Name: ____________________________________ Date: __________________

QUADRATIC WORD PROBLEMS
COMMON CORE ALGEBRA I

Now that we have the Zero Product rule as a method for solving quadratic equations that are **factorable when set equal to zero**, we can also model scenarios that are quadratic in nature and solve them for rational solutions with factoring.

***Exercise* #1:** Consider a rectangle whose area is 45 square feet. If we know that the length is one less than twice the width, then we would like to find the dimensions of the rectangle.

(a) If we represent the width of the rectangle using the variable W, then write an expression for the length of the rectangle, L, in terms of W.

(b) Set up an equation that could be used to solve for the width, W, based on the area.

(c) Solve the equation to find both dimensions. Why is one of the solutions for W not **viable**?

***Exercise* #2:** A square has one side increased in length by two inches and an adjacent side decreased in length by two inches. If the resulting rectangle has an area of 60 square inches, what was the area of the original square? First, draw some possible squares and rectangles to see if you can solve by guess-and-check. Then, solve it algebraically.

We can certainly play around with word problems that involve strictly numbers. For example…

***Exercise* #3:** There are two rational numbers that have the following property: when the product of seven less than three times the number with one more than the number is found it is equal to two less than ten times the number. Find the two rational numbers that fit this description.

And, of course, who can forget our work with **consecutive integers** from the linear unit?

***Exercise* #4:** Find all sets of two consecutive integers such that their product is eight less than ten times the smaller integer.

***Exercise* #5:** Brendon claims that the number five has the property that the product of three less than it with one more than it is the same as the three times one less than it. Show that Brendon's claim is true and algebraically find the other number for which this is true.

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QUADRATIC WORD PROBLEMS
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. The product of two consecutive positive even integers is 14 more than their sum. Set up an equation that can used to find the two numbers and solve it.

2. The length of a rectangle is 4 less than twice the width. The area of the rectangle is 70 square feet. Find the width, *w*, of the rectangle algebraically. Explain why one of the solutions for *w* is not viable.

3. Two sets of three consecutive integers have a property that the product of the larger two is one less than seven times the smallest. Set up and solve an equation that can be used to find both sets of integers.

APPLICATIONS

4. A curious patterns occurs in a group of people who all shake hands with one another. It turns out that you can predict the number of handshakes that will occur if you know the number of people.

   If we are in a room of 5 people, we can determine the number of handshakes by this line of reasoning:

   The first person will shake 4 hands (she won't shake her own). The second person will shake 3 hands (he won't shake his own of the hand of the first person, they already shook). The third person will shake 2 hands (same reasoning). The fourth person will shake 1 hand (that of the fifth person). The fifth person will shake 0 hands. So there will be a total of 1+2+3+4=10 handshakes

   (a) Determine the number of handshakes, *h*, that will occur for each number of people, *n*, in a particular room.

n (people)	Calculation	*h* (handshakes)
2		
3		
4		
5	$1+2+3+4=10$	10
6		

   (b) Using knowledge from Algebra II, Prestel proposes the formula $h=\frac{n(n-1)}{2}$ to find the number of handshakes, *h*, if he knows the number of people. Test the formula and compare with the results you found in (a).

n (people)	$h=\frac{n(n-1)}{2}$	Comparison to (a)
2		
3		
4		
5		
6		

   (c) Assuming Prestel's formula is correct, algebraically determine number of people in a room if there are 66 handshakes that occur.