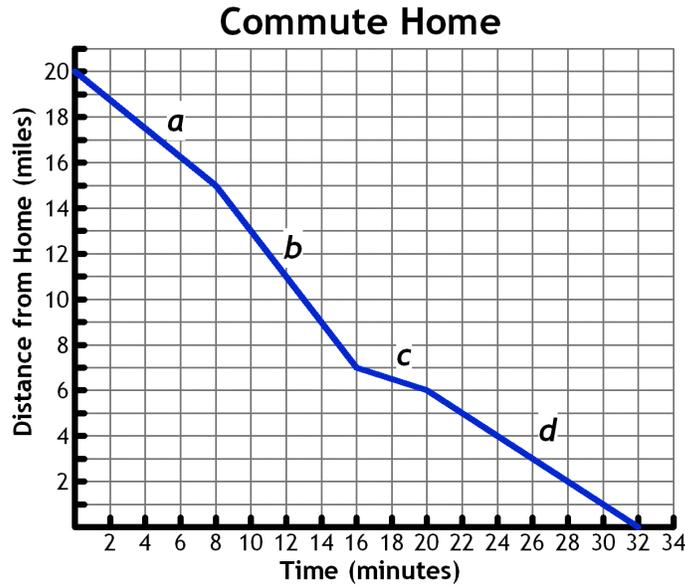


## Using Functions in Models and Decision Making: Step and Piecewise Functions

### V.C Student Activity Sheet 9: Another Piecewise Function

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.



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

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

Segment	Slope	Equation of Line	Domain	Range
<i>a</i>				
<i>b</i>				
<i>c</i>				
<i>d</i>				

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

### V.C Student Activity Sheet 9: Another Piecewise Function

---

- Find the slope of each line segment in the graph of Mrs. Washington's commute. Record your results in the table.
- How did you find the slope of each segment?
- What does the slope of a line segment represent in the context of this situation?
- Is the slope an increasing or decreasing rate of change? What does this mean in the context of this situation?
- Find the equations of the four line segments in the graph. Record your results in the table.
- How did you determine the equations of the lines?
- 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.
- 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.
- Now, restrict the domain of the line. If possible, use graphing technology. Sketch your graph. Explain why the graph looks like it does.
- 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.
- How does your prediction compare with what the graph looks like? Explain any differences.
- Repeat the procedure to graph the lines for Segment **c** and Segment **d**. Sketch your final graph.
- What piece of information did you need to enter into the calculator to tell it which parts of the four lines it should graph?

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

### V.C Student Activity Sheet 9: Another Piecewise Function

15. **REFLECTION:** Describe earlier types of functions that can be analyzed using the terminology used with step and piecewise functions. Give an example of an application of the function.

The height of a diver above a body of water as a function of time can be given using two different functions: a constant function for the time the diver is on the diving board and a quadratic function for the time when the diver jumps off the board and falls toward the water.

Rafael is on vacation with his family in Acapulco, Mexico. La Quebrada is a famous cliff that is about 35 meters above the ocean surface. For many years, divers have jumped off La Quebrada into the Pacific Ocean. Rafael has signed up to go cliff diving.

16. Rafael stands on the cliff, 35 meters above the ocean surface below. What function describes his height above the ocean surface ( $h$ ) as a function of time ( $t$ ) while he stands on the cliff?

Rafael is next. He walks to the edge of the cliff and stands still for 3 seconds. Then he dives off the cliff. As soon as he leaves the cliff, his height above the ocean surface can be found using the function  $h = -4.9(t - 3)^2 + 35$ , where  $h$  represents Rafael's height from the ocean surface and  $t$  represents the time since Rafael stood at the edge of the cliff.

17. Fill in the table below to describe Rafael's height above the ocean surface over time.

	Function, $h(t)$	Domain
Standing still		
Free-fall motion		

18. Use the domain restrictions to graph Rafael's height above the ocean surface over time on your graphing calculator, if possible. Describe the domain, range, and scaling and sketch the graph.
19. **EXTENSION:** What other situations could be modeled using piecewise functions like the ones used to describe Mrs. Washington's commute or Rafael's cliff-diving experience? Investigate one of the situations and prepare a brief report for the class regarding your