

Tennessee Comprehensive Assessment Program

TCAP/CRA 2013



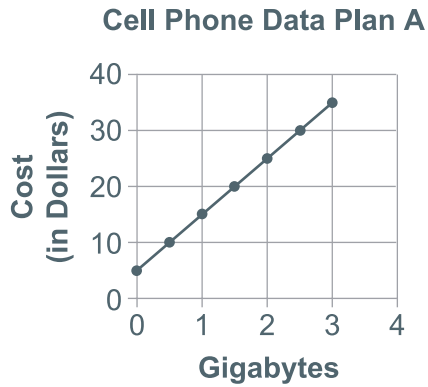
8

Task 1 Scoring Guide

Cell Phone Plan Task

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.



Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?



1. Cell Phone Plan Task Scoring Guide

The CCSS for Mathematical Content (1 point)

8.F.A.2 Compares the characteristics of the two functions to determine which plan costs less. The student may use one of the following approaches: _____

- determining that each function is linear with a slope of 10 and that the y -intercept for Plan A is greater than 2.5.
- using at least two different x -values to calculate the resulting costs for each plan. Noting that both functions are linear, and that for each x -value, Plan A costs more than Plan B. The student may also show this by plotting the points for Plan B.
- creating a table for each plan for at least two values and noting that Plan A costs 2.50 more than Plan B.
- determining the equation of the line for Plan A and noting that the slope for each equation is 10 but the y -intercept for Plan A is greater than 2.5.

(1 Point)

Total Content Points _____

The CCSS for Mathematical Practice (1 point)

MP1 Demonstrates an understanding of the situations described and provides a reasonable method for comparing properties of the two functions. _____

(1 Point)

(MP1: Make sense of problems and persevere in solving them.)

Total Practice Points _____

Total Awarded Points _____

The CCSS for Mathematical Content Addressed in This Task

Define, evaluate, and compare functions.

8.F.A.2 Compare properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

The CCSS for Mathematical Practice*

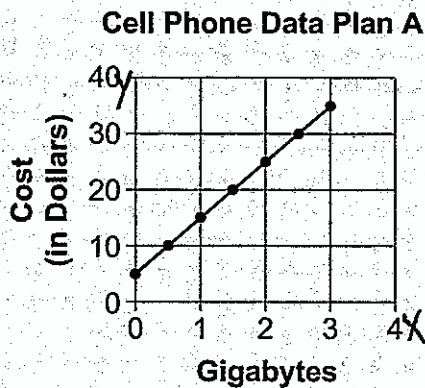
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*Gray text indicates Mathematical Practices that are not addressed in this task.

Students' responses to a mathematical task provide evidence of what they understand and are able to do in relation to the standards and practices. Across tasks, this cumulative evidence shows students' understanding and abilities within a domain. When students do not respond completely to all parts of a task, they provide insufficient evidence of their mathematical understanding and abilities and therefore do not fully demonstrate the expectations of the standards and practices aligned with that task.

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.




Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

$$0.5 = 7.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

 I disagree because plan B is actually cheaper. If you plug in the number of GB in Plan B's equation, which is the x . Then the cost turns out less than the cost of Plan A. Therefore I disagree with Makeda.

Cost per GB	Cost per GB
Plan A	Plan B
0.5 GB = 7.5 \$	0.5 GB = 7.5 \$
1 GB = 15 \$	1 GB = 12.5 \$
1 1/2 GB = 20 \$	1 1/2 GB = 17.5 \$
2 GB = 25 \$	2 GB = 22.5 \$

GB = Gigabytes

Guide 1

Litho 872802

Total Content Points: 1 (8.F.A.2)

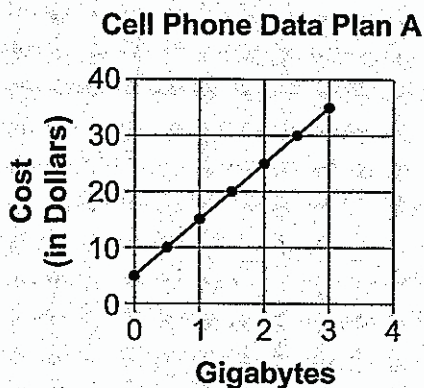
Total Practice Points: 1 (MP1)

This student successfully compares the characteristics of the two functions by using a table of values to test 4 data points for the two functions, showing that for each value Plan A costs more than Plan B (8.F.A.2). The student demonstrates an understanding of the situation by utilizing the constructed table of values to compare the functions, which begin as a graphed line and a given equation, and concludes that Plan B is cheaper (MP1).

Total Awarded Points: 2 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.



Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

I disagree because the cost of 1 Gigabyte is \$15 dollars for plan A and \$12.50 for plan B. For 2 Gigabytes for plan A is \$25.00 and for plan B it is \$22.50. overall it is cheaper for plan B.

↙ more

Plan A - $y = 10x + 5$
 $10 \times 2 + 5 = 25$

Plan B - $y = 10x + 2.5$ ↙ less
 $10 \times 2 + 2.5 = 22.50$

Key

$x = \text{Gigabytes}$

$y = \text{Cost}$

Guide 2

Litho 867700

Total Content Points: 1 (8.F.A.2)

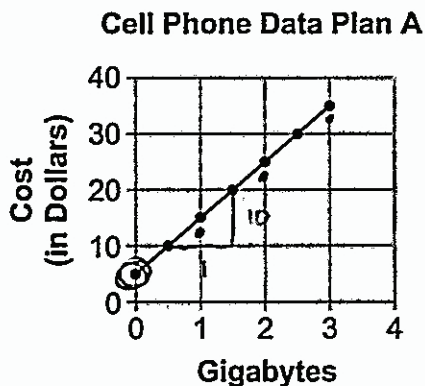
Total Practice Points: 1 (MP1)

This student successfully compares the characteristics of the two functions by substituting two x values, 1 and 2 gigabytes, for each function to calculate the resulting costs (8.F.A.2). The student demonstrates an understanding of the situation by choosing to compare two different values for each plan to show that Plan B costs less than Plan A (MP1).

Total Awarded Points: 2 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.




Plan B

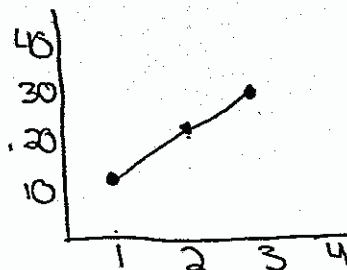
This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

 I disagree with Makeda, Plan A costs more than Plan B.

The graph for Plan B's equation:



Plan B has a lower y -intercept and a ~~the~~ same slope as Plan A.

Plan B

Ex: $y = 10x + 2.5$

$$y = 10(1) + 2.5$$

$$y = \boxed{\$12.5}$$

Plan A

$$y = 10x + 5$$

$$y = 10(1) + 5$$

$$y = \boxed{\$15}$$

The y -intercept of graph A is 5.

Guide 3

Litho 850922

Total Content Points: 1 (8.F.A.2)

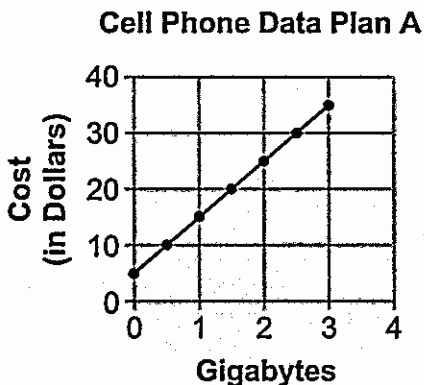
Total Practice Points: 1 (MP1)

This student successfully compares the characteristics of the two functions by indicating that the equation of the line for Plan A is $10x + 5$ and noting that this slope is the same as Plan B's slope, while stating that Plan B has a lower y -intercept at 2.5 (8.F.A.2). Determining the equation for Plan A to compare the slope and y -intercept of the two functions is a reasonable method to demonstrate understanding of the situation (MP1).

Total Awarded Points: 2 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.




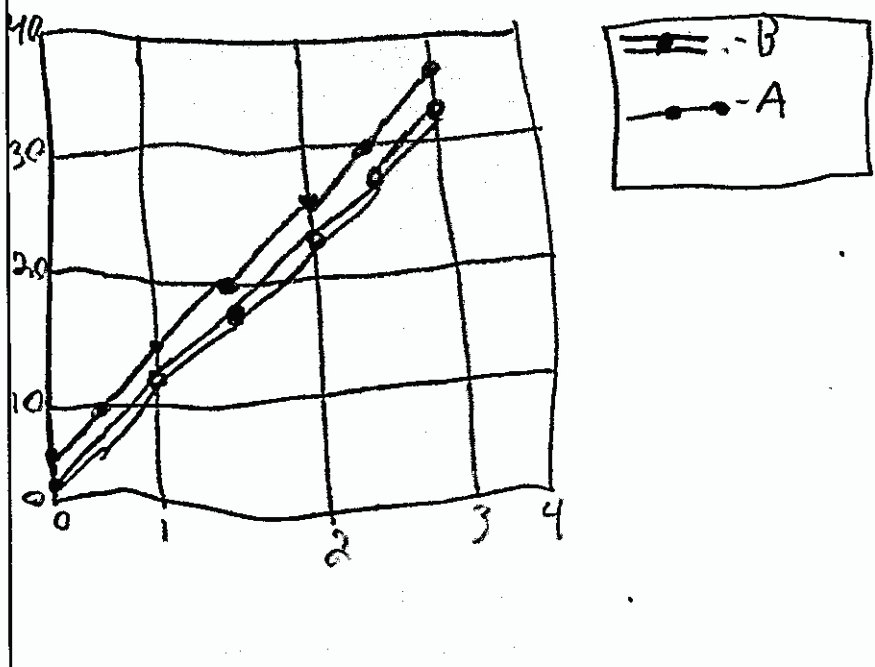
Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

 I disagree with Makeda because Plan B is \$2.50 cheaper than A through out the whole chart. For example look at the chart below.



Gigabytes	Plan A Cost (\$)	Plan B Cost (\$)
0	5	2.5
1	15	12.5
2	25	22.5
3	35	32.5

Guide 4

Litho 853764

Total Content Points: 1 (8.F.A.2)

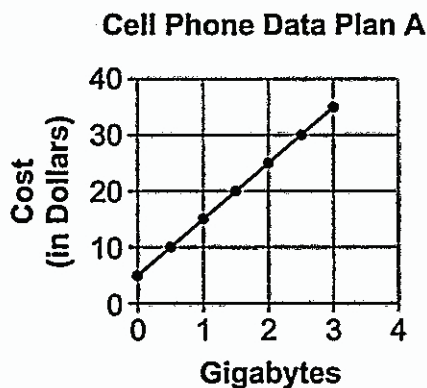
Total Practice Points: 1 (MP1)

This student successfully compares the characteristics of the two functions by correctly plotting 6 data points from Plan B against Plan A and stating that Plan B is \$2.50 cheaper than Plan A throughout the graph (8.F.A.2). By plotting the line of the equation for Plan B, the student has used a reasonable method of comparison between the two functions (MP1).

Total Awarded Points: 2 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.




Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

 I disagree because if you replaced x with let's say 1, that would be 12.5

$$10(1) + 2.5 = 12.5$$

On plan A, 1 gigabyte costs 15 dollars. 15 is more than 12.5, so plan B would be cheaper.

Total Content Points: 0

Total Practice Points: 1 (MP1)

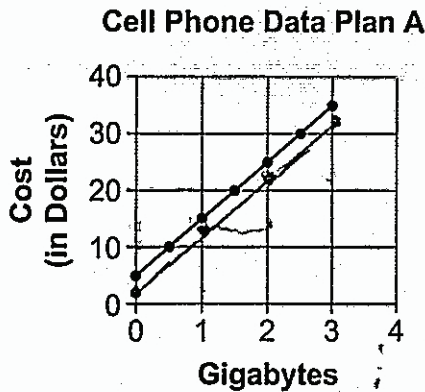
This student does not successfully compare the characteristics of the two functions, only using the x value of 1 gigabyte to compare Plan A to Plan B, which is not enough evidence to back up the claim that Plan B costs less than Plan A at all values of x (no credit for 8.F.A.2). However, using 1 gigabyte as a test value to compare the two functions shows some understanding of the task, and that the student recognizes that the two plans can be compared even though they are represented in different ways (MP1).

Total Awarded Points: 1 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.

A $\frac{15}{1}$ \$
1 month
B $\frac{13}{1}$ \$
1 month



Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

I disagree because Plan A has a higher unit rate ($\frac{15}{1}$) than Plan B ($\frac{13}{1}$).

Total Content Points: 0

Total Practice Points: 1 (MP1)

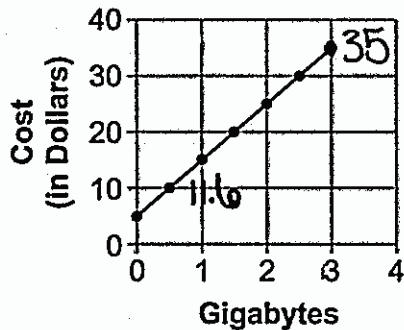
This student does not successfully compare the characteristics of the two functions, incorrectly stating that Plan A has a higher unit rate than Plan B, although the two functions actually share the same slope (no credit for 8.F.A.2). Even though the student does not show understanding of slope, the student makes sense of the problem by correctly plotting 4 data points (for x values 0, 1, 2, and 3) from Plan B onto the graph of Plan A, which shows evidence of comparison between the two plans (MP1).

Total Awarded Points: 1 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.

Cell Phone Data Plan A



Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

Plan B

I agree, because plan a cost \$11.60 per gigabyte, & plan B cost \$12.50 per gigabyte. Plan B has a greater slope than plan a. Plan a cost \$0.90 less than Plan B.

Total Content Points: 0

Total Practice Points: 1 (MP1)

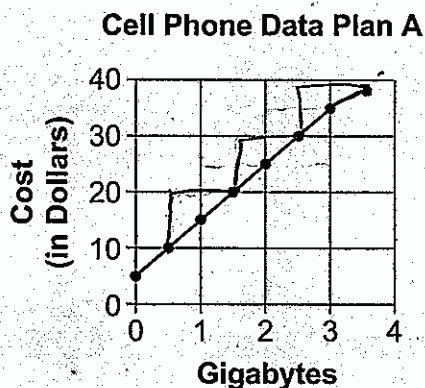
This student does not successfully compare the characteristics of the two functions, incorrectly claiming that Plan A costs \$11.60 per gigabyte and arguing that Plan B has a greater slope than Plan A (no credit for 8.F.A.2). The incorrect answer is based on an incorrect reading of the graph for Plan A, and the student demonstrates some understanding of the situation by correctly plotting and labeling 4 data points from Plan B on a separate graph as a means of comparison with Plan A (MP1).

Total Awarded Points: 1 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.

rise
run




Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

\swarrow Slope \nwarrow Intercept

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

 disagree, because they cost the same when you do rise over run, you rise ten, and run one. Which equals the same as plan a.

Total Content Points: 0

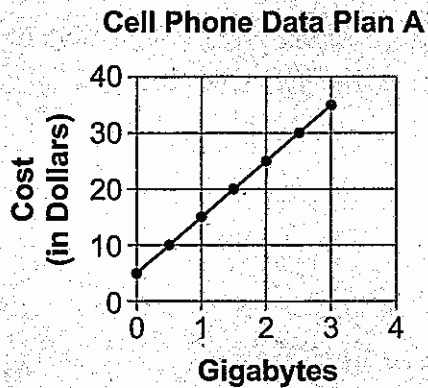
Total Practice Points: 0

This student does not successfully compare the characteristics of the two functions, making the incorrect claim that the two plans cost the same amount based on the reasoning that the slope of 10 is the same. While true that the slopes are equivalent, no mention is made of the y -intercepts of either plan (no credit for 8.F.A.2). The student does not demonstrate an understanding of the situation, describing rise over run on the graph of Plan A rather than making a comparison between the equations or multiple data points from each plan (no credit for MP1).

Total Awarded Points: 0 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.



Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?



Yes, because $10 \cdot 1 + 2.5 = 12.5$
 $10 \cdot 2 + 2.5 = 22.5$
 $10 \cdot 3 + 2.5 = 32.5$

Total Content Points: 0

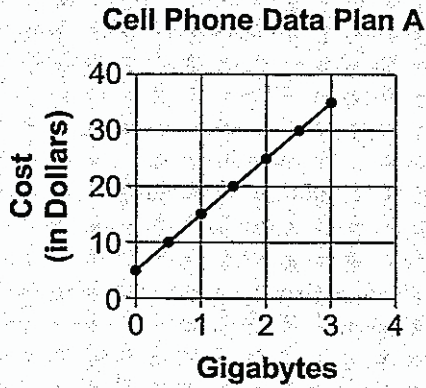
Total Practice Points: 0

This student does not successfully compare the characteristics of the two functions, incorrectly claiming Plan A is cheaper and insufficiently supporting this answer by testing 3 x values in Plan B only, rather than contrasting with the corresponding values from Plan A (no credit for 8.F.A.2). Without a comparison of resulting y values to corresponding points in Plan A, no reasonable method for contrasting the two functions has been used (no credit for MP1).

Total Awarded Points: 0 out of 2

Task 1. Cell Phone Plan Task

Makeda is comparing data plans for 2 cell phone companies.



Plan B

This company gives its cell phone data plan as an equation where x is the number of gigabytes used and y is the cost:

$$y = 10x + 2.5$$

Makeda decides that Plan A costs less than Plan B. Do you agree or disagree? Why?

Handwritten student response:

Plan B $y = 10x + 2.5$

Plan A $y = \frac{1}{2}x + 2.5$

$y = mx + b$

I agree with Makeda, because the slope on Plan A is less than the slope on Plan B.

Total Content Points: 0

Total Practice Points: 0

This student does not successfully compare the characteristics of the two functions, incorrectly determining the equation of the line for Plan A through use of an incorrect slope and y -intercept, making any comparison invalid (no credit for 8.F.A.2). The response does not support an understanding of the situation described or provide the basis for a reasonable method of comparison because the slope and y -intercept of Plan A's equation are incorrect (no credit for MP1).

Total Awarded Points: 0 out of 2