Goal 1: Functions & Algebra

Systems of Linear Equations – Standard Form

OBJECTIVE	CORE LEARNING GOALS
• Students will write systems of equations and find solutions to systems of equations. • Students will explain how they determined their solutions to a system of equations. Students will also justify their solutions. • Students will write equations in standard form and then graph the equations using slope-intercept form.	1.2.1 The student will determine the equation for a line, solve linear equations, and/or describe the solutions using numbers, symbols, and/or graphs. 1.2.3 The student will solve and describe if and where two straight lines intersect using numbers, symbols, and or graphs.
DRILL	MATERIALS • Graphing Calculator • Student Worksheet • Answer Key • Additional Problems
CALCULATOR SKILLS • Setting up appropriate viewing windows • Graphing systems of linear equations • Finding the point of intersection of two equations	
ACTIVITIES 1. **Drill**. 2. **Systems of Linear Equations – Shopping –** Incorporate group work and class discussions into the **Lesson** as students complete the **Student Worksheet.** 3. **Additional problems –** These problems are provided for you to use in any one of a variety of ways such as homework, an individual check for understanding, review, or quiz.	
ASSESSMENT Drill Class discussion Group work	HOMEWORK

SHOPPING
(Systems of Linear Equations – Standard Form)

Lesson:

A clothing store sells jeans for one price and tee shirts for another price. Sam purchases two pair of jeans and six tee shirts for $60. Jose purchases four pairs of jeans and three tee shirts for $75.

1. Write a system of equations that could be used to determine the cost of one pair of jeans (x) and the cost of one tee shirt (y).

2. Solve each equation for y. Enter the equations into your calculator.

> Teacher Tip:
> Some calculators will not accept an equation written in standard form. It may be necessary to discuss with the students how to transform the equations into an appropriate form for the calculator they are using.

3. Set up an appropriate graphing window, and then graph the equations.

> Teacher Tip:
> At this point stop and discuss with your students what makes an appropriate window. Discuss the mathematics behind graphing equations just as if you were graphing it on paper. Discuss the domain and range of the graphs. Help students to see the equations in different windows and understand the need for an appropriate window.

4. Use your calculator to find the point of intersection of the two lines. (CLG: 1.2.3)

> Teacher Tip:
> Discuss the meaning of the point of intersection of the two equations in the context of the problem. Also discuss different ways, other than graphing, that a solution to a system of equations may be found.

5. What is the meaning of this point of intersection in the context of this problem? Use mathematics to justify your answer.

6. How much does each pair of jeans cost? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

7. How much does each tee shirt cost? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

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Student Worksheet:

A clothing store sells jeans for one price and tee shirts for another price. Sam purchases two pair of jeans and six tee shirts for $60. Jose purchases four pairs of jeans and three tee shirts for $75.

1. Write a system of equations that could be used to determine the cost of one pair of jeans (x) and the cost of one tee shirt (y).

2. Solve each equation for y. Enter the equations into your calculator.

3. Set up an appropriate graphing window, and then graph the equations.

4. Use your calculator to find the point of intersection of the two lines.

5. What is the meaning of this point of intersection in the context of this problem? Use mathematics to justify your answer.

6. How much does each pair of jeans cost? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

7. How much does each tee shirt cost? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

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Answer Key

1. Write a system of equations that could be used to determine the cost of one pair of jeans (x) and the cost of one tee shirt (y).

   $2x + 6y = 60$
   $4x + 3y = 75$

2. Solve each equation for y. Enter the equations into your calculator.

   $Y = (-1/3)x + 10$
   $Y = (-4/3)x + 25$

3. Set up an appropriate graphing window, and then graph the equations.

4. Use your calculator to find the point of intersection of the two lines.

   (15, 5)

5. What is the meaning of this point of intersection in the context of this problem? Use mathematics to justify your answer.

   The x value of the point of intersection is the cost of a pair of jeans and the y value is the cost of a tee shirt. This is true because the point of intersection of two lines is the point that makes both equations true.

6. How much does each pair of jeans cost? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

   A pair of jeans cost $15.
   Example explanation: I found this by determining the x value of the point of intersection.

7. How much does each tee shirt cost? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

   A tee shirt cost $5.
   Example explanation: (algebraic)

   $2x + 6y = 60$ $\qquad$ $-4x - 12y = -120$
   $4x + 3y = 75$ $\qquad$ $4x + 3y = 75$

   $-9y = -45$
   $y = 5$ $\quad$ *tee shirts cost $5*

Systems of Linear Equations
Additional Problems

1. The Marvin family likes to go to major league baseball games. On opening day at Major League Stadium the family bought 4 sodas and 4 hotdogs for $14.50. One month later, the Marvin family attended another game at Major League Stadium. At this game, they bought 2 sodas and 5 hotdogs for $13.25.
   - What is the cost of sodas and hotdogs at Major League Stadium? Use mathematics to explain how you determined your answer. Use words, symbols or both in your explanation.

2. Sam has a collection of fifty baseball cards. The Major League baseball cards are worth $3.50 each and the Minor League baseball cards are worth $2.00 each. Sam's collection is worth $122.50.
   - Write a system of equations that can be used to determine the number of each type of card Sam has.
   - How many of each type of card does Sam have? Use mathematics to justify your answer.

3. At the grocery store, apples are one price and chocolate bars are another. Mary buys three apples and one chocolate bar for $2.70. Bill buys one apple and 4 chocolate bars for $6.40.
   - Write a system of equations that can be used to determine the cost of apples and chocolate bars.
   - Determine the cost for an apple and a chocolate bar at the grocery store. Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.