Solving Quadratics

Monday, March 30, 2015

Solve each quadratic

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1. $x^2 - 5x - 6 = 0 \rightarrow$ $x^2 - 6x + 1x - 6 = 0 \rightarrow (x-6)(x+1) = 0$

① $a = 1$
$b = -5$
$c = -6$

② $a \cdot c$
-6
$-6 \quad +1$
-5

③

X	x^2	$-6x$
$+1$	$1x$	-6

$X \quad -6$

$x - 6 = 0$ or $x + 1 = 0$

$\boxed{x = 6 \quad \text{or} \quad x = -1}$

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2. $x^2 + 5x - 24 = 12$

$-12 \quad -12$

$x^2 + 5x - 36 = \boxed{0} \rightarrow x^2 + 9x - 4x - 36 = 0 \rightarrow (x+9)(x-4) = 0$

$a = 1$
$b = 5$
$c = -36$

-36
$+9 \quad -4$
5

X	x^2	$9x$
-4	$-4x$	-36

$X \quad +9$

$x + 9 = 0 \qquad x - 4 = 0$

$x = -9$ or $x = 4$

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3. $x^2 - 28x + 75 = 0$

$a = 1$
$b = -28$
$c = 75$

75
$-25 \quad -3$
-28

$x^2 - 25x - 3x + 75 = 0$

X	x^2	$-25x$
-3	$-3x$	75

$x \quad -25$

$(x-3)(x-25) = 0$

$\boxed{x = 3 \quad \text{or} \quad x = 25}$

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4. $x^2 + 15x + 32 = -3x$

$+3x \qquad +3x$

$1x^2 + 18x + 32 = 0 \qquad x^2 + 2x + 16x + 32 = 0$

$a = 1$
$b = 18$
$c = 32$

32
$+2 \quad +16$
18

X	x^2	$2x$
$+16$	$16x$	32

$X \quad +2$

$(x+2)(x+16) = 0$

$x+2 = 0$ or $x+16 = 0$

$\boxed{x = -2 \quad \text{or} \quad x = 16}$

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5. $5x^3 - 19x^2 + 12x = 0$

$X(5x^2 - 19x + 12) = 0 \rightarrow x(5x^2 - 4x - 15x + 12) = 0 \rightarrow X(x-3)(5x-4) = 0$

$a = 5$
$b = -19$
$c = 12$

60
$-4 \quad -15$
-19

$5x \quad -4$

X	$5x^2$	$-4x$
-3	$-15x$	12

$x - 3 = 0$ or $5x - 4 = 0$
$+4 \quad +4$
$5x = 4$

$\boxed{x = 0 \text{ or } x = 3 \text{ or } x = 4/5}$

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6. $6x^2 - 4x - 4 = 12$

$-12 \quad -12$

$6x^2 - 4x - 16 = 0$

$2(3x^2 - 2x - 8) = 0$

$a = 3$
$b = -2$
$c = -8$

-24
$+4 \quad -6$
-2

$2(3x^2 + 4x - 6x - 8) = 0$

$3x \quad +4$

X	$3x^2$	$4x$
-2	$-6x$	-8

$2(3x+4)(x-2) = 0$

$\boxed{x = -4/3 \quad x = 2}$

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7. $6x^2 + 17x + 11 = 0$

$a = 6$
$b = 17$
$c = 11$

66
$+6 \quad +11$
17

$6x^2 + 6x + 11x + 11 = 0$

$x \quad +1$

$6x$	$6x^2$	$6x$
$+11$	$11x$	11

$(x+1)(6x+11) = 0$

$\boxed{x = -1 \quad \text{or} \quad x = -11/6}$

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8. Lupe has a rectangular garden. The length of the garden is 2 ft. less than three times its width
   a. Write two variable expressions for the dimensions of the garden

   Length: $3w - 2$

   Width: w

   b. If you were told that the area of the garden is 96 ft^2, how could you figure out what the dimensions of the garden are in feet? Explain your steps; describe what you know and *how* you can then use that information to figure out the actual dimensions of the garden.

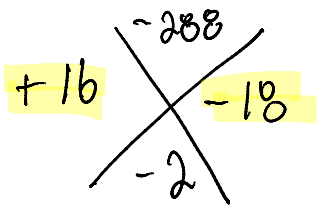   c. What are the actual dimensions of the garden?

$$A = l \cdot w$$
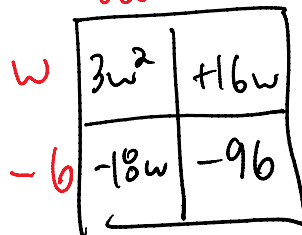$$96 = (3w - 2)(w)$$
$$96 = 3w^2 - 2w$$
$$\underline{-96 \qquad\qquad -96}$$
$$0 = 3w^2 - 2w - 96 \;\longrightarrow\; 0 = 3w^2 + 16w - 18w - 96$$

$a = 3$
$b = -2$
$c = -96$

$+16 \;\times\; -18$
-288
-2

$3w + 16$

w	$3w^2$	$+16w$
-6	$-18w$	-96

$0 = (3w + 16)(w - 6)$

$3w + 16 = 0$ or $w - 6 = 0$
$3w = -16$
$w = -16/3$
$w = -5.3$ $w = 6$

length = $3w - 2$ = 16 ft
width = 6 ft