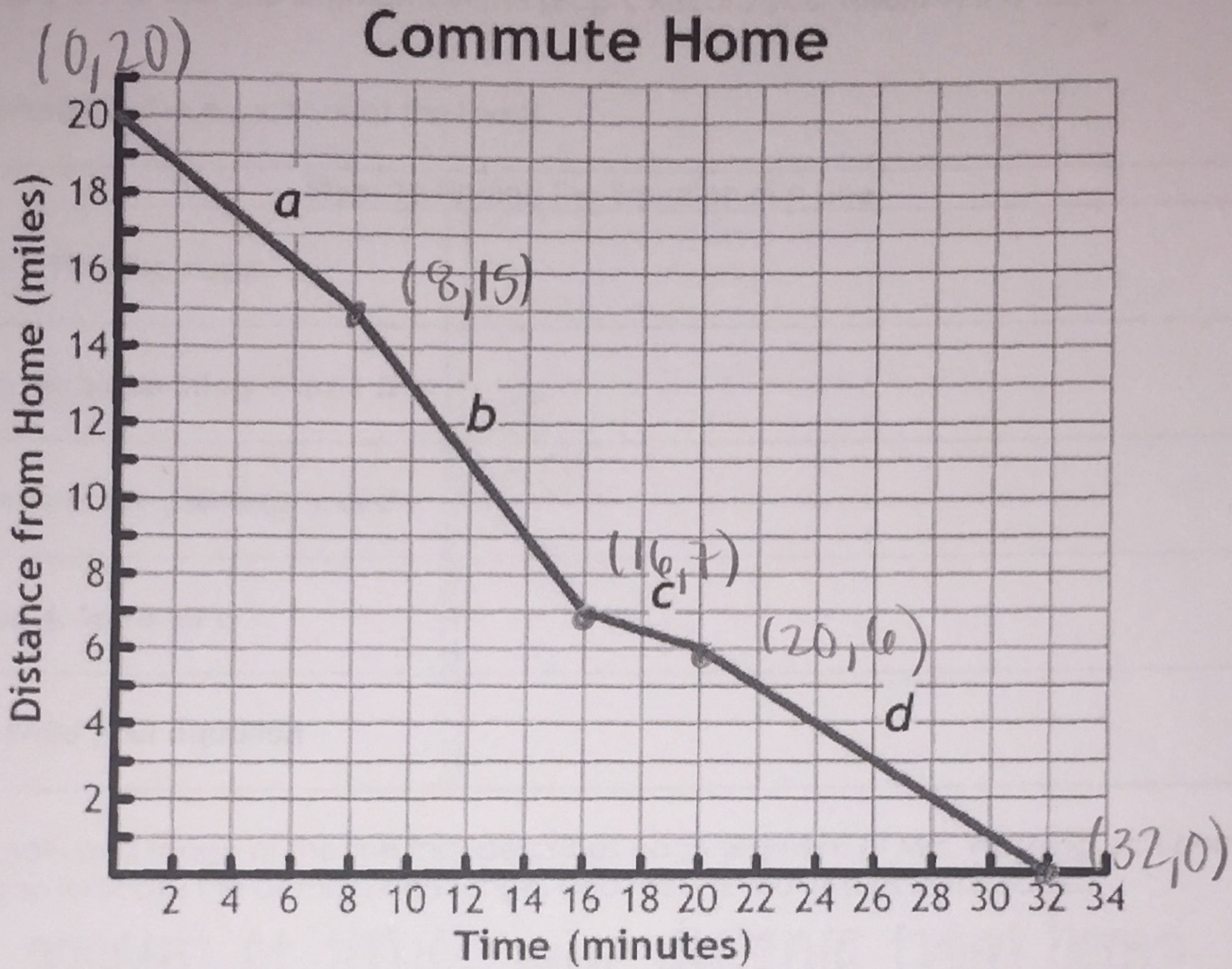


Using Functions in Models and Decision Making: Step and Piecewise Functions

Unit 5C: SAS 9

Mrs. Washington lives 20 miles from her office and drives her car to and from work every day. The graph below shows her distance from home over time as she drove home from work one day.



1. Write a dependency statement expressing the relationship between the two variables, distance and time.

Mrs. Washington's distance from home depends on the amount of time she's been driving.

The following table will be used to answer Questions 2, 6, and 8.

Segment	Slope	Equation of Line	Domain	Range
a	$\frac{20-15}{0-8} = -\frac{5}{8}$	$y = -\frac{5}{8}x + 20$	$0 \leq x < 8$	$15 < y \leq 20$
b	$\frac{7-15}{16-8} = -1$	$7 = -1(16) + b$ $b = 23$ $y = -1x + 23$	$8 \leq x < 16$	$7 < y \leq 15$
c	$\frac{6-7}{20-16} = -\frac{1}{4}$	$6 = -\frac{1}{4}(20) + b$ $b = 11$ $y = -\frac{1}{4}x + 11$	$16 \leq x < 20$	$6 < y \leq 7$
d	$\frac{0-6}{32-20} = -\frac{1}{2}$	$0 = -\frac{1}{2}(32) + b$ $b = 16$ $y = -\frac{1}{2}x + 16$	$20 \leq x \leq 32$	$0 \leq y \leq 6$

2. Find the slope of each line segment in the graph of Mrs. Washington's commute. Record your results in the table.

3. How did you find the slope of each segment?

$m = \frac{y_2 - y_1}{x_2 - x_1}$ where (x_1, y_1) and (x_2, y_2) are the endpoints of each segment.

4. What does the slope of a line segment represent in the context of this situation?

the speed at which Mrs. Washington is driving

5. Is the slope an increasing or decreasing rate of change? What does this mean in the context of this situation?

decreasing - her distance from home decreases as the amount of time increases.

6. Find the equations of the four line segments in the graph. Record your results in the table.

7. How did you determine the equations of the lines?

Steps To Finding the Equation of a Line	
Step 1: Find the slope	
Step 2: Plug in the slope into $y = mx + b$	see
Step 3: Plug in one of the points for x and y	front
Step 4: Solve for b	
Step 5: Write your equation	

8. Identify the domain and range of the line that describes each segment of Mrs. Washington's commute. Use inequality symbols to indicate the domain and range, and record your results in the table.

Domain: amount of time driven Range: distance from home

9. Graph the line that represents Segment **a** in your graphing calculator. To do this, set your viewing window to match the graph at the beginning of the activity.

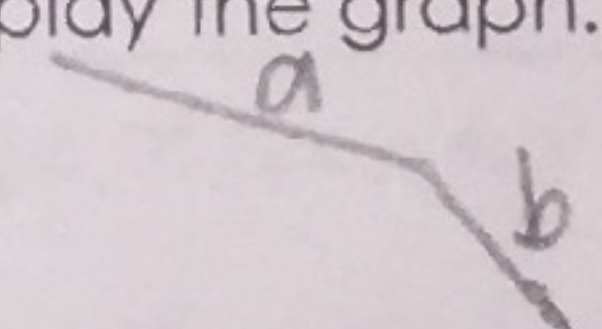
xmin: 0 xsc1: 2 ymin: 0 ysc1: 2
xmax: 34 ymax: 20

10. Now, restrict the domain of the line. If possible, use graphing technology. Sketch your graph. Explain why the graph looks like it does.

ex. $y = -\frac{5}{9}x + 1$ / $(x \geq 0 \text{ and } x < 8)$ graph
 domain is restricted so graph only shows values of the function when $x < 8$.
 ↑ division ↑ 2nd → math ↑ 2nd → math ↑ 2nd → math → logic

11. Graph the line that represents Segment **b**. Restrict the domain of the line as needed. What do you expect the graph to look like? Sketch your prediction before you actually draw or display the graph.

very similar to the graph on the front.



12. How does your prediction compare with what the graph looks like? Explain any differences.

very close - the slope is negative, there's a short line segment

13. Repeat the procedure to graph the lines for Segment **c** and Segment **d**. Sketch your final graph.

