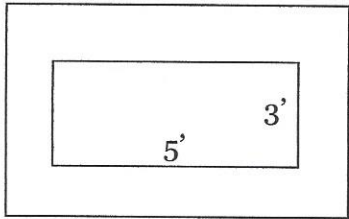# ALGEBRA II UNIT 2 QUADRATIC EQUATIONS Applications Notes

76
1. 70
2. 35
3.

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1 A rectangular flower bed 3 meters wide and 5 meters long is surrounded by a sidewalk of uniform width. If the area of the sidewalk is 48 square meters, what are the outside dimensions of the sidewalk?

7m × 9m

$(3+2x)(5+2x) = 63$

$15 + 16x + 4x^2 = 63$

$4x^2 + 16x - 48 = 0$

$x^2 + 4x - 12 = 0$

$(x+6)(x-2) = 0$

$x = -6 \quad x = 2$

2 A certain rectangle is twice as long as it is wide. If each dimension were increased by 2 inches, the new area would 144 square inches. Find the original dimensions.

7in × 14in

2x

x

2x+2

x+2 | 144

$(x+2)(2x+2) = 144$

$2x^2 + 2x + 4x + 4 = 144$

$2x^2 + 6x - 140 = 0$

$x^2 + 3x - 70 = 0$

$(x+10)(x-7) = 0$

$x = -10 \quad x = 7$

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3 An athletic field is 40 yards wide and 90 yards long. If a lawnmower cuts a border around the outside of the field, how wide must the border be so that one-third of the lawn is cut

4 A yearbook editor is designing a page layout. The outside dimensions of the page are 9 in. x 12 in. The white border around the rectangular printed matter on the page is twice as wide on the sides as it is on the top and bottom of the page. The area of the printed matter is 50 square in. What are the dimensions of the printed material?

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5 A 9 x 15 foot rug has a red center that is 91 square feet surrounded by a flower border of equal width. How wide is the border?

6 A rectangular picture is 13 x 15 inches. A frame of the same width all the way around has an area of 93 square inches. What is the width of the frame?

#3

$$(40-2x)(90-2x) = \frac{2}{3}(3600)$$

I factored to solve, but you may use quadratic formula.
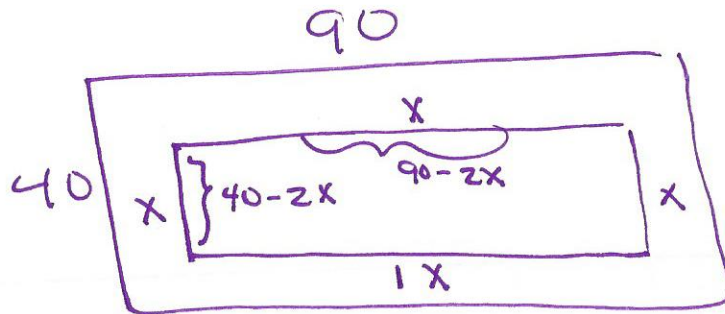
$$3600 - 80x - 180x + 4x^2 = 2400$$

$$4x^2 - 260x + 1200 = 0$$

$$x^2 - 65x + 300 = 0$$

$$(x-5)(x-60) = 0$$

$$x=5 \qquad x=\cancel{60}$$

$$\begin{array}{l} \underline{300} \\ 1. \ 300 \\ 2. \ 150 \\ 3. \ 100 \\ \cancel{4}. \ 75 \\ \boxed{5 \cdot 60} \end{array}$$

The boarder is 5 yds wide.

#4

9-4=5

12-2=10

5in X 10in

9

1x

2x   2x   12

12-2x

1x

9-4x
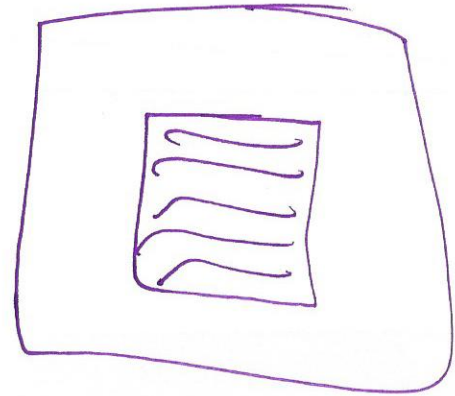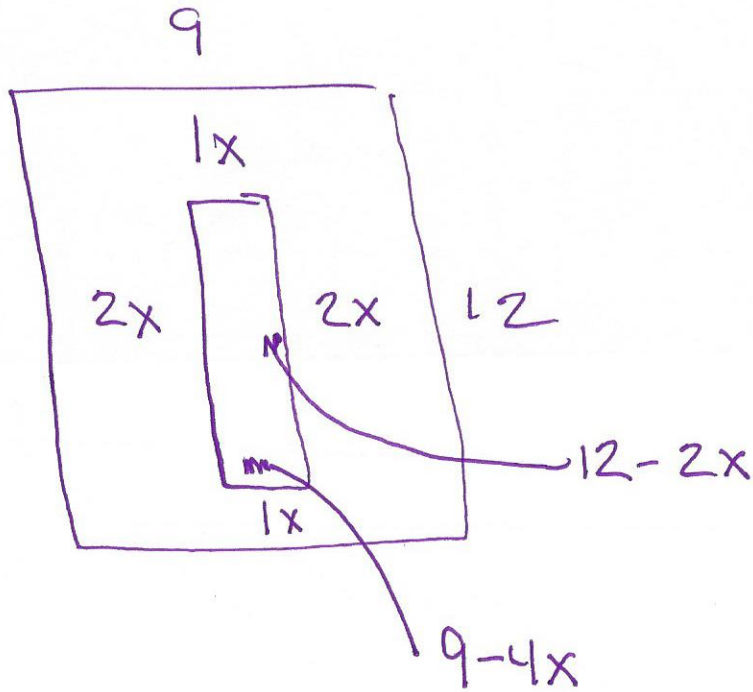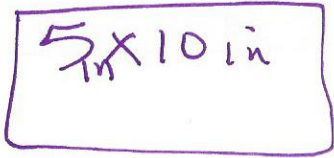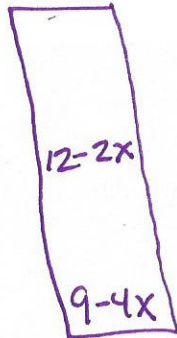
$$\frac{33 \pm \sqrt{1089 - 4(4)(29)}}{8}$$

$$\frac{33 \pm \sqrt{625}}{8}$$

$$\frac{33 \pm 25}{8} \rightarrow 7.25$$

$\rightarrow 1$
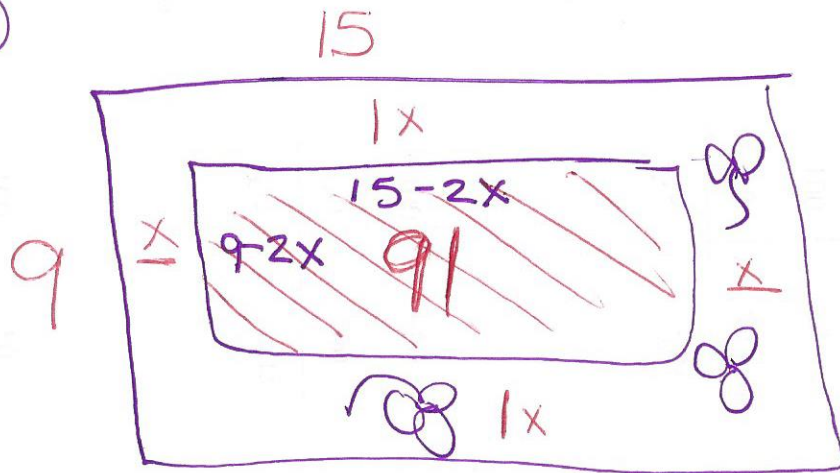
12-2x

9-4x

A = 50

$(12-2x)(9-4x) = 50$

$108 - 48x + 8x^2 = 50$
        $-18x$

$$\frac{8x^2 - 66x + 58 = 0}{2}$$

$4x^2 - 33x + 29 = 0$

3.

15

1x

15 - 2x

9   x   9-2x   91

x

1x

$(9-2x)(15-2x) = 91$

$135 - 18x - 30x + 4x^2 = 91$

$\dfrac{4x^2 - 48x + 44 = 0}{4}$

$x^2 - 12x + 11 = 0$

$(x-1)(x-11)$

$x = 1$ $x = 11$

The boarder is
1 ft. wide

$-\dfrac{x^2}{x}$

9

15 + 2x

13 + 2x

15

13
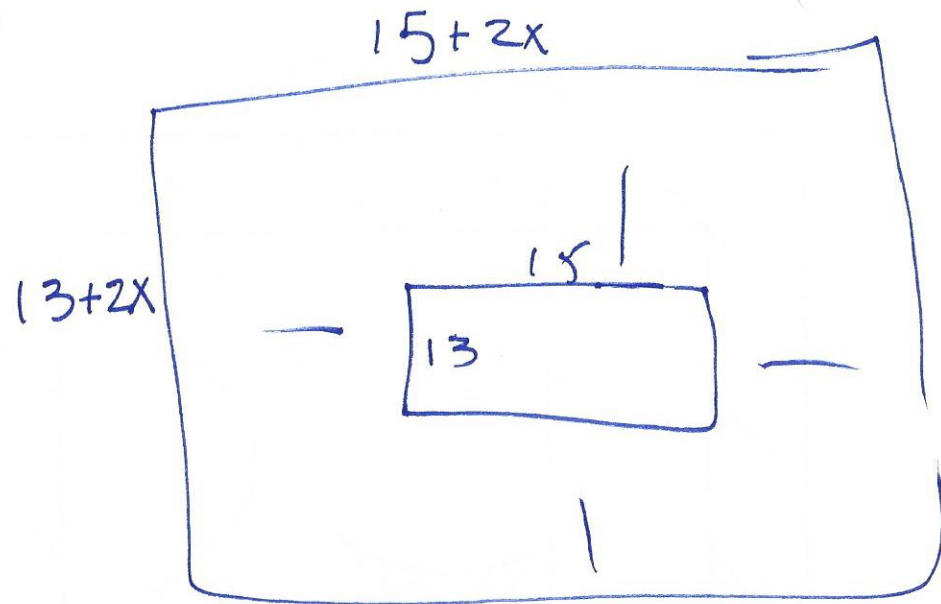
X = 1.5

The frame is
1.5 inches wide

Picture + Frame = total

$195 + 93 = (13+2x)(15+2x)$

$288 = 195 + 26x + 30x + 4x^2$

$4x^2 + 56x - 93 = 0$

$$\frac{-56 \pm \sqrt{3136 - 4(4)(-93)}}{8}$$

$$\frac{-56 \pm \sqrt{4424}}{8}$$

→ 1.5

→ ✱