Due Mon 2/6

- Ch 8 Review, pp.326-327, #7-29

Due Thurs. 2/9

- Ch 9 Review, pp. 371-375 #8-36; 46-52

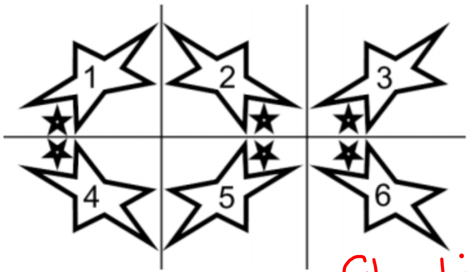
Test #4 - Thurs. 9 Feb
Ch 7 Quadrilaterals, Ch 8 Transformations, Ch 9 Area

Due Mon. 2/13

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

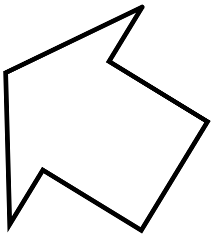
Final Exam - Fri. 2/17

__Part IV__ – State the type of transformation that takes the following objects to their images. Choose your answer from the following: ***translation, reflection, rotation, dilation, glide reflection.***



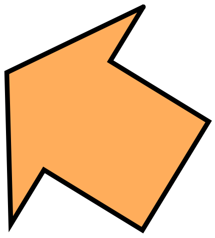
51. What type of transformation takes object 1 to object 2? reflection
52. What type of transformation takes object 1 to object 3? translation
53. What type of transformation takes object 1 to object 4? reflection
54. What type of transformation takes object 1 to object 5? rotation
55. What type of transformation takes object 1 to object 6? glide reflection

9.1 - Area



The black line is the polygon.

The region bounded by that polygon is a polygonal region.



When we find the area of a polygon, we are actually finding the area of the polygonal region bounded by that polygon.

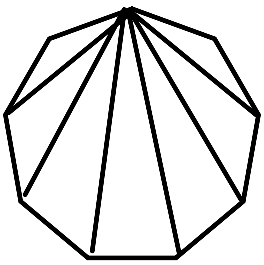
Postulate 8 - The Area Postulate

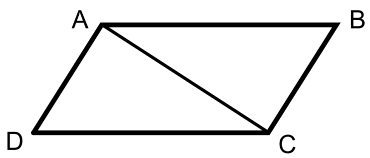
Every polygonal region has a positive number called its area such that

(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

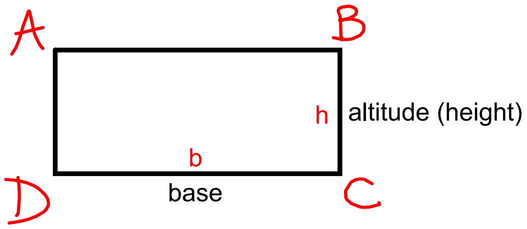
$$\alpha ABCD = \alpha \triangle ABC + \alpha \triangle CDA$$





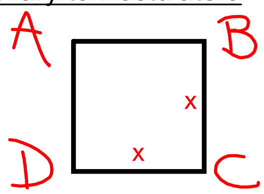
9.2 - Squares and Rectangles

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

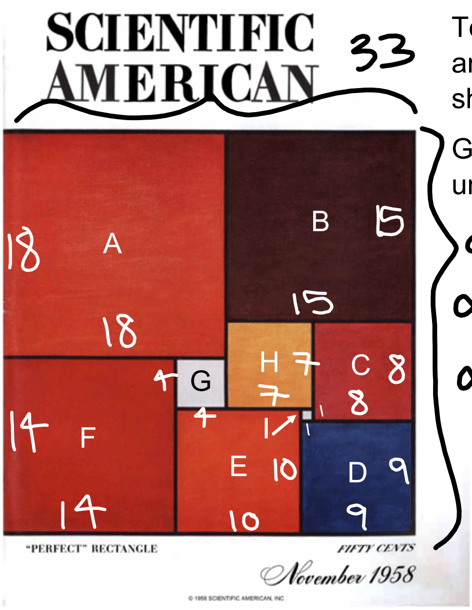


$\alpha ABCD = bh$

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



$\alpha ABCD = x^2$



To divide a square into smaller squares each having a different area was once thought to be impossible. The figure seems to show a solution.

Given that the areas of squares C and D are 64 and 81 square units respectively, find the areas of the other squares.

$\alpha C = 64$ $\alpha H = 49$ $\alpha G = 16$

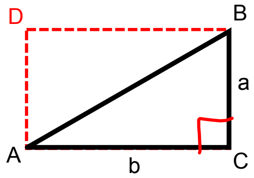
$\alpha D = 81$ $\alpha E = 100$ $\alpha F = 196$

$\alpha I = 1$ $\alpha B = 225$ $\alpha A = 324$

32

9.3 - Triangles

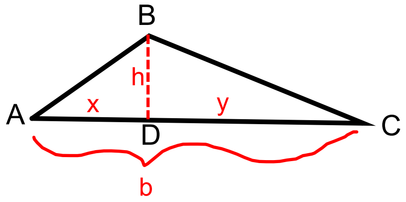
Theorem 38 - The area of a right triangle is half the product of its legs.



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

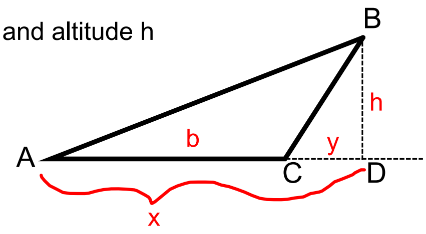
Prove: $\alpha \triangle ABC = \frac{1}{2}ba$

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

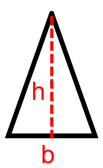


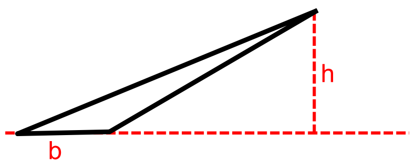
Given: $\triangle ABC$ with base b and altitude h

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



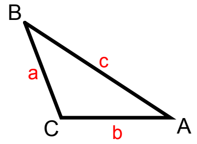
Corollary to Theorem 39 - Triangles with equal bases and equal altitudes have equal areas.





Heron's Theorem $S = \frac{1}{2}(a+b+c)$

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.



Suppose there are three triangles with the following sides:

Triangle 1: 5, 5, and 6. $S = \frac{1}{2}(5+5+6) = 8$ $\alpha\Delta 1 = \sqrt{8(8-5)(8-5)(8-6)} = 12$

Triangle 2: 5, 5, and 8. $S = \frac{1}{2}(5+5+8) = 9$ $\alpha\Delta 2 = \sqrt{9(9-5)(9-5)(9-8)} = 12$

Triangle 3: 5, 5, and 10.

$S = \frac{1}{2}(5+5+10) = 10$ $\alpha\Delta 3 = \sqrt{10(10-5)(10-5)(10-10)} = 0$

1. Which triangle do you think has the greatest area? #3
2. Use Heron's Theorem to find the area of each triangle.
3. One of the "triangles" isn't really a triangle. Which one and why not?

#3 fails the triangle inequality

Now, suppose there are two triangles with the following sides:

Triangle 4: 4, 6, and 8.

Triangle 5: 400, 600, and 1000.

4. Which do you think has the greater area? $\Delta 4$ b/c $\Delta 5$ doesn't exist
5. Use Heron's Theorem to find it.

$$S = \frac{1}{2}(4+6+8) = 9$$

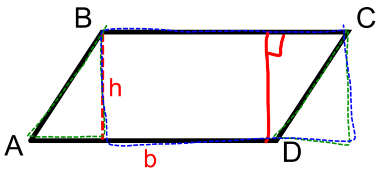
$$\alpha\Delta 4 = \sqrt{9(9-4)(9-6)(9-8)}$$

$$= \sqrt{9 \cdot 5 \cdot 3 \cdot 1}$$

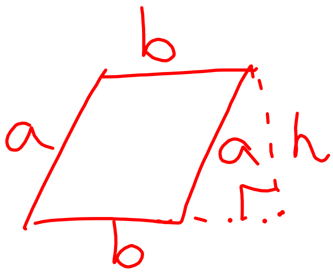
$$= \boxed{3\sqrt{15}}$$

9.4 - Parallelograms and Trapezoids

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

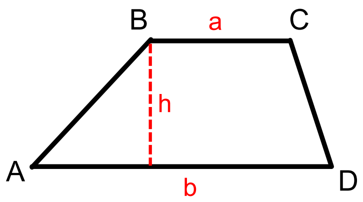


$\alpha ABCD = bh$



$\alpha = bh$

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



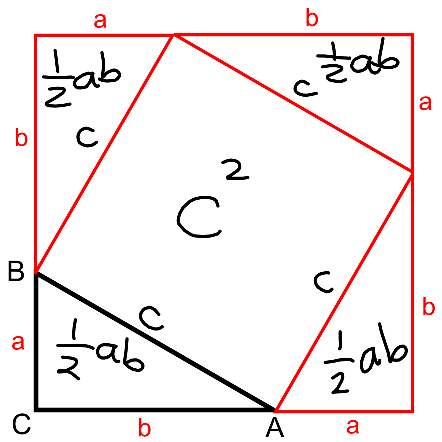
$$\alpha ABCD = \frac{1}{2}(a+b)h$$

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

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

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.



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

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

$$-2ab \qquad -2ab$$

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

Theorem 43 (Converse of the Pythagorean Theorem) - 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.