# Cell Phone Range

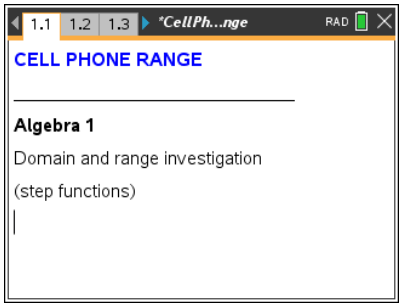
## Student Activity

Name _____

Class _____

**Open the TI-Nspire document *CellPhoneRange.tns*.**

Domain and range are terms that mathematicians often use. In this activity you will look at a variety of different real world applications to investigate domain, range, as well as step functions.




### Problem 1 – Cell Phone Situation

**Move to page 1.2.**

1. The **domain** is the set of _____ where the function is defined.

**Move to pages 1.3 – 1.4**

2. Your friend got a cell phone that charges 40 cents per minute (or any part of a minute). However, he is not allowed to use it for more than 4 minutes per call.
   a. If he talks for 0.5 seconds, how much was the fee?

   b. If the cost is a function of time, what is the domain of the cost function?

**Move to page 1.5**

3. The output of a function is called the _____.

**Move to pages 1.6 and 1.7.**

On page 1.6, move the slider to change the amount of time that your friend talks on the costly cell phone. Observe the output.

4. Describe the graph.

5. What is the **range** of the cost function?

**Move to pages 1.8, 1.9, and 1.10**

On page 1.9, use **MENU > Trace > Graph Trace** to explore the function. When using **Graph Trace**, you can type in a number to jump to that value.

6. On the graph on page 1.9, why so some of the points have open circles and other points closed or filled in?

7. _____ points occur where the function is _____.

**Problem 2 – Snail Mail "Pen Pal" Situation**

**Pages 2.1 – 2.5**

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

8. The cost is a function of the weight. What is the **domain** of this function? Let x be the variable for the input.

9. Using the graph on page 2.3, determine how much it cost to mail a 7.25 ounce letter.

10. The graph on page 2.3 represents what type of function?

11. What is the **range** of this function?

**Extension/Homework #1 – Shipping Situation**

**Pages 3.1 – 3.3**

Your friend calls you on your cell 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 it in 2 days is $11.45 for the first pound and $0.60 more for each additional pound.

12. You decide you can only spend $15.00 for shipping. With this limitation, what is the **domain** of the cost function for shipping a package?

13. What is the **range** for this cost of shipping function?

14. Make a sketch of what the graph would look like.

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**Extension/Homework #2 – Functions**

**Pages 3.4 – 3.9**

For the function y = 2x, the domain is all real numbers or {x: x ∈ ℝ}. The output, or range, is similarly the set of y such that y is an element of the reals.

Consider the following questions and determine the **domain** and **range**. Be especially mindful of dividing by zero or taking the square root of negative numbers. If needed, you may graph the function to confirm and to deepen your understanding of the solution.

15. $y = x^2$

Domain: _____ Range: _____

16. $y = \sqrt{x}$

Domain: _____ Range: _____

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

Domain: _____ Range: _____

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

Domain: _____ Range: _____

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

Domain: _____ Range: _____