Solve Quadratics by Factoring

Zero Product Property and Factored Form

A polynomial or function is in ***factored form*** if it is written as the product of two or more linear binomial factors. The ***zero product property*** is used to solve an equation when one side is zero and the other side is a product of binomial factors.

Examples: a. $(x-2)(x+4)=0$ b. $x(x+4)=0$ c. $(x+3)^2=0$

$x-\cancel{2}=0$
$+\cancel{2}\ +2$
$x=2$

$x+\cancel{4}=0$
$-\cancel{4}\ -4$
$x=-4$

$x=0$

$x+\cancel{4}=0$
$-\cancel{4}\ -4$
$x=-4$

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

$x+\cancel{3}=0$
$-\cancel{3}\ -3$
$x=-3$

$x+\cancel{3}=0$
$-\cancel{3}\ -3$
$x=-3$

Practice: Identify the zeros of the functions: set the equation equal to 0

a. $y=(x+4)(x+3)$ b. $f(x)=(x-7)(x+5)$ c. $y=x(x-9)$ d. $f(x)=5(x-4)(x+8)$

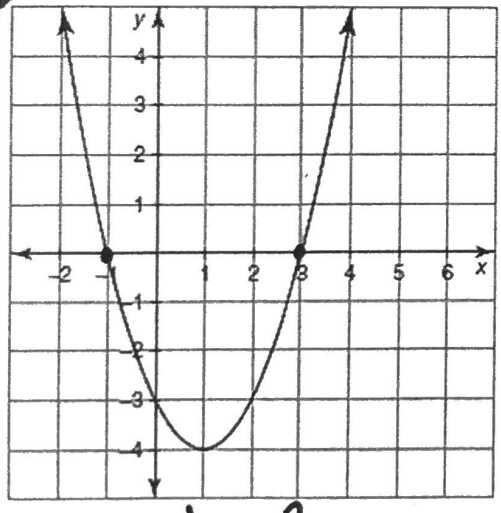
$0=5(x-4)(x+8)$

$5\neq 0$

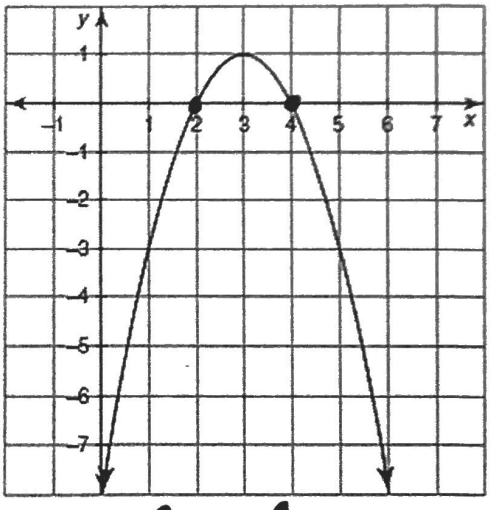
$x-\cancel{4}=0$
$+\cancel{4}\ +4$
$x=4$

$x+\cancel{8}=0$
$-\cancel{8}\ -8$
$x=-8$

Find the x-intercepts (zeros) of the graphs below.



x = -1 & 3



x = 2 & 4

In this unit, you will be solving quadratic equations. In order to understand what we mean by "solving" quadratic equations, you must understand exactly what we will be solving for from an equation.

Solving a quadratic equation really means:

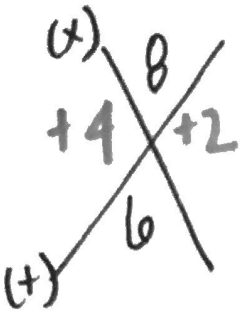
solving for 'x'

The place(s) where the graph crosses the x-axis has several names. They can be referred as:

Zeros x-intercepts

Practice with Solving Quadratic Equations by Factoring

1. $x^2 + 6x + 8 = 0$ $a=1$ X-method

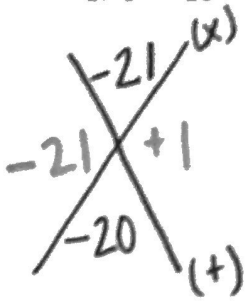


$x+4=0$ $\quad x+2=0$
$-4\ -4$ $\quad -2\ -2$
$x=-4$ $\quad x=-2$

Factored Form: $(x+4)(x+2)$

Zeros: $x=-4,-2$

2. $3x^2 - 20x - 7 = 0$ $a \neq 1$ - ~~GCF~~ - X-method - box method



	X	-7
3X	$3x^2$	-21X
+1	1X	-7

$3x+1=0$
$-1\ -1$
$\frac{3x}{3} = \frac{-1}{3}$

$x-7=0$
$+7\ +7$
$x=7$

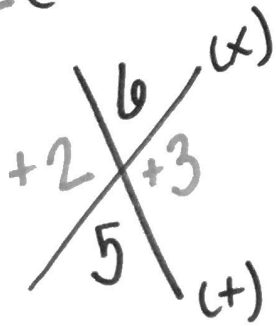
Factored Form: $(3x+1)(x-7)$

Zeros: $x=-\frac{1}{3}, 7$

3.) $2x^2 + 10x + 12 = 0$ $a \neq 1$ GCF, X-method, box method

2	$1x^2$	5X	6
	$2x^2$	10X	12

$2(x^2+5x+6) \rightarrow a=1$ X-method



$2 \neq 0$

$x+2=0$ $\quad x+3=0$
$-2\ -2$ $\quad -3\ -3$
$x=-2$ $\quad x=-3$

Factored Form: $2(x+2)(x+3)$

Zeroes: $x=-2,-3$

4.) $2x^2 - 8x = 0$ GCF method

	X	-4
2X	$2x^2$	-8X

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

Factored Form: $2x(x-4)$

Zeroes: $x=0,4$