Quadratic Function in Standard Form:

$y = ax^2 + bx + c$

Quadratic Equation in Standard Form:

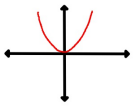
$0 = ax^2 + bx + c$

The only difference is that in a Quadratic Equation $y = 0$.

Solutions to this equation are actually x-intercepts of the graph.

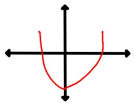
# of solutions to a Quadratic Equation. (same as # x-intercepts on the graph)

1 Real Solution



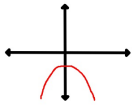
Only the vertex touches the x-axis

2 Real Solutions



The parabola crosses the x-axis in two places

No Real Solution



The parabola doesn't touch the x-axis

Solving Quadratic Equations:

- Factoring
- Square Roots
- Graphing
- Completing the Square
- Quadratic Formula

Solving by factoring:

1. Rewrite equation so one side = 0.
2. Factor completely.
3. Find zeros of the factors.

Zero Product Property:

If $a \cdot b = 0$, then $a = 0$ or $b = 0$.

Use the Zero Product Property to find the value of x in each.

1. $(x + 9)(x - 13) = 0$ $x = -9, 13$

These values of x are the solutions to the equation

They are also called the zeros of each factor or the zeros of the equation.

Since y = 0 these are also the x-intercepts of the graph.

Another name used for these values of x are roots of the function.

Use the Zero Product Property to find the zeros of this function.

2. $y = (2x - 5)(3x + 1)$

$0 = (2x - 5)(3x + 1)$

$2x - 5 = 0$ $3x + 1 = 0$

Zeros are: $x = \frac{5}{2}, -\frac{1}{3}$

Use the Zero Product Property to find the x-intercepts of this function

3. $y = 4x(x - 7)$

$0 = 4x(x - 7)$

$4x = 0$ $x - 7 = 0$

x-int = 0, 7

In general, the zero of the linear factor $(ax+b)$

is always $x = \frac{-b}{a}$

$ax + b = 0$

$-b \quad -b$

$\frac{ax}{a} = \frac{-b}{a}$

This is true even if the the factor is (x + b)

a=1

$x = \frac{-b}{1}$

$x = -b$

Solve by factoring.

$4x^2 - 30x = 0$

$2x(2x-15)=0$

$2x=0 \quad 2x-15=0$

$x=0, \frac{15}{2}$

Solve by factoring.

$6x^2 + 13x = 28$

$-28 \quad -28$

$6x^2+13x-28=0$

$21, -168, 13, -8$

	$2x$	$+7$
$3x$	$6x^2$	$21x$
-4	$-8x$	-28

$(2x+7)(3x-4)=0$

$2x+7=0 \quad 3x-4=0$

$x = \frac{-7}{2}, \frac{4}{3}$

Solve by factoring.

$2x^3 + 2x^2 - 84x = 0$

$2x(x^2+x-42)$

$-42, 7, -6, 1$

$2x=0 \quad x+7=0 \quad x-6=0$

$2x(x+7)(x-6)$

$x=0, -7, 6$

Solve by factoring.

$12x^2+40 = 44x$

$12x^2-44x+40=0$

$4(3x^2-11x+10)=0$

$30, -6, -5, -11$

	x	-2
$3x$	$3x^2$	$-6x$
-5	$-5x$	$+10$

$4(x-2)(3x-5)=0$

$x-2=0 \quad 3x-5=0$

$x = \frac{5}{3}, 2$

Solve by factoring.

$4x^2 - 81 = 0$

$(2x+9)(2x-9) = 0$

$2x+9=0$ $\qquad$ $2x-9=0$

$x = -\frac{9}{2}, \frac{9}{2}$

$x = \pm\frac{9}{2}$

Solve this quadratic by factoring.

$18k^2 - 8 = 0$

$2(9k^2-4) = 0$

$2(3k-2)(3k+2) = 0$

$3k-2=0$ $\qquad$ $3k+2=0$

$k = \pm\frac{2}{3}$

You can now finish Hwk #11 Sec 5-5

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Problems 1-6