

Algebra I: Factoring and solving quadratics:

- When the leading coefficient is not one
- When the equation is not equal to zero

Solve each quadratic equation for x . Show your work

1. $3x^2 + 3x - 36 = 0$

$$3(x^2 + x - 12) = 0$$

	x	-3
x	x^2	$-3x$
4	$+4x$	-12

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

$$x-3=0$$

$$x=3$$

$$x+4=0$$

$$x=-4$$

Solutions: $x=3$ or $x=-4$

2. $6x^2 - 36x + 48 = 0$

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

	x	-4
x	x^2	$-4x$
-2	$-2x$	8

$$6(x-4)(x-2) = 0$$

$$x-4=0$$

$$x=4$$

$$x-2=0$$

$$x=2$$

Solutions: $x=4$ or $x=2$

3. $n^2 + 7n + 15 = 5$

**** NOTICE THAT THIS EQUATION IS NOT EQUAL TO ZERO!! ****

$$-5 -5$$

$$n^2 + 7n - 10 = 0$$

	n	-2
n	n^2	$-2n$
-5	$-5n$	-10

$$(n-2)(n-5) = 0$$

$$n-2=0$$

$$n=2$$

$$n-5=0$$

$$n=5$$

Solutions: $n=2$ or $n=5$

4. $6x^2 - 18x - 18 = 6$
 $-6 \quad -6$

$6x^2 - 18x - 24 = 0$

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

	x	-4
x	x^2	$-4x$
1	x	-4

$6(x-4)(x+1) = 0$

$(x-4) = 0$

$x = 4$

$x+1 = 0$

$x = -1$

Solutions: $x = 4$ or $x = -1$

5. Check your solutions to #4 by substituting into the *original* equation:

Check solution #1: $x = 4$:

$6x^2 - 18x - 18 = 6$

$6(4)^2 - 18(4) - 18 \stackrel{?}{=} 6$

$6(16) - 18(4) - 18 \stackrel{?}{=} 6$

$96 - 72 - 18 \stackrel{?}{=} 6$

$6 = 6 \checkmark$

Check solution #2: $x = -1$

$6x^2 - 18x - 18 = 6$

$6(-1)^2 - 18(-1) - 18 \stackrel{?}{=} 6$

$6 + 18 - 18 \stackrel{?}{=} 6$

$6 = 6 \checkmark$

6. Consider the parabola formed by the equation: $y = -5x^2 + 20x + 25$

a. Find the x -intercepts of the parabola

x -INTERCEPTS $\Rightarrow y = 0$

$0 = -5x^2 + 20x + 25$

$= -5(x^2 - 4x - 5)$

	x	-5
x	x^2	$-5x$
1	x	-5

$-5(x-5)(x+1) = 0$

$x-5 = 0$

$x = 5$

$x+1 = 0$

$x = -1$

b. Find the y -intercept of the parabola:

y -INTERCEPT $\Rightarrow x = 0$:

$y = -5(0)^2 + 20(0) + 25$

$y = 25$

Algebra I: Factoring and solving quadratics :: CHALLENGE

- When the leading coefficient is not one
- When the equation is not equal to zero

Solve each quadratic equation. Show your work

1. $3x^2 + 3x - 36 = 0$

$$3(x^2 + x - 12) = 0$$

	x	$+4$
x	x^2	$+4x$
-3	$-3x$	-12

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

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

$$x=-4 \quad x=3$$

Solutions: $x = -4$ or $x = 3$

7. $6x^2 - 36x + 40 = -8$

$+8 \quad +8$

**** NOTICE THAT THIS EQUATION IS NOT EQUAL TO ZERO!! ****

$$6x^2 - 36x + 48 = 0$$

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

	x	-2
x	x^2	$-2x$
-4	$-4x$	8

$$6(x-2)(x-4) = 0$$

$$x=2 \text{ or } x=4$$

Solutions: $x = 2$ or $x = 4$.

8. $(n+3)(n+4) = 2$

NEED TO MAKE THIS ZERO.

CONVERT TO STD. FORM
TO SUBTRACT 2:

$$n^2 + 7n + 12 = 2$$

$$-2 \quad -2$$

$$n^2 + 7n + 10 = 0$$

	n	5
n	n^2	$5n$
2	$2n$	10

$$(n+2)(n+5) = 0$$

$$n = -2 \quad n = -5$$

Solutions: $n = -2$ or $n = -5$

(Note: The solutions are not $n = -1$ and $n = -2$)

9. The function, h is defined by $h(x) = 6x^2 - 18x - 18$. Find x if $h(x) = 6$

$$\begin{array}{r} 6 = 6x^2 - 18x - 18 \\ -6 \qquad \qquad -6 \end{array}$$

$$0 = 6x^2 - 18x - 24$$

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

	x	-4
x	x^2	$-4x$
1	x	-4

$$\rightarrow 6(x-4)(x+1) = 0$$

$$x = 4 \text{ or } x = -1$$

Solutions: $x = 4$ or $x = -1$

10. Check your solutions to #9 by substituting into the *original* equation:

Check solution #1:

$$x = 4 :$$

$$6x^2 - 18x - 18 = 6$$

$$6(4)^2 - 18(4) - 18 \stackrel{?}{=} 6$$

$$6(16) - 18(4) - 18 \stackrel{?}{=} 6$$

$$96 - 72 - 18 \stackrel{?}{=} 6$$

$$6 = 6 \checkmark$$

Check solution #2:

$$x = -1$$

$$6x^2 - 18x - 18 = 6$$

$$6(-1)^2 - 18(-1) - 18 \stackrel{?}{=} 6$$

$$6 + 18 - 18 \stackrel{?}{=} 6$$

$$6 = 6 \checkmark$$

6. Consider the parabola formed by the equation: $y = -5x^2 + 20x + 25$

- a. Find the x -intercepts of the parabola $\Rightarrow y = 0$

$$0 = -5x^2 + 20x + 25$$

$$0 = -5(x^2 - 4x - 5)$$

	x	-5
x	x^2	$-5x$
1	x	-5

$$\rightarrow -5(x-5)(x+1) = 0$$

$$x = 5 \text{ or } x = -1$$

- b. Find the y -intercept of the parabola:

$$\Rightarrow x = 0 :$$

$$y = -5(0)^2 + 20(0) + 25$$

$$y = 25$$