

Algebra II Pre-AP -- Assignment 52
Non-linear Systems and Applications of Conics

Solve #1 - 4 by graphing on a calculator. If you have to solve for y , show your work and write your equation(s) in calculator-ready form. Round your solutions to the nearest 0.001 where necessary.

A Problems (Required)		B Problems (for additional practice)	
1. $\begin{cases} y = (x+1)^2 - 2 \\ \frac{x^2}{25} + \frac{y^2}{9} = 1 \end{cases}$	2. $\begin{cases} 16x^2 + 9y^2 = 144 \\ 25x^2 - 4y^2 = 100 \end{cases}$	1. $\begin{cases} 16x^2 + 4y^2 = 64 \\ 3x + 4y = 12 \end{cases}$	2. $\begin{cases} x^2 + y^2 = 25 \\ xy = 10 \end{cases}$
3. $\begin{cases} x^2 - 9y = 0 \\ x - 2y = 2 \end{cases}$	4. $\begin{cases} x^2 - y^2 = 1 \\ 2x - y = 4 \end{cases}$	3. $\begin{cases} 9x^2 + 9y^2 = 1 \\ x = y^2 + 1 \end{cases}$	4. $\begin{cases} x^2 - y^2 = 4 \\ x + y = 4 \end{cases}$

Solve #5 - 10 algebraically using substitution or elimination.
Write each solution as a separate ordered pair giving exact values.

5. $\begin{cases} x^2 - y = 5 \\ 2x + y = 3 \end{cases}$	6. $\begin{cases} 4x^2 - y^2 = -12 \\ x + y = 3 \end{cases}$	5. $\begin{cases} x = y^2 - 9 \\ x - 4y = 12 \end{cases}$	6. $\begin{cases} x^2 - y^2 = 15 \\ x + y = 1 \end{cases}$
7. $\begin{cases} 2x^2 - 3y^2 = 30 \\ x^2 + y^2 = 25 \end{cases}$	8. $\begin{cases} x^2 + 3y^2 = 28 \\ x = y^2 \end{cases}$	7. $\begin{cases} x^2 - y^2 = 7 \\ x^2 + y^2 = 25 \end{cases}$	8. $\begin{cases} x^2 + y^2 = 12 \\ y = x^2 \end{cases}$
9. $\begin{cases} x^2 + 2y^2 = 23 \\ 2x^2 - y^2 = 1 \end{cases}$	10. $\begin{cases} y^2 = x + 7 \\ xy = 6 \end{cases}$ Problem 10 will lead to a cubic equation. It is okay to use a calculator to find the roots of that equation.	9. $\begin{cases} 4x^2 + 3y^2 = 24 \\ x^2 + y^2 = 7 \end{cases}$	10. $\begin{cases} y = x^2 - 1 \\ xy = -6 \end{cases}$ Problem 10 will lead to a cubic equation. It is okay to use a calculator to find the roots of that equation.
11. A semi-elliptical arch over a tunnel for a road has a major axis of 100 feet and its height at the center is 30 feet. a) Sketch the figure on the coordinate plane with the center at the origin. b) Find the equation of the ellipse described. You don't have to adjust your equation to describe only half an ellipse. c) Determine the height of the arch 5 feet from the edge of the tunnel.		11. A "sunburst" window above a doorway is constructed in the shape of the top half of an ellipse. The semi-ellipse is 20 in. tall at its highest point and is 80 in wide at the bottom. a) Sketch the figure on the coordinate plane with the center at the origin. b) Find the equation of the ellipse described. You don't have to adjust your equation to describe only half an ellipse. c) Determine the height of the arch 25 in. from the center of the base.	
12. Each cable of a suspension bridge is suspended in the shape of a very wide parabola between 2 towers that are 120 meters apart. The top of each tower is 30 meters above the roadway and the lowest point of each cable is at the midpoint between the towers 10 meters off the ground at the center of the bridge. a) Sketch and label one cable on the coordinate plane with the vertex at (0,10). b) Find the equation of the parabola described. c) How high is a cable that is 40 m from the center of the bridge?		12. In a suspension bridge, the shape of the suspension cables is parabolic. A certain bridge has towers that are 600 meters apart, and the lowest point of the suspension cables is 150 meters below the top of the 200 m towers. a) Draw and label a sketch of one cable on the coordinate plane with the origin located at the midpoint of the bridge. b) Find the equation of the parabola described. c) How high is a cable at a point that is 100 meters from one tower?	