



# Cell Phone Range

## Student Activity

Name \_\_\_\_\_

Class \_\_\_\_\_

### Definition

The domain is the set of \_\_\_\_\_. The output of a function is called the \_\_\_\_\_.

### Problem 1 – Cell Phone Situation

Your friend has a cell phone that charges 40 cents per minute. However, he is not allowed to use it for more than 4 minutes.

1. If he talks for 0.5 seconds, how much is the fee?
2. If the cost is a function of time, what is the domain of the cost function?

Press **[stat]** **[enter]**. In list **L1**, enter numbers for the amount of time that your friend can talk on the costly cell phone.

Move your cursor to the top of list **L2**. Enter the shown “ceiling” function,  $0.4 * \text{int}(-L1/60)$ , to calculate cost.

Note: To enter **int()**, press **[math]**, arrow to the NUM menu and select the command.

L1	L2	L3	L4	L5	2
0					
20					
40					
60					
80					
100					
120					
140					
160					
180					
200					

$L2 = 0.4 * \text{int}(-L1/60)$

Create a scatter plot of the data. Press **[2nd]** **[stat plot]** **[STAT PLOT]** and select **Plot1**. Match the settings to those shown at the right.

Press **[zoom]** and select **ZoomStat** to view the plot.

Plot1	Plot2	Plot3
On	Off	Off
Type: [Scatter]		
Xlist: L1		
Ylist: L2		
Mark: [square]		
Color: BLUE		

3. Describe the graph.
4. What is the range of the cost function?



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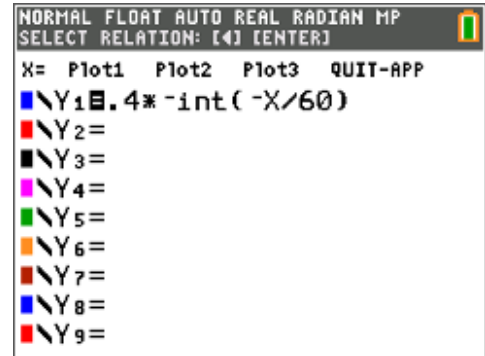
Class \_\_\_\_\_

- Press  $\boxed{\text{trace}}$ . What is significant about the point just before and after the “step?” Enter some specific values to explore (60 and 61, 120 and 121, and so on).

Turn off Plot1 by pressing  $\boxed{2\text{nd}} \boxed{[\text{stat plot}]} \boxed{[\text{STAT PLOT}]}$  and selecting **PlotsOff**.

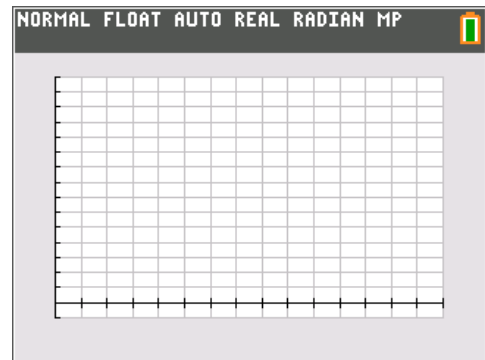
Press  $\boxed{y=}$  and next to **Y1** enter the ceiling function.

Press  $\boxed{\text{graph}}$  to view the graph.



- Where does each step begin and end? How does this relate to the scatter plot and lists?

- Which end points are included? Which are not? Draw the graph and indicate where the open circle ends should appear.



### Problem 2 – Snail Mail “Pen Pal”

From April 3, 1988, to February 3, 1991, the U.S. postage rate for first class postage was \$0.25 for the first ounce and \$0.20 for each additional ounce. The letter must have weighed less than 13 ounces.

- The cost is a function of the weight. What is the domain of this function? Let  $x$  be the input and  $y$  be the output.



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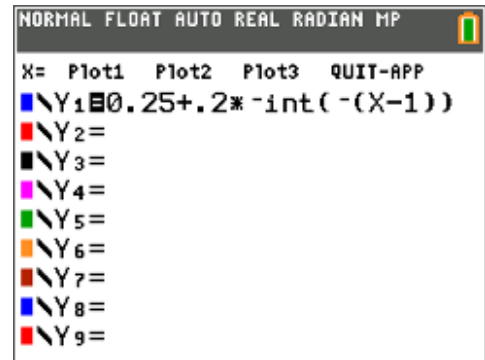
Name \_\_\_\_\_

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Graph the function  $Y_1=0.25+0.2*\text{int}(-(X-1))$ .

Press `trace`.

9. How much did it cost to mail a 7.25-ounce letter?



10. This type of function is called a \_\_\_\_\_ function. What is the range?

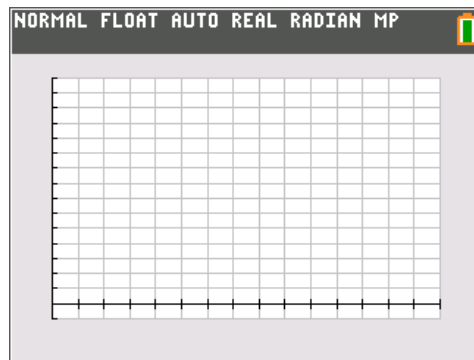


### Extension/Homework 1 – Shipping

Your friend calls you to tell you about a great sale at an online store for some supplies you need for a school function. You find out that the shipping cost to get your order in 2 days is \$11.45 for the first pound and \$0.60 more for each additional pound. You can only spend \$15 for shipping.

11. What is the domain of the cost function for shipping a package?

12. What is the range for this cost of shipping function? Make a sketch of what the graph would look like.



### Extension/Homework 2 – Functions

You can graph the functions to confirm and to deepen your understanding of the solution. What is the domain and range of the following functions?

13.  $y = x^2$

14.  $y = \frac{3}{x+5}$

15.  $y = \sqrt{x}$

16.  $y = \sqrt{2x-6}$

17.  $y = \frac{5}{x}$