Section 5-5: Quadratic Equations

Standard Form of a Quadratic Equation:

$$ax^2 + bx + c = 0$$

A quadratic equation could also come in the following form:

$$0 = a(x - h)^2 + k$$

But this wouldn't be called Standard Form!

To solve a quadratic equation by factoring you must

have one side =0 (Standard Form of a Quadratic Equation)

Then you factor the other side.

Solutions are the zeros of the factors.

Solving by Factoring:

This method uses the Zero-Product Property

Property	Zero-Product Property
If $ab = 0$, then $a = 0$ or $b = 0$.	
Example	If $(x + 3)(x - 7) = 0$, then $(x + 3) = 0$ or $(x - 7) = 0$.

Solving Quadratic Equations

Methods to solve Quadratic Equations:

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

Solving Quadratic Equations

Methods to solve Quadratic Equations:

- Factoring - Works only SOME of the time.
- Square Roots - Works only SOME of the time.
- Quadratic Formula - Works - ALWAYS.
- Completing the Square - Works only SOME of the time.
- Graphing - Works only IF you have technology and doesn't always give exact answers.

Solve by factoring.

$5x^2 = 20x$ must move all terms to one side first

$-20x \quad -20x$

$5x^2 - 20x = 0$

$5x(x-4) = 0$

$\frac{5x}{5} = \frac{0}{5}$ $\quad x - 4 = 0$

$+4 \quad +4$

$x = 0, +4$

Solve by factoring. $(-1)(-x^2 - x + 30) = (0)(-1)$

It's always easier to factor and solve when a is positive. There are several ways to accomplish this:

1. Multiply or divide both sides of the equation by -1.
2. Move all terms to the right side.
3. Factor out -1.

$x^2 + x - 30 = 0$

-30, $+6$, -5, $+1$

$\Rightarrow (x+6)(x-5) = 0$

$x = -6, +5$

Solve by factoring.

$10x^2 + 34x = 24$ first move all terms to one side

$-24 \quad -24$

$10x^2 + 34x - 24 = 0$

$2(5x^2 + 17x - 12) = 0$

-60, $+20$, -3, $+17$

	x	$+4$
$5x$	$5x^2$	$+20x$
-3	$-3x$	-12

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

$x = -4, \frac{3}{5}$

Solve by factoring.

$-4x^3 + 16x^2 = 7x$

To get a to be positive you could move all terms to the right side.

$0 = 4x^3 - 16x^2 + 7x$

$0 = x(4x^2 - 16x + 7)$

28, -14, -2, -16

	2x	-7
2x	$4x^2$	$-14x$
-1	$-2x$	$+7$

$x(2x-7)(2x-1)$

$x = 0, \frac{7}{2}, \frac{1}{2}$

Solve by factoring.

$3x^2 + 36x + 108 = 0$

$3(x^2 + 12x + 36) = 0$

36, +6, +6, +12

$3(x+6)(x+6) = 0$

$x = -6$

this is really two solutions but they are the same number.

Solve by factoring.

When you move all terms to one side make sure you write the result in Standard Form so that you don't confuse a, b, and c when factoring.

$9x^2 - 7 = 18x$

$-18x \quad -18x$

this is the middle term.

$9x^2 - 18x - 7 = 0$

-63, -21, +3, -18

	3x	+1
3x	$9x^2$	$+3x$
-7	$-21x$	-7

$(3x+1)(3x-7) = 0$

$x = -\frac{1}{3}, \frac{7}{3}$

You can now finish Hwk #13

Practice Sheet

Sec 5-5

Solve by factoring