DAY 10

Quadratic Equation Area Problems!

1 Given the diagram below, find the value of x if the area of the rectangle is 78 square meters.

$78m^2$ (width x, length $x+7$) $A = L \cdot W$

$x(x+7) = 78$

$x^2 + 7x = 78$

$x^2 + 7x - 78 = 0$

$(x+13)(x-6) = 0$

$x = -13$ $\boxed{x = 6}$

2 Given the diagram below, find the dimensions of the rectangle if the area of the rectangle is 108 square meters.

(width x, length $x-3$)

3 Given the diagram below, find the dimensions of the rectangle if the area is 128 square feet.

(width $x+7$, length $x-1$)

4 The dimensions of a rectangle can be expressed as $x + 3$ and $x - 8$. If the area of the rectangle is 60 square inches, what is the value of x?

$60in^2$ $(x+3)(x-8)$ $\boxed{x = 12m}$

$(x+3)(x-8) = 60$

$x^2 - 5x - 84 = 0$

$(x-12)(x+7) = 0$ $x = \{12, -7\}$

5 The length of a rectangular garden is 4 meters more than its width. The area of the rectangle is 60 meters. Find the dimensions of the rectangle.

$L = 4 + W$

$60m^2$ (width W, length $4+W$) 10m x 10m

$W(4+W) = 60$

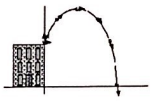
$4W + W^2 = 60$

$W^2 + 4W - 60 = 0$

$(W+10)(W-6) = 0$

$W = -10$ $\boxed{W = 6}$

6 The length of a rectangle is 6 meters less than its width. Find the dimensions of the rectangle if its area is 27 square meters.



PROJECTILE MOTION

1. A soccer ball is kicked from the ground with an initial upward velocity of 90 feet per second. The equation $h = -16t^2 + 90t$ gives the height h of the ball after t seconds.

   $y = -16x^2 + 90x$

   a. Find the maximum height of the ball.

   max/vertex: (2.81, 126.56) (x, y)

   max height: 126.56 feet

   b. How many seconds will it take for the ball to reach the ground?

   x-intercept: (5.625, 0) (x, y)

   ↳ t: time ↳ 0 ft up = ground

   1a. 126.56 ft.

   b. 5.625 sec.

2. An apple is launched directly upward at 64 feet per second from a platform 80 feet high. The equation for this apple's height h at time t seconds after launch is $h = -16t^2 + 64t + 80$.

   $y = -16x^2 + 64x + 80$

   a. Find the maximum height of the apple.

   max/vertex: (2, 144) (x, y) (t, h)

   b. How many seconds will it take for the apple to reach the ground?

   x-intercept: (5, 0) (x, y) (t, h)

   2a. 144 ft.

   b. 5 sec

3. In science class, the students were asked to create a container to hold an egg. They would then drop this container from a window 25 feet above the ground. The equation $h = -16t^2 + 25$, gives the container's height h after t seconds.

   $y = -16x^2 + 25$

   a. Find the maximum height of the container.

   max/vertex: (0, 25) (x, y) (t, h)

   time hasn't started = you haven't dropped the egg!

   you're holding the egg 25 ft up in the air

   b. How many seconds will it take for the container to reach the ground?

   x-intercept: (1.25, 0) (x, y) (t, h)

   3a. 25 ft.

   b. 1.25 sec.

the egg hit the ground after 1.25 seconds