## Lesson 4: Using Function Notation to Describe Rules (Part 1)

Let’s look at some rules that describe functions and write some, too.

### 4.1: Notice and Wonder: Two Functions

What do you notice? What do you wonder?

|  |  |
| --- | --- |
|  |  |
| 1 | 8 |
| 1.5 | 7 |
| 5 | 0 |
| -2 | 14 |

|  |  |
| --- | --- |
|  |  |
| -2 | -8 |
| 0 | 0 |
| 1 | 1 |
| 3 | 27 |

### 4.2: Four Functions

Here are descriptions and equations that represent four functions.

A. To get the output, subtract 7 from the input, then divide the result by 3.

B. To get the output, subtract 7 from the input, then multiply the result by 3.

C. To get the output, multiply the input by 3, then subtract 7 from the result.

D. To get the output, divide the input by 3, and then subtract 7 from the result.

1. Match each equation with a verbal description that represents the same function. Record your results.
2. For one of the functions, when the input is 6, the output is -3. Which is that function: , , or ? Explain how you know.
3. Which function value—, or —is the greatest when the input is 0? What about when the input is 10?

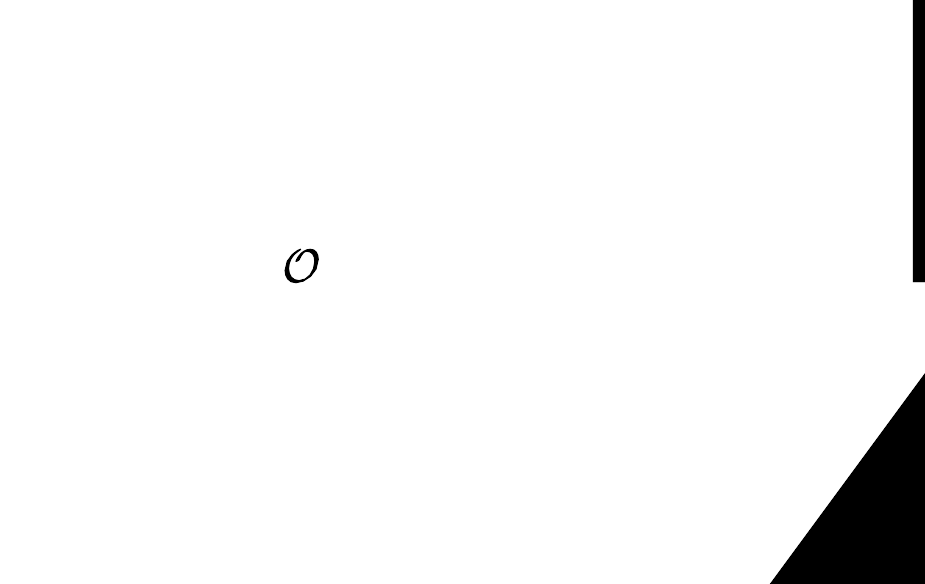
#### Are you ready for more?

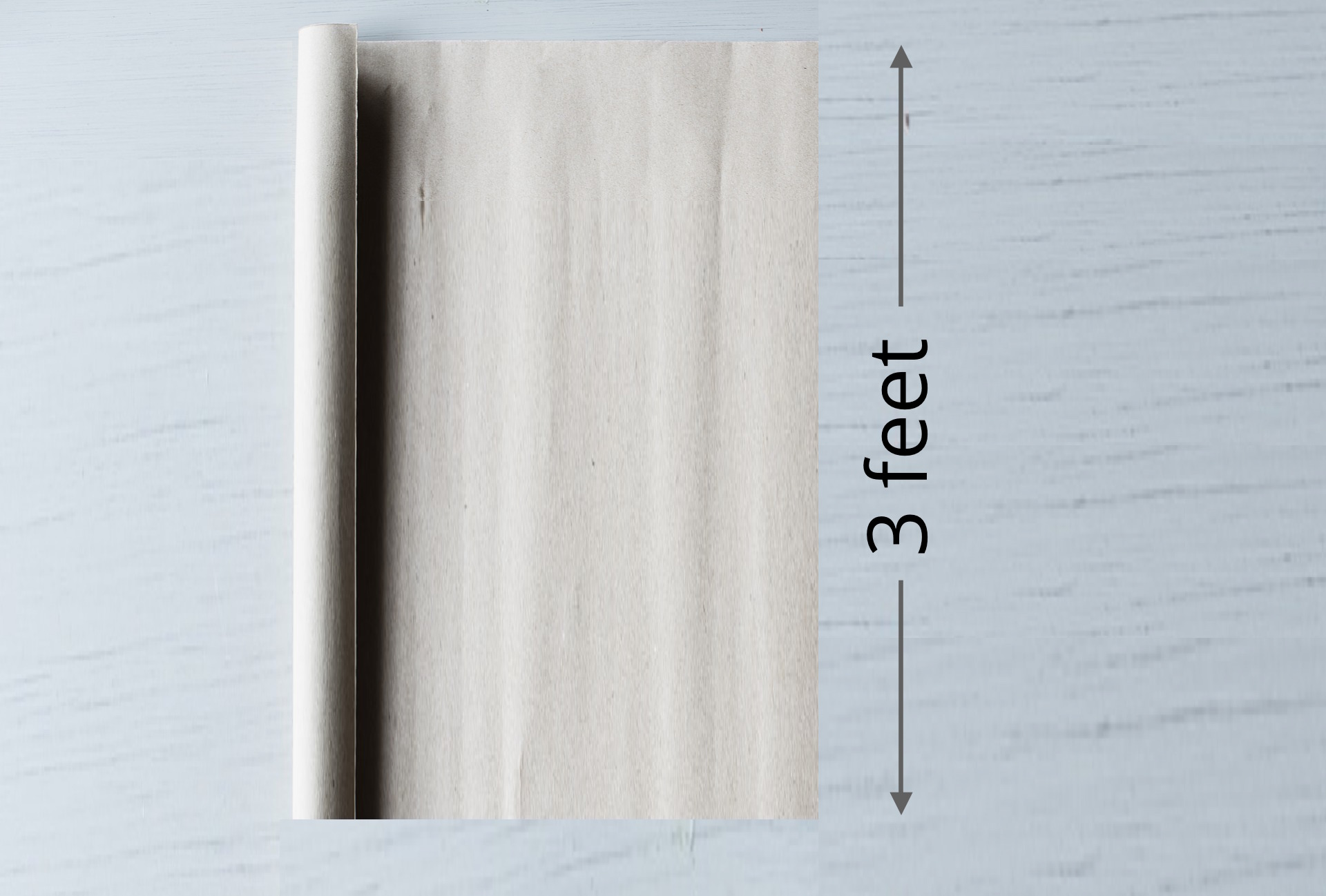
Mai says is always greater than for the same value of . Is this true? Explain how you know.

### 4.3: Rules for Area and Perimeter

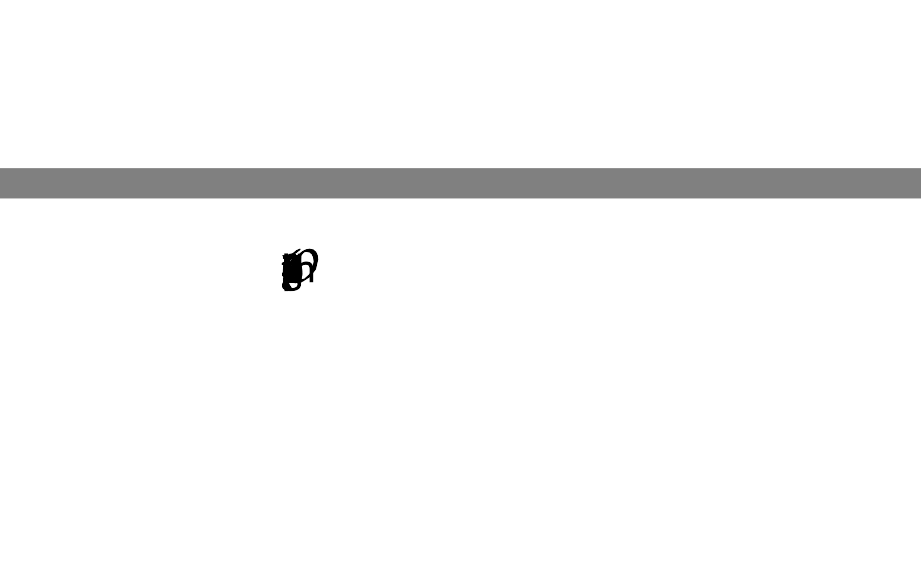
1. A square that has a side length of 9 cm has an area of 81 cm2. The relationship between the side length and the area of the square is a function.
   1. Complete the table with the area for each given side length.
   * Then, write a rule for a function, , that gives the area of the square in cm2 when the side length is cm. Use function notation.

|  |  |
| --- | --- |
| * + side length (cm) | * + area (cm2) |
| * + 1 |  |
| * + 2 |  |
| * + 4 |  |
| * + 6 |  |
|  |  |

* 1. What does represent in this situation? What is its value?
  2. On the coordinate plane, sketch a graph of this function.
  + 

1. A roll of paper that is 3 feet wide can be cut to any length.
   1. If we cut a length of 2.5 feet, what is the perimeter of the paper?
   * 
   1. Complete the table with the perimeter for each given side length.
   * Then, write a rule for a function, , that gives the perimeter of the paper in feet when the side length in feet is . Use function notation.

|  |  |
| --- | --- |
| * + side length (feet) | * + perimeter (feet) |
| * + 1 |  |
| * + 2 |  |
| * + 6.3 |  |
| * + 11 |  |
|  |  |

* 1. What does represent in this situation? What is its value?
  2. On the coordinate plane, sketch a graph of this function.
  + 

### Lesson 4 Summary

Some functions are defined by rules that specify how to compute the output from the input. These rules can be verbal descriptions or expressions and equations. For example:

Rules in words:

* To get the output of function , add 2 to the input, then multiply the result by 5.
* To get the output of function , multiply the input by and subtract the result from 3.

Rules in function notation:

* or

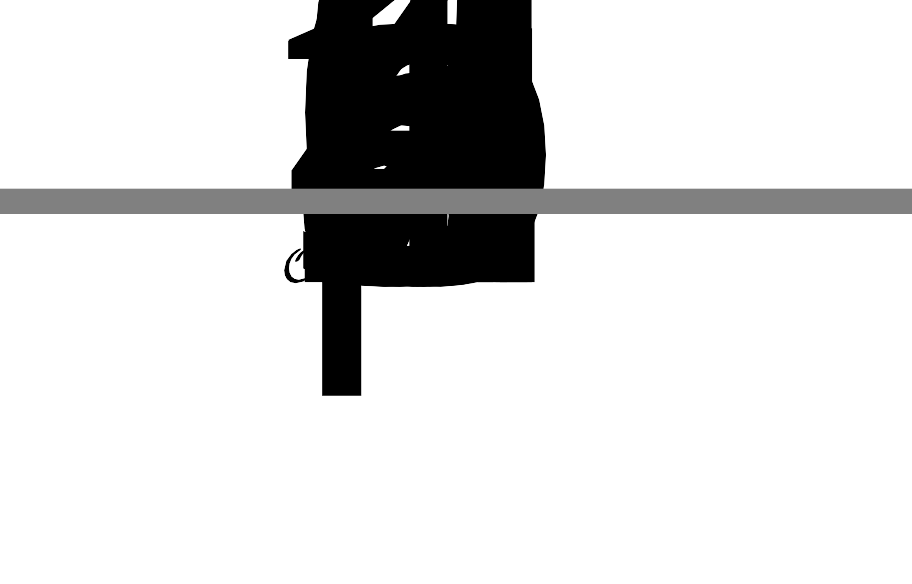
Some functions that relate two quantities in a situation can also be defined by rules and can therefore be expressed algebraically, using function notation.

Suppose function gives the cost of buying pounds of apples at $1.49 per pound. We can write the rule to define function .

To see how the cost changes when changes, we can create a table of values.

|  |  |
| --- | --- |
| pounds of apples, | cost in dollars, |
| 0 | 0 |
| 1 | 1.49 |
| 2 | 2.98 |
| 3 | 4.47 |
|  |  |

Plotting the pairs of values in the table gives us a graphical representation of .





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