Road Trip

Reporting Category	Equations and Inequalities
Topic	Writing equations to describe real-life data; creating statistical plots
Primary SOL	A.4 The student will solve multistep linear and quadratic equations in two variables, including e) solving systems of two linear equations in two variables algebraically and graphically; and f) solving real-world problems involving equations and systems of equations.
Related SOL	A.4d, A.7f

Materials

- Graphing calculators
- Road Trip, Saving Money, and Salaries activity sheets (attached)

Vocabulary

independent variable, dependent variable (earlier grades)

linear equation, system of linear equations (A.4)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Distribute copies of the Road Trip activity sheet. Have students investigate the problem and the cost for Prestige Auto by working in pairs to complete the Prestige Auto chart, concentrating on the independent and dependent variables. Have students write an equation that represents this data.
2. Then, have students complete the same procedure for Getaway Auto, entering the data in the Getaway Auto chart and writing an equation to represent this data.
3. Have students fill in the data in the third chart and then answer the questions comparing the data and the range of values to determine when it makes sense to use one or the other auto rental company.
4. Have students enter the two equations into the graphing calculator's *Y* = screen. Have them use their graphing calculators to graph the data and verify their answers in steps 1 and 2, based on the graphs.

Assessment

- **Questions**
  - Write a system of equations that has (2, −3) as the solution.
  - Write a system of equations that has no solution.
- **Journal/Writing Prompts**
  - Write about a real-world situation that can be solved using systems of equations.
- **Other**
  - Distribute copies of the "Salaries" activity sheet, and have students follow the same procedures to complete the problem.

Extensions and Connections (for all students)

- Distribute copies of the "Saving Money" activity sheet, and have students follow the same procedures to complete the problem.

Strategies for Differentiation

- Encourage the use of graph paper, graphing calculators, pictorial representations of the problems, and graphic organizers to represent the information.
- Have students use highlighters to highlight important information in word problems.
- Some students may need to do the first problem collaboratively in a small group and then do the rest in pairs. Other students may need to do the first few rows of the first problem collaboratively and then do the rest in pairs.
- Have students write the equation for each car rental company at the top of the columns in the chart.

Road Trip

Name _____

Date _____

You are planning a one-day road trip, but you don't have a car. You have investigated rental cars available from companies in the area and have decided to rent a car from either Prestige Auto or Getaway Auto.

1. Prestige Auto charges $35 a day plus 24¢ per mile. Fill in data in the chart below to indicate the charges you would incur for rental from Prestige Auto.

Miles Driven	Start up Cost	Cost for Miles Driven	Total Cost of Trip
0			
20			
40			
60			
80			
100			
120			
140			
160			

- Which values change in this situation? _____
- What causes the values to change? _____
- What is the *independent* variable? (causes the change) _____
- What is the *dependent* variable? (is affected by the change) _____
- Write an equation in words to explain the situation. _____

  _____
- Write an equation in algebraic notation to explain this situation. _____

2. Getaway Auto charges $51 a day plus 16¢ per mile. Fill in data in the chart below to indicate the charges you would incur for rental from Getaway Auto.

Miles Driven	Start-up Cost	Cost for Miles Driven	Total Cost of Trip
0			
20			
40			
60			
80			
100			
120			
140			
160			

- Which values change in this situation? _____
- What causes the values to change? _____
- What is the *independent* variable? (causes the change) _____
- What is the *dependent* variable? (is affected by the change) _____
- Write an equation in words to explain the situation. _____

  _____
- Write an equation in algebraic notation to explain this situation. _____

3. Complete the table below, using the equations you developed in no. 1 and 2.

Miles Driven	Cost of Car from Prestige Auto	Cost of Car from Getaway Auto
50		
75		
100		
200		
250		
300		
325		

- Is there a particular number of miles driven at which the cost of using Prestige is the same as using Getaway? _____ If so, what is it? _____
- Is there a range of values of miles driven in which the cost of using Prestige is less than using Getaway? _____ If so, what is it? _____
- When is it cheaper to use Getaway? _____

Saving Money

Name _____

Date _____

Nilda has $480 dollars in her sock drawer. She plans to save $30 per week from now on.

1. Complete the chart to show the amount of money Nilda has in her sock drawer.

No. of Weeks	Beginning Amount	Amount Added	Total Amount
0			
1			
2			
3			
4			
5			
6			

- Which values change in this situation? _____
- What causes the values to change? _____
- What is the *independent* variable? (causes the change) _____
- What is the *dependent* variable? (is affected by the change) _____
- Write an equation in words to explain the situation. _____

  _____
- Write an equation in algebraic notation to explain this situation. _____
- At this rate, after how many weeks will Nilda have $690 in her sock drawer? _____
- After how many weeks will she have $2,040 in her sock drawer? _____
- If Nilda's mom had put money in Nilda's sock drawer at the same rate each week, how long had Nilda's mom been saving before Nilda took over? _____
- Put your equation in the *Y* = screen of your graphing calculator. Do your answers match the graph? _____ Do your answers match the table? _____

Salaries

Name _____

Date_____

Manny just graduated from high school and has been offered a job. He will start at $18,000 per year with a promise of a $500 raise per year. Sonny just graduated from college and has been offered a job. He has been offered $24,000 per year with a promise of a $300 raise per year.

1. Complete the following chart.

Manny		**Sonny**	
# Years Experience	**Salary**	**# Years Experience**	**Salary**
0		**0**	
1		**1**	
2		**2**	
3		**3**	
4		**4**	
5		**5**	

- What is the *independent* variable? _____
- What is the *dependent* variable? _____
- Enter the data into LIST on the graphing calculator, and create a scatterplot with STAT PLOT.
- What is the equation for each graph? _____
- Graph the equations on the same screen. Does Manny ever make more money than Sonny? _____ If so, when? _____ How do you know? _____

  _____
- You want to know after how many years Manny and Sonny will make the same amount of money. Since *y* represents the amount of money each person earns, and you want to know when these two amounts become the same, what can you do algebraically to determine this equalization?

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  _____

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