Standard Form of a Quadratic Function:

$y = ax^2 + bx + c$

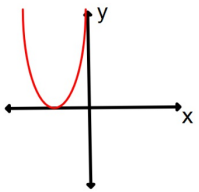
Standard Form of a Quadratic Equation:

$0 = ax^2 + bx + c$

Solutions to quadratic equations using graphs:

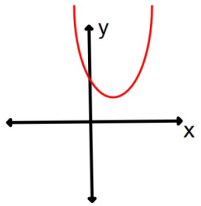
Tell the number of solutions to each quadratic equation by using it's graph.

1. $0 = x^2 + 4x + 4$



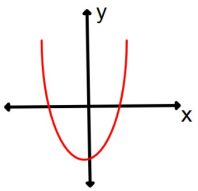
One Sol
(One x-int)

2. $0 = 2x^2 - x + 5$



No Sol
(No x-int)

3. $0 = x^2 + x - 6$



Two Sol's
(Two x-int)

Standard Form of a Quadratic Equation:

$0 = ax^2 + bx + c$

Solutions to Quadratic Equations are the same as

x-intercepts of the graph.

When y=0 you are finding x-intercepts!

Can you solve this equation with square roots?

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

$-2 \quad -2$

$x^2 - 3x = 10$

$+3x \quad +3x$

$\sqrt{x^2} = \sqrt{10 + 3x}$

$x = \pm\sqrt{10 + 3x}$

The solution for x can't have an x in it!

No, you can only solve Quadratic Equations using square roots if b = 0

In other words, only if the Quadratic Equation is $ax^2 + c = 0$

OR if the equation can be written in this form: $(x \pm h)^2 = c$

If I asked you to solve $0=x^2 - x - 12$
right now you wouldn't know how to solve it.

If I turn $0=x^2 - x - 12$ into $0=(x - 4)(x + 3)$
what have I done?
I've FACTORED the Quadratic

Once it's been factored you can now solve because there is only one way the product of two things equals ZERO.

if $a \cdot b = 0$ either $a = 0$ or $b = 0$ or they both equal zero

Property **Zero-Product Property**

For every real number a and b, if ab=0, then a=0 or b=0

Example: If (x+3)(x+2)=0, then x+3=0 or x+2=0

$x + 3 = 0$ $\quad -3 \quad -3$ or $x + 2 = 0$ $\quad -2 \quad -2$

$x = -3$ $\qquad x = -2$

-3 and -2 are called:

- solutions to the equation
- Zeros of the factors
- Roots of the function
- They are also x-intercepts of the parabola

Solve each equation.

1. $(x - 10)(x + 4) = 0$

$x - 10 = 0$ $\qquad x + 4 = 0$

$x = 10$ $\qquad x = -4$

$x = -4, 10$

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

$x = \frac{1}{3}, -5$

3. $2x(5x + 11) = 0$

$\frac{2x}{2} = \frac{0}{2}$ $\quad 5x + 11 = 0$

$x = 0$ $\quad x = -11/5$

$x = 0, -11/5$

$7(9x + 100) = 0$

$9x + 100 = 0$

$x = \frac{-100}{9}$

There is no solution from this factor because it's a constant (it doesn't have a variable to solve for).

$(x - 10)(x + 4) = 0$

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

$2x(5x + 11) = 0$

Where are these coming from?

Factoring quadratics!!

When you factor a Quadratic Equation you change if from the sum and difference of terms equal to zero into the product of things equal to zero.

Then you can apply the Zero-Product Property

$x^2 - 6x - 40 = 0 \rightarrow (x - 10)(x + 4) = 0$

$x = 10, -4$

Sec 10-5: Factoring to Solve Quadratic Equations

1. Make sure the Quadratic Equation is in Standard Form
   $0 = ax^2 + bx + c$
2. Factor the Quadratic
3. Find the zeros of each factor

Solve by factoring.

$4x^2 - 12x - 27 = 0$

-108, -18, +6, -12

	2x	-9
2x	$4x^2$	-18x
+3	+6x	-27

$(2x - 9)(2x + 3) = 0$

$2x - 9 = 0 \quad x = \frac{9}{2}$

$2x + 3 = 0 \quad x = -\frac{3}{2}$

$x = -\frac{3}{2}, \frac{9}{2}$

Solve each equation by factoring.

$x^2 + 12x + 35 = 0$

35, 7, 5, 12

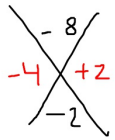
$(x + 7)(x + 5) = 0$

$x = -7, -5$

Solve each equation by factoring.

$x^2 - 8 = 2x$

$x^2 - 2x - 8 = 0$



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

$x = -2, 4$

Solve each equation by factoring.

$7x^2 - 21x = 0$

$7x(x-3) = 0$

$x = 0, 3$

You can now finish Hwk #29

Sec 10-5

pages 538-539

problems 1-3, 9, 10, 13, 14, 17, 27, 32

Solve each equation by factoring.

$6x^2 + 5x - 21 = 0$