Name: Key Date: _____

# Solving Quadratics by Graphing and Factoring

## Solve a Quadratic Algebraically by Factoring

1. Get the equation into Standard Form and equal to zero
2. Factor the quadratic to create two binomials with the variable as the first term and set it equal to zero. EXAMPLE:
3. Set each binomial equal to zero and Solve for x.

**Example 1: Factoring when (a = 1)**

$x^2 - 12x = -20$

$x^2 - 12x + 20 = 0$

$(x-10)(x-2) = 0$

$x-10=0 \quad | \quad x-2=0$

$x = 10 \quad | \quad x = 2$

***Example 2: Factoring (GCF)***

$3x^2 + 9x - 54 = 0$

$3(x^2 + 3x - 18) = 0$

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

$3=0 \quad | \quad x+6=0 \quad | \quad x-3=0$

Nope! $\quad | \quad x = -6 \quad | \quad x = 3$

**Example 3: Factoring (DOTS)**

$9x^2 - 64 = 0$

$(3x+8)(3x-8) = 0$

$3x+8=0 \quad | \quad 3x-8=0$

$3x=-8 \quad | \quad 3x=8$

$x=-8/3 \quad | \quad x=8/3$

***Example 4: Factoring (a >1)***

$6x^2 + 11x + 4 = 0$

$(2x+1)(3x+4)$

$2x+1=0 \quad | \quad 3x+4=0$

$2x=-1 \quad | \quad 3x=-4$

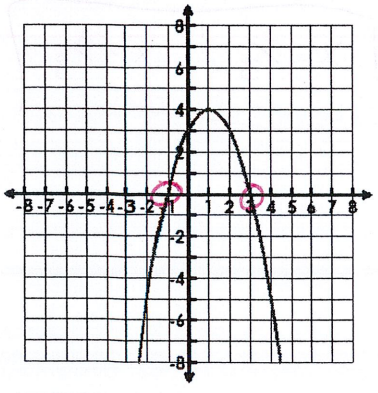
$x=-1/2 \quad | \quad x=-4/3$

## Solve a Quadratic by Graphing

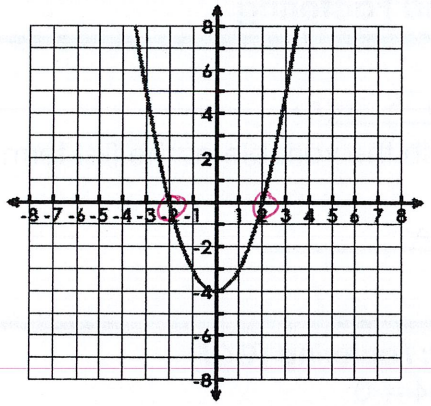
To solve a quadratic by graphing is to find where the parabola crosses the x-axis. We call these the zeros, roots, solutions, or x-intercepts.

***Example 1:*** Find the roots.

$x = -1, 3$



***Example 2:*** Find the zeros.



$x = -2, 2$

**Try It:** Find the zeros of the function by factoring.

1. $h(x) = x^2 + 6x + 9$

↑ just as good as zero

$x^2 + 6x + 9 = 0$

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

$x+3=0$ ; $x+3=0$

$x = -3$ ; $x = -3$

2. $g(x) = 2x^2 + 9x + 4$

$2x^2 + 9x + 4 = 0$

$(2x+1)(x+4) = 0$

$2x+1=0$ ; $x+4=0$

$2x = -1$ ; $x = -4$

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

**Try It:** Find the roots of each equation by factoring.

3. $12x = 9x^2 + 4$

$-12x \quad -12x$

$0 = 9x^2 - 12x + 4$

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

$3x-2=0$ ; $3x-2=0$

$3x = 2$ ; $3x = 2$

$x = \frac{2}{3}$ ; $x = \frac{2}{3}$

4. $16x^2 = 9$

$-9 \quad -9$

$16x^2 - 9 = 0$

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

$4x+3=0$ ; $4x-3=0$

$4x = -3$ ; $4x = 3$

$x = -\frac{3}{4}$ ; $x = \frac{3}{4}$