Lab Framework

Text: CORD

Unit number and title: Unit 26 Systems of Equations

Short Description: students create their own word problems to better understand how to solve systems of equations.

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Word Problems

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  To write word problems for use in future classes.
- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  basic arithmetic
- **Vocabulary**
  none
- **Materials List**
  per student: handout, pair of dice
- **State Standards addressed**
  Math: A1.4.D: Write and solve systems of two linear equations in two variables
  A1.3.C: Evaluate $f(x)$ at a (i.e., $f(a)$) and solve for x in the equation $f(x) = b$.
  A1.5.G: Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others
- **Leadership Skills**
  creativity, communication
- **SCAN Skills/Workplace Skills**
  Not quite sure how to cite the SCAN skills.
- **Set-up information**
  Pass out one handout to each student. Pass out pair of dice to each student (students can share in small groups if not enough dice).
- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**
  Time: no more than one class period. If students need additional time, the project becomes homework.
- **Teacher Assessment of student learning** (scoring guide, rubric)
  Students assess each other's work for clear communication and algebraic correctness.
- **Summary of learning** (to be finished after student completes lab)
  Students are more confident in ability to solve system of equations and decipher word problems.
- **Optional activities**
  After students understand basic process with positive integers, this activity is easily adapted to include negative integers and then fractions/decimals.
- **Career Applications**
  Agriculture, Business & Marketing, Health Occupations, Home Economics, Industrial Technologies

LAB TITLE: Unit 26: Writing Word Problems

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  Student will create and write a word problem in order to understand how to decipher and solve systems of equations.

- **Grouping instructions and roles**
  Each student will write their own problems, then have two other students proof read and verify solution.

- **Procedures** – steps to follow/instructions

PART 1 DATA

1. Students pick a store or restaurant they like (Nordstrom). Students name two items along with the prices for these two items from this business (shirts for $30 and pants for $50). It is best if students round prices to whole numbers. Students name two variables based on these items (s for shirts and p for pants).
2. Students roll a pair of dice (5, 2). These two numbers represent how many of each item the student purchases (5 shirts, 2 pants).

PART 1 EQUATION 1

1. students add the two die together to determine how many total items they purchased (5 + 2 = 7 items).
2. students write equation (s + p = 7)

PART 1 EQUATION 2

1. students complete table (5 shirts at $30 each is $150 and 2 pants at $50 each is $100).
2. students write the total amount spent on all items ($150 + $100 = $250)
3. students write equation (30s + 50p = 250)

PART 1 SUMMARY

1. students write both equations (s + p = 7 and 30s + 50p = 250)
2. students write the question ("How many of each item did I buy?")

PART 2 DATA

1. Students pick a store or restaurant they like (Nordstrom). Students name two items along with the prices for these two items from this business (shirts for $30 and pants for $50). It is best if students round prices to whole numbers. Students name two variables based on these items (s for shirts and p for pants).
2. Students write the solution to the word problem ((s, p) = (30, 50))
3. Students roll a pair of dice (5, 2). These two numbers represent how many of each item the student purchases (5 shirts, 2 pants).
4. Students roll a pair of dice (1, 4). These two numbers represent how many of each item a friend purchases (1 shirts, 4 pants).

PART 2 EQUATION 1

1. students determine how much money they spent on their items (5x30 + 2x50 = 250)
2. students write equation (5s + 2p = 250)

PART 2 EQUATION 2

1. students determine how much money their friend spent on their items (1x30 + 4x50 = 230)
2. students write equation (1s + 4p = 230)

PART 2 SUMMARY

1. students write both equations (5s + 2p = 250 and 1s + 4p = 230)
2. students write the question ("What is the price of each item?")

- **Outcome instructions**

Once students have equations and questions they will write the word problem. Students will have two other students proof read and solve the problem.

> *I went to Nordstrom and bought some shirts and pants. Shirts cost $30 and pants cost $50. I bought a total of seven items and spent a total of $250. How many of each item did I buy?*
>
> *I went to Nordstrom with Roger and we each bought some shirts and pants. I bought 5 shirts and 2 pants and spent a total of $250. Roger bought 1 shirt and 4 pants and spent a total of $230. How much did each item cost?*

- **Assessment instructions** (peer-teacher)
  Students will have other students proof and solve the equations. If the peer-evaluators do not understand the problem or cannot solve the problem, the student-creator will need to revise and ask two other students to proof and solve the equations.

Lab Data Collection

Student: _____ **Date:** _____

Unit: 26: Systems of Equations **Lab Title:** Writing Word Problems, Part 1

Criteria: Write the problem/objective in statement form

Given the solution and the coefficients, students will create the two equations and then write a word problem for the two equations.

Data Collection: Record the collected/given data

Name of store at which you like to shop: _____

Item 1 you buy at this store and its price: _____ Variable1 based on this item:_____

Item 2 you buy at this store and its price: _____ Variable2 based on this item:_____

(die1, die2) = (variable1, variable2) is how many of each item you bought:_____

Equation 1: Complete the given process to create the first equation

This equation represents how many items you bought.

How many total items did you buy?_____

variable1 + variable2 = total First equation: _____

Equation 2: Complete the given process to create the first equation

The solution represents how much money you spent.

How many of item 1 did you buy?_____	How many of item 1 did you buy?_____
What is the price per item?_____	What is the price per item?_____
How much did you spend?_____	How much did you spend?_____

What was the total amount spent?_____

price1 x variable1 + price2 x variable2 = total spent

Second equation: _____

Summary Statement:

First Equation: _____ Second Equation: _____

The question this solution answers:_____

Lab Data Collection

Student: _____ **Date:** _____

Unit: 26: Systems of Equations **Lab Title:** Writing Word Problems, Part 2

Criteria: Write the problem/objective in statement form

Given the solution and the coefficients, students will create the two equations and then write a word problem for the two equations.

Data Collection: Record the collected/given data

Name of store at which you like to shop: _____

Item 1 you buy at this store and its price: _____ Variable1 based on this item:_____

Item 2 you buy at this store and its price: _____ Variable2 based on this item:_____

SOLUTION: (price1, price2) = (variable1, variable2) _____

(die1, die2) = (coefficient1, coefficient2) is how many of each item you bought:_____

(die3, die4) = (coefficient3, coefficient4) is how many of each item a friend bought:_____

Equation 1: Complete the given process to create the first equation

This equation represents how much money you spent.

coefficient1 x variable1 + coefficient2 x variable2 = total you spent

First equation: _____

Equation 2: Complete the given process to create the first equation

This equation represents how much money your friend spent.

coefficient3 x variable1 + coefficient4 x variable2 = total friend spent

Second equation: _____

Summary Statement:

First Equation: _____ Second Equation: _____

The question this solution answers:_____