Geometry Unit 10

11-3: Area of Trapezoids

Warm-Up

- On the whiteboards:

Give the Equations for the area of the following figures:

1.) Rectangle: $A = bh$

2.) Square: $A = s^2$

3.) Parallelogram: $A = bh$

4.) Triangle: $A = \frac{1}{2}bh$

5.) Rhombus: $A = \frac{1}{2}d_1 d_2$

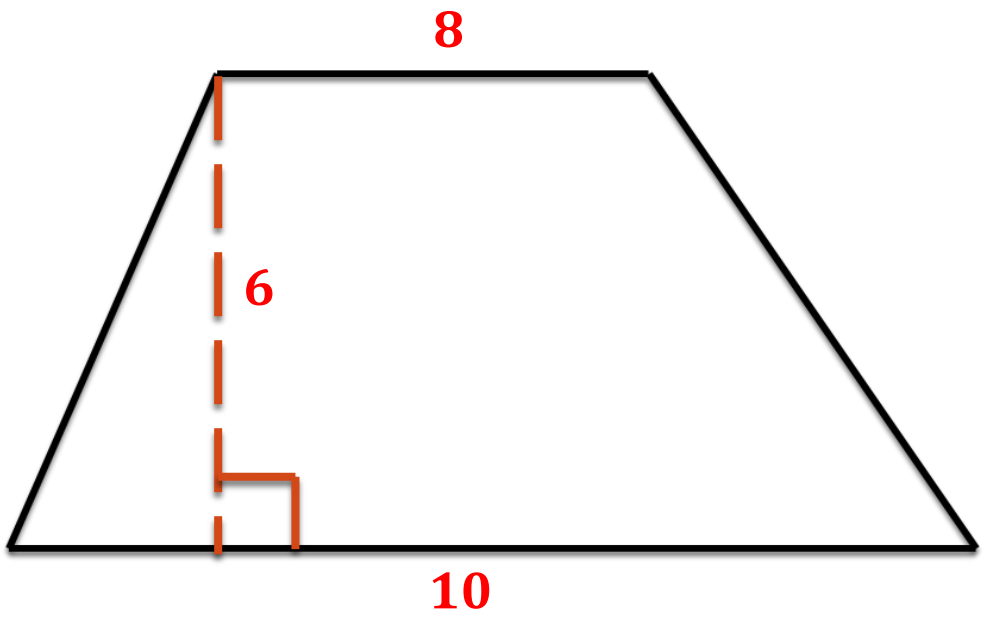
Area of a Trapezoid

- **Content Objective**: Students will be able to find the area of various trapezoids.

- **Language Objective**: Students will be able to identify the parts of Trapezoids, using them in an equation to find the area of the Trapezoids.

Discover the Area of a trapezoid

- Start with this example: Find the Area of this shape.
- Recall how we took the area of a parallelogram, as well as how we took the area of a triangle.

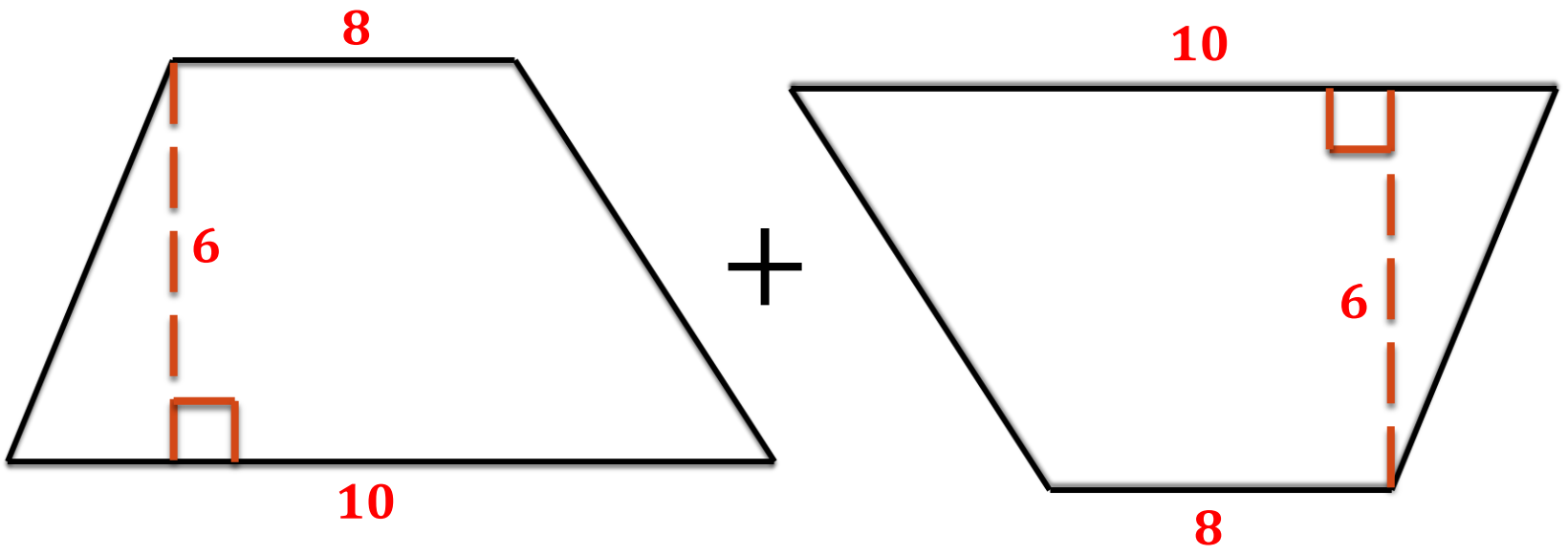


Discover the Area of a trapezoid

1.) Draw a flipped version of the trapezoid next to your current trapezoid.

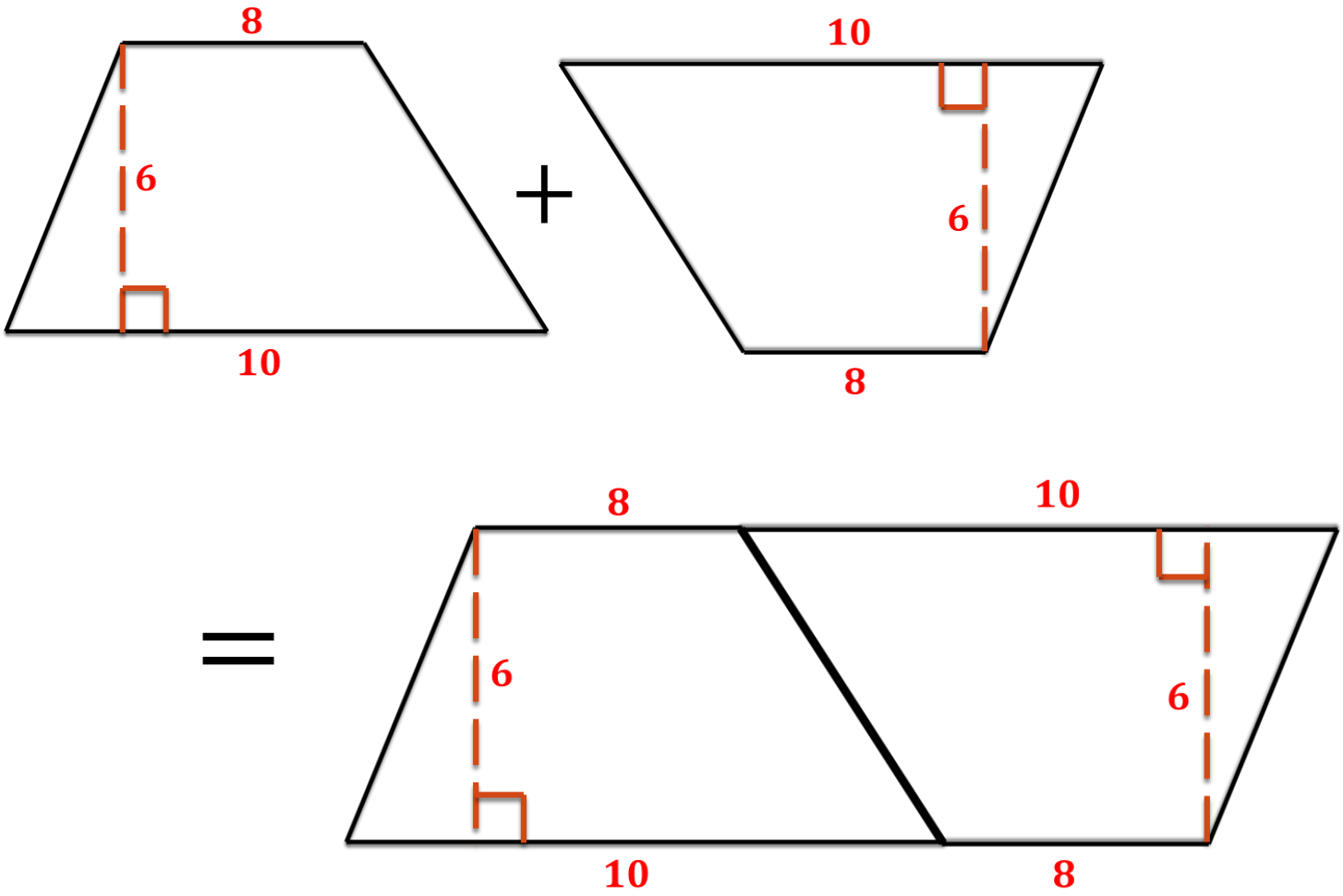
2.) Add the trapezoids together.

- In the space provided, illustrate this addition by drawing the two shapes attached to each other.



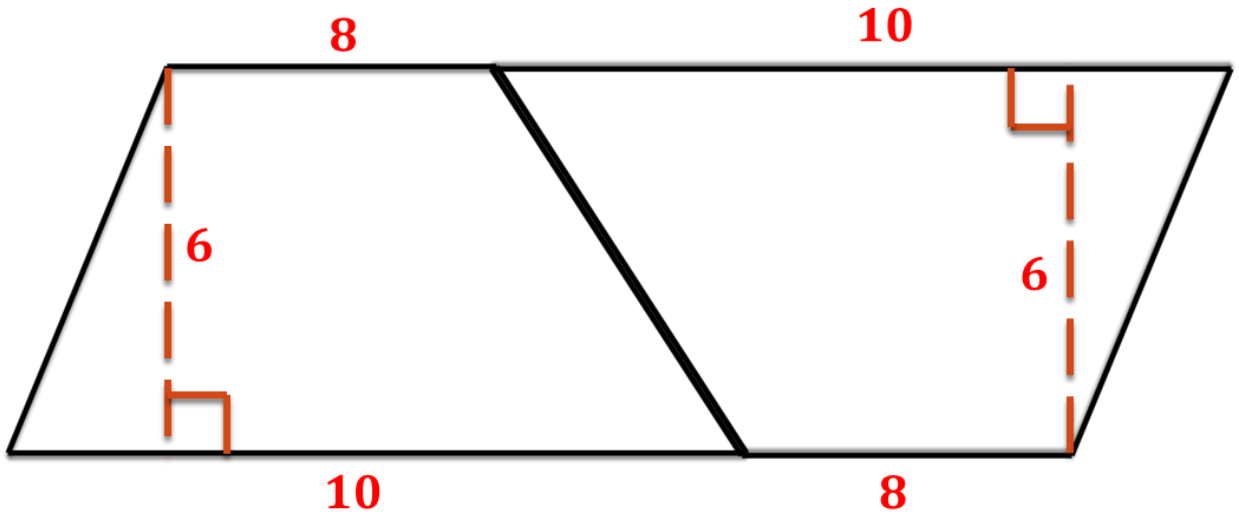
Discover the Area of a trapezoid

- The final result should look like this:



Discover the Area of a trapezoid

3.)The combined figure looks like a Parallelogram

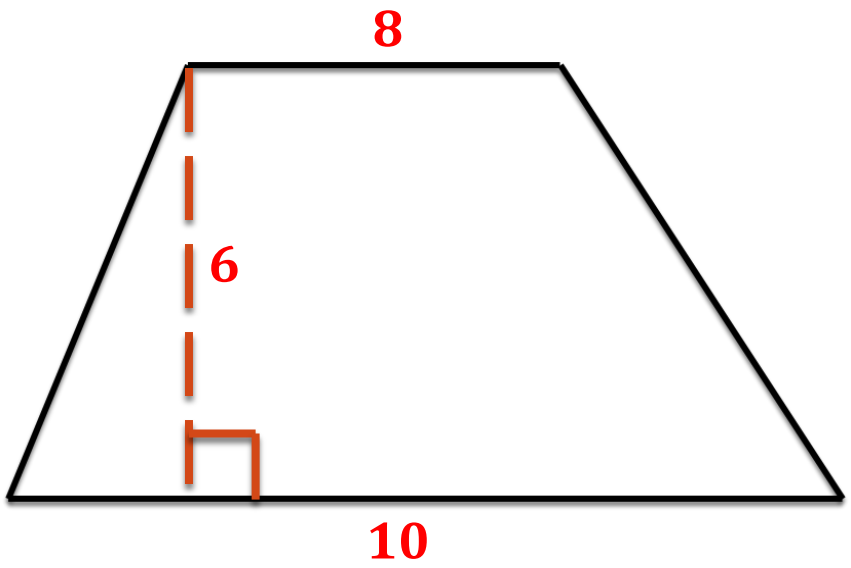


- Find its Area:

- $A = 6 \times (10 + 8) = 6 \times 18 = 108$

Discover the Area of a trapezoid

4.) Recall However that you want this area:

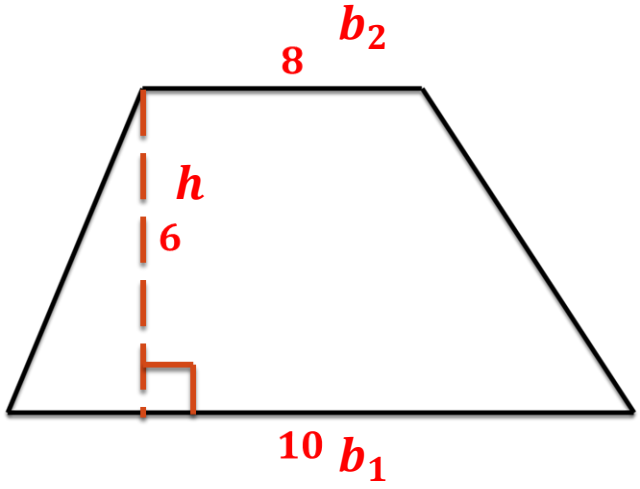


This is only half the area you just took.

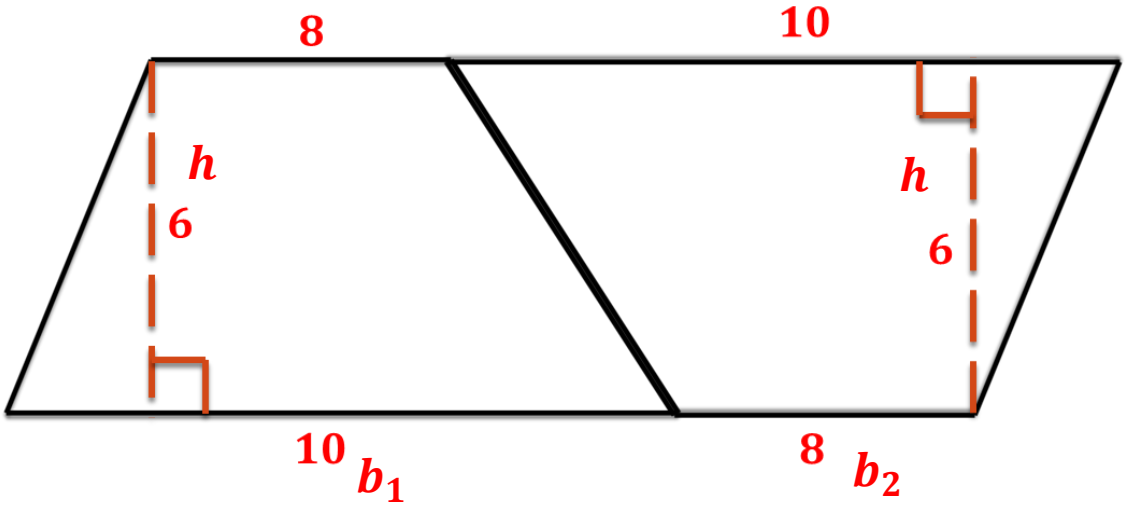
- To find this area: $A = \frac{1}{2} \times 108 = 54$

Discover the Area of a trapezoid

5.) Return to the original figure and examine its parts, comparing them to the constructed parallelogram.



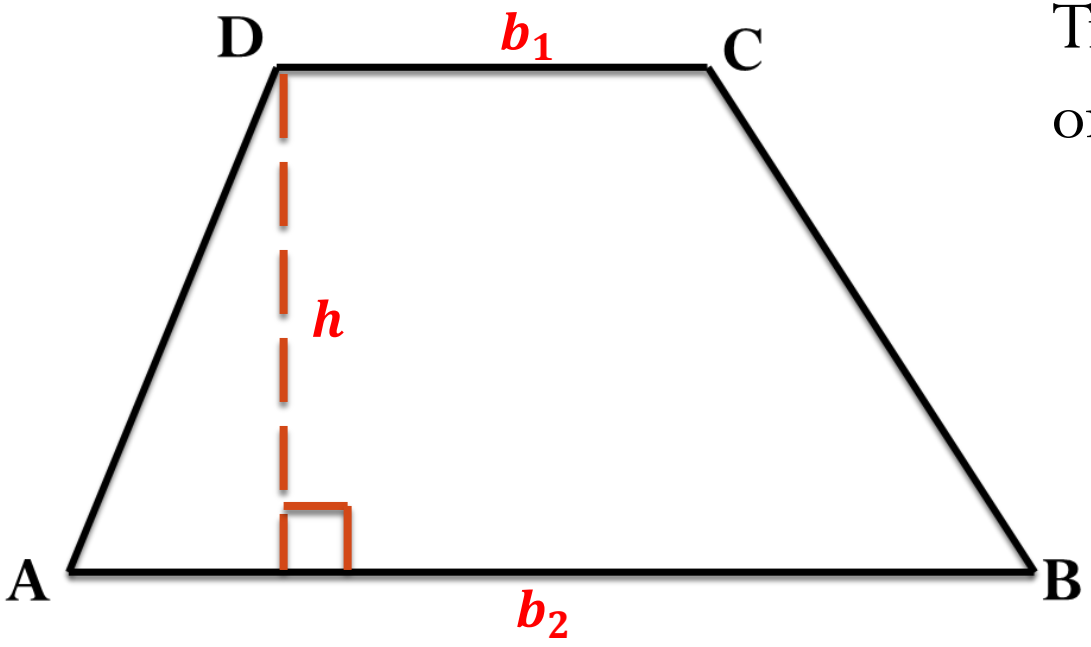
This takes us to the equation for the area of a trapezoid…



Area of a Trapezoid

Theorem 11-5: The area of a trapezoid equals half the product of the height and the sum of the bases.

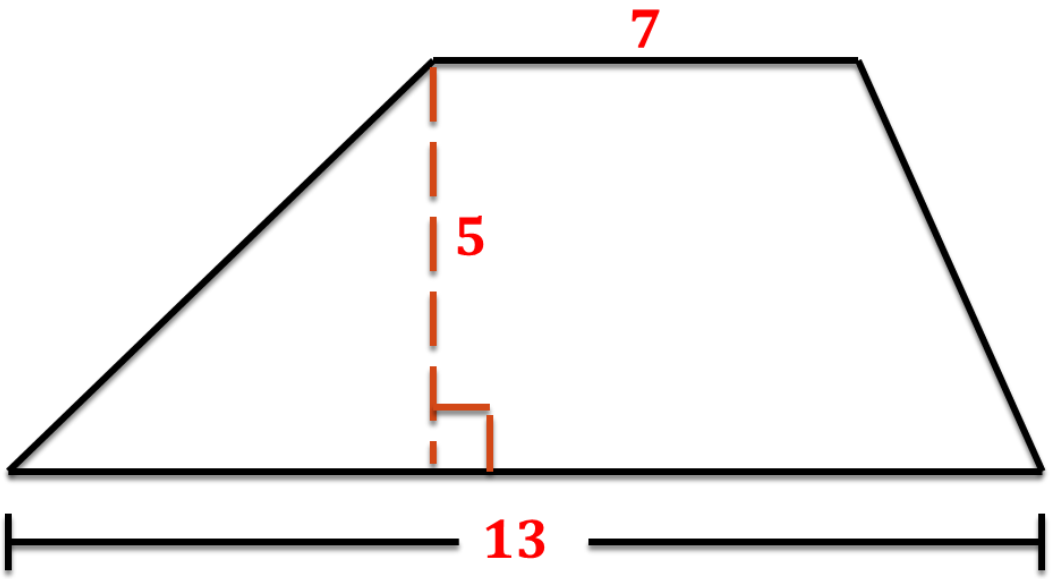
Equation: $A = \frac{1}{2}h(b_1 + b_2)$



Try it on our original example.

Practice Problems

- Find the area of each trapezoid.



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 5(13 + 7)$$

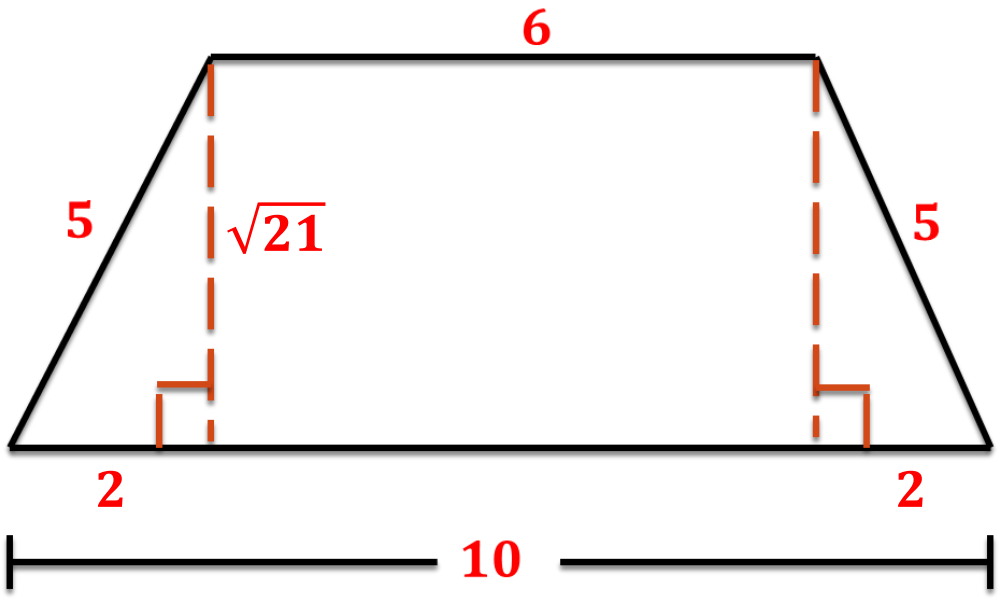
$$A = \frac{1}{2} \times 5(20)$$

$$A = \frac{1}{2} \times 100$$

$$\boldsymbol{A = 50}$$

Practice Problems

- Find the area of each trapezoid.



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times \sqrt{21}(10 + 6)$$

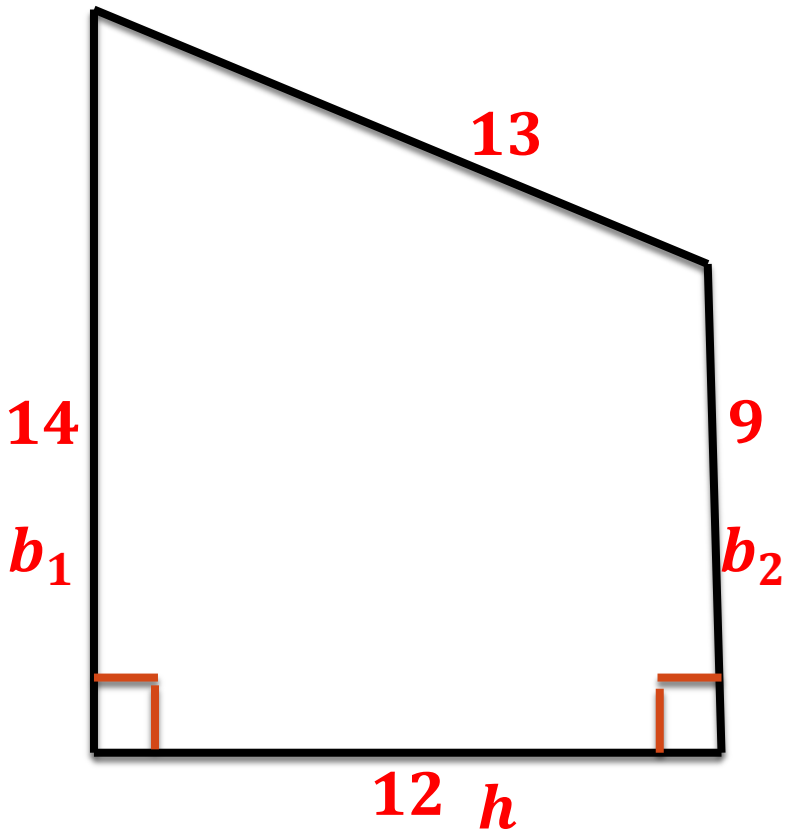
$$A = \frac{1}{2} \times \sqrt{21}\,(16)$$

$$A = \frac{1}{2} \times 16\sqrt{21}$$

$$\boldsymbol{A = 8\sqrt{21}}$$

Practice Problems

- Find the area of each trapezoid.



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 12\,(14 + 9)$$

$$A = \frac{1}{2} \times 12\,(23)$$

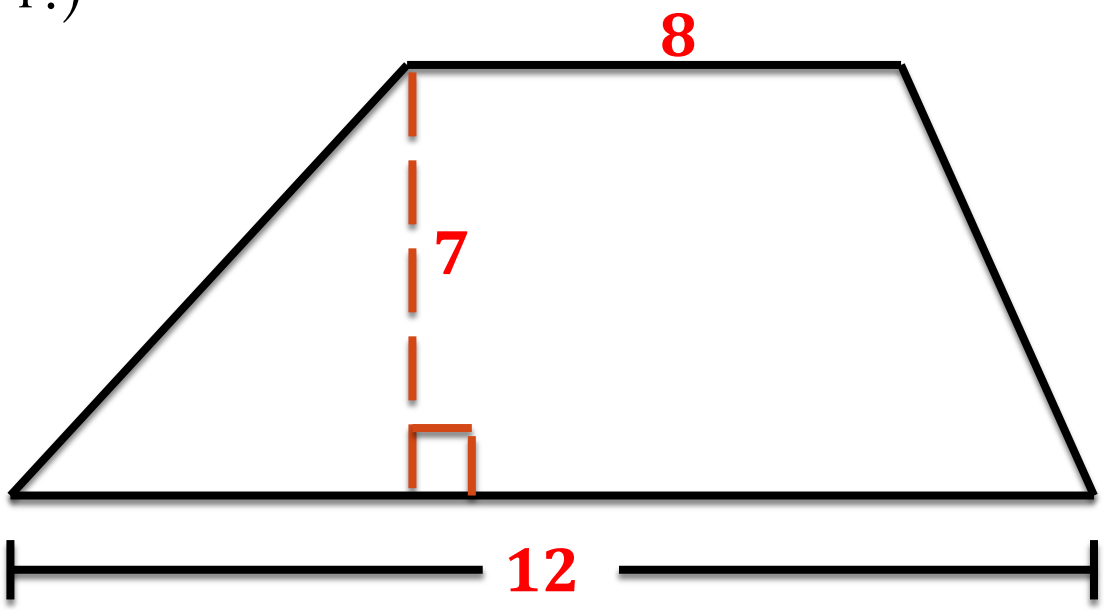
$$A = \frac{1}{2} \times 276$$

$$\boldsymbol{A = 138}$$

Group Practice

- Find the area of each trapezoid in your groups.

1.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 7(12 + 8)$$

$$A = \frac{1}{2} \times 7(20)$$

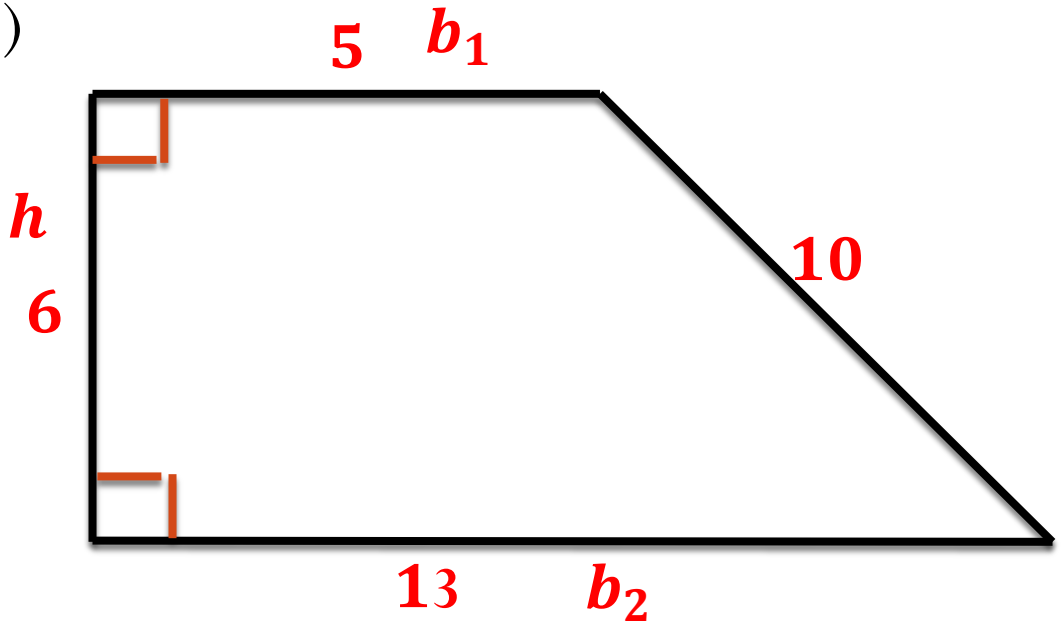
$$A = \frac{1}{2} \times 140$$

$$\boldsymbol{A = 70}$$

Group Practice

- Find the area of each trapezoid in your groups.

2.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 6(13 + 5)$$

$$A = \frac{1}{2} \times 6(18)$$

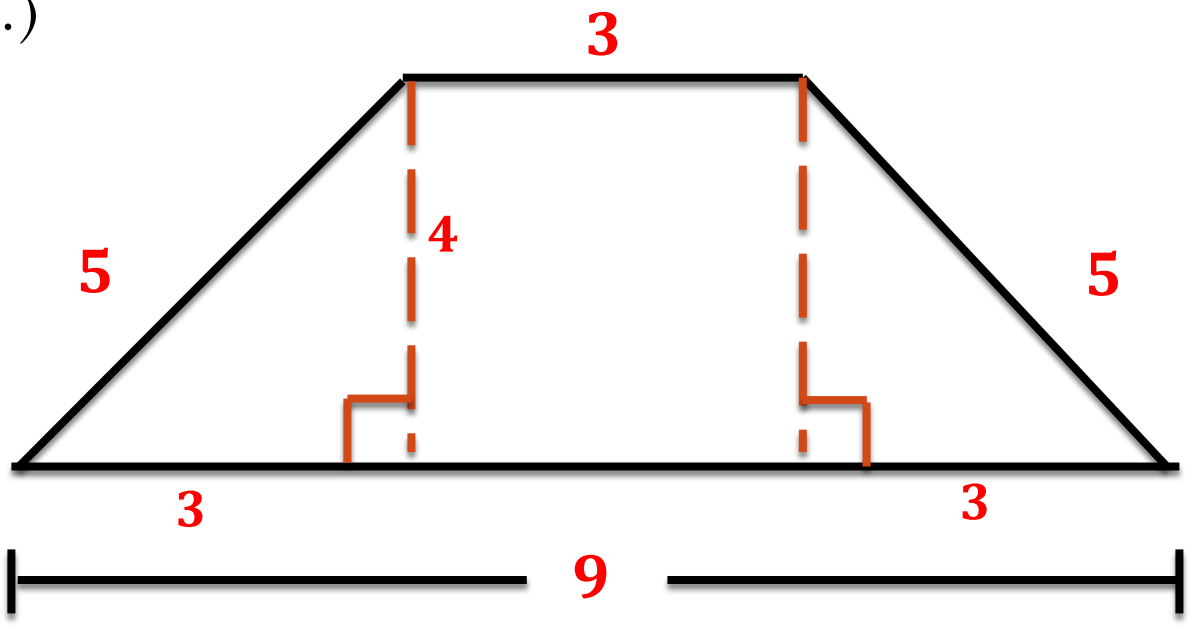
$$A = \frac{1}{2} \times 108$$

$$\boldsymbol{A = 54}$$

Group Practice

- Find the area of each trapezoid in your groups.

3.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 4(9 + 3)$$

$$A = \frac{1}{2} \times 4(12)$$

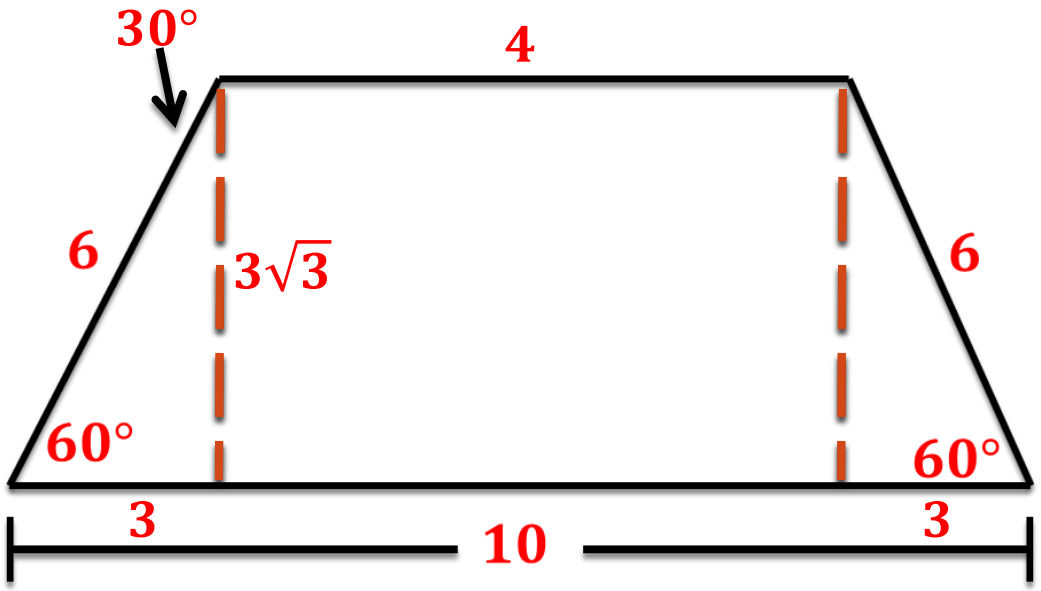
$$A = \frac{1}{2} \times 48$$

$$\boldsymbol{A = 24}$$

Group Practice

- Find the area of each trapezoid in your groups.

4.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 3\sqrt{3}(10 + 4)$$

$$A = \frac{1}{2} \times 3\sqrt{3}(14)$$

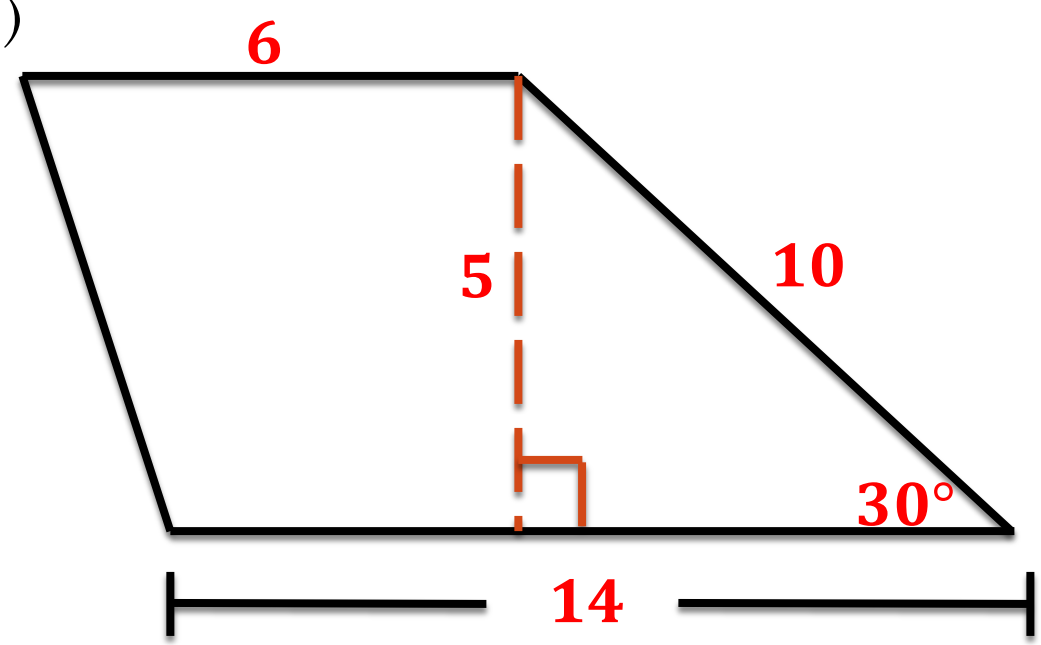
$$A = \frac{1}{2} \times 42\sqrt{3}$$

$$\boldsymbol{A = 21\sqrt{3}}$$

Group Practice

- Find the area of each trapezoid in your groups.

5.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 5(14 + 6)$$

$$A = \frac{1}{2} \times 5\,(20)$$

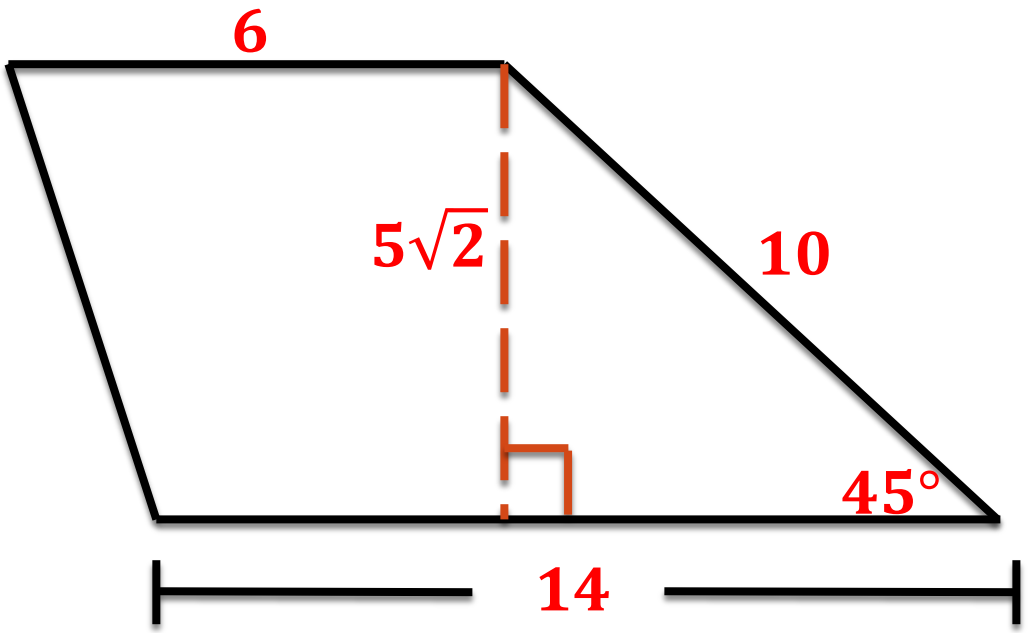
$$A = \frac{1}{2} \times 100$$

$$\boldsymbol{A = 50}$$

Group Practice

- Find the area of each trapezoid in your groups.

6.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 5\sqrt{2}(14 + 6)$$

$$A = \frac{1}{2} \times 5\sqrt{2}(20)$$

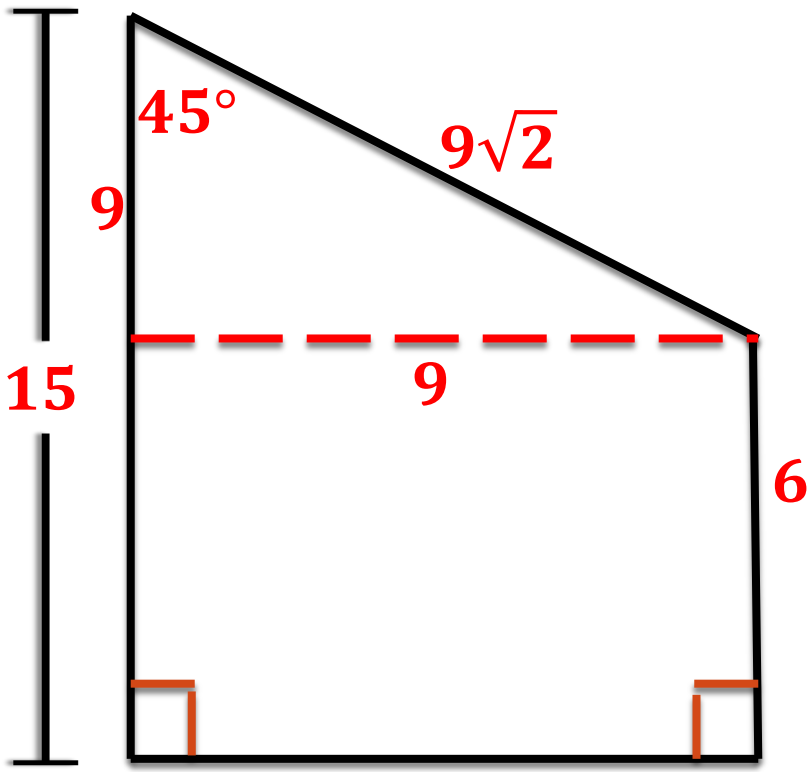
$$A = \frac{1}{2} \times 100\sqrt{2}$$

$$\boldsymbol{A = 50\sqrt{2}}$$

Group Practice

- Find the area of each trapezoid in your groups.

7.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 9(15 + 6)$$

$$A = \frac{1}{2} \times 9(21)$$

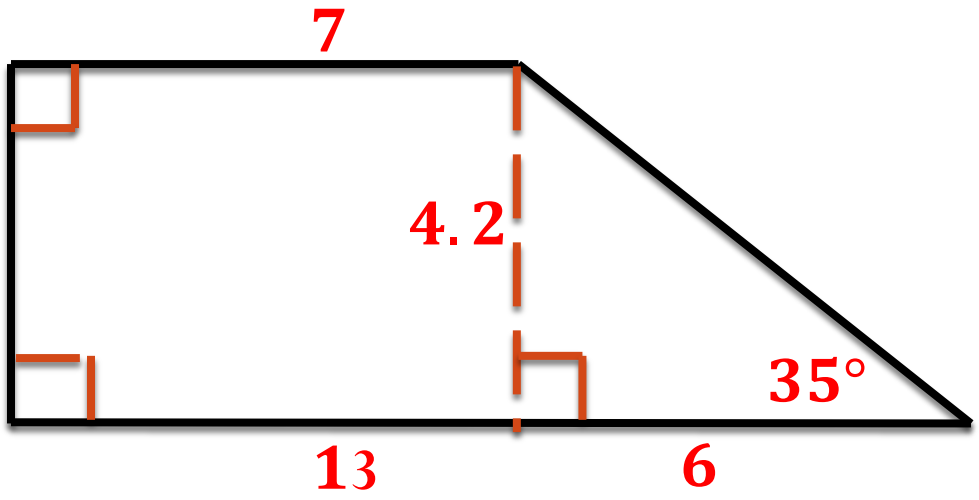
$$A = \frac{1}{2} \times 189$$

$$\boldsymbol{A = 94.5}$$

Group Practice

- Find the area of each trapezoid in your groups.

8.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 4.2(13 + 7)$$

$$A = \frac{1}{2} \times 4.2(20)$$

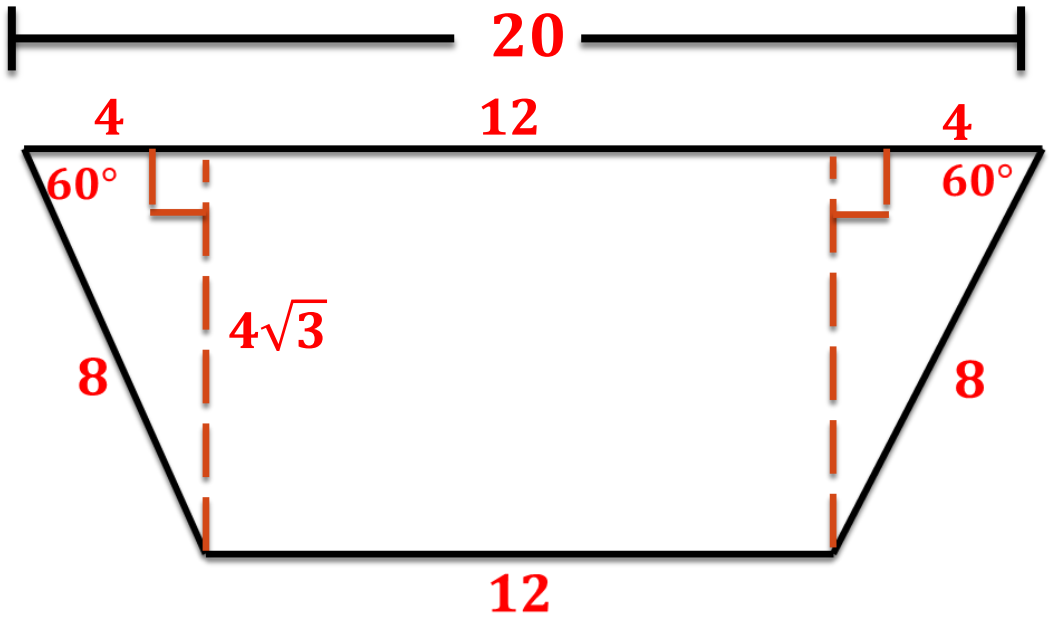
$$A = \frac{1}{2} \times 84$$

$$\boldsymbol{A = 42}$$

Group Practice

- Find the area of each trapezoid in your groups.

9.)



Solution:

Area of a Trapezoid

$$A = \frac{1}{2} \times 4\sqrt{3}(20 + 12)$$

$$A = \frac{1}{2} \times 4\sqrt{3}(32)$$

$$A = \frac{1}{2} \times 128\sqrt{3}$$

$$\boldsymbol{A = 64\sqrt{3}}$$