Zero Product Property:

If a•b = 0, then a = 0 or b = 0.

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

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

$x+9=0$ or $x-13=0$

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.

They are also called roots of the function

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

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

$2x-5=0$

$3x+1=0$

Zeros are:

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

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

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

$x = 7, 0$

$\frac{4x}{4} = \frac{0}{4}$

$x=0$

$x-7=0$

$x=7$

Section 5-5: Quadratic Equations

Quadratic Function in Standard Form:

$y = ax^2 + bx + c$

Quadratic Equation in Standard Form:

$ax^2 + bx + c = 0$

Solving Quadratic Equations by Factoring:

1st: Make sure one side = 0
2nd: Factor completely
3rd: Solutions are zeros of each factor

Classwork from yesterday

Solve each equation by factoring.

GCF

1. $48x^2 + 36x = 0$

$6x(8x+6)$

$2 \cdot 6x(4x+3)$

$12x(4x+3) = 0$

$x = 0, -\frac{3}{4}$

2. $x^2 - 9x + 20 = 0$

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

$x = 5, 4$

+20, −5, −4, −9

3. $2x^2 + 6x = 20$

$-20 \quad -20$

$2x^2 + 6x - 20 = 0$

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

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

−10, +5, −2, +3

$x = -5, 2$

4. $8x^2 - 21 = 22x$

$8x^2 - 22x - 21 = 0$

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

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

5. $24x^3 + 72x^2 + 30x = 0$

$6x(4x^2 + 12x + 5)$

$6x(2x+1)(2x+5)$

$x = 0, -1/2, -5/2$

6. $45x^3 - 80x = 0$

$5x(9x^2 - 16)$

$5x(3x+4)(3x-4)$

$x = 0, \pm 4/3$

7. $36x^2 - 49 = 0$

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

$x = \pm 7/6$

Solve this quadratic by factoring.

$18k^2 - 8 = 0$

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

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

$x = \pm 2/3$

Another way to solve the following quadratic equation:

$18k^2 - 8 = 0$

$+8 \quad +8$

$\frac{18k^2}{18} = \frac{8}{18}$

$\sqrt{k^2} = \sqrt{\frac{8}{18}}$ $\quad \pm\sqrt{\frac{8}{18}}$ $\quad \pm\sqrt{\frac{4}{9}}$

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

What numbers could you square and get 25?

+ 5 or -5

$(5)^2 = 25$ $(-5)^2 = 25$

What are the square roots of 100? ±10

Every Positive Number has two square roots ±

Solving Quadratic Equations with Square Roots:

You can use Square Roots to solve a Quadratic Equation

ONLY IF there is no linear term (b = 0)

Steps to follow if solving using square roots:

1. Isolate x^2 or $(x\ \ )^2$ on one side of the equation
2. Take the square root of both sides
3. Finish solving for x (if necessary)

Find the exact solutions to

1. $6x^2 - 7 = 17$

$+7 \quad +7$

$\frac{6x^2}{6} = \frac{24}{6}$

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

2. $6x^2 - 7 = 137$

$+7 \quad +7$

$\frac{6x^2}{6} = \frac{144}{6}$

$\sqrt{x^2} = \sqrt{24}$

$x = \pm 2\sqrt{6}$

Why can't you solve the following equation using square roots?

$x^2 - 16x + 49 = 0$

$-49 \quad -49$

$x^2 - 16x = -49$

$+16x \quad +16x$

$\sqrt{x^2} = \sqrt{6x - 49}$

To solve for x you would get an x in your answer but that means you wouldn't have actually gotten x by itself!
Therefore, if there is bx in the problem you can't get x by itself using square roots.

What are the solutions to this equation?

$x^2 + 81 = 0$

$-81 \quad -81$

$\sqrt{x^2} = \sqrt{-81}$

No Real Solutions

The square root of a negative is not a real number!

You can now finish Hwk #20

Sec 5-5

Pages 270-271

Problems 2, 3, 5-7, 10, 11, 13, 14, 35, 51, 52