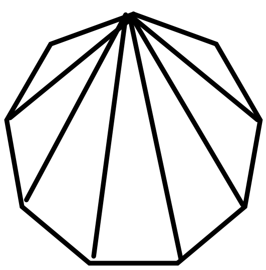
Postulate 8 - The Area Postulate

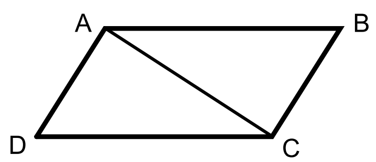
Every polygonal region has a positive number called its area such that

(1) congruent triangles have equal areas $\alpha \triangle ABC = \alpha \triangle CDA$

(2) the area of a polygonal region is equal to the sum of the areas of its nonoverlapping parts

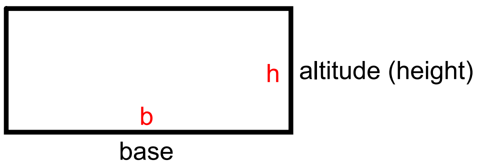
$$\alpha ABCD = \alpha \triangle ABC + \alpha \triangle CDA$$





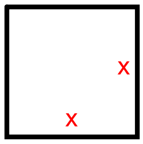
9.2 - Squares and Rectangles

Postulate 9 - The area of a rectangle is the product of its base and altitude



$A_{rect} = bh$

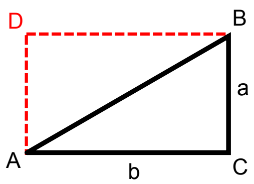
Corollary to Postulate 9 - The area of a square is the square of its side



$A_{sq} = x^2$

9.3 - Triangles

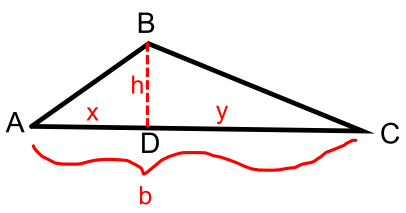
Theorem 38 - The area of a right triangle is half the product of its legs.



Given: Right $\triangle ABC$ with legs a and b

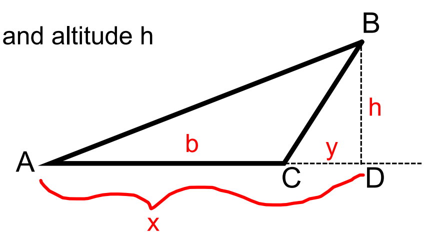
Prove: $\alpha \triangle ABC = \frac{1}{2}ba$

Theorem 39 - The area of a triangle is half the product of any base and corresponding altitude.

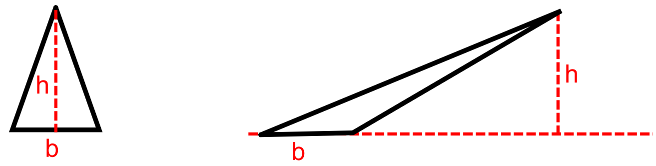


Given: $\triangle ABC$ with base b and altitude h

Prove: $\alpha \triangle ABC = \frac{1}{2}bh$



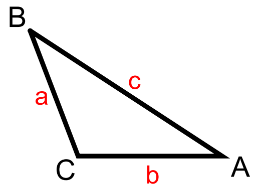
Corollary to Theorem 39 - Triangles with equal bases and equal altitudes have equal areas.



Heron's Theorem

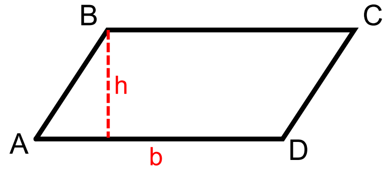
The area of a triangle with sides a, b, and c is $\sqrt{s(s-a)(s-b)(s-c)}$

where s is half of the triangle's perimeter.

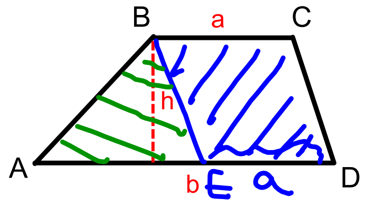


$S = \frac{1}{2}(a+b+c)$

Theorem 40 - The area of a parallelogram is the product of any base and corresponding altitude.



Theorem 41 - The area of a trapezoid is half the product of its altitude and the sum of its bases.



Given: ABCD is a trapezoid w/ bases BC & AD, altitude h
(BC = a, AD = b)

Prove: $\alpha ABCD = \frac{1}{2}(a+b)\cdot h$

α▱ $= ah$

α△ $= \frac{1}{2}(b-a)h$

$\alpha ABCD = ah + \frac{1}{2}(b-a)h$

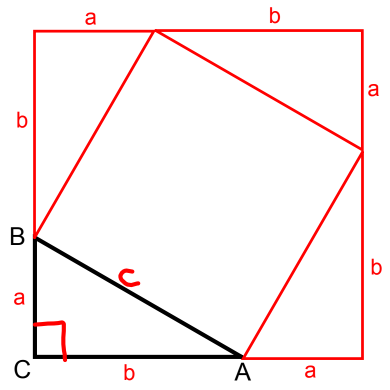
$= ah + \frac{1}{2}bh - \frac{1}{2}ah$

$= \frac{1}{2}ah + \frac{1}{2}bh$

$\alpha ABCD = \frac{1}{2}(a+b)h$

9.5 - The Pythagorean Theorem

Theorem 42 (The Pythagorean Theorem) - The square of the hypotenuse of a right triangle is equal to the sum of the squares of its legs.



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

a, b - legs , c - hypotenuse of right $\triangle ABC$

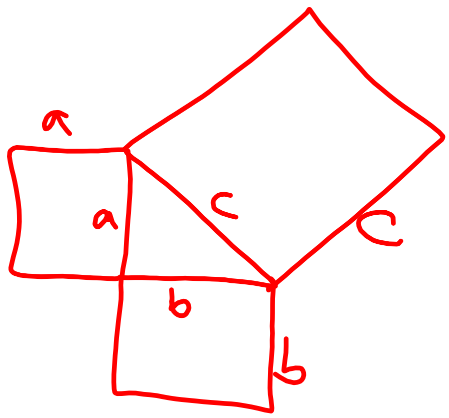
$\text{Area big square} = (a+b)^2$
$= c^2 + 4 \text{ Area } \triangle ABC$

$(a+b)^2 = c^2 + 4\left(\frac{1}{2}ba\right)$

$(a+b)(a+b)$

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

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



<u>Theorem 43 (Converse of the Pythagorean Theorem)</u> - If the square of one side of a triangle is equal to the sum of the squares of the other two sides, the triangle is a right triangle.