financialalgebra

1.5 Graphing a Function
Student Activity Packet
UNIT: TAXES & FUNDAMENTALS OF ALGEBRA

Name:

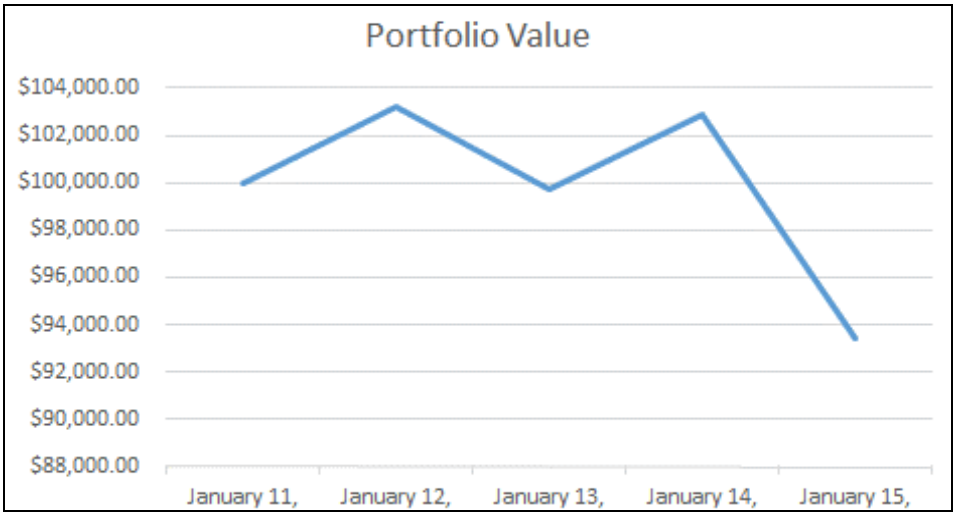
IN THIS LESSON, YOU WILL:

- Graph ordered pairs on a coordinate plane
- Describe a situation using words, equations, tables and graphs
- State the domain and range of a function using inequality notation
- Calculate gross and net pay

INTRO

PROMPT:

Graphs aren't just about numbers. They tell stories. Take a look at this graph showing a portfolio's value over time. You'll see some ups and downs, and then a big drop at the end.



1. **What story do you think this graph is telling? (There's no single right answer here. Your job is to imagine what might have happened. Be creative. As long as your story makes sense with the shape of the graph, it's a valid interpretation.)**

LEARN IT

One important way that we represent a function's inputs and outputs is with ordered pairs (also known as *coordinates* when we graph them). Let's take a look at what ordered pairs are, how they relate to functions, and how we can graph them to give a visual representation of our data.

An **ordered pair** is a set of two numbers written in the form (x, y) where x represents the input of a function and y represents the output after plugging x into the function.

Example
Given f(x) = 2x - 1, represent f(3) as an ordered pair.

1	**Substitute for x then simplify:** f(3) means that you are going to find x on the other side of the equation and substitute a 3, then simplify as much as you can	f(3) = 2(3) - 1 f(3) = 6 - 1 f(3) = 5
2	**Rewrite as an ordered pair:** If 3 represents the input and 5 represents the output, you can rewrite these numbers in the form (x, y)	f(3) = 5 can be written as (3, 5)

We can also represent a bunch of ordered pairs on a table. This list represents many different inputs for the function f(x) = 2x + 6 along with their corresponding outputs.

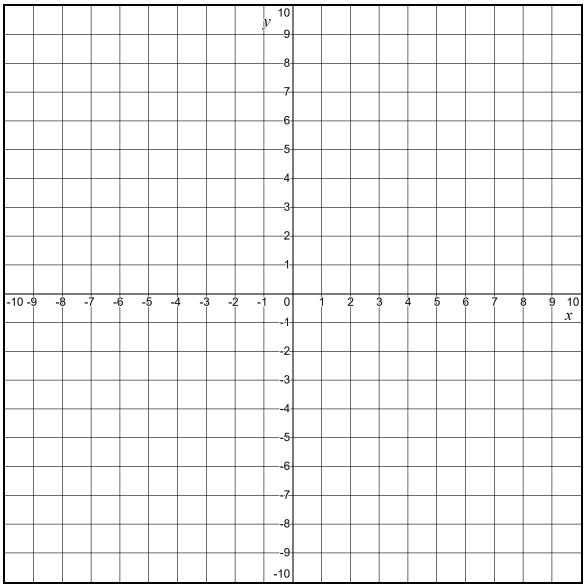
Example

x	f(x)
0	6
1	8
2	10
3	12

This table represents the points (0, 6), (1, 8), (2, 10), and (3, 12)

Now that we know what ordered pairs are and how to write them, let's graph them on a coordinate plane.

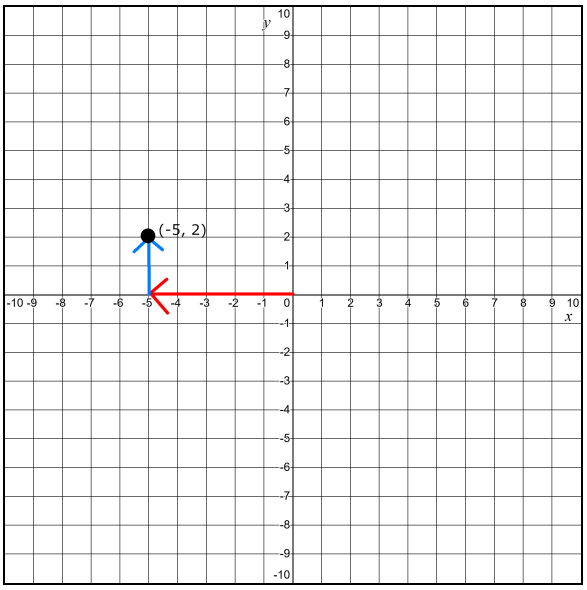
Here's a standard XY coordinate plane (sometimes called the Cartesian plane!).



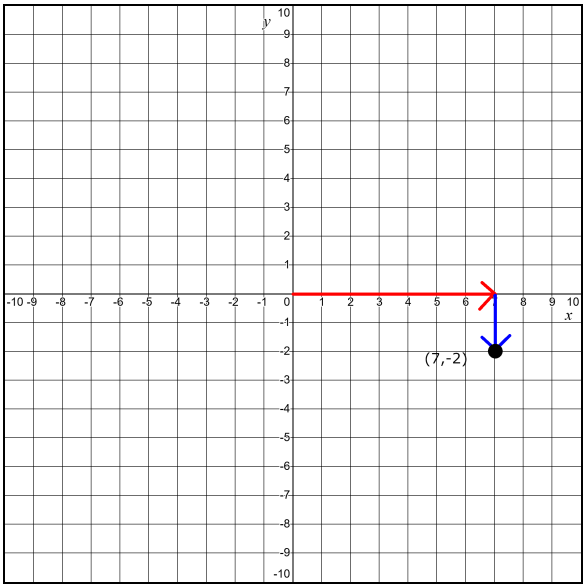
- The center of the graph where the two axes intersect is the point (0, 0) and is called the **origin**. Whenever we graph, we'll start moving from this point.
- The horizontal axis is called the **x-axis** and it's used to represent the first number in the ordered pair.
    - Move to the right for positive numbers
    - Move to the left for negative numbers.
- The vertical axis is called the **y-axis** and it's used to represent the second number in the ordered pair.
    - Move up for positive numbers
    - Move down for negative numbers.

Example

If we want to graph (-5, 2), we'll start at (0, 0) move 5 units LEFT then two units UP.



If we want to graph (7, -2), we'll start at (0, 0) move 7 units to the RIGHT then two units DOWN.



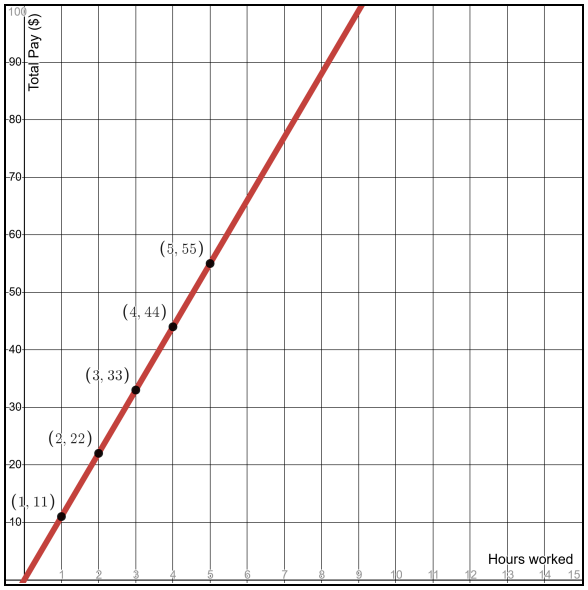
PRACTICE IT

AMPLIFY: The (Awesome) Coordinate Plane Activity
Follow your teacher's instructions to complete this activity.

LEARN IT

We've just seen that we can represent a function by writing an equation, listing its ordered pairs as either (x, y) or on a table, and graphing it. There is a fourth way to describe a function's relationship: using words. Let's put these four representations together and see how we can view a function and its relationship in many different ways.

A function can be described...	**Example**
In words	For every hour that Penelope works, she gets paid $11
As an equation	f(h) = 11h where h represents hours worked and f(h) represents Penelope's total pay
As a table	h | f(h) 1 | 11 2 | 22 3 | 33

	4 | 44 5 | 55
As a graph	

PRACTICE IT

CARD SORT: Four Views of a Function
Follow your teacher's instructions to complete this activity.

1. **Match each word description, equation, graph and table of values that represent the same function. Write your answers or paste the cards below.**

Match 1	
Match 2	

Match 3	

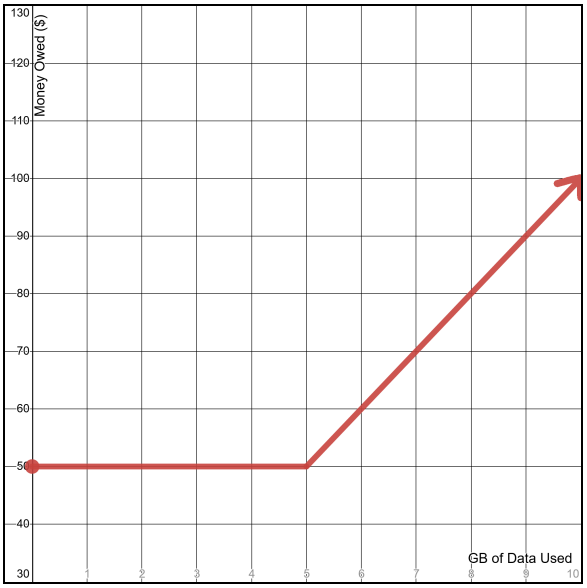
LEARN IT

In lesson 3, you were introduced to domain (all of the numbers that you can input into a function) and range (all of the numbers that can come out of a function). Because the 4 views of a function are all different ways of representing the same situation, that means that we can find the domain and range of graphs and word situations!

Example
Maryellen pays $50 per month for up to 5GB of data on her cell phone. After 5GB, she is charged $10 per GB for any additional data that she uses. What is the domain and range of this function?

1 **Determine the input and output variables:** There are two unknown or changing quantities: GB used and total dollars spent. Maryellen is choosing how much data she uses, so this is the input variable (domain). Her total dollars spent (range) will be determined based on the input variable.	The input variable is total GB used (Domain) The output variable is Dollars Spent (Range)
2 **Think about the lowest and highest possible input based on the situation:** Consider what make sense for this situation and describe it with words	Maryellen can't have negative data used. She can have zero data or anything positive
3 **Write your domain using inequality notation.**	If x represents the amount of data, the domain is $x \geq 0$
4 **Repeat the above steps for the output of this situation:**	Maryellen is going to pay at least $50 for her data and can pay any amount above that depending on how much data she uses. If y represents the amount of money paid for data, $y \geq 50$

You can also do the same thing graphically. Here is a graph of Maryellen's data plan.



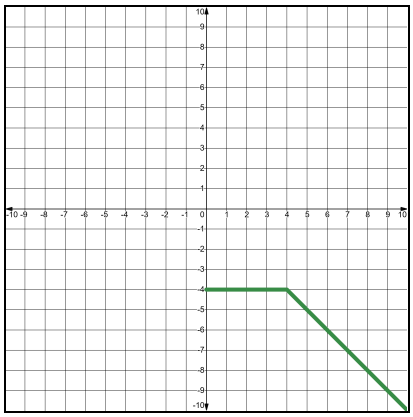
The graph starts at 0 on the x-axis and travels to the right forever ($x \geq 0$). It also goes as low as $50 and goes up forever ($y \geq 50$).

PRACTICE IT

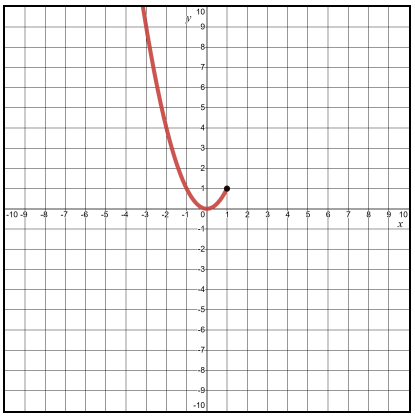
5-Point Practice: Domain and Range

Complete any number of problems that add up to 5 points. For each graph, state the domain and range using inequality notation. Assume that any graph that hits the edge of the graph continues forever in that direction.

1 point each



Domain:
Range:



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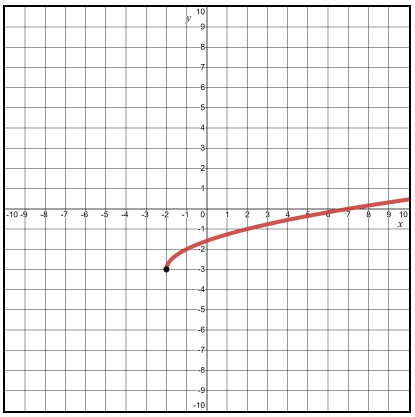
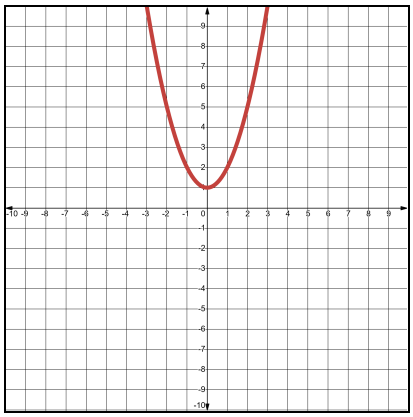


Domain:
Range:

2 points each



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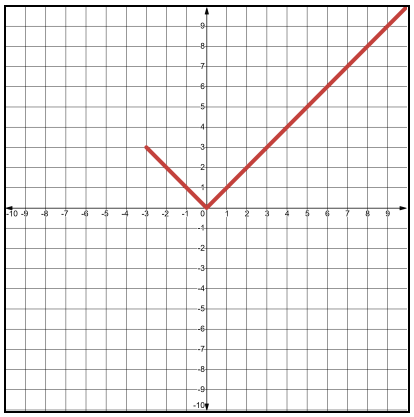

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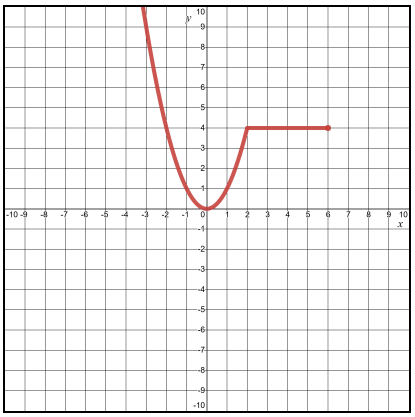

Domain:
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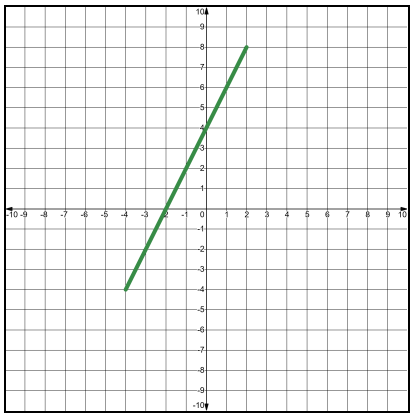
3 points each



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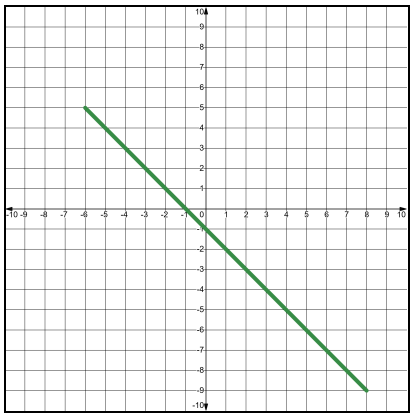

Domain:
Range:

APPLY IT

Follow your teacher's directions to complete the Application Problems.

Teachers, you can find the Application problems linked in the Lesson Guide.