Notes #5

Lesson 5-5 Factoring Quadratic Equations to Solve

Objective: Students will use the method of factoring and solving by square roots, to solve a quadratic equation.

Standard Form of a Quadratic Equation: $ax^2 + bx + c = 0, a \neq 0$

Zero Product Property: If ab = 0, then $a = 0$ or $b = 0$

Solving by Factoring

1. Write in Standard Form. (right side must = 0)
2. Factor the Quadratic Expression.
3. Use the Zero-Product Property.
4. Solve for x.
5. These are the zeros of the parabola, where it crosses the x-axis.

Example 1: Solving by Factoring and then sketch a graph.

A. $x^2 - 8x = -12$

$+12 \quad +12$

$a=1$ $x^2 - 8x + 12 = 0$

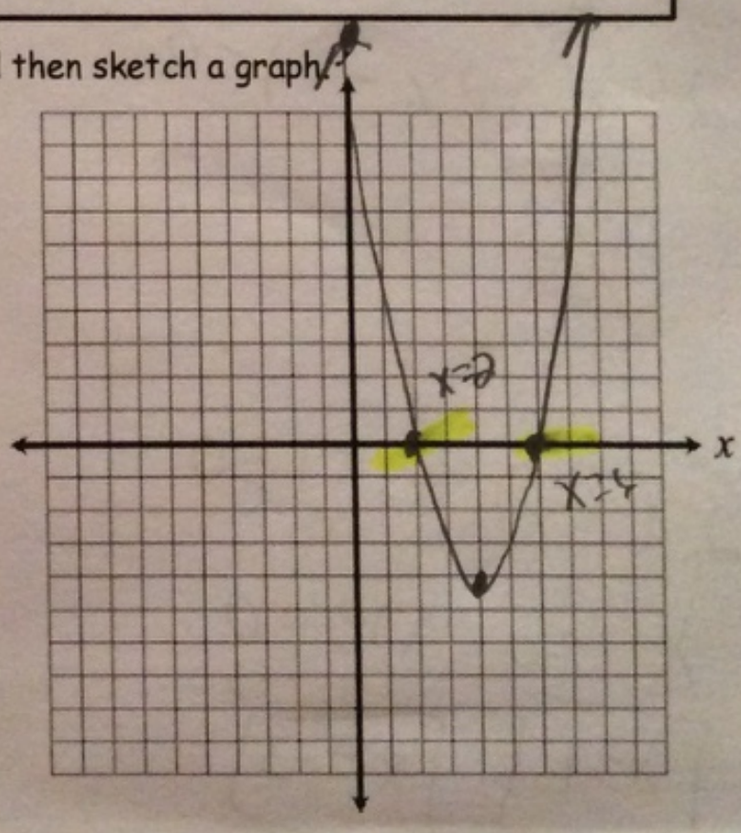
12, -6×-2, -8

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

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

$+6 \quad +6 \quad +2 \quad +2$

$x=6 \quad x=2$



Points where parabola crosses the x-axis (x intercepts, roots, zeros)

Solving by Factoring

1. Write in Standard Form. (right side = 0)
2. Factor the Quadratic Expression.
3. Use the Zero-Product Property.
4. Solve for x.
5. These are the zeros of the parabola, where it crosses the x-axis.

Example 2) Find the solutions to the quadratic by factoring.

A. $2x^2 + 4x = 6$

$-6 \quad -6$

$\frac{2x^2}{2} + \frac{4x}{2} - \frac{6}{2} = 0$

$2(x^2 + 2x - 3) = 0$ ($a=1$)

-3, -1×3, 2

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

$x - 1 = 0 \quad x + 3 = 0$

$-3 \quad -3$

$x = 1 \quad x = -3$

✓

$2(1)^2 + 4(1) = 6$ ✓

$2(-3)^2 + 4(-3) = 6$

B. $16x^2 = 8x$

$-8x \quad -8x$

$\frac{16x^2}{8x} - \frac{8x}{8x} = 0$

$8x(2x - 1) = 0$

$8x = 0 \quad 2x - 1 = 0$

$\frac{8x}{8} = \frac{0}{8} \quad +1 \quad +1$

$x = 0 \quad \frac{2x}{2} = \frac{1}{2}$

$x = \frac{1}{2}$

Solving by Square Rooting

Step 1) Rewrite equation as $ax^2 = c$

Step 2) Divide both sides by a

Step 3) Take the square root of both sides
(Remember to include a $\pm$ sign with your answer)

Example 3: Solve by Finding the Square Roots.

A. $4x^2 - 25 = 0$

$+25 \quad +25$

$\frac{4x^2}{4} = \frac{25}{4}$

$\sqrt{x^2} = \sqrt{\frac{25}{4}}$

$x = \pm\sqrt{\frac{25}{4}} = \pm\frac{\sqrt{25}}{\sqrt{4}}$

$x = \pm\frac{5}{2}$

B. $\frac{3x^2}{3} = \frac{48}{3}$

$\sqrt{x^2} = \sqrt{16}$

$x = \pm\sqrt{16}$

$x = \pm 4$

C. $x^2 - \frac{1}{4} = 0$

$+\frac{1}{4} \quad +\frac{1}{4}$

$\sqrt{x^2} = \sqrt{\frac{1}{4}}$

$x = \pm\frac{\sqrt{1}}{\sqrt{4}} = \pm\frac{1}{2}$

$\pm\sqrt{5}$