

Name: _____

Date: _____

THE ZERO PRODUCT LAW ALGEBRA 2 WITH TRIGONOMETRY

Arguably the most important equation solving technique stems from the following:

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 law can immediately be put to use in the first exercise. In this exercise, quadratic equations are given already in factored form.

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

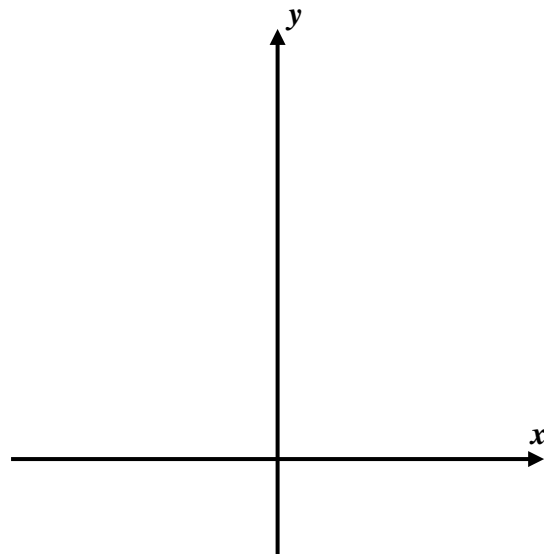


Exercise #4: Consider the system of equations shown below consisting of a parabola and a line.

$$y = 3x^2 - 8x + 5 \quad \text{and} \quad y = 4x + 5$$

(a) Find the intersection points of these curves *algebraically*.

(b) Using your calculator, sketch a graph of this system on the axes to the right. **Be sure to label the curves with equations, the intersection points, and the window.**



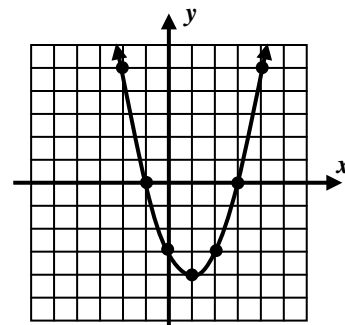
(c) Verify your answers to part (a) by using the **INTERSECT** command on your calculator.

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

Exercise #5: 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 #6: *Algebraically* find the set of x -intercepts for each parabola given below.

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

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

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



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THE ZERO PRODUCT LAW
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

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

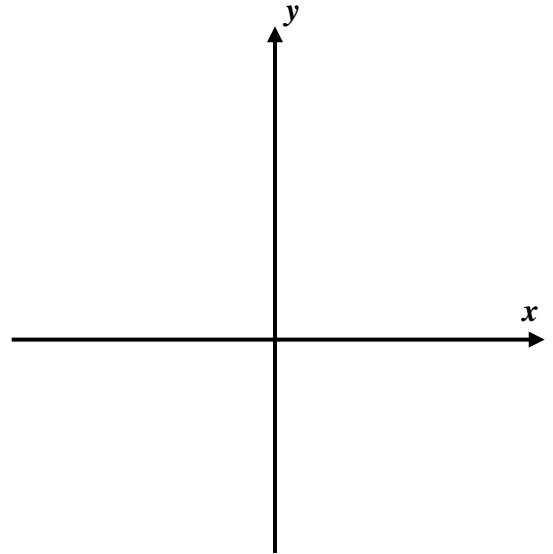


APPLICATIONS

4. Consider the system of equations shown below consisting of one linear and one quadratic equation.

$$y = 4x - 5 \quad \text{and} \quad y = 2x^2 - 5x - 10$$

- (a) Find the intersection points of this system *algebraically*.



- (b) Using your calculator, sketch a graph of this system to the right. **Be sure to label the curves with equations, the intersection points, and the window.**

- (c) Use the **INTERSECT** command on your calculator to verify the results you found in part (a).

5. *Algebraically*, find the x -intercepts of each quadratic function given below.

(a) $y = x^2 - 81$

(b) $y = 12x^2 - 18x$

(c) $y = 2x^2 - 6x - 8$

REASONING

6. A quadratic function is graphed to the right.

- (a) What are the x -intercepts of this parabola?

- (b) Based on your answer to part (a), what two factors must be part of the factorization of this quadratic?

