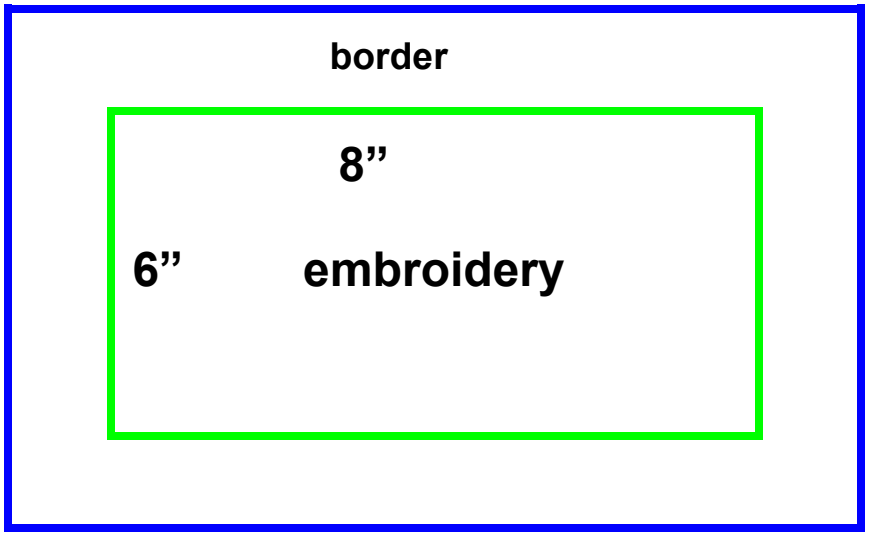
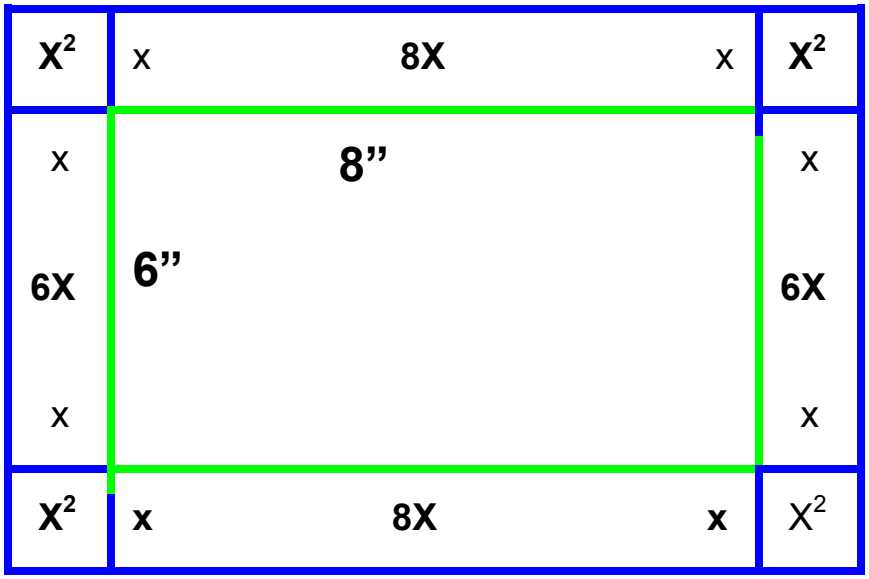
I have a 6” by 8” piece of embroidery to create a wall hanging. I want to make a border all around it. I already have a piece of material that I can cut into strips to make the border. The material is 8” by 9” (72 square inches). I want to use all of my material for the border, but I don’t know how wide I should cut the strips. To look balanced, the border should be the same width on all four sides.



Teachers' Notes

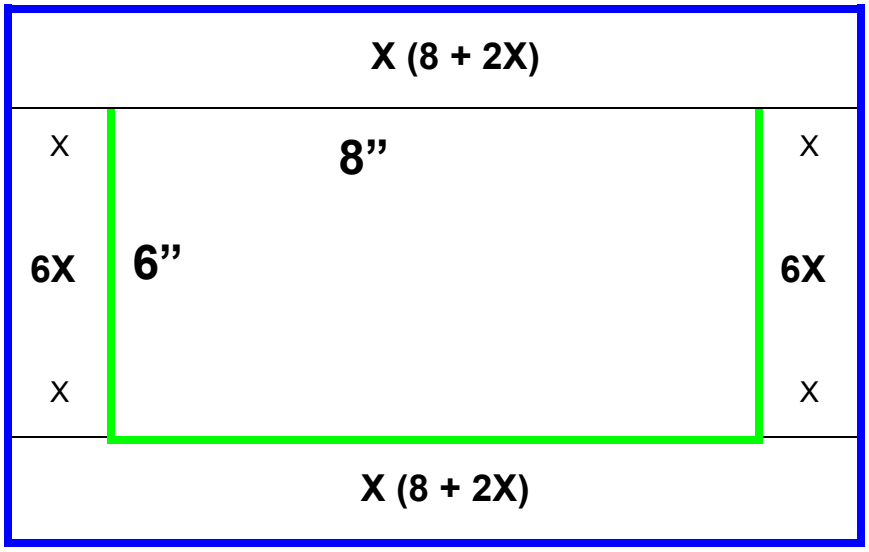
There are multiple ways to visualize the border, but all generate an equivalent quadratic equation: **$4x^2 + 28x = 72$**

Here are two ways to visualize the border:



Here, the border is composed of 8 pieces:

$x^2 + x^2 + x^2 + x^2 + 6x + 8x + 6x + 8x = \underline{4x^2 + 28x}$



Here, the border is composed of 4 pieces:

$x(8+2x) + 6x + x(8+2x) + 6x = 8x + 2x^2 + 6x + 8x + 2x^2 + 6x = \underline{4x^2 + 28x}$

The border has to equal 72 square inches so
$4x^2 + 28x = 72$ or $4x^2 + 28x - 72 = 0$

Factoring out 4, $x^2 + 7x - 18 = 0$
$(x + 9)(x - 2) = 0$

Solution Set: - 9 and 2 (-9) is a meaningless solution, so, the border pieces should be 2 inches wide.