§12.4 Areas of Parallelograms and Polygons.

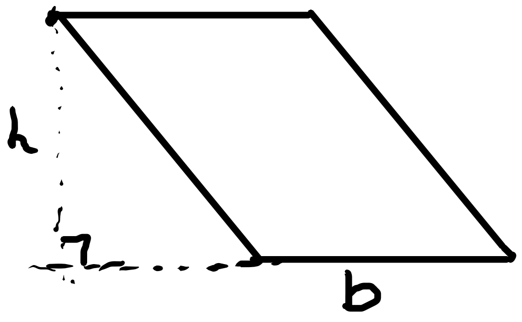
Key words.

Base: Any side of a Parallelogram. (b)

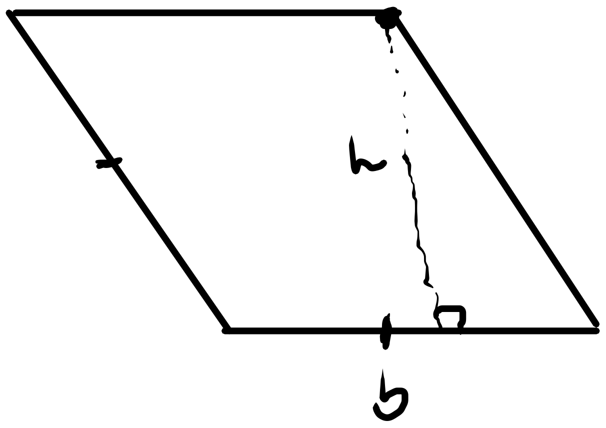
Height: A line segment that has the following Properties.

1. Perpendicular to the base.
2. Connects the base, or an extension of the base, to a vertex of a Parallelogram that is NOT on the base.

Eg)

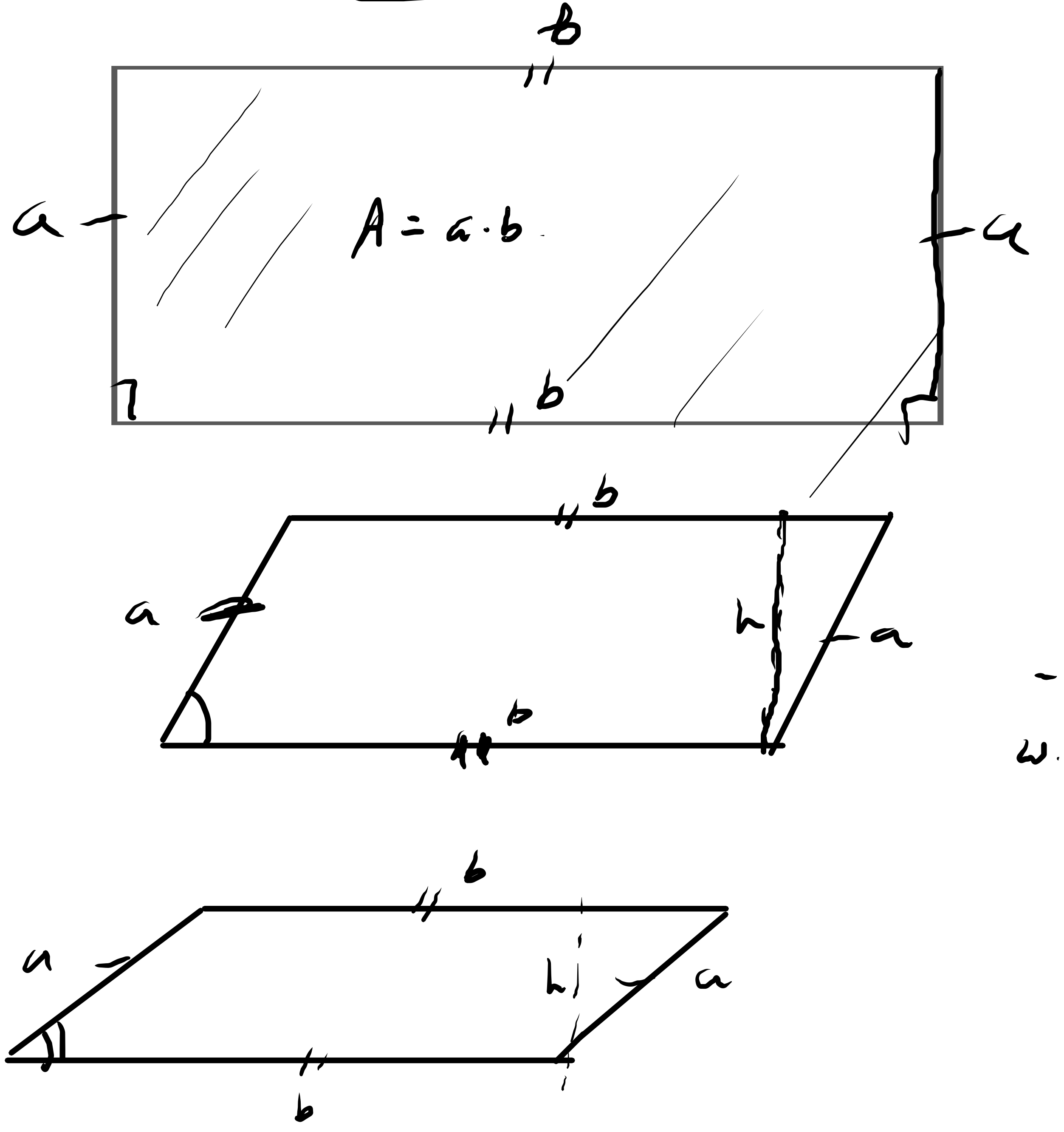


or



Area of Parallelogram: $b \cdot h$.

Reasoning why $A = b \cdot h$ for Parallelograms.

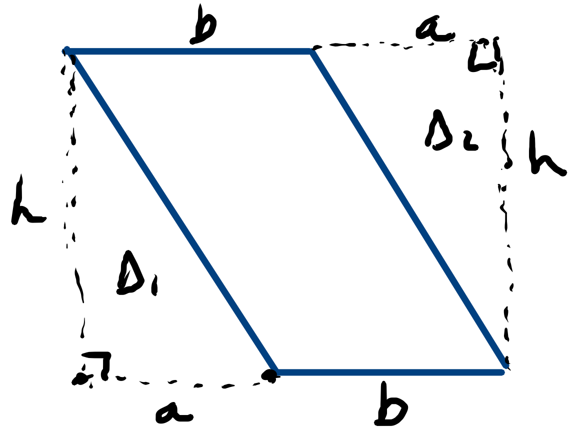


ASSUme that they have the Same lengths.

Will NOT have the Same Area b/c angles are NOT the Same.

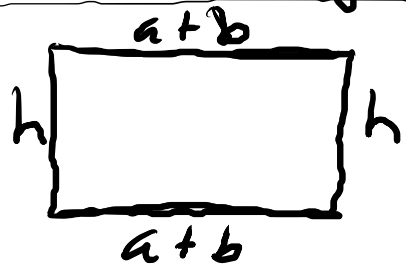
- Area of a Parallelogram will NOT be from the Side length.

Why is $A = b \cdot h$ for Parallelograms



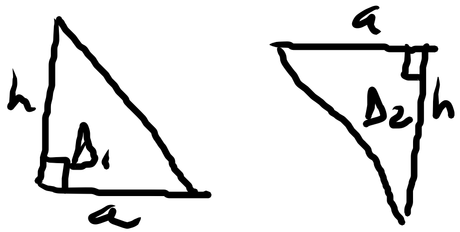
4 Shapes.

1 Rectangle



; $A = (a+b)h$.

2 Triangles.



$\Delta_1 = \frac{1}{2}ah$

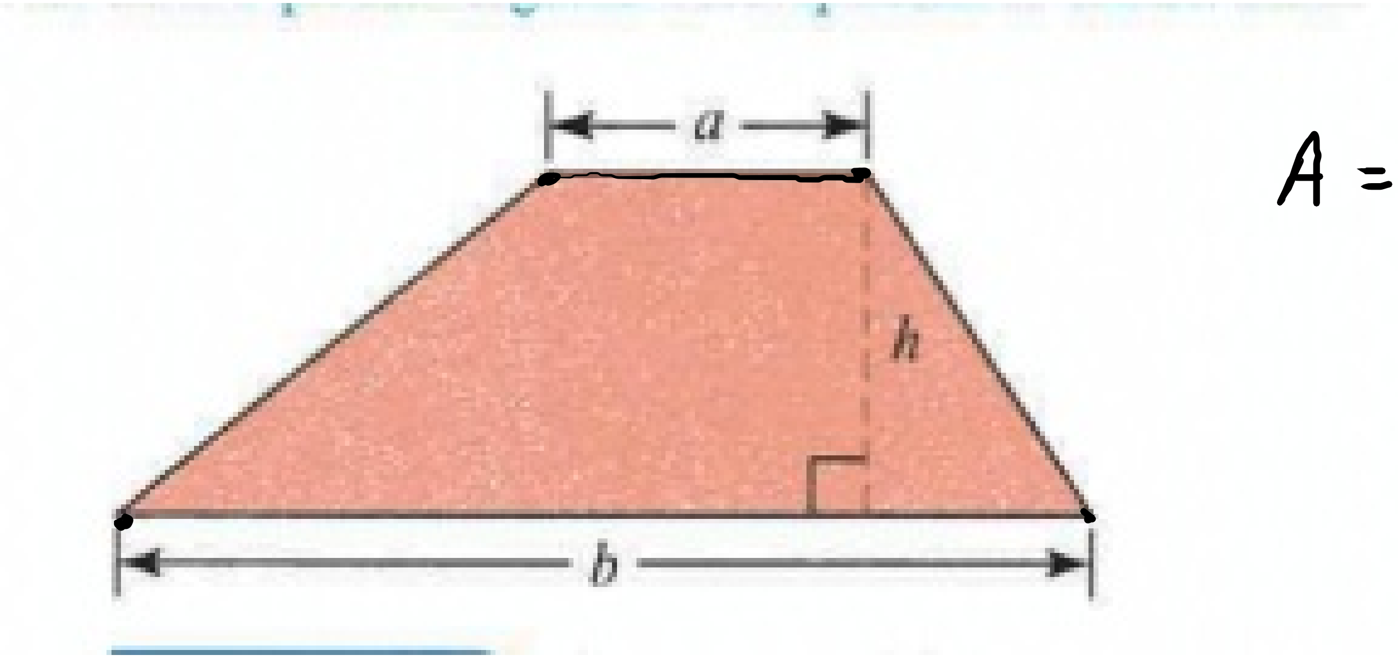
$\Delta_2 = \frac{1}{2}ah$

Now to find Area of Parallelogram, take-away the area of Δ_1 & Δ_2 from Rectangle: $(a+b)h - \frac{1}{2}ah - \frac{1}{2}ah$

$\cancel{ah} + bh - \cancel{1ah}$

$$\boxed{A = bh}$$

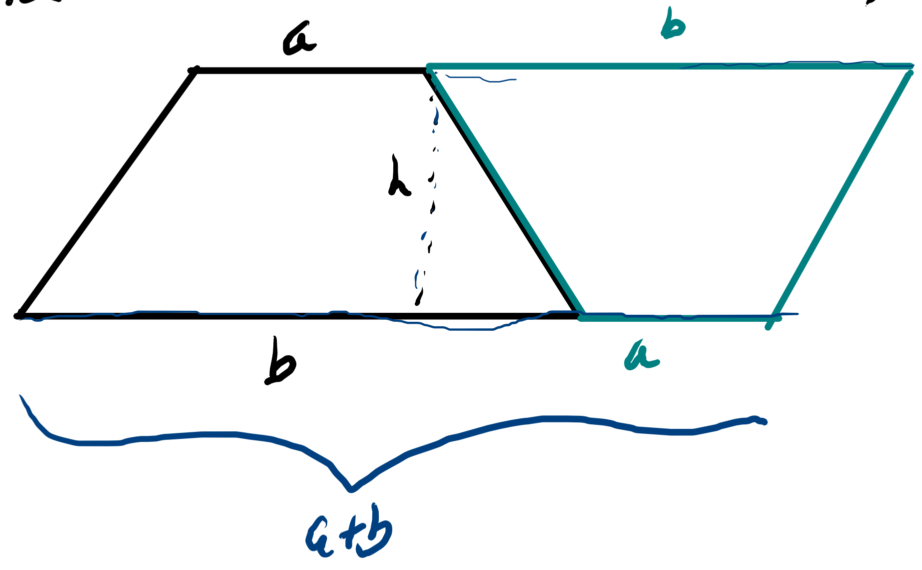
Exercise #4 : Trapezoid



Goal

$$A = \frac{(a+b)\cdot h}{2} = \frac{1}{2}(a+b)\cdot h$$

(4) To find area of Trapezoid, make two copies.



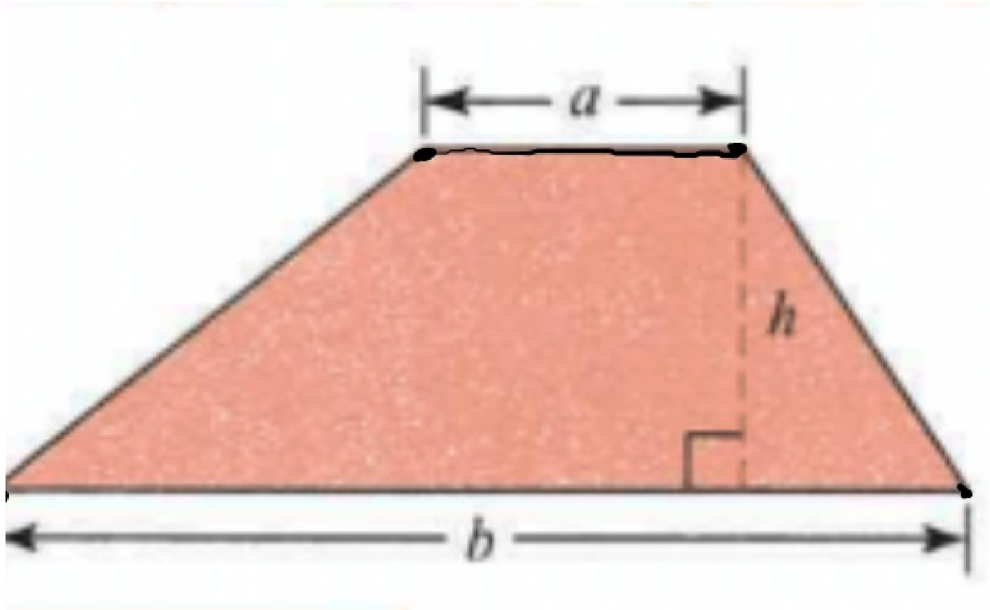
When putting two trapezoids together, we get a Parallelogram.

$*A = (a+b)h$

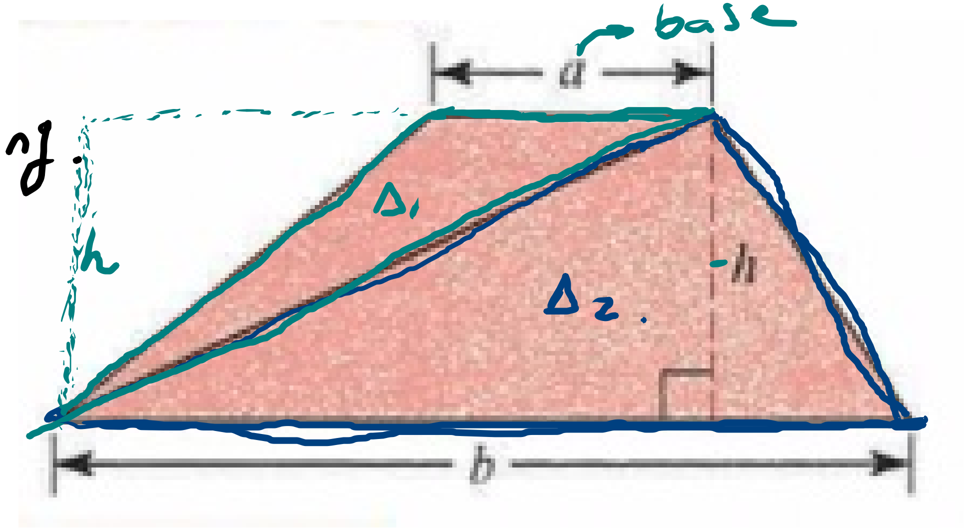
To get the Trapezoid, divide the area by 2.

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

To find area by Sub-dividing the Trapezoid.



Sub-dividing $\longrightarrow$



They're two Δ's that we can work with.

Area of $\Delta_2 = \frac{1}{2}bh$.

Area of $\Delta_1 = \frac{1}{2}ah$

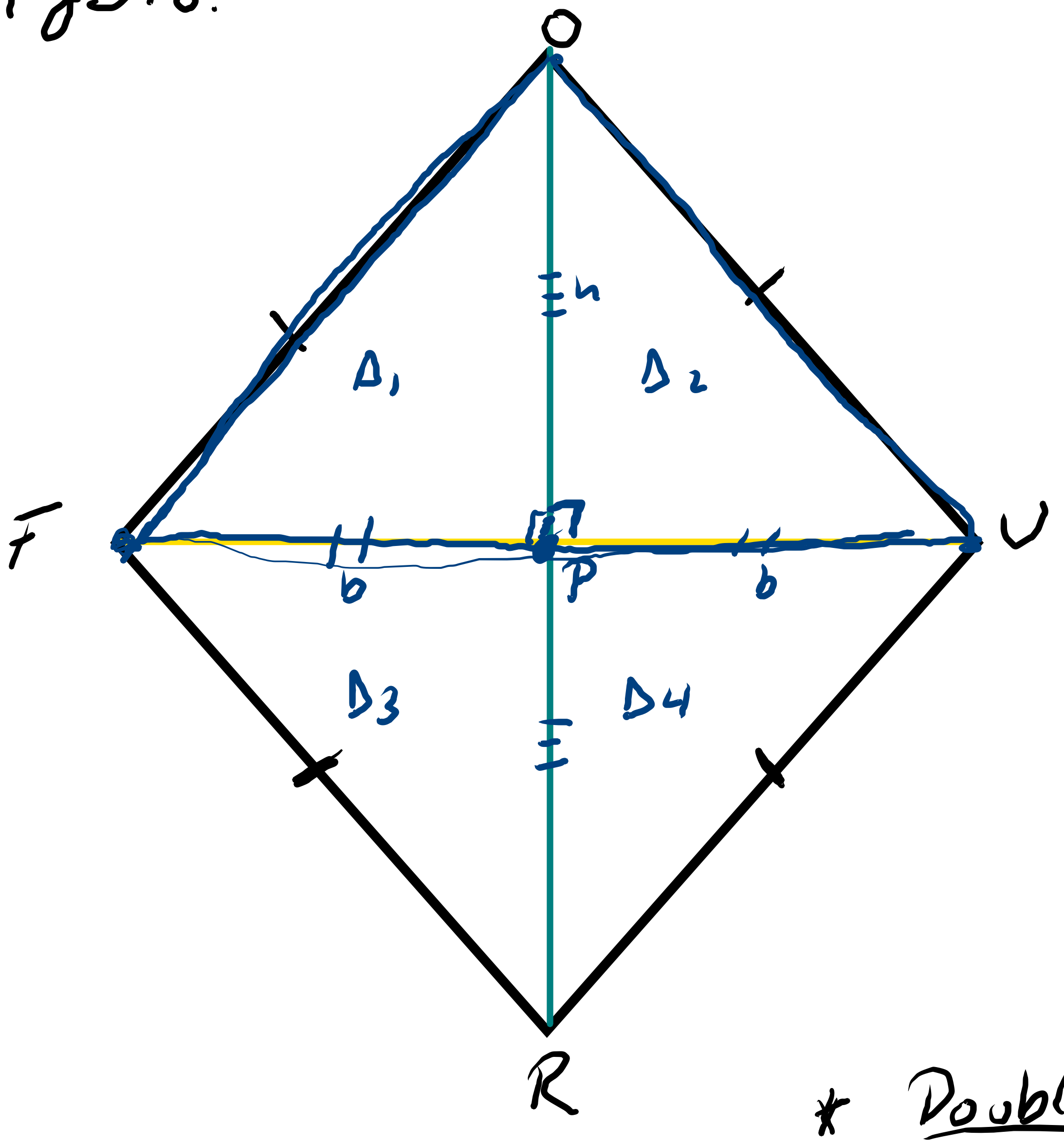
|| the total Area of a trapezoid: $\Delta_1 + \Delta_2$

$\Rightarrow \frac{1}{2}bh + \frac{1}{2}ah$. $\rightarrow$ Factor common values.

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

Rhombus: All sides are Equal

Excercise #6: Pg 548.



Area of Δ_1

base: $\overline{FP}$ * =

Hieght: $\overline{OP}$.

$\frac{1}{2}(\overline{FP})(\overline{OP})$

Area of Δ_2

base: $\overline{UP}$ *

Hieght: $\overline{OP}$.

$\frac{1}{2}(\overline{UP})(\overline{OP})$

$$\frac{1}{2}(\overline{FP})(\overline{OP}) + \frac{1}{2}(\overline{FP})(\overline{OP})$$

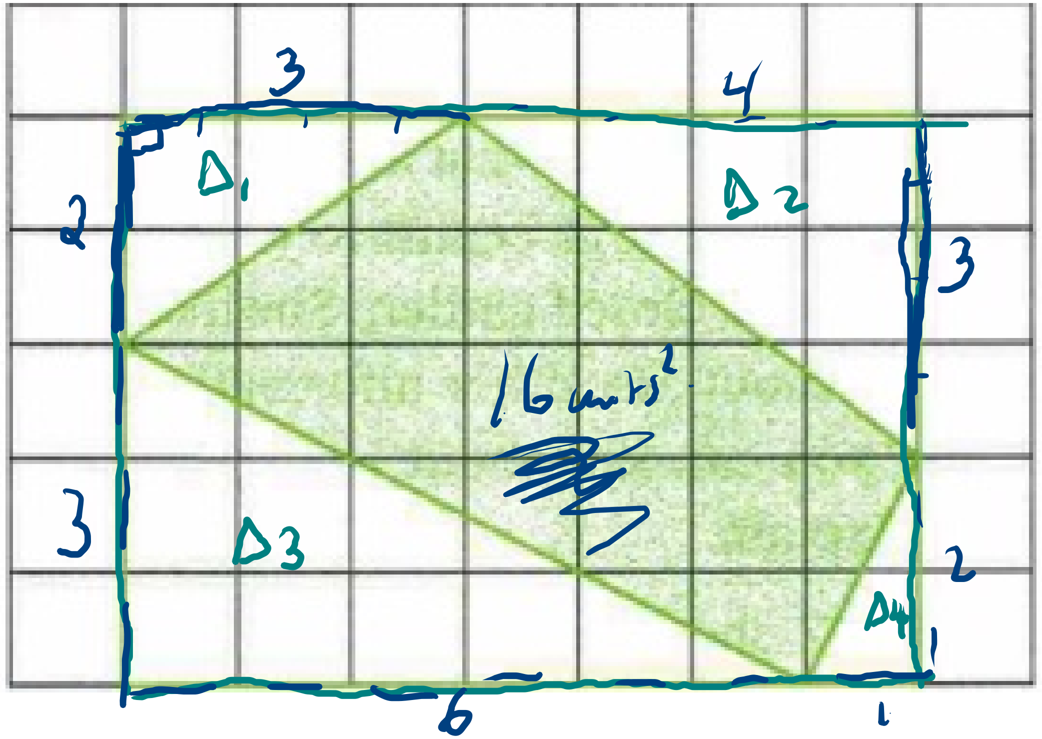
$$(\overline{FP})(\overline{OP})$$

Total Area: $2(\overline{FP})(\overline{OP})$

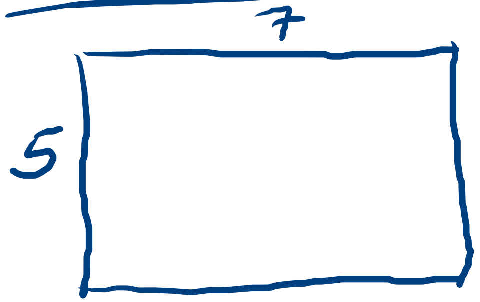
* **Double Check** Clearer ans later.

7. a. Determine the areas (in square units) of the 4 lightly shaded triangles in Figure 12.53. The grid lines are 1 unit apart. Explain your reasoning.

b. Use the moving and additivity principles and your results from part (a) to determine the area of the dark shaded quadrilateral in Figure 12.53. Explain your reasoning.



(A) 1 Rectangle



$A = (5)(7) = \underline{35}$.

4 Δ's

$\Delta_1 = \frac{1}{2}(2)(3) = 3$.

$\Delta_2 : \frac{1}{2}(4)(3) = 6$

$\Delta_3 = \frac{1}{2}(6)(3) = 9$

$\Delta_4 = \frac{1}{2}(2)(1) = +1$

Total Δ Area : 19

(B) Area of quad.

$35 - 19$

$= \underline{16 \text{ units}^2}$