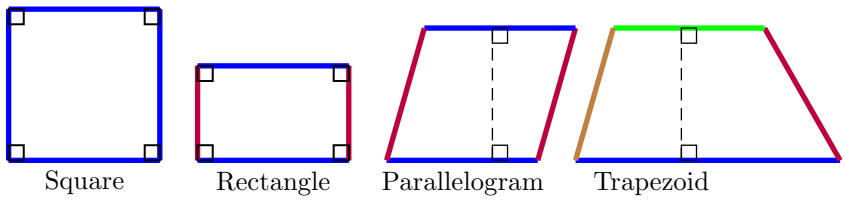
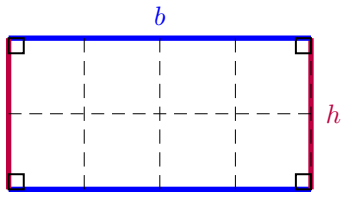
Here we consider shapes that have exactly 4 straight sides bounding them. Specifically, we will study the ones that have at least one pair of opposite sides, and none of the sides intercept each other except at the endpoints. Here is a list of some of the famous ones. Note, on each shape, sides o same color have the same size.

Famous Quadrilaterals



Now, we define the concepts *area*. We first define the concept for a rectangle. On a rectangle, if the base side measures length b and the height length measures h, then we define:

Rectangle Area Defined

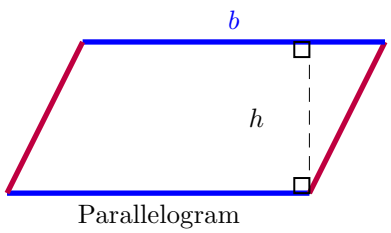


AREA $= bh$

Example $= 4 \cdot 2 = 8$

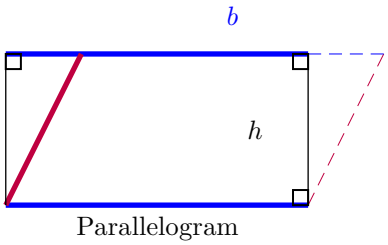
In layman terms, the area of a rectangle is the number of tiles that fit inside the rectangle. It should be noted that from this definition we can find the areas of all other quadrilaterals described in this section, as well as the area of all triangles in the next section. Said differently, this is the only area we have to define. All other areas come from the logical milking of this definition.

Parallelogram Area



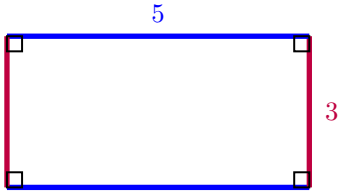
AREA $= bh$

Since...

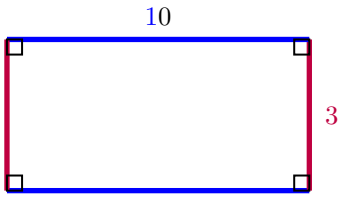


Similarly, the areas of a trapezoid as well as areas of triangles can be derived. These are left as important exercises.

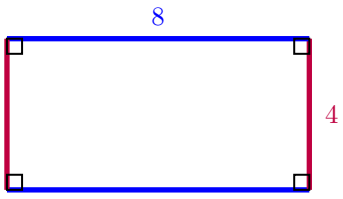
1. Find the area for the following shape.



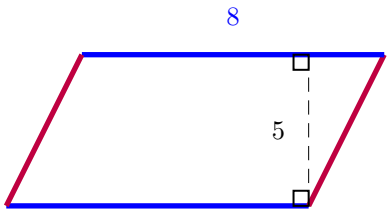
2. Find the area for the following shape.



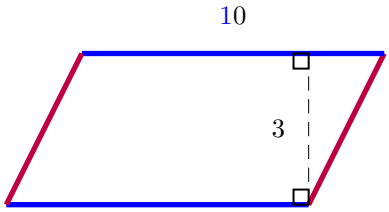
3. Find the area for the following shape.



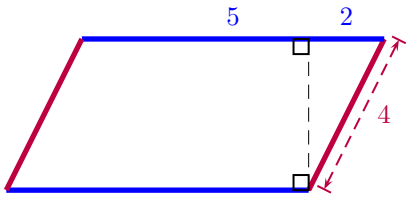
4. Find the area for the following parallelogram.



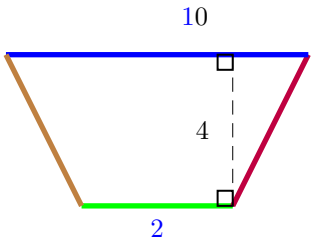
5. Find the area for the following parallelogram.

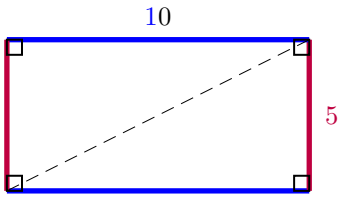


6. Find the area for the following parallelogram.



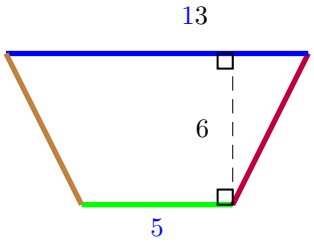
7. Find the area for the following trapezoid.



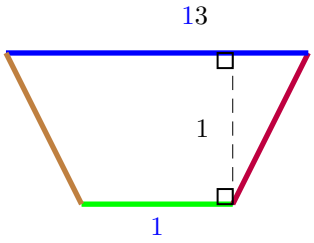


Now, use this area to calculate the area of each of the triangles inside the rectangle.

8. Find the area for the following trapezoid.

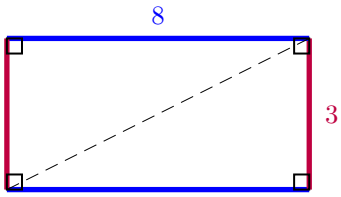


9. Find the area for the following trapezoid.



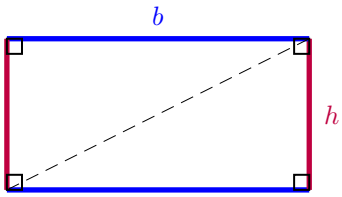
10. Find the area for the following Rectangle.

11. Find the area for the following Rectangle.

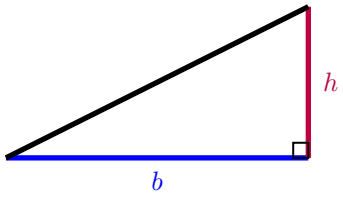


Now, use this area to calculate the area of each of the triangles inside the rectangle.

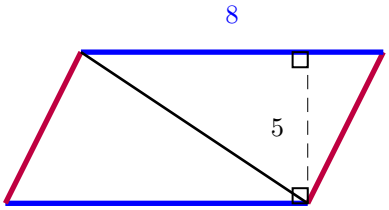
12. (**FAMOUS**) Find the area for the following Rectangle.



Now, use this area to calculate the area of each of the triangles inside the rectangle. use this to determine a formula for a triangle with the following shape

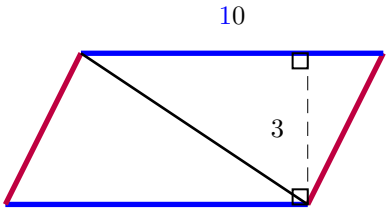


13. Find the area for the following parallelogram.



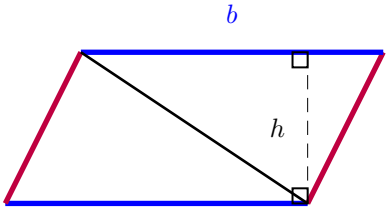
Now, use this area to calculate the area of each of the two large triangles inside the parallelogram.

14. Find the area for the following parallelogram.

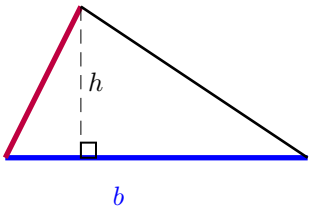


Now, use this area to calculate the area of each of the two large triangles inside the parallelogram.

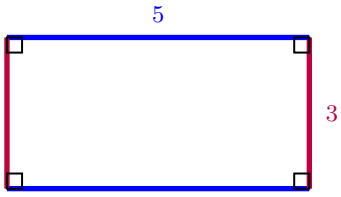
15. **(FAMOUS)** Find the area for the following parallelogram.



Now, use this area to calculate the area of each of the two large triangles inside the parallelogram. Then, use this to determine a formula for the area of a triangle with the following shape.

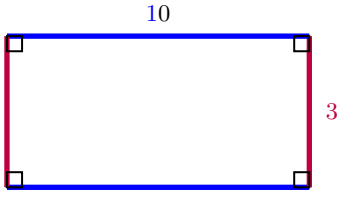


1. Find the area for the following shape.



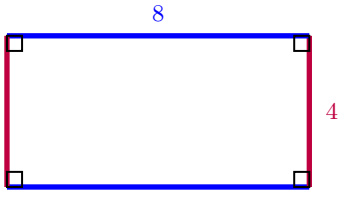
Solution: $A = bh = 5 \cdot 3 = 15$ square units

2. Find the area for the following shape.



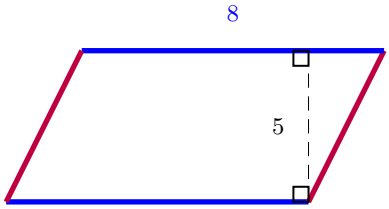
Solution: $A = bh = 10 \cdot 3 = 30$ square units

3. Find the area for the following shape.



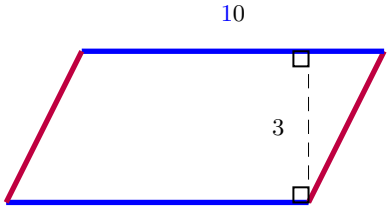
Solution: $A = bh = 8 \cdot 4 = 32$ square units

4. Find the area for the following parallelogram.



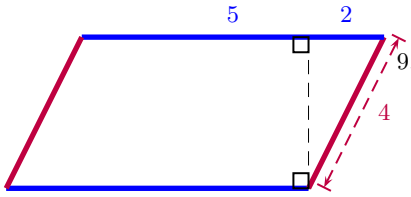
Solution: $A = bh = 8 \cdot 5 = 40$ square units

5. Find the area for the following parallelogram.



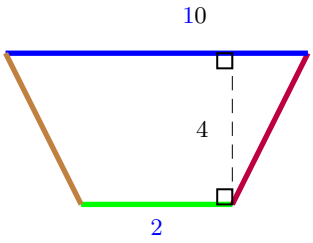
Solution: $A = bh = 10 \cdot 3 = 30$ square units

6. Find the area for the following parallelogram.



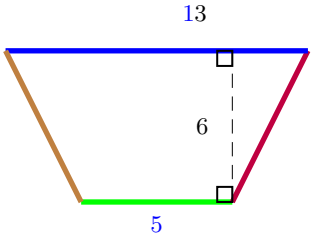
Solution: first find the height using pythagoras, $4^2 = h^2 + 2^2$, thus $h = \sqrt{12}$.... then... $A = bh = 7 \cdot \sqrt{12}$ square units

7. Find the area for the following trapezoid.



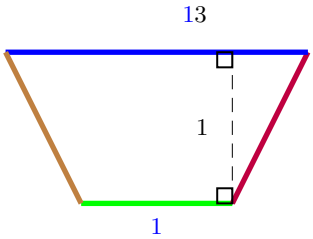
Solution: $A = (B + b)h/2 = \frac{(10+2)}{2} \cdot 4 = 24$ square units

8. Find the area for the following trapezoid.



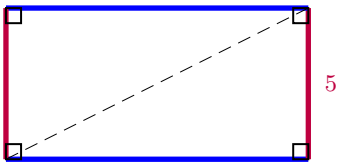
Solution: $A = (B + b)h/2 = \frac{(13+5)}{2} \cdot 6 = 54$ square units

9. Find the area for the following trapezoid.



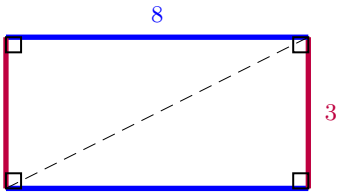
Solution: $A = (B + b)h/2 = \frac{(13+1)}{2} \cdot 1 = 7$ square units

10. Find the area for the following Rectangle.



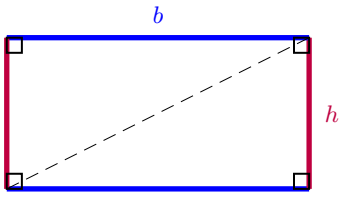
Now, use this area to calculate the area of each of the triangles inside the rectangle.

11. Find the area for the following Rectangle.

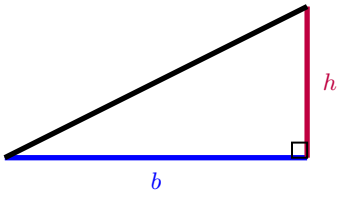


Now, use this area to calculate the area of each of the triangles inside the rectangle.

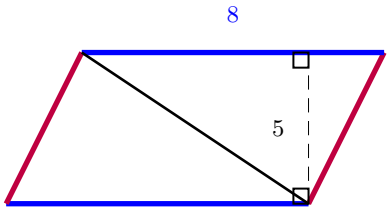
12. (**FAMOUS**) Find the area for the following Rectangle.



Now, use this area to calculate the area of each of the triangles inside the rectangle. use this to determine a formula for a triangle with the following shape

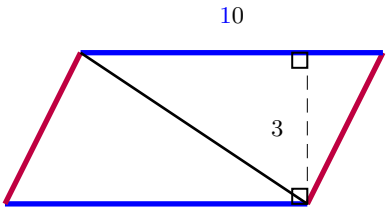


13. Find the area for the following parallelogram.



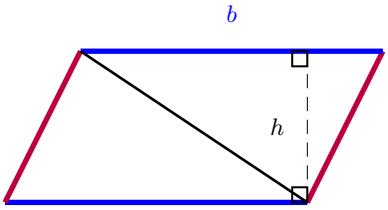
Now, use this area to calculate the area of each of the two large triangles inside the parallelogram.

14. Find the area for the following parallelogram.

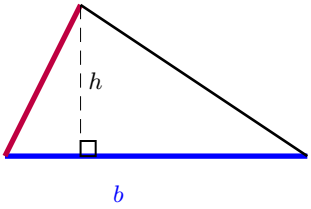


Now, use this area to calculate the area of each of the two large triangles inside the parallelogram.

15. **(FAMOUS)** Find the area for the following parallelogram.



Now, use this area to calculate the area of each of the two large triangles inside the parallelogram. Then, use this to determine a formula for the area of a triangle with the following shape.



Solution: see video lectures...

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