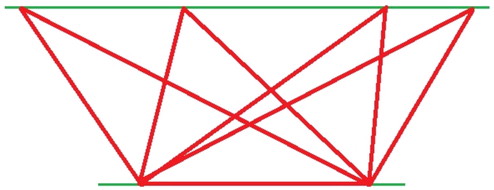
Step-1

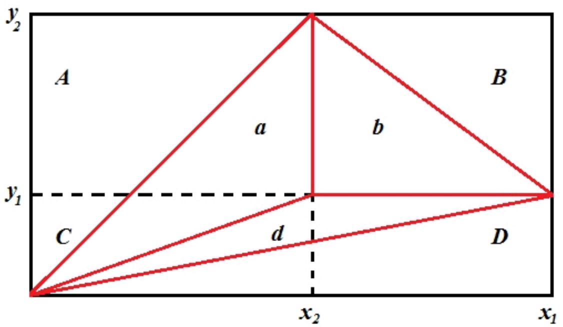
Also, we know that the areas of the triangles, which have common base and same height are same.



The various triangles, shown above, have same base and the same height and therefore, their areas are equal.

Step-2

Let $x_1 > x_2$ and $y_2 > y_1$. Consider the figure, drawn below. We have removed the area of a smaller rectangle (x_2, y_1) from a bigger rectangle (x_1, y_2). After the removal, the remaining part is divided into three parts, as shown:



Here *C* is the removed rectangle. From the properties of the triangle, which we discussed above, it is clear that

$$A(\square A) = 2A(\Delta a)$$
$$A(\square B) = 2A(\Delta b)$$
$$A(\square D) = 2A(\Delta d)$$

Step-3

This gives,

$$\begin{aligned}
2A(\Delta a)+2A(\Delta b)+2A(\Delta d) &= A(\square A)+A(\square B)+A(\square D)\\
2\big(A(\Delta a)+A(\Delta b)+A(\Delta d)\big) &= A(\square A)+A(\square B)+A(\square D)\\
A(\Delta a)+A(\Delta b)+A(\Delta d) &= \frac{1}{2}\big(A(\square A)+A(\square B)+A(\square D)\big)\\
&= \frac{1}{2}(x_1y_2-x_2y_1)
\end{aligned}$$

Step-4

Thus, the area of the biggest triangle in the figure is equal to half the area of the bigger rectangle minus the removed the rectangle. Now to obtain, the parallelogram, we need to attach another congruent triangle to the biggest triangle. This will form a parallelogram. Observe the figure, drawn below. There are three parallelograms. Each has the same area, equal to $x_1y_2-x_2y_1$.