

Solving Quadratics (1)

#27

The solutions of a quadratic is the value of x when you set y equal to 0. (The solutions of a quadratic are the zeros of the equation.)

So....when you are asked to solve a quadratic or find the solutions, you are being asked to find the zeros of the function.

There are 4 different ways to solve a quadratic:

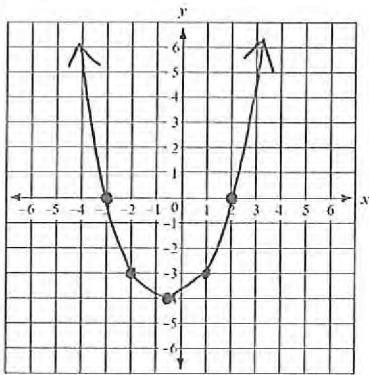
1. Graphing
2. Factoring
3. Taking the square root
4. Quadratic Formula

SOLVING BY GRAPHING

When can we solve by graphing? when given the graph of a quadratic
How do we solve by graphing? identify the zeros of the graph

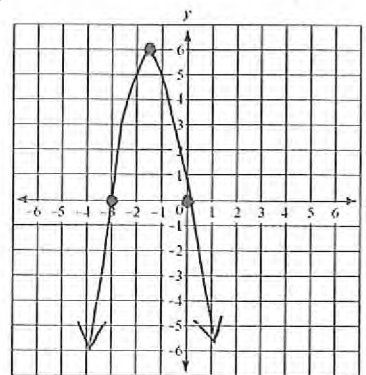
Find the solutions for each quadratic graphed.

Ex. 1



Solutions: -3 and 2

Ex. 2



Solutions: -3 and 0

SOLVING BY FACTORING

When can we solve by factoring?

when given an equation in standard form that is factorable

How do we solve by factoring?

1. convert the equation intercept form
2. set each binomial equal to
3. solve for x

(Complete Ex. 3-6 on a separate sheet of paper.)

Ex. 3 Solve the following quadratic by factoring: $y = x^2 + 5x + 6$

Ex. 4 Solve the following quadratic by factoring: $y = x^2 + 6x + 5$

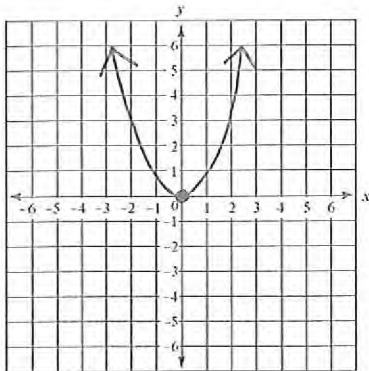
Ex. 5 Solve the following quadratic by factoring: $y = 5x^2 + 9x + 4$

Ex. 6 Solve the following quadratic by factoring: $y = x^2 + 5x - 23$

PRACTICE PROBLEMS ON SOLVING BY GRAPHING AND FACTORING

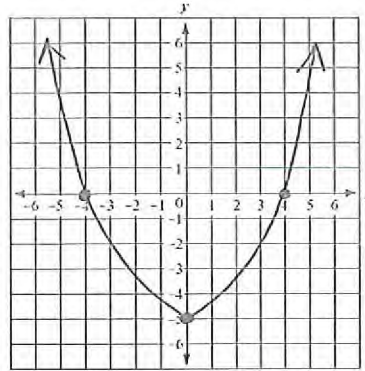
Directions: Find the solutions for each quadratic graphed.

1.



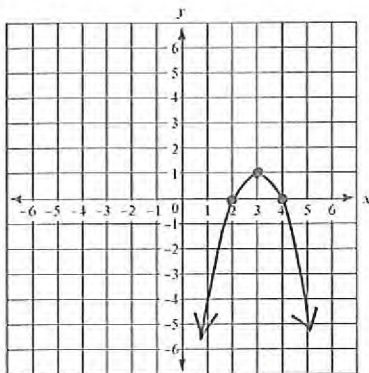
Solutions: 0

2.



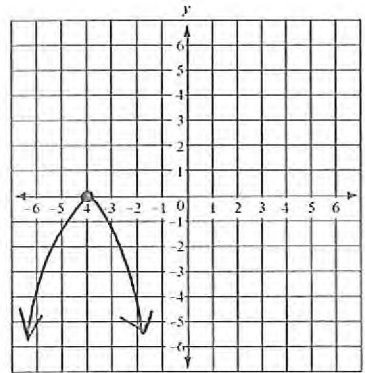
Solutions: -4 and 4

3.



Solutions: 2 and 4

4.



Solutions: -4

(Complete #5-10 on a separate sheet of paper.)

Directions: Find the solutions for each quadratic factoring.

5. $y = x^2 - 14x + 48$

6. $y = 5x^2 + 3x - 14$

7. $y = 2x^2 - 17x + 21$

8. $y = x^2 - x - 56$

9. $y = 4x^2 - 15x + 9$

10. $y = 3x^2 - 10x + 3$

Examples 3-6

EX.3 $y = x^2 + 5x + 6$

$$\begin{array}{l} \underline{3 \cdot 2} = 6 \\ \underline{3 + 2} = 5 \end{array}$$

	x	3
x	x^2	$3x$
2	$2x$	6

$$y = x^2 + 3x + 2x + 6$$

$$y = (x+3)(x+2)$$

$$\begin{array}{l} x+3=0 \\ -3 \quad -3 \\ \hline x = -3 \end{array}$$

$$\begin{array}{l} x+2=0 \\ -2 \quad -2 \\ \hline x = -2 \end{array}$$

EX.4 $y = x^2 + 6x + 5$

$$\begin{array}{l} \underline{5 \cdot 1} = 5 \\ \underline{5 + 1} = 6 \end{array}$$

	x	5
x	x^2	$5x$
1	x	5

$$y = x^2 + 5x + x + 5$$

$$y = (x+5)(x+1)$$

$$\begin{array}{l} x+5=0 \\ -5 \quad -5 \\ \hline x = -5 \end{array}$$

$$\begin{array}{l} x+1=0 \\ -1 \quad -1 \\ \hline x = -1 \end{array}$$

EX.5 $y = 5x^2 + 9x + 4$

$$\begin{array}{l} \underline{5 \cdot 4} = 20 \\ \underline{5 + 4} = 9 \end{array}$$

	x	1
5x	$5x^2$	$5x$
4	$4x$	4

$$y = 5x^2 + 5x + 4x + 4$$

$$y = (5x+4)(x+1)$$

$$\begin{array}{l} 5x+4=0 \\ -4 \quad -4 \\ \hline 5x = -4 \\ \hline x = -\frac{4}{5} \end{array}$$

$$\begin{array}{l} x+1=0 \\ -1 \quad -1 \\ \hline x = -1 \end{array}$$

$$\text{Ex. 6 } y = x^2 + 5x - 23$$

$$\begin{array}{l} \underline{\quad} \cdot \underline{\quad} = -23 \\ \underline{\quad} + \underline{\quad} = 5 \end{array}$$

NOT FACTORABLE
*can't find solutions
this way*

Practice Problems 5-10

$$5) y = x^2 - 14x + 48$$

$$\begin{array}{l} \underline{-6} \cdot \underline{-8} = 48 \\ \underline{-6} + \underline{-8} = -14 \end{array}$$

	x	-6
x	x^2	$-6x$
-8	$-8x$	48

$$y = x^2 - 6x - 8x + 48$$

$$y = (x-6)(x-8)$$

$$\begin{array}{l} x-6=0 \\ +6 \quad +6 \\ \hline x=6 \end{array}$$

$$\begin{array}{l} x-8=0 \\ +8 \quad +8 \\ \hline x=8 \end{array}$$

$$6) y = 5x^2 + 3x - 14$$

$$\begin{array}{l} \underline{-7} \cdot \underline{10} = -70 \\ \underline{-7} + \underline{10} = 3 \end{array}$$

	5x	-7
x	$5x^2$	$-7x$
2	$10x$	-14

$$y = 5x^2 - 7x + 10x - 14$$

$$y = (5x-7)(x+2)$$

$$\begin{array}{l} 5x-7=0 \\ +7 \quad +7 \\ \hline 5x=1 \\ \frac{5}{5} \quad \frac{1}{5} \\ \hline x=\frac{1}{5} \end{array}$$

$$\begin{array}{l} x+2=0 \\ -2 \quad -2 \\ \hline x=-2 \end{array}$$

$$7) y = 2x^2 - 17x + 21$$

$$-14 \cdot -3 = 42$$

$$-14 + -3 = -17$$

	x	-7
$2x$	$2x^2$	$-14x$
-3	$-3x$	21

$$y = 2x^2 - 14x - 3x + 21$$

$$y = (x-7)(2x-3)$$

$$x-7=0$$

$$+7 \quad +7$$

$$x=7$$

$$2x-3=0$$

$$+3 \quad +3$$

$$2x=3$$

$$\frac{2}{2} \quad \frac{3}{2}$$

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

$$8) y = x^2 - x - 56$$

$$-8 \cdot 7 = -56$$

$$-8 + 7 = -1$$

	x	-8
x	x^2	$-8x$
7	$7x$	-56

$$y = x^2 - 8x + 7x - 56$$

$$y = (x-8)(x+7)$$

$$x-8=0$$

$$+8 \quad +8$$

$$x=8$$

$$x+7=0$$

$$-7 \quad -7$$

$$x=-7$$

$$9) y = 4x^2 - 15x + 9$$

$$\begin{aligned} -3 \cdot -12 &= 36 \\ -3 + -12 &= -15 \end{aligned}$$

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

$$\begin{array}{r|l} 4x & -3 \\ \hline x & 4x^2 - 3x \\ -3 & -12x \quad 9 \end{array}$$

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

$$\begin{array}{r} 4x - 3 = 0 \\ +3 \quad +3 \\ \hline 4x = 3 \\ \frac{4x}{4} = \frac{3}{4} \\ \hline \end{array}$$

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

$$\begin{array}{r} x - 3 = 0 \\ +3 \quad +3 \\ \hline \end{array}$$

$$x = 3$$

$$10) y = 3x^2 - 10x + 3$$

$$\begin{aligned} -9 \cdot -1 &= 9 \\ -9 + -1 &= -10 \end{aligned}$$

$$y = 3x^2 - 9x - x + 3$$

$$\begin{array}{r|l} x & -3 \\ \hline 3x & 3x^2 - 9x \\ -1 & -x \quad 3 \end{array}$$

$$y = (x - 3)(3x - 1)$$

$$\begin{array}{r} x - 3 = 0 \\ +3 \quad +3 \\ \hline \end{array}$$

$$x = 3$$

$$\begin{array}{r} 3x - 1 = 0 \\ +1 \quad +1 \\ \hline \end{array}$$

$$\frac{3x}{3} = \frac{1}{3}$$

$$x = \frac{1}{3}$$