Test #4
Thurs. 02/04

Ch 8 Review #7-29 pp326-327
due Wed. 01/27

Ch 9 Review #
Midterm Review #1-125 pp330-336
due Wed. 02/03

Ch 9 - Area

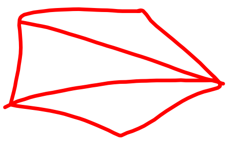
Polygonal region
When we refer to "area of a polygon" we really mean the area of the polygonal region bounded by that polygon

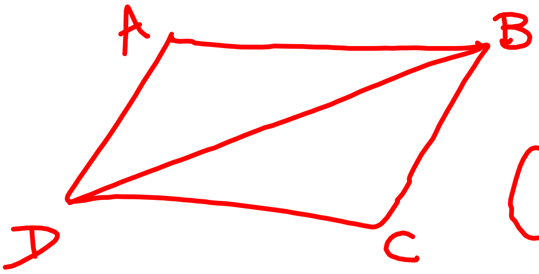
The Area Postulate

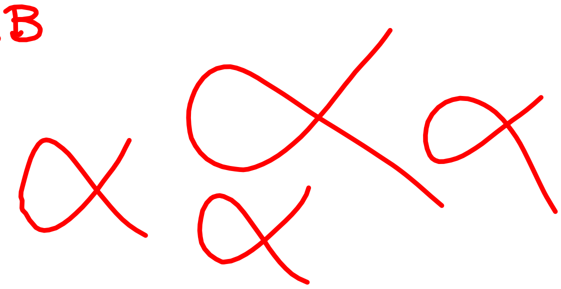
Every polygonal region has a positive number called its area such that

(1) congruent triangles have equal areas

(2) the area of a polygonal region is equal to the sum of the areas of its non-overlapping parts.





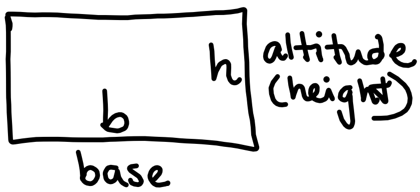


$$\alpha\, ABCD = \alpha\triangle ABD + \alpha\triangle BCD$$

↑ greek alpha means area

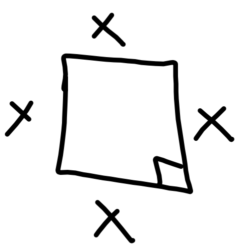
Postulate:

The area of a rectangle is the product of its base and its altitude.



$$A = bh$$

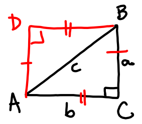
Corollary: The area of a square is the square of its side



$$A = x^2$$

9.3 - Triangles

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



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

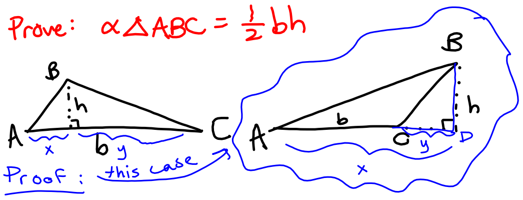
Prove: $\alpha\triangle ABC = \frac{1}{2}ab$

1. Draw DB through B so that DB ∥ AC & draw DA through A so that DA ∥ BC — Parallel Postulate
2. ACBD is a parallelogram — 2 pairs of opposite sides parallel
3. $\angle D = \angle C$, $DA = a$, $DB = b$, $\angle A = \angle B$ — opposite sides & angles in a parallelogram are equal
4. $\angle A + \angle B + \angle C + \angle D = 360°$ — Quadrilateral Sum Theorem
5. $\angle A + \angle A + 90° + 90° = 360°$ — Substitution
   $2\angle A = 180°$
   $\angle A = 90°$
   $\angle B = 90°$
6. ADBC is a rectangle. — parallelogram w/ all right ∠'s
7. $\alpha ADBC = ab$ — area of a rectangle is base×altitude
8. $\alpha ADBC = \alpha\triangle ABC + \alpha\triangle BAD$ — Area postulate
9. $\triangle ABC \cong \triangle BAD$ — SAS congruence
10. $\alpha\triangle ABC = \alpha\triangle BAD$ — Area Postulate
11. $ab = \alpha\triangle ABC + \alpha\triangle ABC$ — Substitution
    $ab = 2\alpha\triangle ABC$
12. $\boxed{\frac{1}{2}ab = \alpha\triangle ABC}$ — division

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

Given: $\triangle ABC$ w/ base b and altitude h

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



Proof:

1. extend AC & draw BD perpendicular to AC @ point D — only one perpendicular through a given point
1.5 ∠D is right — ⊥ lines form right ∠'s
2. $\triangle CBD$ & $\triangle ABD$ are right $\triangle$'s — triangles w/ right ∠'s are right
3. $\alpha\triangle CBD = \frac{1}{2}yh$ — right $\triangle$ area theorem
   $\alpha\triangle ABD = \frac{1}{2}xh$
4. $\alpha\triangle ABD = \alpha\triangle ABC + \alpha\triangle CBD$ — area postulate
5. $\frac{1}{2}xh = \alpha\triangle ABC + \frac{1}{2}yh$ — substitution
6. $x = b + y$ — Betweenness of Points Theorem
7. $\frac{1}{2}(b+y)h = \alpha\triangle ABC + \frac{1}{2}yh$ — distributive
   $\frac{1}{2}bh + \frac{1}{2}yh - \frac{1}{2}yh = \alpha\triangle ABC$ — subtraction
8. $\frac{1}{2}bh = \alpha\triangle ABC$ — simplification