Goal 1: Functions & Algebra

Linear Relationships – Standard Form

OBJECTIVE	CORE LEARNING GOALS
• The students will use a graphing calculator to examine the association between the data points and equation of a linear relationship. • The students will write equations in standard form and then graph the equations using the slop-intercept form.	1.1.2 The student will represent patterns and/or functional relationships in a table, as a graph, and/or by mathematical expression. 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.
DRILL	MATERIALS • Student Government Fund-raiser (Lesson, Student Worksheet, Answer Key, Extra Practice Items) • Graphing calculators

CALCULATOR SKILLS

- Enter data into a list.
- Set up an appropriate graphing window.
- Graph equations and data points.
- Set up and examine tables.

ACTIVITIES

1. **Drill**.
2. **Student Government Fund-raiser** – Incorporate group work and class discussions into the **Lesson** as students complete the **Student Worksheet**.
3. **Extra Practice Items** – Students work together to complete the problems.

ASSESSMENT	HOMEWORK
Class discussion Group work	

Student Government Fundraiser

Lesson:

Engage the students in the content.

The student government is selling baskets of fruit to raise money. A small basket costs $8 and a large basket costs $12. The students need to sell $3000 worth of baskets.

1. Write an equation that represents the different amounts of $8 baskets ($x$) and $12 baskets ($y$) that could be sold to raise the money needed. (CLG: 1.2.1)

2. Use the equation to complete the table below. Use mathematics to justify each answer. (CLG: 1.2.1)

Fruit Baskets

$8 baskets ($x$)	$12 baskets ($y$)
0	
	0

3. Enter the values from the table into the list storage of your calculator.

> Teacher Tip:
> Instruct the students on how to enter a list. This includes setting up the number of lists you wish to use. Discuss with students how to name their lists if the calculators have that capability.

4. State an appropriate graphing window and then graph the data using that window. (CLG: 1.1.2)

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

5. What type of relationship exists in the data points? Use mathematics to justify your answer. (CLG: 1.1.1)

> Teacher Tip:
> Discuss with the students linear and non-linear relationships.

6. Write your equation in slope-intercept form. Enter and graph your equation in the calculator. Describe the association between the data points and the graph of the line.

> Teacher Tip:
> You may need to review with the students how to write an equation in standard form in slope-intercept form.
> Discuss with the students how to graph the equation and data points together.

7. What is the *y*-intercept of the equation and what does it mean in the context of the problem?

> Teacher Tip:
> The students need to see the connection between the *y*-intercept and the table created in question 2.

8. What is the slope of the equation and what does it mean in the context of the problem?

> Teacher Tip:
> Students should use the table feature of the calculator to see the connection between the slope and the table values.

9. Suppose the student government needed to raise $3600.

- Write an equation that describes the number of each type of basket that could be sold to raise the money needed.
- Find three possible combinations of baskets that could be sold to raise $3600. Use mathematics to justify your answer.

Student Government Fund-raiser

Student Worksheet:

The student government is selling baskets of fruit to raise money. A small basket costs $8 and a large basket costs $12. The students need to sell $3000 worth of baskets.

1. Write an equation that represents the different amounts of $8 baskets ($x$) and $12 baskets ($y$) that could be sold to raise the money needed.

   Equation: _____

2. Use the equation to complete the table below. Use mathematics to justify each answer.

Fruit Baskets

(x)	(y)
0	
	0

3. Enter the values from the table into the list storage of your calculator.

4. State an appropriate graphing window and then graph the data using that window.

5. What type of relationship exists in the data points? Use mathematics to justify your answer.

6. Write your equation in slope-intercept form. Enter and graph your equation in the calculator. Describe the association between the data points and the graph of the line.

7. What is the y-intercept of the equation and what does it mean in the context of the problem?

8. What is the slope of the equation and what does it mean in the context of the problem?

9. Suppose the student government needed to raise $3600.

   - Write an equation that describes the number of each type of basket that could be sold to raise the money needed.
   - Find three possible combinations of baskets that could be sold to raise $3600. Use mathematics to justify your answer.

Student Government Fund-raiser
Answer Key

1. Equation: $8x + 12y = 3000$

2. The students must give (0, 250) and (375, 0) and three other correct sets of data points. All sets of data points must be justified. Example justification: 8(0) + 12(250) = 3000

5. The data points are linear because there is a constant rate of change.

6. The graph of the line goes through the data points.

7. The *y*-intercept is (0, 250). This means that the student government could sell two hundred fifty $12 baskets and no $8 baskets to raise the money needed.

8. The slope of the equation is –2/3. This means that as the number of $12 baskets decreases by 2 the number of $8 baskets increases by 3.

9. 8x + 12y = 3600

   The combinations that the students give will vary. All answers must be justified.

Linear Relationship – Standard Form

Extra Practice Items:

1. You have $24.00 to purchase grapes and strawberries for a party. Grapes cost $1.50 per pound and strawberries cost $2.00 per pound. What are three different amounts of grapes and strawberries that you could purchase to spend the $24.00? Use mathematics to justify each answer.

2. Suppose you have two summer jobs. You earn $6 per hour cutting lawns and $4 per hour baby-sitting. You want to earn $180. What are three different combinations of hours that you would need to work at each job to earn the $180? Use mathematics to explain how you determined your answers. Use word, symbols, or both in your explanation.

3. The drama club is selling tickets for a play. Adult tickets cost $5 each and student tickets cost $3 each. The drama club needs to sell $2400 worth of tickets. Write an equation that describes the number of adult and student tickets that could be sold to raise the money needed. What are five different combinations of adult and student tickets that need to be sold to raise $2400? Use mathematics to justify each answer.