Module: Mathematical Reasoning

Lesson Title: Which Cell Phone Plan Should I Choose?

Objectives and Standards

Students will:
- Compare two cell phone plans through examples of different usage
- Write equations to model allocation of money for cell phone usage
- Graph and solve a system of equations
- Analyze the solution and the meaning of the graph

Mathematical Reasoning 2014 GED® Assessment Targets	Mathematical Practices 2014 GED® Assessment Targets
Solve algebraic and real-world problems that involve linear equations. (A.2.a and A.2.b)	Make sense of problems and persevere in solving them. (CCSS.Math.Practice.MP1)
Locate points and graph linear equations on the coordinate place. (A.5.a and A.5.d)	Model with mathematics. (CCSS.Math.Practice.MP4)
Find the slope of a line from a graph, equation, or table. (A.5.b) .	Use appropriate tools strategically. (CCSS.Math.Practice.MP5)
	Look for and make use of structure. (CCSS.Math.Practice.MP7)

Materials

- Computer with Internet access (optional)
- Information about current cell phone plans (optional)
- *What Plan Will You Choose?* Activity Sheet
- *What Plan Will You Choose?* Answer Key
- *What's the Best Plan?* Activity Sheet

Instructional Plan

Overview

In this lesson, students compare and contrast different costs associated with cell phone plans. The lesson requires that students write equations with two variables and graph the equations. Then students analyze the meaning of the graph and discuss other factors that may be important when selecting a cell phone plan.

Process

Ask students whether or not they have a cell phone and what type of plan they have. Ask students how they selected the specific plan. As a class, discuss different options provided by phone plans, such as rates charged for text messaging, rates for voice minutes, data plans, etc. Discuss the difference between pre-paid plans,

monthly contracts, and one- or two-year contracts. Examples of current plans offered by cell phone companies may be included as part of the discussion.

Divide the class into small groups of 2 to 4. Explain that students will be reviewing two prepaid plans offered by two different cell phone companies. Distribute the What Plan Will You Choose? activity sheet to each student. Have students complete questions 1 to 5. When finished, have the class discuss the answers. Students may have found *x-* or *y-* values that are decimals or fractions. Discuss why this is not a viable answer. Ensure that everyone has the correct equation.

Next, have groups graph their equations using whatever method they choose (slope and *y*-intercept, *x/y* table, or *x* and *y* intercepts).

Discuss the students' graphs. Determine which plan was most popular and why. Create a list of pros and cons of each plan on the board. Discuss that there is no right answer for this question. However, investigating plans mathematically can lead one to make a better, more informed decision.

Sample Debriefing Questions

- Under what circumstances is each cell phone plan better? (Plan A is better when you talk on the phone more. Plan B is better when you send text messages more.)
- What does the graph of each equation represent? (Combinations of texts and minutes that cost exactly $25.)
- What does the space underneath the graph of the line represent? (Combinations of texts and minutes that cost less than $25.)
- What does the space above the graph of the line represent? (Combinations of texts and minutes that cost more than $25.)
- Can you use quadrant II, III, or IV?(No, because you cannot have negative minutes or negative text messages.)
- What other factors might you consider when choosing a cell phone plan? (Answers will vary.)

Assessments/Extensions

1. Have students solve a similar problem using two other cell phone plans.
2. Provide students with the average number of text messages sent and the average number of minutes used by a particular person. Have students determine which plan the person should choose and how much money would be saved.
3. Have students research and compare plans offered by two or more different companies. Have them compare different factors, such as free evening and weekend minutes or cell phones offered by the company. Discuss how these variables would affect their choices.
4. Use scenarios to have students improve their understanding of solving systems of linear equations by graphing. Assign students scenarios, such as those in Handout 2: What's the Best Plan? Have each group decide which plan best suits the situation and graph the solution. Have students share their reasons for their solutions.

What Plan Will You Choose?

Your budget allows you $25 per month for a cell phone plan. To make the best decision, you've found the two plans below. Compare the cell phone plans and select the one that's right for you.

	Voice Minutes	Text Messages
Plan A	5¢/minute	15¢/message
Plan B	10¢/minute	5¢/message

1. If you choose to only send text messages, which plan will allow you to send the most? How many will you be able to send?

2. If you choose to only talk on the phone, which plan will allow you to talk the longest? How long will you be able to talk?

3. If you talk for a total of two hours in a month, how many texts will you be able to send under Plan A? under Plan B?

4. Create names for Plan A and Plan B that clearly communicate the benefits of each plan to potential customers.

5. Write an equation for each plan to represent the number of text messages (x) and the number of voice minutes (y) you will be able to use with the $25. You should have a separate equation for each plan.

6. Graph the two equations on the same coordinate grid.

7. Where do the graphs of the equations intersect? What does this point represent?

8. Which plan would you choose? Why? Use mathematical reasoning in explaining your choice.

What Plan Will You Choose? Answer Key

1. Plan A: 166 (the exact value is 166 2/3, but you can't send a fraction of a message); Plan B: 500 Plan B allows you to send the most text messages.

2. Plan A; 500; Plan B: 250. Plan A allows you to talk the longest.

3. Plan A: 126 (the exact value is 126 2/3, but you can't send a fraction of a message); Plan B: 260

4. Answers will vary.

5. Plan A: $25 = 0.15x + 0.05y$ and Plan B: $25 = 0.05x + 0.1y$

6. Graph the two equations on the same coordinate grid.
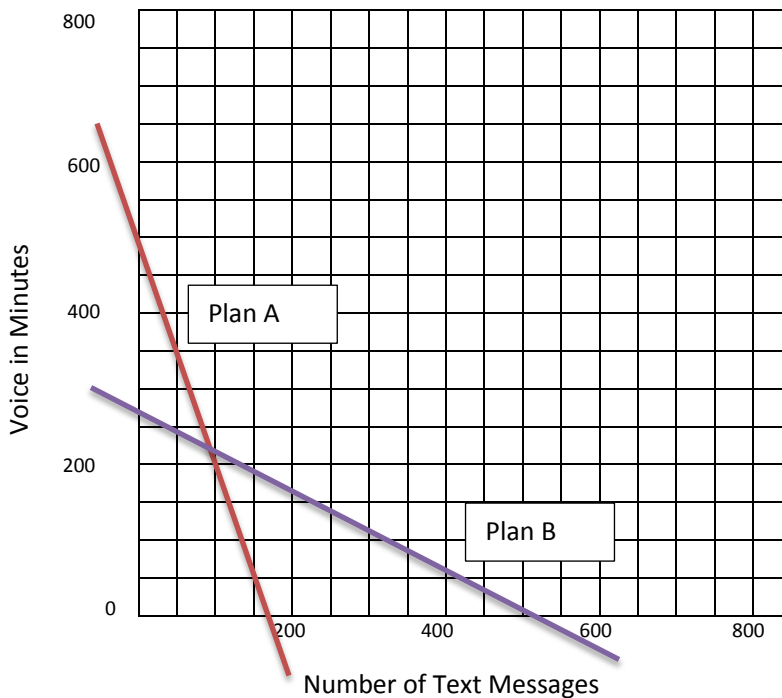
7. The graphs intersect at (100,200). This represents the number of text messages and the number of minutes used when both plans are the same.

8. Use mathematical reasoning in explaining your choice. Answers will vary. However, possible answers may be Plan B because I text more than talk or Plan B because the prices are lower per minute or Plan A because I talk more than text.

What's the Best Plan?

Scenario #1

Dave talks on his cell phone approximately 750 minutes a month.   Most of his friends are Cell Wireless subscribers. He also sends and receives about 200 texts a month. Which plan should Dave choose?

Scenario #2

Dave talks on his cell phone approximately 250 minutes a month. Most of his friends are Mobile Cell subscribers. He also sends and receives about 500 texts a month. Which plan should Dave choose?

Cell Wireless

Plan	Plan A	Plan B
Features	300 minutes/month Unlimited night & weekend minutes Unlimited calling to all Cell Wireless subscribers No long distance charges 250 Incoming/Outgoing texts with non-Cell Wireless subscribers Unlimited texts to Cell Wireless subscribers	500 minutes/month Unlimited night & weekend minutes Unlimited calling to all Cell Wireless subscribers No long distance charges 500 Incoming/Outgoing texts with non- Cell Wireless subscribers Unlimited texts to Cell Wireless subscribers
Monthly Charge	$29.99	$44.99
Additional Features	$10.00 –Unlimited Incoming/ Outgoing texts with non- Cell Wireless subscribers $0.10 – Each additional text over 250 $0.20 – Each additional minute over 300 minutes	$8.00 – Unlimited Incoming/ Outgoing texts with non- Cell Wireless subscribers $0.05 – Each additional text over 500 $0.15 – Each additional minute over 500 minutes

Mobile Cell

Plan	Plan A	Plan B
Features	450 minutes/month Unlimited night & weekend minutes Unlimited calling to all Mobile Cell subscribers No long distance charges 400 Incoming/Outgoing texts with non-Mobile Cell subscribers Unlimited texts to Mobile Cell subscribers	600 minutes/month Unlimited night & weekend minutes Unlimited calling to all Mobile Cell subscribers No long distance charges 800 Incoming/Outgoing texts with non- Mobile Cell subscribers Unlimited texts to Mobile Cell subscribers
Monthly Charge	$41.99	$55.99
Additional Features	$10.00 - Unlimited Incoming/Outgoing texts with non- Mobile Cell subscribers $0.10 – Each additional text over 400 $0.15 – Each additional minute over 450 minutes	$8.00 - Unlimited Incoming/Outgoing texts with non- Mobile Cell subscribers $0.05 – Each additional text over 800 $0.05 – Each additional minute over 600 minutes