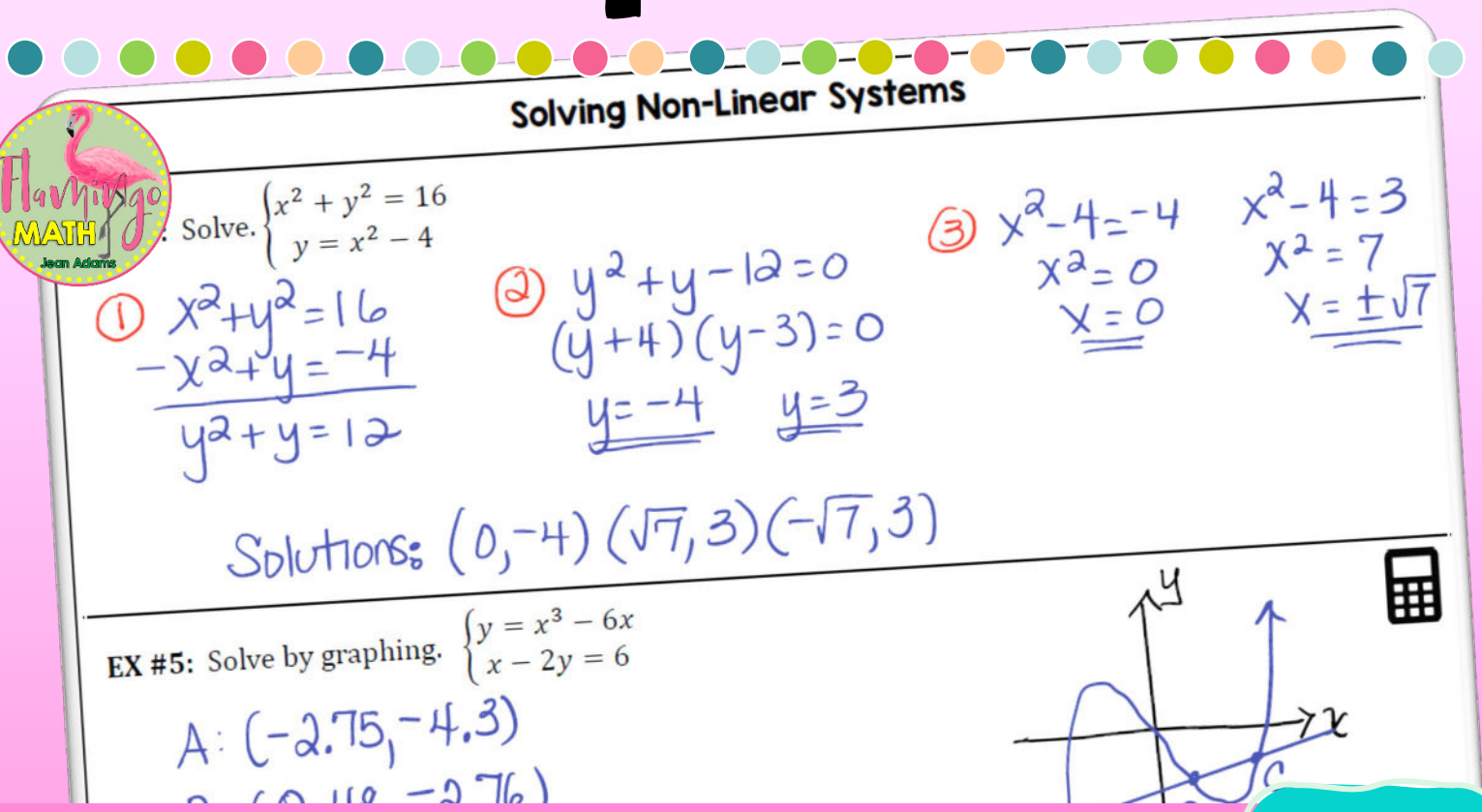
Precalculus Honors

Solving Systems of Equations



Completely Editable

7.1

Lesson 7.1: Solving Systems of Equations

A ***linear system*** or ***system of equations*** is a set of two or more equations using the same variables.
A ***solution*** consists of values for the variables that are solutions of each equation of the system.

Methods to Solve Systems of Equations:

1. Graphically
2. Substitution method
3. Elimination Method (Linear Combinations)
4. Matrices

Categorizing Systems by Names

Case	Number of Solutions	Name of System
Lines intersect		
Parallel lines		
Coinciding lines		

Solving a System by Elimination

1. Use the multiplication property of equality to create additive inverses for one variable.
2. Rewrite the system of equations to show at least one variable with additive inverses.
3. Then add the system together, you will then have one equation with one variable only, known as a linear combination of the original equations.
4. Solve for the remaining variable, then substitute this value back into one of the original equations to find the missing coordinate for the second variable.

EX #1: Solve. $\begin{cases} 3x - y = 7 \\ 2x - 5y = 9 \end{cases}$

Inconsistent and Dependent Systems

EX #2: Solve the system: $\begin{cases} 6x + 3y = 14 \\ 2x + y = 5 \end{cases}$

EX #3: Solve the system: $\begin{cases} 3x - y = 4 \\ -6x + 2y = -8 \end{cases}$

Solving Non-Linear Systems

EX #4: Solve. $\begin{cases} x^2 + y^2 = 16 \\ y = x^2 - 4 \end{cases}$

EX #5: Solve by graphing. $\begin{cases} y = x^3 - 6x \\ x - 2y = 6 \end{cases}$

EX #6: Solve $\begin{cases} y = x^3 + x^2 - 6x \\ y = 2x - x^2 \end{cases}$

Solving Systems with Three Variables

EX #7: Solve. $\begin{cases} x + y + z = 5 \\ 2x - y + 2z = 1 \\ 3x + 2y - z = -4 \end{cases}$

EX #8: Solve. $\begin{cases} x + y - z = 6 \\ x + 3y - 2z = 14 \\ 3x - 2y + z = -5 \end{cases}$

Curve Fitting with Systems

EX #9: Find real numbers a, b, and c so that the graph of the quadratic function $y = ax^2 + bx + c$ contains the points $(-1,11)$, $(2,5)$, and $(1,3)$.

Real-World Applications

EX #10: Kyle and Austin are taking the baseball team on a Spring Break road trip. They plan to rent a van, so everyone rides together. Airport Rentals has a flat rate of $50 plus 10 cents per mile. Best Auto & Van charges a $30 flat rate plus 15 cents per mile.

A. How many miles can the team drive in order to be charged the same amount by the two companies?

B. When would it benefit the boys to choose one plan over the other?

The total cost C of producing x units of a product has two components, the cost per unit and the initial cost. When the total revenue R equals the total cost C, the sales are at a **break-even point**. This point corresponds to the point of intersection of the cost function and the revenue function.

EX #11: A software developer invests $15,000 to produce a package that will sell for $75.25. Each unit can be produced for $37.55.

A. Write the cost and revenue functions for x units produced and sold.

B. Solve the system of equations to find the break-even point.

NOTES

7.1 **Solving Systems of Equations Homework**

Name _____

Date _____ Period _____

1. $\begin{cases} x + 2y = 10 \\ 5x + 4y = 26 \end{cases}$

2. $\begin{cases} 2m + 3n = 18 \\ 5m - n = 11 \end{cases}$

3. $\begin{cases} 3x + 11y = 31 \\ -2x - 5y = -9 \end{cases}$

4. $\begin{cases} 1.6x + 1.2y = 5.6 \\ 3.2x - 2.1y = 20.2 \end{cases}$

5. $\begin{cases} \frac{4}{5}x - \frac{3}{2}y = 6 \\ \frac{2}{5}x - \frac{3}{4}y = -3 \end{cases}$

7. $\begin{cases} \frac{1}{2}x - \frac{3}{2}y = -3 \\ \frac{5}{6}x + \frac{1}{3}y = 17 \end{cases}$

8. $\begin{cases} \frac{x+3}{4} + \frac{y-1}{3} = -1 \\ 2x - y = 18 \end{cases}$

9. $\begin{cases} y = 3x + 3 \\ y = -5x - 17 \end{cases}$

10. $\begin{cases} \frac{2}{x} - \frac{1}{y} = 0 \\ \frac{4}{x} - \frac{3}{y} = -1 \end{cases}$

12. $\begin{cases} x + 2y - 3z = -1 \\ 2x - y - 2z = 2 \\ x - 3y + z = 1 \end{cases}$

13. $\begin{cases} 4x - z = 10 \\ 6x + 5y - z = -1 \\ -x - y + 5z = -9 \end{cases}$

14. $\begin{cases} 2x + 4y + z = 2 \\ 2x - 4y + 6z = 11 \\ 4x - 2y + z = 8 \end{cases}$

15. $\begin{cases} x + y - 2z = 3 \\ 2x - 3y + 6z = 8 \\ 3x - 2y + 4z = 1 \end{cases}$

16. $\begin{cases} x + 2y + z = 7 \\ x - 2y + 3z = -1 \\ 2x + y + z = 3 \end{cases}$

Problems 17 – 18, find real numbers a, b, and c so that $y = ax^2 + bx + c$ contains the point

17. $(-3,1)$, $(1,-3)$ and $(-2,6)$

18. $(-2,10)$, $(2,-2)$, and $(3,-2.5)$

Problems 19 – 22, write a system of equations for each scenario and solve.

19. The Robotics Team wants to buy t-shirts for their upcoming competition. One printing company charges $8.75 per shirt and a $30 art fee. Another company charges $7.50 and a $45 art fee. Find the number of t-shirts where the price will be the same.

20. The drama class held a spring play at school. They charged $8.00 for adults and $6.00 for students and $4.50 for senior citizens. They sold twice as many student tickets as adult tickets. The total number of tickets sold was 307 and the total proceeds for the play was $1947.00. How many adults, students, and senior citizens saw the spring play?

21. In a basketball tournament, the Titans defeated the Panthers by a score of 65 to 53. The Titans won by scoring a combination of one-point free throws, two-point and three-point field goals. The number of free throws was one less than the number of three-point field goals and 7 less than the number of two-point goals. Find the combination of scores that the Titans scored to win the tournament.

22. A small airplane flies 600 miles in 3 hours with a tail wind. One the return trip, it takes the pilot 4 hours against the wind. Find the average air speed of the plane and the wind speed.

Practice Sets

Lesson Warm-Ups

3. Solve. $\begin{cases} -\frac{5}{7} - \frac{11}{7}x = -y \\ 2y = 7 + 5x \end{cases}$

Name _____ Date _____ Period _____

Lesson 7.1 Solving Systems of Equations **Warm-Up # 2**

1. Solve. $\begin{cases} 6x - 12y = 24 \\ -x - 6y = 4 \end{cases}$

2. Solve. $\begin{cases} -24 - 8x = 12y \\ 1 + \frac{5}{9}y = -\frac{7}{18}x \end{cases}$

3. Solve. $\begin{cases} -4y - 11x = 36 \\ 20 = -10x - 10y \end{cases}$

Form A

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riod _____

2. Solve: $\begin{cases} 5x - y = 13 \\ 2x + 3y = 12 \end{cases}$

3. Solve: $\begin{cases} 3x - 2y = 0 \\ 5x + 10y = 4 \end{cases}$

Grade:

7.1 Solving Systems of Equations **Form B**

Name _____

Date _____ Period _____

1. Solve: $\begin{cases} 2x - y = 5 \\ 5x + 2y = 8 \end{cases}$

2. Solve: $\begin{cases} 2x - 3y = -8 \\ x + 3y = 5 \end{cases}$

3. Solve: $\begin{cases} 3x - 8y = -12 \\ 3x + 2y = 18 \end{cases}$

Grade:

Daily Lesson Quiz