

Name: _____ Date: _____ Period: _____

Piecewise Function Activity

Steve Butabi really enjoys spending money. Steve realizes that he has to make money in order to spend money. Please use the facts and the table below to model the amount of money that Steve has at any given time.

- Steve started with \$10 in his wallet.
- For two days Steve mowed lawns, earning \$15/day.
- Steve realized that his brother Doug was making more money (\$45/day) working at a carnival and decided to join him for a day.
- Tired from his work, Steve stayed in bed for three days, neither making money nor spending.
- Steve then spent \$5 in a day on a new app.
- Steve had so much fun with his new app that he spent 8 times the initial amount (\$40/day) for each of the next two days unlocking new levels.
- Sadly, Steve ran out of money and had to begin working again...

1. Complete the table.

Time (days)	Amount of Money Steve Has (\$)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

2. You are now going to plot your points on a graph. Open you web browser and visit www.desmos.com/calculator. In the upper left hand corner, click on the "+" symbol and add a table. As you fill out the table the points will be plotted, but you may not be able to see all of them at first.
3. To adjust the bounds of your Desmos graph we're going to need adjust the Graph Settings using the wrench in the upper right corner. Change your x-axis bounds to run from -1 to 12 and your y-axis bounds to run from -10 to 100.
4. Draw a quick sketch of your graph below, including labels. Don't forget to connect the points.



4. Label the pieces of the graph with letters A through E.
5. What pieces have positive slopes? Why are these slopes positive?
6. What pieces have negative slopes? Why are these slopes negative?

7. What is the slope of piece A, and what does it represent in this context?

8. What is the slope of piece B, and what does it represent in this context?

9. What is the slope of piece C, and what does it represent in this context?

10. What is the slope of piece D, and what does it represent in this context?

11. What is the slope of piece E, and what does it represent in this context?

12. Order pieces A through E from most steep to least steep and explain your thinking.

13. Using all the terminology you've learned this year, describe the all characteristics of this graph that you can possibly think of. Explain your thinking for each term you feel applies.

This scenario is a piecewise function, which means it behaves differently between different points. For instance not all the pieces have the same rate of change.

14. Fill out the bounds of the following piecewise function for each piece we investigated today:

Hint: When did piece A start and stop?

$$y = \begin{cases} \text{Piece A} & _ \leq x \leq _ \\ \text{Piece B} & _ < x \leq _ \\ \text{Piece C} & _ < x \leq _ \\ \text{Piece D} & _ < x \leq _ \\ \text{Piece E} & _ < x \leq _ \end{cases}$$

Piecewise functions are functions whose equations change for different parts or pieces of the domain. Each of these different equations models a different piece of the function. For instance, $y = 15x + 10$ could model Piece A, but not the entire function. When connected together though, these different equations model the whole function.

15. Transfer your bounds from #14 to complete the following piecewise function for today's scenario.

$$y = \begin{cases} 15x + 10 & _ \leq x \leq _ \\ 45x - 50 & _ < x \leq _ \\ 0x + 85 & _ < x \leq _ \\ -5x + 115 & _ < x \leq _ \\ -40x + 360 & _ < x \leq _ \end{cases}$$