

Name: _____ Date: _____ Band: _____
Algebra 2

Quadratic Applications Study Guide

Solving Nonlinear Systems

1. Solve the system by elimination.

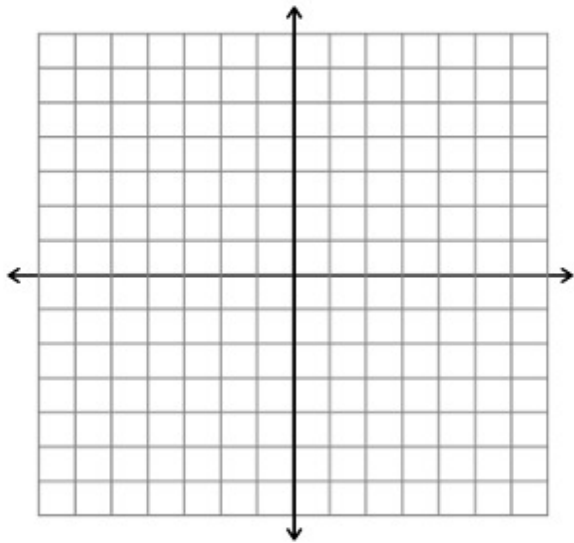
$$\begin{aligned}2x^2 - 8x + y &= -5 \\2x^2 - 16x - y &= -31\end{aligned}$$

Solve the system algebraically using substitution or elimination.

2. $\begin{aligned}2x^2 - 2 &= y \\-2x + 2 &= y\end{aligned}$

3. $\begin{aligned}x^2 - 6x + 13 &= y \\-y &= -2x + 3\end{aligned}$

4. Solve $y = -3x^2 + 5x - 1$
 $y = 5x^2 - 8x - 3$ by graphing.



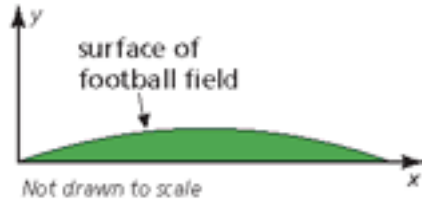
Word Problems

Launched Object

5. A soccer player kicks a ball downfield. The height of the ball increases until it reaches a maximum height of 8 yards, 20 yards away from the player. A second kick is modeled by $y = x(0.4 - 0.008x)$. Which kick travels farther before hitting the ground? Which kick travels higher?



6. Although a football field appears to be flat, some are actually shaped like a parabola so that rain runs off to both sides. The cross section of a field can be modeled by $y = -0.000234x(x - 160)$, where x and y are measured in feet. What is the width of the field? What is the maximum height of the surface of the field?



7. While marching, a drum major tosses a baton into the air and catches it. The height h (in feet) of the baton t seconds after it is thrown can be modeled by the function $h = -16t^2 + 32t + 6$.

A. Find the maximum height of the baton.

B. The drum major catches the baton when it is 4 feet above the ground. How long is the baton in the air?

8. A number A of tablet computers sold (in millions) can be modeled by the function $A = 4.5t^2 + 43.5t + 17$, where t represents the year after 2010. In what year did the tablet computer sales reach 65 million?



9. An employee at a local stadium is launching T-shirts from a T-shirt cannon into the crowd during an intermission of a football game. The height h (in feet) of the T-shirt after t seconds can be modeled by $h = -16t^2 + 96t + 4$. Find the maximum height of the T-shirt.

Maximizing Revenue

9. A skateboard shop sells 50 skateboards per week when the advertised price is charged. For each \$1 decrease in price, one additional skateboard per week is sold. The shop's revenue can be modeled by $y = (70 - x)(50 + x)$. Find the maximum weekly revenue.



Border/Area Problems

10. A rectangular enclosure at the zoo is 35 feet long by 18 feet wide. The zoo wants to double the area of the enclosure by adding the same distance x to the length and width. Write and solve an equation to find the value of x . What are the dimensions of the enclosure?