



Grade Level(s): 9-12

Subject: Math (Algebra 2 or higher)

Florida Standard: MA.912.AR.9.1 Given a mathematical or real-world context, write and solve a system of two variable linear equations algebraically or graphically.

MA.912.AR.9.3 Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically.

MA.912.AR.9.6 Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or nonviable options.

Objective: Part of the plot in Shakespeare's Comedy of Errors surrounds the mishaps of a valuable gold necklace. Using their knowledge of solving systems of equations, students will analyze different supply/demand functions to determine the optimal selling price (or value) in different situations.

Duration: 50 Minutes

Key Vocabulary Terms:

- 1. Cartesian (x/y) coordinate plane
- 2. Function
- 3.Slope
- 4. System of equations
- 5. Solution
- 6. Supply and Demand
- 7.Equilibrium





Do Now/Bellwork:

Graph each equation on the same cartesian coordinate plane

1.y = 2x - 3 $2.y = -\frac{3}{4}x + 6$

Lesson Steps:

- 1.Explain (reexplain) what a system of equations represents (two or more equations existing at the same time) and how to find the solution to a system (the solution can be found 3 ways: Graphing, Substitution, or Elimination)
- 2. Demonstrate examples on solving systems of equations by graphing (graph the equations and identify the point of intersection)
- 3. Discuss real-world example of supply/demand curves and how using graphs to solve systems of equations can identify the optimal selling point of a product.

Assessment Steps:

- 1. Partner Up: Students will use graphing software to create a system of equations (linear or quadratic) and identify the solution. They will write down their system of equations on one side of an index card and the solution on the other. They will then find a partner and trade index cards with the goal of correctly finding the solution(s) to the system on the card they received. Repeat this process with 4 partners. The teacher will walk around and assess understanding by monitoring.
- 2. Students will complete a worksheet.



Do Now/Bellwork:

Graph each equation on the same cartesian coordinate plane.

1.y = 2x - 32.y = -1/2x + 7



Solving Systems of Equations (by Graphing)

The ______ to a system of equations can be seen visually as the ______ of two functions Identify the solution to the system of equations shown below



The Comedy of Errors

Student Page Book by William Shakespeare | Adapted by Jim Helsinger



Graph the given equations in order to identify the solution for the system.



The Price is Right!

5. Orlando Shakes is running a bake sale to raise money for their performance of Shakespeare's The Comedy of Errors. The demand for brownies is given by the equation $y = -\frac{1}{15}x - 3$ whereas the supply can be represented by the equation $y = -\frac{1}{30}x + 9$. What is the optimal number of brownies they need to make and the price they need to sell to meet demand?

6. Elon Musk is trying to determine the optimum number of Tesla Cybertruck's needed to reach demand, while at the same time achieving the optimum profit. From market research they have determined that the demand for the Cybertruck can be modeled by the equation $y = \frac{-1}{50}x + 75,500$ and supply can be produced at a rate determined by the function $y = \frac{1}{30}x - 500$. Use graphing software to find the number of trucks needed to be produced and the price to achieve equilibrium.

7. The graph below shows the supply of gold in Ephesus during the time of Shakespeare's The Comedy of Errors in black. The demand for gold is in red. As a goldsmith, using the graph below, what is the ideal price of gold in marks?





The Price is Right! ANSWER KEY

Do Now/Bellwork:

Graph each equation on the same cartesian coordinate plane.



Solving Systems of Equations (by Graphing)

The <u>Solution</u> to a system of equations can be seen visually as the <u>Intersection</u> of two functions Identify the solution to the system of equations shown below





2. The solution is (0, -4) and (4, 0)





The Price is Right! ANSWER KEY

Graph the given equations in order to identify the solution for the system.



The solutions are (0,1) and (1, 2)



The solutions are (3,0) and (6, 3)



The solution is (2, 1)



The solutions are (-3, 4) and (2, -1)



5. Orlando Shakes is running a bake sale to raise money for their performance of Shakespeare's The Comedy of Errors. The demand for brownies is given by the equation $y = -\frac{1}{15}x - 3$ whereas the supply can be represented by the equation $y = -\frac{1}{30}x + 9$. What is the optimal number of brownies they need to make and the price they need to sell to meet demand?



Need to make 120 brownies and sell them for \$5 each

6. Elon Musk is trying to determine the optimum number of Tesla Cybertruck's needed to reach demand, while at the same time achieving the optimum profit. From market research they have determined that the demand for the Cybertruck can be modeled by the equation $y = \frac{-1}{50}x + 75,500$ and supply can be produced at a rate determined by the function $y = \frac{1}{30}x - 500$. Use graphing software to find the number of trucks needed to be produced and the price to achieve equilibrium.



Need to make 1,425,000 trucks and sell them for \$47,000 each.

ORLANDO



The Price is Right! ANSWER KEY

7. The graph below shows the supply for gold in Ephesus during the time of Shakespeare's The Comedy of Errors in black whereas the demand for gold is in red. As a goldsmith, using the graph below what is the ideal price of gold in marks?



The ideal price of gold is 200 marks per ounce