

## 3.1: The Zero Property Law

**SWBAT:** Use the zero property law to solve quadratics

### THE ZERO PRODUCT LAW

If the **product** of multiple factors is **equal to zero** then at least **one of the factors must be equal to zero**.

The **Zero Product Property** can be used to find where a quadratic equation crosses the x-axis. These points are the

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**Exercise #1:** Solve each of the following equations for all value(s) of x.

(a)  $(x+7)(x-3)=0$

(b)  $(2x-5)(x-4)=0$

(c)  $4(3x+2)(4x-3)=0$

**Exercise #2:** In Exercise #1(c), why does the factor of 4 have no effect on the solution set of the equation?

*The Zero Product Law can be used to solve any quadratic equation that is factorable (not prime). To utilize this technique the problem solver must first set the equation equal to zero and then factor the non-zero side.*

**Exercise #3:** Solve each of the following quadratic equations using the Zero Product Law.

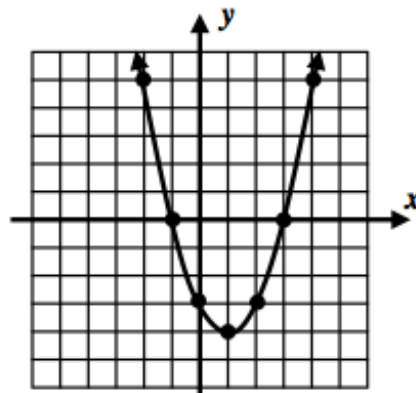
(a)  $x^2+3x-14=-2x+10$

(b)  $3x^2+12x-7=x^2+3x-2$

The **Zero Product Law** is extremely important in finding the **zero's or x-intercepts** of a parabola.

**Exercise #4:** The parabola shown at the right has the equation  $y = x^2 - 2x - 3$ .

(a) Write the coordinates of the two x-intercepts of the graph.



(b) Find the x-intercepts of this parabola algebraically.

**Exercise #5:** Algebraically find the set of x-intercepts for each parabola given below.

(a)  $y = 4x^2 - 1$

(b)  $y = 3x^2 + 13x - 10$

(c)  $y = 5x^2 - 10x$

## Practice Problems

1. Solve each of the following equations for all value(s) of  $x$ .

(a)  $(x-2)(x+5)=0$

(b)  $(7x-1)(2x+5)=0$

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

2. Solve each of the following quadratic equations which have already been set equal to zero.

(a)  $x^2+10x+16=0$

(b)  $3x^2+11x-4=0$

(c)  $12x^2+8x=0$

3. Solve each of the following quadratic equations by first manipulating them so that one side of the equation is set equal to zero.

(a)  $x^2+4x-40=10x+15$

(b)  $4x^2+3x-11=3x-2$

(c)  $6x^2-15x+2=2x^2+10x-4$

(d)  $-16t^2+76t+5=12t+5$

Directions: Solve each equation by factoring or by using the zero product property.

1.  $(x + 2)(x + 7) = 0$

2.  $(x - 11)(x + 5) = 0$

3.  $(x - 10)^2 = 0$

4.  $x^2 + 12x + 35 = 0$

5.  $x^2 + 2x - 63 = 0$

6.  $x^2 - 10x + 16 = 0$

7.  $2x^2 - 16x + 32 = 0$

8.  $x^2 + 16x + 48 = 0$