Area of Triangles and Trapezoids

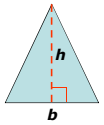
A diagonal of a parallelogram divides the parallelogram into two congruent triangles. So the area of each triangle is half the area of the parallelogram.

The base of a triangle can be any side. The height of a triangle is the perpendicular distance from the base to the opposite vertex.

AREA OF A TRIANGLE

The area A of a triangle is half the product of its base b and its height h.

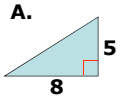
$$A = \frac{1}{2}bh$$



Additional Example 1A: Finding the Area of a Triangle

Find the area of the triangle.

A.



$A = \frac{1}{2}bh$ *Use the formula.*

$A = \frac{1}{2}(8 \cdot 5)$ *Substitute 8 for b and 5 for h.*

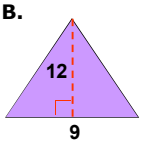
$A = 20$

The area of the triangle is 20 square units.

Additional Example 1B: Finding the area of a Triangle

Find the area of the triangle.

B.



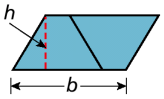
$A = \frac{1}{2}bh$ *Use the formula.*

$A = \frac{1}{2}(9 \cdot 12)$ *Substitute 9 for b and 12 for h.*

$A = 54$

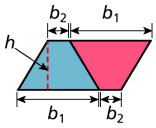
The area of the triangle is 54 square units.

A parallelogram can be divided into two congruent trapezoids. The area of each trapezoid is one-half the area of the parallelogram.



Area of a trapezoid $= \frac{1}{2}$*(base of parallelogram)(height).*

The two parallel sides of a trapezoid are its bases. If we call the longer side b_1 and the shorter side b_2, then the base of the parallelogram is $b_1 + b_2$.

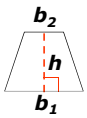


Area of a trapezoid $= \frac{1}{2}$*(base 1 + base 2)(height).*

AREA OF A TRAPEZOID

The area of a trapezoid is half its height multiplied by the sum of its two bases.

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



Additional Example 2A: Finding the Area of a Trapezoid

Find the area of the trapezoid.

A.

$A = \frac{1}{2}h(b_1 + b_2)$ *Use the formula.*

$A = \frac{1}{2} \cdot 6(5 + 9)$ *Substitute.*

$A = \frac{1}{2} \cdot 6(14)$ *Add.*

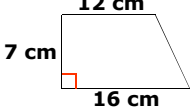
$A = 42$ *Multiply.*

The area of the trapezoid is 42 in^2.

Additional Example 2B: Finding the Area of a Trapezoid

Find the area of the trapezoid.

B.



$A = \frac{1}{2}h(b_1 + b_2)$ *Use the formula.*

$A = \frac{1}{2} \cdot 7(12 + 16)$ *Substitute.*

$A = \frac{1}{2} \cdot 7(28)$ *Add.*

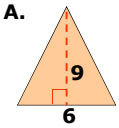
$A = 98$ *Multiply.*

The area of the trapezoid is 98 cm^2.

Try This: Example 1A

Find the area of the triangle.

A.



$A = \frac{1}{2}bh$ *Use the formula.*

$A = \frac{1}{2}(6 \cdot 9)$ *Substitute 6 for b and 9 for h.*

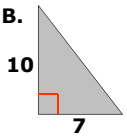
$A = 27$

The area of the triangle is 27 square units.

Try This: Example 1B

Find the area of the triangle.

B.



$A = \frac{1}{2}bh$ *Use the formula.*

$A = \frac{1}{2}(7 \cdot 10)$ *Substitute 7 for b and 10 for h.*

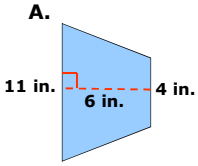
$A = 35$

The area of the triangle is 35 square units.

Try This: Example 2A

Find the area of the trapezoid.

A.



$A = \frac{1}{2}h(b_1 + b_2)$ *Use the formula.*

$A = \frac{1}{2} \cdot 6(11 + 4)$ *Substitute.*

$A = \frac{1}{2} \cdot 6(15)$ *Add.*

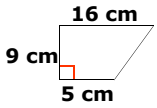
$A = 45$ *Multiply.*

The area of the trapezoid is 45 in^2.

Try This: Example 2B

Find the area of the trapezoid.

B.



$A = \frac{1}{2}h(b_1 + b_2)$ *Use the formula.*

$A = \frac{1}{2} \cdot 9(5 + 16)$ *Substitute.*

$A = \frac{1}{2} \cdot 9(21)$ *Add.*

$A = 94.5$ *Multiply.*

The area of the trapezoid is 94.5 cm^2.