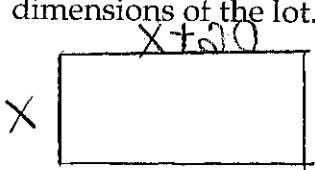


Quadratic Application: Quiz STUDY GUIDE

Directions: Solve each problem and label your answers.

1.) A rectangular lot is 20 yards longer than it is wide and its area is 2400 square yards. Find the dimensions of the lot.



$$\begin{aligned} x(x+20) &= 2400 & x^2 + 20x - 2400 &= 0 \\ x^2 + 20x &= 2400 & (x+60)(x-40) &= 0 \\ -2400 \quad -2400 & & & \end{aligned}$$

length: 60 yds
width: 40 yds

2.) A company models its net income, in thousands of dollars, with the function $f(x) = 9x^2 - 54x - 144$, where x is the number of units of its product sold. How many units of its product does the company need to sell in order for the net income to equal \$0?

$$\begin{aligned} 9x^2 - 54x - 144 & & 9(x+2)(x-8) &= 0 \\ 9(x^2 - 6x - 16) &= 0 & x - 8 &= 0 \end{aligned}$$

$x = 8$ units

3.) Find three consecutive positive integers such that the square of the largest is 51 more than the sum of the smallest.

$$\begin{aligned} n &= 1st \# & (n+2)^2 &= n + (n+1) + 51 & n^2 + 2n - 48 &= 0 \\ n+1 &= 2nd \# & n^2 + 4n + 4 &= 2n + 1 + 51 & (n+8)(n-6) &= 0 \\ n+2 &= 3rd \# & n^2 + 4n + 4 &= 2n + 52 & n &= -8 \end{aligned}$$

$n = 6$
 $n + 1 = 7$
 $n = 8$

4.) Robert launched an object at 32 meters per second (m/s) from a 48-meter tall platform. The equation for the object's height s at time t seconds after launch is $s(t) = -16t^2 + 32t + 48$, where s is in meters.

A. How long does it take for the object to reach its maximum height?

$$t = \frac{-32}{2(-16)} \quad t = 1 \text{ sec.}$$

B. What is the maximum height?

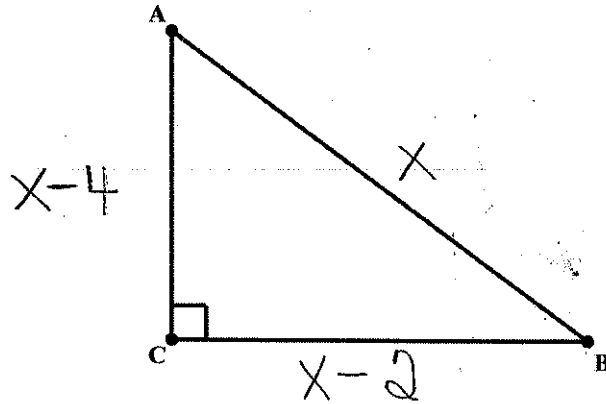
$$\begin{aligned} s(t) &= -16(1)^2 + 32(1) + 48 \\ &= 64 \text{ ft.} \end{aligned}$$

C. When does the object strike the ground?

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

5.) The shorter leg of a right triangle is 4 centimeters shorter than the hypotenuse. The longer leg is 2 centimeters shorter hypotenuse. How long is the hypotenuse?

(a) Let the hypotenuse be represented by x , write expressions for the longer leg and the shorter leg 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 .

$$a^2 + b^2 = c^2$$

$$(x-4)^2 + (x-2)^2 = (x)^2$$

$$x^2 - 8x + 16 + x^2 - 4x + 4 = x^2$$

$$2x^2 - 12x + 20 = x^2$$

$$x^2 - 12x + 20 = 0$$

(c) Find the length of all three sides.

$$(x-10)(x-2) = 0$$

$$x = 10 \text{ cm}$$

$$x = 10$$

$$x - 4 = 6 \text{ cm}$$

$$x - 2 = 8 \text{ cm}$$