Name: _____ Date: _____

Solving Quadratic Word Problems I
Algebra 1

Quadratic equations arise naturally when one solves problems from a variety of contexts, including area, motion, economics, and growth rates of populations. In fact, any problem situation in which one quantity depends upon the product of two linear quantities yields an analysis of a quadratic equation. Over the next two lessons we will solve classic quadratic word problems. As always, read each question thoroughly to understand what is given and what is being asked.

Exercise #1: The product of two consecutive even integers is 48. Find all sets of these integers that satisfy this description using both guess-and-check and algebraic methods.

(a) Guess-and-Check Approach (b) Algebraic Approach

n	$n+2$	$n(n+2)$

One of the severe limitations in a guess-and-check approach is that it often misses answers. For each of the remaining exercises, solve exclusively using **algebraic techniques**.

Exercise #2: Find three consecutive positive integers such that the product of the first two is 22 less than 11 times the third.

Exercise #3: The product of two consecutive odd integers is equal to 30 more than the first. Find the integers.

***Exercise #4*:** An object is moving in a straight line. It initially travels at a speed of 9 meters per second, and it speeds up at a constant rate of 2 meters per second each second. Under such conditions, the distance *d*, in *meters*, that the object travels is given by the equation $d = t^2 + 9t$, where *t* is in seconds. According to this equation, how long will it take the object to travel 22 meters?

***Exercise #5*:** A rectangular picture has a width that is two-thirds its length. The picture has an area of 294 square inches. What are the dimensions of the picture?

***Exercise #6*:** A square is altered so that one dimension is increased by 4, while the other dimension is decreased by 2. The area of the resulting rectangle is 55. Find the area of the original square.

***Exercise #7*:** The profit *P*, in *dollars*, gained by selling *x* computers is modeled by the equation $P = -5x^2 + 1000x + 5000$. How many computers must be sold to obtain a profit of $55,000.00?

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Solving Quadratic Word Problems I
Algebra 1 Homework

Applications

Solve each of the following quadratic word problems ***algebraically***.

1. Two consecutive odd integers have a product of 99. Find all sets of integers that satisfy this description.

2. The product of two consecutive positive even integers is 14 more than their sum. Find the integers.

3. Find three consecutive positive integers such that the product of the first and the third is 29 more than the second.

4. The length of a rectangle is 4 less than twice the width. The area of the rectangle is 70. Find the dimensions of the rectangle.

5. An object is launched straight up into the air at an initial velocity of 64 feet per second. It is launched from a height of 6 feet off the ground. Its height *H*, in *feet*, at *t* seconds is given by the equation $H = -16t^2 + 64t + 6$. Find all times *t* that the object is at a height of 54 feet off the ground.

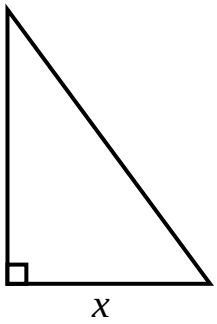
6. A rectangular picture has a height that is $\frac{5}{7}$ of its width. Its area is 140 square inches. What are the dimensions of the picture?

7. The square of a number decreased by 3 times the number is 28. Find all possible values for the number.

8. In a right triangle, the length of the longer leg is 7 more inches than the shorter leg. The length of the hypotenuse is 8 more inches than the length of the shorter leg.

(a) If the shortest leg is represented by *x*, write expressions for the longer leg and the hypotenuse in terms of *x*. Label them on the diagram.

(b) Write an equation using the Pythagorean Theorem that relates the three sides together and solve it for the value of *x*.



(c) Find all three side lengths, and check your answer by verifying that $a^2 + b^2 = c^2$.