

4/17 Algebra 1 - Downing

Go over HW Quiz

9.5B - Quadratic Formula (and other solving methods)

Solve: $\frac{1}{2}x^2 + x - 10 = 0$

↓ plug into the formula

Quadratic Formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-1 \pm \sqrt{(1)^2 - 4(\frac{1}{2})(-10)}}{2(\frac{1}{2})}$

← solve everything under the square root

$x = \frac{-1 + \sqrt{21}}{1}$ $x = \frac{-1 - \sqrt{21}}{1}$

$x = 3.6$

$x = -5.6$

Solve: $-3x^2 + 2x = -7$

$$\begin{array}{r} -3x^2 + 2x + 7 = 0 \\ \hline a \quad b \quad c \end{array}$$

$x = \frac{-2 \pm \sqrt{(2)^2 - 4(-3)(7)}}{2(-3)}$

$x = \frac{-2 + \sqrt{88}}{-6}$ $x = \frac{-2 - \sqrt{88}}{-6}$

$x = -1.2$

$x = 1.9$

Classwork - Online

Worksheet - Application Problems

Ex) Kicking a soccer ball $h = -16t^2 + 50t$ When does the ball reach a point 5 ft. above the ground?

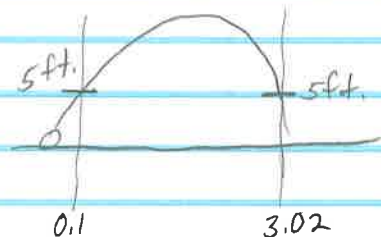
$5 = -16t^2 + 50t + 0$
 $-5 = -16t^2 + 50t - 5$

$0 = -16t^2 + 50t - 5$

$x = \frac{-50 \pm \sqrt{(50)^2 - 4(-16)(-5)}}{2(-16)}$

$\frac{-50 + \sqrt{2180}}{-32}$

$\frac{-50 - \sqrt{2180}}{-32}$



$x = 0.1 \text{ sec}$

$x = 3.02 \text{ sec}$

on the way up

on the way down

HW - online

Solving Quadratics - Application

The number y of Northern Rocky Mountain wolf breeding pairs x years since 1990 can be modeled by the function $y = 0.20x^2 + 1.8x - 3$.
When were there about 35 breeding pairs?

$x = \text{years since 1990}$
 $y = \text{\# of breeding pairs}$

$$y = 0.20x^2 + 1.8x - 3$$

$$\begin{array}{r} 35 \\ -35 \\ \hline 0 = 0.20x^2 + 1.8x - 38 \end{array}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-1.8 \pm \sqrt{(1.8)^2 - 4(0.20)(-38)}}{2(0.20)}$$

Answer

In 2000, there were 35 breeding pairs

$$x = \frac{-1.8 + \sqrt{33.64}}{.4} \quad x = \frac{-1.8 - \sqrt{33.64}}{.4}$$

$$x = 10$$

$$x = -19$$

$$1990 + 10$$

$$\text{year} = 2000$$

The number y of bald eagle nesting pairs in a state x years since 2000 can be modeled by the function $y = 0.34x^2 + 13.1x + 51$.

a. When were there about 160 bald eagle nesting pairs?

$y = \text{\# of bald eagle nesting pairs}$
 $x = \text{years since 2000}$

$$x = \frac{-13.1 \pm \sqrt{(13.1)^2 - 4(.34)(-109)}}{2(.34)}$$

$$\begin{array}{r} 160 \\ -160 \\ \hline 0 = 0.34x^2 + 13.1x + 51 \end{array}$$

$$x = \frac{-13.1 + \sqrt{319.85}}{.68} \quad x = \frac{-13.1 - \sqrt{319.85}}{.68}$$

$$x = 7.04$$

$$x = -45.6$$

$2000 + 7 = 2007$
there were 160 bald eagle nesting pairs

b. How many bald eagle nesting pairs were there in 2000?

$$y = .34x^2 + 13.1x + 51 \quad x = 0 \text{ years}$$

$$y = 51$$

There were 51 nesting pairs in the year 2000

Solving Quadratics - Application

A rectangular prism has a volume of 2430 cubic units. The height of the prism is 10 units. The length is three times the width. Find the length and width of the prism.

Laura is a part of the RP swim team. She dives off the high board. Her height (in feet) is represented by the function $h = -16t^2 + 48t + 15$, where t is the time (in seconds) after she begins her dive. Find the time it takes Laura to reach a point 3 feet above the water.

$h =$ height (in feet)
 $t =$ time (in seconds)

$$\begin{aligned} h &= -16t^2 + 48t + 15 \\ -3 &= -16t^2 + 48t + 15 \\ -3 & \quad \quad \quad -15 \\ \hline h &= -16t^2 + 48t + 12 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-48 \pm \sqrt{(48)^2 - 4(-16)(12)}}{2(-16)}$$

$$x = \frac{-48 + \sqrt{3072}}{-32} \quad x = \frac{-48 - \sqrt{3072}}{-32}$$

$$x = \cancel{-0.2} \quad x = 3.2 \text{ seconds}$$