Applications of Quadratic Equations

There are three types of problems: equation is given, area of a rectangle, and right triangle.

I. Equation Given

Equation is given: know how to use it to answer the question asked.

Example: When a cannon is fired, the height, h, in feet, of the cannonball after t seconds can be found by using the formula \( h = -16t^2 + 128t \).

a) Determine the height of the cannonball 3 seconds after being fired.

b) How long will it take the cannonball to reach 192ft?

II. Area of Rectangle

area of a rectangle =

Example: The area of a rectangle is 36 square inches. Determine the length and the width of the rectangle if its length is 1 inch longer than twice the width.
III. Right triangle

A right triangle is a triangle with a 90° angle. We call the sides that make up the 90° angle the _________. The side opposite the 90° angle, that is the longest side, is called the _____________________.

The _____________________________ is the formula that relates the lengths of the sides of a right triangle. It says

\[ a^2 + b^2 = c^2 \]

Example: Gus has constructed a rectangular garden. The length of the garden is 4 feet more than four times the width. The diagonal of the garden is 5 feet more than four times its width. Find the length and width of the garden.

Now you try...
- Is the equation given? If so, use it.
- If not, does it involve the area of a rectangle? If it does, use \( A = l \cdot w \).
- If not, then it must involve a right triangle. Use the Pythagorean Theorem \( a^2 + b^2 = c^2 \).

Example 1: The area of a rectangle is 104 square meters. Find the length and the width of the rectangle if its length is 5 meters greater than the width.

Example 2: A TV screen has a diagonal of 17 inches. If the length of the screen is 1 inch less than twice its width, find the dimensions of the screen.

Example 3: The MacQuiddy Elementary School PTA has determined the cost, \( C \), to make \( x \) dozen brownies can be determined by the formula \( C = x^2 - 79x + 20 \). If they have $100 to be used to make the brownies, how many dozen brownies can the PTA make to sell at a fundraiser?