Chapter 1: Functions and Change

Section 1.1: What is a Function?

1. Definition: A function is a rule which associates to each input value exactly one output value.

2. Input- x-value, in the domain. The x-value is the independent variable.

3. Output- y-value, in the range. The y-value is the dependent variable.

4.

5. Rule of Four: Four different ways to represent functions.

A) Verbal or word problem C) Graphic

B) Numeric/Table D) Symbolic

Example:

A) Verbal: The base of a ramp sits on the ground. The slope of the ramp is 0.4 feet/1foot and it extends to the top of the steps of a building 15 horizontal feet away. How high is the top of the steps relative to the ground?

1. Draw the picture of what is stated:

y

15

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x in feet | 0 | 5 | 10 | 15 |
| y in feet | 0 | 2 | 4 | 6 |

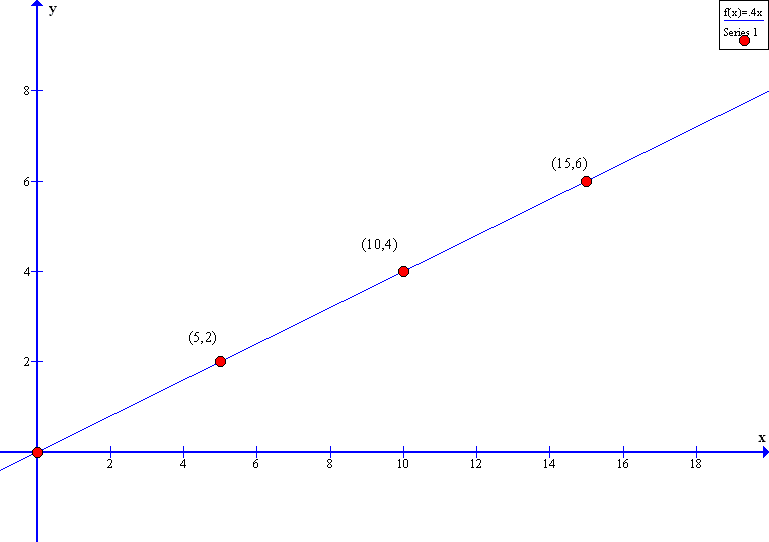
2. Define what we know:

B) Table: Let’s create a table with the values we have.

At the beginning of the incline, the point is . We need to find the other y-values using the slope value and the change in x-value.

So, the height of the building at the top of the steps is 6 feet when the base of the ramp is 15 feet.

C) Graphic: Sketch the graph of function using the data in the table.



D) Symbolic: Use an equation to solve the problem.

Each time we multiplied the slope by the horizontal change value in feet, so the equation will be:

6. Mathematical Modeling is a mathematical description of a real situation which is considered a function.

7. The graph of this example represents a linear function.

8. The linear function is in the form of .

To use this form, we must have the , and , otherwise, we must find them.

9. Slope of a linear function is the constant rate of change. For every constant change in y, there exists a constant change in x.

10. Functional notation for is given in the form of: .

11. Functional Notation: , where \_\_\_x\_\_\_\_\_\_\_\_ is the input and is the output.

, where \_\_\_\_t\_\_\_\_\_\_\_ is the input and is the output.

, where \_\_\_\_p\_\_\_\_\_\_\_ is the input and is the output.

12. To find the **y-intercept**: set and then .

13. To find the **x-intercept**: when .

**Problems for Section 1.1**

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7. Let represent wheat production in Argentina, in millions of metric tons, where t is years since 2010. Interpret the statement in terms of wheat production.

Here’s what we know: The **input** represents the years since 2010 and the **output** represents the wheat production in Argentina in millions of metric tons.

So, in 2015, the wheat production in Argentina will be 49.2 million metric tons.

9. The concentration of carbon dioxide, in the atmosphere, in parts per million (ppm) is a function of years, , since 2000.

1. Interpret in terms of carbon dioxide.

This means that 15 years since 2000 in 2015, the concentration of carbon dioxide will be 400 ppm

1. What is the meaning of ? This value would represent the in 2020.

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16. Let .

1. Find the y-value when **.** This is the y-intercept.

Then the ordered pair or point for the y-intercept is at .

1. What is

Then the ordered pair or point for is .

1. What values of give a value of 11? So now the output for . We have:

Subtract 2 from both sides to get:

Take the square root of both sides to get:

1. Are there any values of x where y will equal 1?

Solve by subtracting 2 from both sides to get:

In the real number world, there is no solution to this equation.

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26. A deposit is made into an interest bearing account and the graph shows the balance in the account t years later.

1. What is the original deposit? $1000

How do I know? I know the initial value is $1000 because the t-value is zero.

1. Estimate and interpret it.
2. When does the balance reach $5000?

It looks like the input value would be approximately 22 years.