

Name: _____ Date: _____

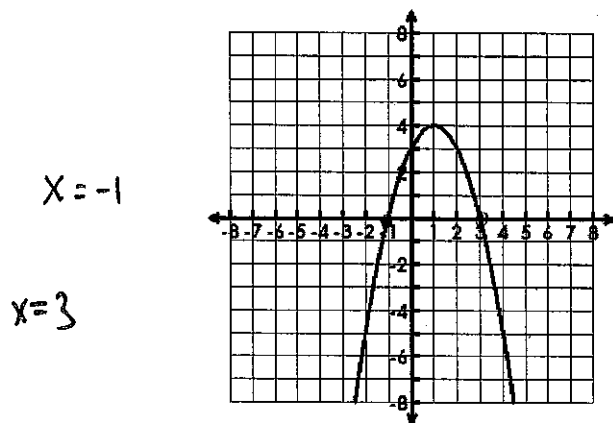
Solving Quadratics by Graphing and Factoring

Solve a Quadratic by Graphing

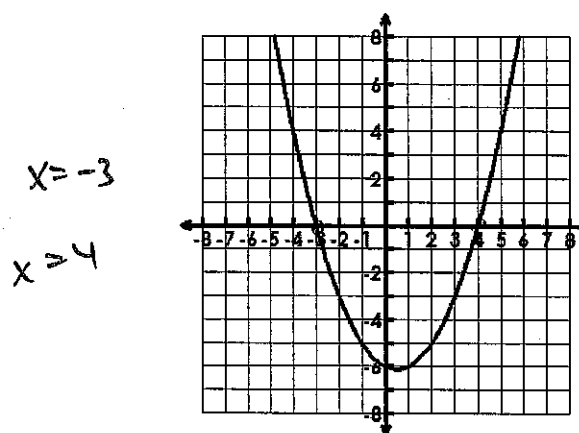
To solve a quadratic by graphing is to find where the parabola crosses the x-axis.

We call these the ROOTS, ZEROS, SOLUTIONS, or X-INTERCEPTS

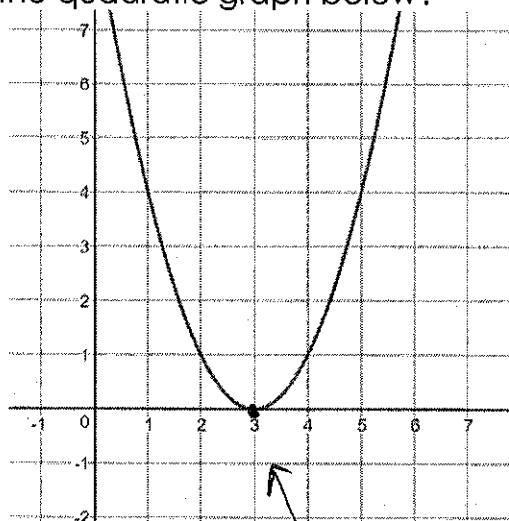
Example 1: Find the roots.



Example 2: Find the solutions



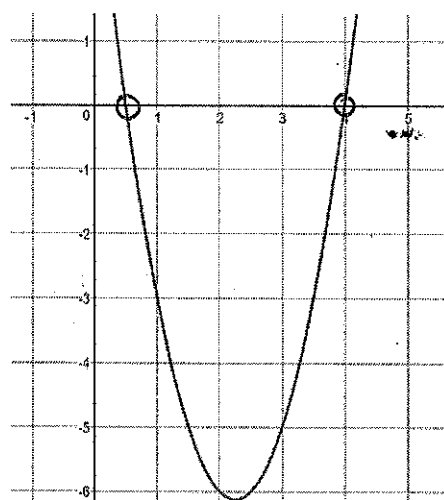
Example 3: What are the solutions to the quadratic graph below?



$x = 3$

ONLY 1 SOLUTION!

Example 4: What are the x-intercepts of the quadratic function?



$x = 1/2$

$x = 4$

How is the **graph** of a quadratic function related to the **factored function** AND to the **solutions**?

Factored Quadratic Function	Graph	Solutions
$(x - 3)(x + 2)$		$x = -2$ $x = 3$

Describe the connection between the factored form and the solution:

THE SOLUTIONS ARE THE OPPOSITE OF THE FACTORS

How is the **graph** of a quadratic function related to the **factored function** AND to the **solutions**?

Factored Quadratic Function	Graph	Solutions
$(2x - 1)(x + 2)$		$x = 1/2$ $x = -2$

Describe the connection between the factored form and the solution:

THE SOLUTIONS ARE THE OPPOSITE OF THE FACTORS AND IF THERE IS A NUMBER IN FRONT OF X, THAT IS THE DENOMINATOR OF THE SOLUTION. See $(2x-1) = \frac{1}{2}$

Given the following equations *already in factored form* what would be the zeros?

1) $(x - 4)(x - 3)$

$x = 4$

$x = 3$

2) $(x + 2)(x - 1)$

$x = -2$

$x = 1$

3) $(4x - 1)(5x + 2)$

$x = 1/4$

$x = -2/5$

The difference between FACTORING and SOLVING

Factoring	Solving
<p>• FACTORING FINAL ANSWER IS IS WRITTEN AS TERMS (X)</p>	<p>• ANSWERS ARE WRITTEN AS <u>X =</u></p>

Solve a Quadratic Algebraically by Factoring

1. Move everything to one side in standard form so that the X² term is POSITIVE and it is set equal to zero.

2. FACTOR!

3. WRITE OUT SOLUTIONS AS X = . REMEMBER IT IS THE OPPOSITE!

Example 3:

$(x - 10)(3x + 2) = 0$ ← ALREADY = 0

$x = 10$
 $x = -2/3$

← ALREADY FACTORED!

Example 4:

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

← EQUAL TO ZERO AND X² IS POSITIVE

$(x - 6)(x + 4) = 0$ NOW FACTOR

$x = 6$ $x = -4$ WRITE SOLUTIONS

Example 5:

$5x^2 + 31x + 6 = -6$
+6 +6

← NOT = 0!
MOVE THE -6

$5x^2 + 31x + 12 = 0$ ← NOW FACTOR

$(x + \frac{30}{5})(x + \frac{1}{5}) = 0$
30
1, 30
2, 15

$(x + 6)(x + \frac{1}{5}) = 0$
3, 10
5, 6

$(x + 6)(5x + 1) = 0$ ← NOW IT IS FACTORED

$x = -6$
 $x = -1/5$

← WRITE SOLUTIONS

Example 6:

$2x^2 - 6 = x$
-x -x

← NOT = 0
MOVE THE X!

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

← MAKE SURE TO PUT THE X IN THE CORRECT SPOT

$(x - \frac{4}{2})(x - \frac{3}{2}) = 0$

$(x - 2)(x - \frac{3}{2}) = 0$

NOW FACTOR!

$(x - 2)(2x - 3) = 0$
12
1, 12
3, 4

$x = 2$ $x = 3/2$ ANSWERS

(go to back for extra practice!)

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

1. $0 = x^2 + 6x + 9$

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

$$x = -3$$

↑ you only need to
WRITE IT ONCE
SINCE IT IS A DOUBLE

2. $2x^2 + 9x + 4 = 0$ ⇒

$$(x + \frac{3}{2})(x + \frac{4}{2}) = 0$$

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

$$x = -4 \quad x = -\frac{1}{2}$$

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

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

← GET = 0!
AND PUT 12x
IN CORRECT
SPOT!

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

$$(x - \frac{2}{3})(x - \frac{2}{3})$$

$$\frac{36}{6,6}$$

$$(x - \frac{2}{3})(x - \frac{2}{3})$$

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

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

4. $16x^2 - 9 = 0$

← SPECIAL
FACTOR!

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

DIFFERENCE
OF SQUARES

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