Triangles and Quadrilaterals

cK-12 Study Guides
MADE BY STUDENTS!

Geometry

Big Picture

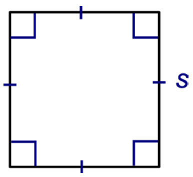
Triangles and quadrilaterals are among the more basic and common polygons. Triangles always have interior angles sum to 180° while quadrilaterals always have interior angles sum to 360°.

Key Terms

Perimeter: The distance around a shape.

Area: The amount of surface covered by a figure.

Square

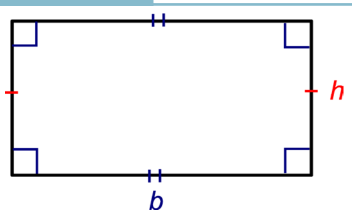


Perimeter = $P_{\text{square}} = s + s + s + s = 4s$

Postulate: The area of a square is the square of the length of its side.

- **Area** = $A_{\text{square}} = s \cdot s = s^2$

Rectangle

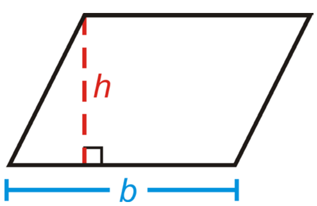


Perimeter = $P_{\text{rectangle}} = b + b + h + h = 2b + 2h$

Theorem: The area of a rectangle is the product of its base and height.

- Area = $A_{\text{rectangle}} = b \cdot h = bh$

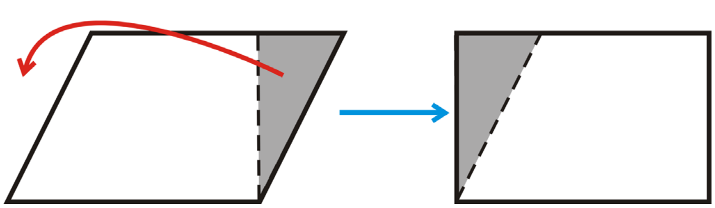
Parallelogram



Either pair of parallel sides can be the bases of a parallelogram. The height is perpendicular to the base - the side is NOT the height!

- Area = $A_{\text{parallelogram}} = bh$

The area of a parallelogram is the same as the area of a rectangle.

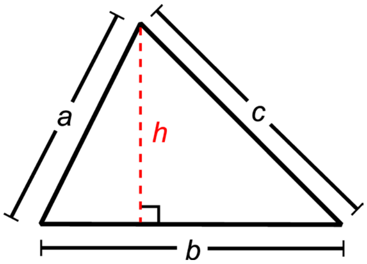


Disclaimer: this study guide was not created to replace your textbook and is for classroom or individual use only.

This guide was created by Nicole Crawford, Jane Li, Amy Shen, and Zachary Wilson. To learn more about the student authors, visit http://www.ck12.org/about/about-us/team/interns.

Triangles and Quadrilaterals cont.

Triangle

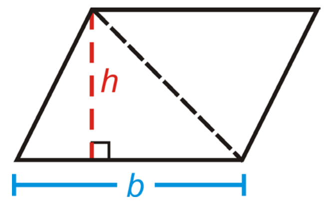


Perimeter = $P_{\text{triangle}} = a + b + c$

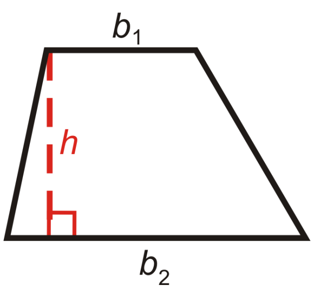
Theorem: The area of a triangle is one half the product of the base and its corresponding height.

- Area = $A_{\text{triangle}} = \frac{1}{2}bh$

If a parallelogram is cut in half along a diagonal, there would be two congruent triangles. The area of the triangle, then, is half the area of the area of a parallelogram.



Trapezoid

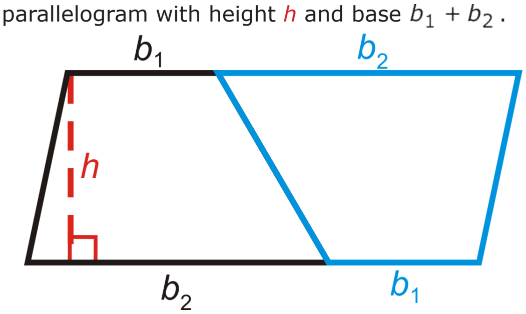


The height of a trapezoid is the perpendicular distance between its bases.

Theorem: The area of a trapezoid is one half the product of the height and the sum of the lengths of the bases.

- Area = $A_{\text{trapezoid}} = \frac{1}{2}h(b_1 + b_2)$

A trapezoid can be turned into a parallelogram with height h and base $b_1 + b_2$.

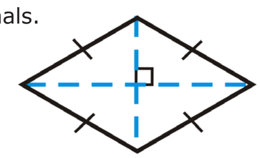


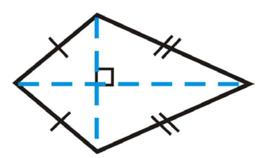
- The area for the parallelogram is $h(b_1 + b_2)$.
- So the area of the trapezoid is half the parallelogram:

  $\frac{1}{2}h(b_1 + b_2)$

Rhombus and Kite

Both rhombuses (left) and kites (right) have perpendicular diagonals.





Rhombus

Theorem: The area of a rhombus is half the product of the lengths of the diagonals.

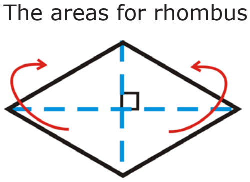
$A_{\text{rhombus}} = \frac{1}{2}d_1 d_2$

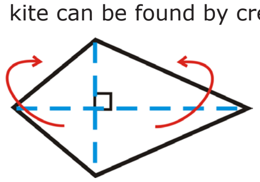
Kite

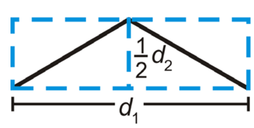
Theorem: The area of a kite is half the product of the lengths of the diagonals.

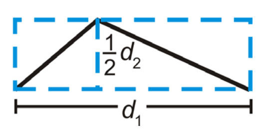
- $A_{\text{kite}} = \frac{1}{2}d_1 d_2$

The formulas for the areas of rhombus and kite are the same!
The areas for rhombus and kite can be found by creating two rectangles:









The area of the rectangles is: $\frac{1}{2}d_1 d_2$.