

1. The length of a rectangle is 1 foot less than 3 times the width. The area is  $310 \text{ ft}^2$ . Find the dimensions of the rectangle.

Step 1: Identify your variables and write an equation to help you solve this problem.

$$L = 3w - 1 \quad L = \text{length}$$

$$w = \text{width} \quad LW = 310$$

Step 2: Solve the equation. Be sure to state all solutions to the equation.

$$L \cdot w = 310$$

$$(3w - 1)w = 310$$

$$3w^2 - w - 310 = 0$$

$$(3w - 31)(w + 10) = 0$$

$$3w - 31 = 0 \quad w + 10 = 0$$

$$3w = 31 \quad w = -10$$

$$w = 31/3$$

$$= 10\frac{1}{3}$$

Step 3: Interpret the solution and answer the initial question.

The rectangle is  $10\frac{1}{3} \text{ ft} \times 30 \text{ ft}$ .

2. The profit earned by an electronics company for selling printers is modeled by the function  $P = -3x^2 + 33x - 72$ , where  $x$  is the number of printers in hundreds, and  $P$  is measured in thousands of dollars. What two numbers of printers sold will result in zero profit?

Step 2: Solve the equation. Be sure to state all solutions to the equation.

$$0 = -3x^2 + 33x - 72$$

$$0 = -3(x^2 - 11x + 24)$$

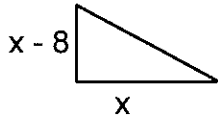
$$0 = -3(x - 8)(x - 3)$$

$$x = 8, 3$$

Step 3: Interpret the solution and answer the initial question.

You can sell 800 or 300 printers to end up with 0 profit.

3. The height of a right triangle is 8 inches less than the length of its base. The area of the triangle is 90 square inches. What is the height and base of the triangle?



Step 1: Identify your variables and write an equation to help you solve this problem.

$$x = \text{length of base} \quad \frac{1}{2}x(x-8) = 90$$

Step 2: Solve the equation. Be sure to state all solutions to the equation.

$$\begin{aligned} \frac{1}{2}x^2 - 4x &= 90 & x - 4 &= \pm 14 \\ x^2 - 8x &= 180 & x &= 4 \pm 14 \\ x^2 - 8x + 16 &= 180 + 16 & x &= 18, -10 \\ \sqrt{(x-4)^2} &= \sqrt{196} \end{aligned}$$

Step 3: Interpret the solution and answer the initial question.

The base of the  $\Delta$  is 18 in & the height is 10 in.

4. A golf ball is hit from a hill, and its height can be modeled by  $h = -16t^2 + 32t + 48$ , where  $h$  is height in feet and  $t$  is time in seconds. How long is the ball in the air? *\*when will h be 0?*

Step 2: Solve the equation. Be sure to state all solutions to the equation.

$$\begin{aligned} 0 &= -16t^2 + 32t + 48 \\ 0 &= -16(t^2 - 2t - 3) \\ 0 &= -16(t-3)(t+1) \\ t &= 3, -1 \end{aligned}$$

Step 3: Interpret the solution and answer the initial question.

The ball is in the air for 3 seconds

5. A rectangular swimming pool is 50 meters long and 25 meters wide. A concrete walkway with a width of  $x$  meters will surround the pool. The combined area of the pool and the walkway will be 1736 square meters. Solve the equation  $(50 + 2x)(25 + 2x) = 1736$  to find the width of the walkway. Justify that your answer is reasonable.

Step 2: Solve the equation. Be sure to state all solutions to the equation.

$$(50 + 2x)(25 + 2x) = 1736$$

$$1250 + 100x + 50x + 4x^2 = 1736$$

$$4x^2 + 150x - 486 = 0$$

$$2(2x^2 + 75x - 243) = 0$$

$$2x^2 + 75x - 243 = 0$$

$$x = \frac{-75 \pm \sqrt{5625 - 4(2)(-243)}}{2}$$

$$x = \frac{-75 \pm \sqrt{5625 + 1944}}{2}$$

$$x = \frac{-75 \pm \sqrt{7569}}{2}$$

Step 3: Interpret the solution and answer the initial question.

The walkway is 3 meters wide

$$x = \frac{-75 \pm 87}{2}$$

$$x = \frac{12}{2} = 3$$

$$x = \frac{94}{2} = 47$$

6. A baseball player hits a ball from a height of 5 feet with an initial vertical velocity of 54 feet per second. The function  $h = -16t^2 + 54t + 5$  models the height  $h$  in feet of the ball  $t$  seconds after it is hit. Will the ball reach a height of 50 feet? Justify your answer.

Step 2: Solve the equation. Be sure to state all solutions to the equation.

$$50 = -16t^2 + 54t + 5$$

$$0 = -16t^2 + 54t - 45$$

$$x = \frac{-54 \pm \sqrt{2916 - 4(-16)(-45)}}{2(-16)}$$

$$x = \frac{-54 \pm \sqrt{2916 - 2880}}{-32}$$

$$x = \frac{-54 \pm \sqrt{36}}{-32}$$

$$x = \frac{-54 \pm 6}{-32}$$

$$x = \frac{-48}{-32} = 1.5$$

$$x = \frac{-60}{-32} = 1.875$$

Step 3: Interpret the solution and answer the initial question.

Yes it will be at 50 ft after 1.5 s & again at 1.875 s