LESSON 3

An Introduction to Domain and Range

LEARNING OBJECTIVES

- Today I am: estimating the amount of money deposited in a coin counting machine.
- So that I can: identify the maximum and minimum values possible.
- I'll know I have it when I can: shade a graph to show its domain and range.

Exploratory Activity

1. Watch the *Coin Counting* video. What questions do you have?

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2. What is the least amount of pennies that could be in the machine? Explain your thinking.

At least 10 pennie

3. A. Make a guess about the amount of money put in the counting machine that is **obviously too low** to be accurate.

At least $1

B. Make a guess about the amount of money put in the counting machine that is **obviously too large** to be accurate.

At most $1000

C. Write an inequality to describe these boundary points.

x = amount of $ (value)

$1 \leq x \leq 1000$

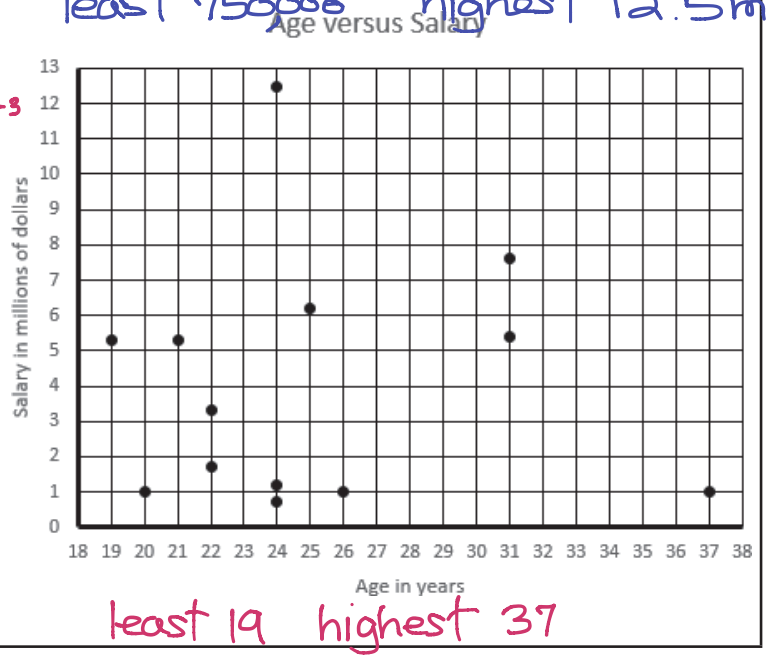
4. What information could you use to find the total amount of money put in the counting machine?

- What types of coins?
- How many of each?

5. Get a clue card from your teacher to find the answer to the questions, "How many coins were put in the counting machine?" and "What is the total amount of money placed in the machine?"

In Exercise 3, you considered the least and greatest amounts of money placed in the counting machine in the video. When we look at least and greatest values possible, we are considering the ***domain*** and ***range*** of a data set, equation, graph or situation.

For each exercise below, identify the least and greatest values possible.

6.	7.	8.	9.
Temperatures in the Santa Clarita Valley in October $60 \leq x \leq 95$	7, 7, 8, 9, 9, 9, 11, 12, 12, 13, 30, 31, 33, 37, 40, 70 least: 7 highest: 70	$\lvert x \rvert < 3$ $x < 3$ and $x > -3$ $-3 < x < 3$	least 750000 highest 12.5 million  least 19 highest 37

Discussion

10. What similarities did these data sets have? What differences did you notice?

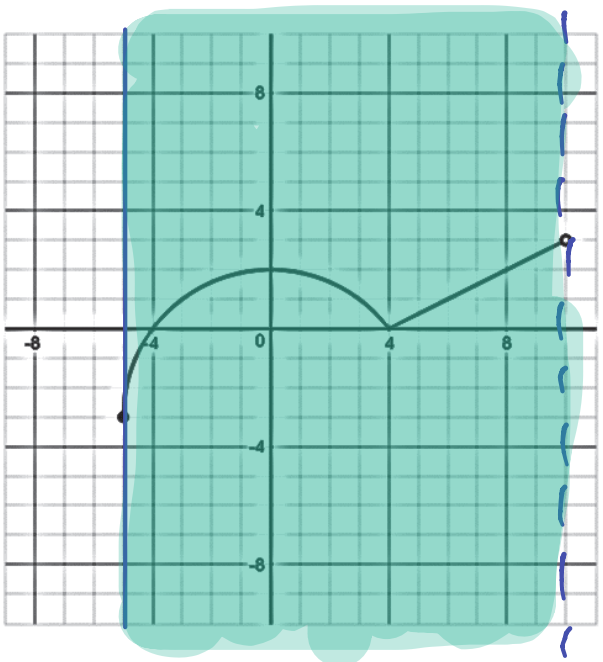
Let's take a closer look at the domain and range of graphs where two quantities are being represented.

You will need: access to a computer, class code for the Desmos Activity *Domain and Range Introduction*

11. Go to student.desmos.com and type in your class code _____. Then complete the activity.

Practice Exercises

12. A. Shade the graph below to show the domain of this function.



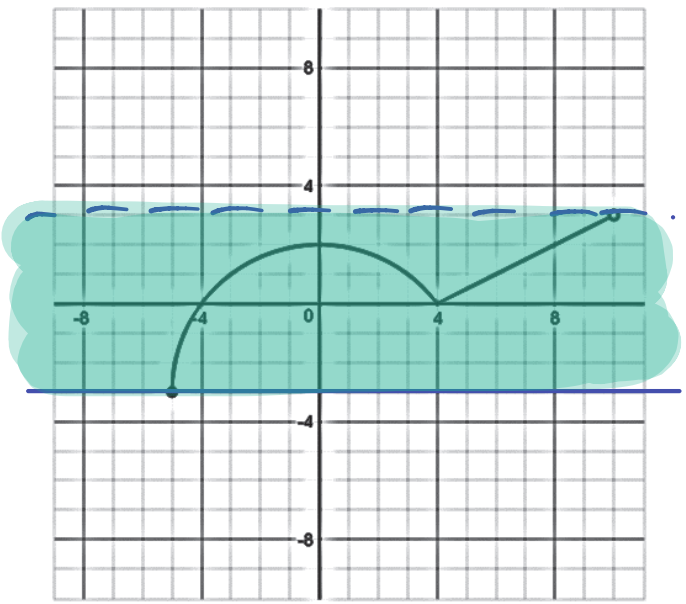
B. Write an inequality to describe the domain of this function.

$-5 \leq x < 10$

C. Write the domain in interval notation.

$[-5, 10)$

13. A. Shade the graph below to show the range of this function.



B. Write an inequality to describe the range of this function.

$-3 \leq y < 3$

C. Write the range in interval notation.

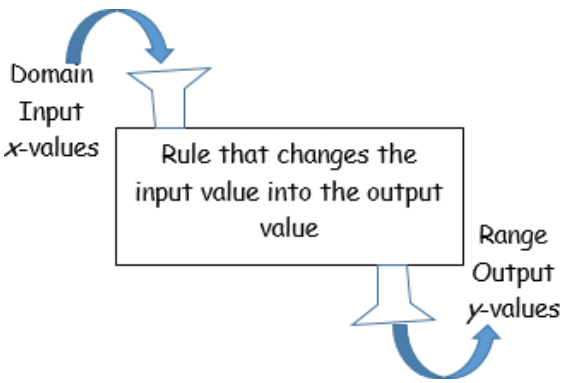
$[-3, 3)$

Domain and Range Machine

Another way of thinking about domain and range is by thinking of domain as the input values and range as the output values.

14. A. What is the domain and range of the points below?

(3, 9), (−7, 49), (−1, 1), (0, 0), (−3, 9)



Domain: $\{-7, -3, -1, 0, 3\}$

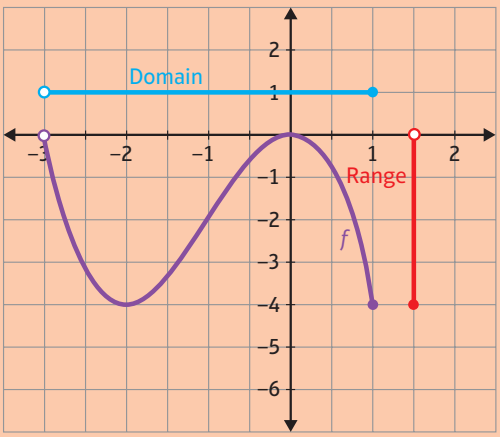
Range: $\{0, 1, 9, 49\}$

B. Can you tell what rule was used to change the input value into the output value?

$f(x) = x^2$

15. State the domain and range of the graph in the Lesson Summary.

Lesson Summary



Source: http://philschatz.com/algebra-trigonometry-book/contents/m51262.html

Domain and Range

- Domain is the set of input values of a function or relation.
- Range is the set of output values of a function or relation.

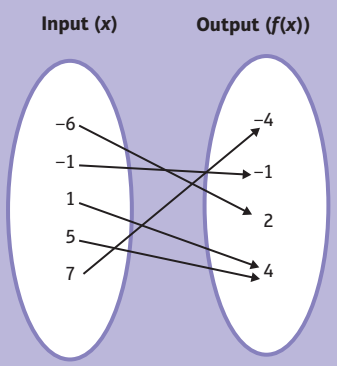
Ordered Pairs

{(−6, 2), (−1, −1), (1, 4), (5, 4), (7, −4)}

Domain: {−6, −1, 1, 5, 7}

Range: {−4, −1, 2, 4}

Mapping Diagram



Domain: {−6, −1, 1, 5, 7}

Range: {−4, −1, 2, 4}

Table

X	Y
−6	2
−1	−1
1	4
5	4
7	−4

Domain: {−6, −1, 1, 5, 7}

Range: {−4, −1, 2, 4}

Source: https://www.texasgateway.org/resource/domain-and-range-numerical-representations

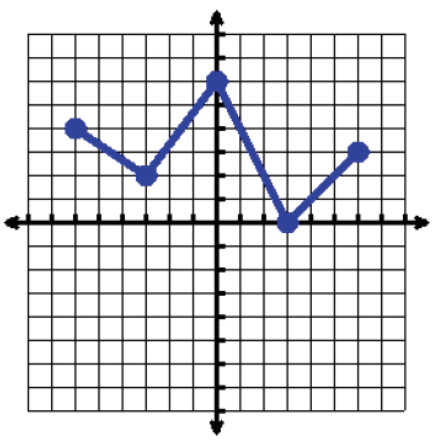
NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

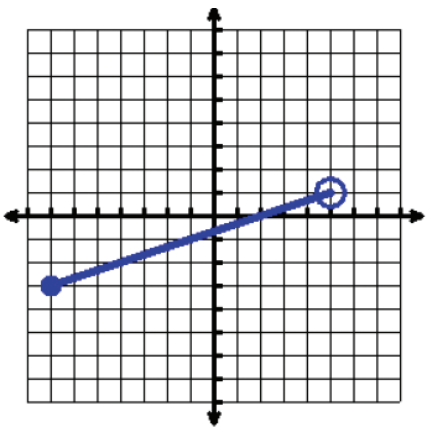
Shade the domain for each graph below. Then give the domain as an inequality and in interval notation.

Source: http://esbailey.cuipblogs.net/files/2015/09/Domain-Range-Matching.pdf

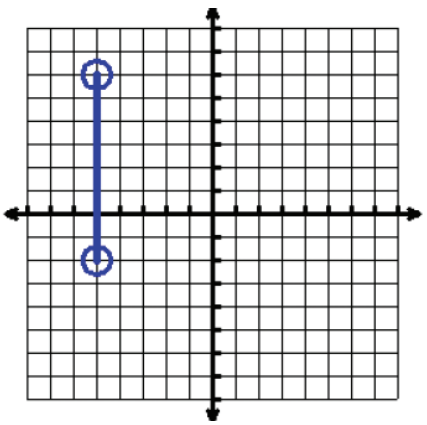
1. inequality: _____
   interval notation: _____



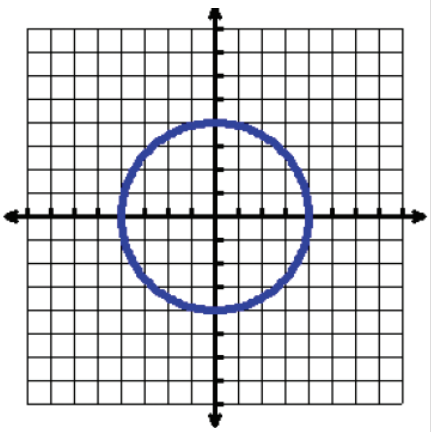
2. inequality: _____
   interval notation: _____



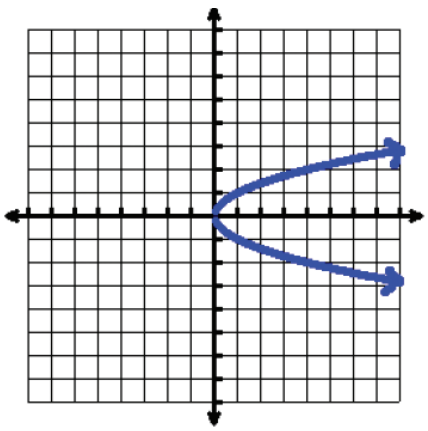
3. inequality: _____
   interval notation: _____



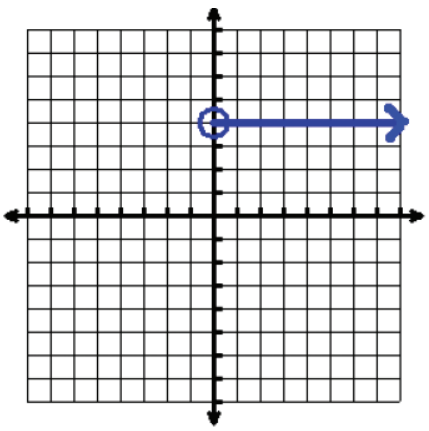
4. inequality: _____
   interval notation: _____



5. inequality: _____
   interval notation: _____



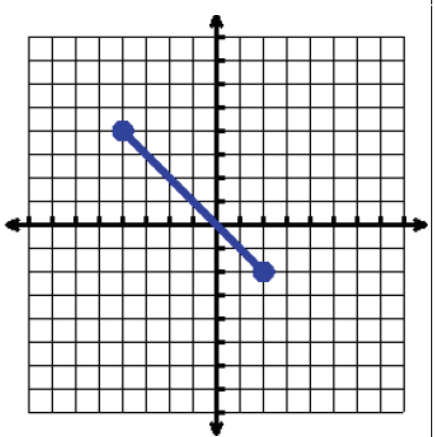
6. inequality: _____
   interval notation: _____



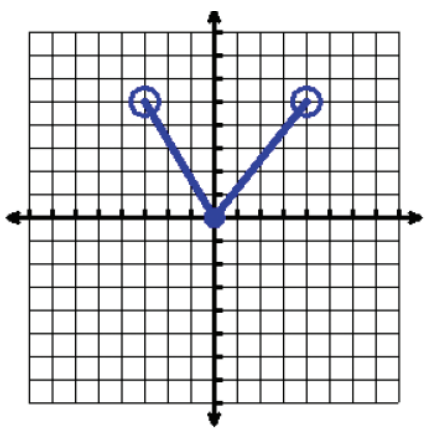
Shade the range for each graph below. Then give the range as an inequality and in interval notation.

Source: http://esbailey.cuipblogs.net/files/2015/09/Domain-Range-Matching.pdf

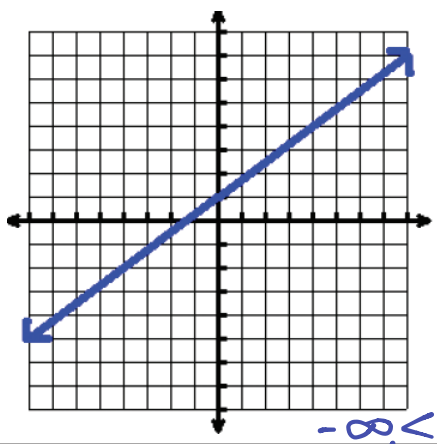
7. inequality: _____
   interval notation: _____



8. inequality: _____
   interval notation: _____



9. inequality: _____
   interval notation: _____

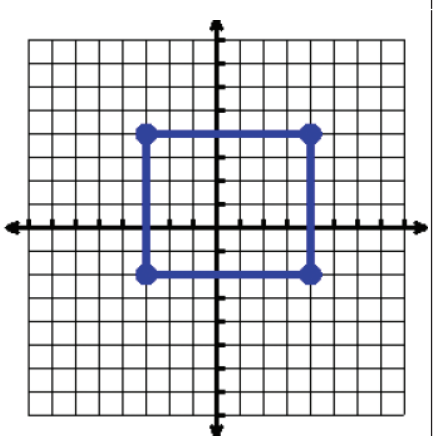


$-\infty < x < \infty$

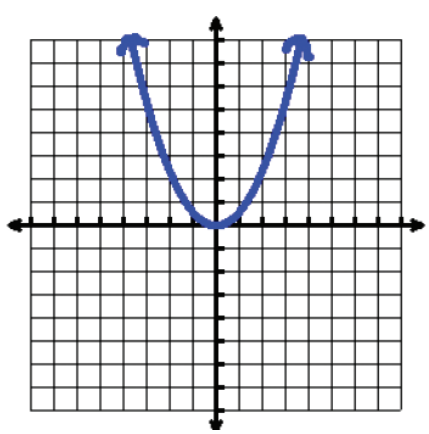
All reals

$(-\infty, \infty)$

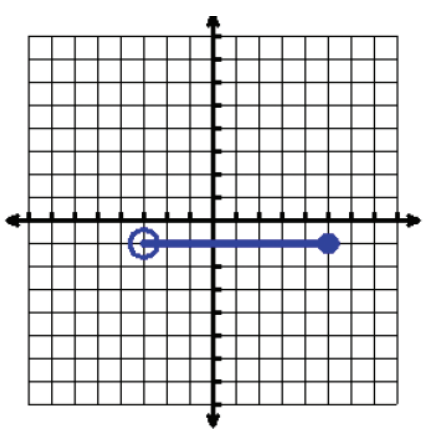
10. inequality: _____
    interval notation: _____



11. inequality: _____
    interval notation: _____



12. inequality: _____
    interval notation: _____



Match each description to the correct graph.

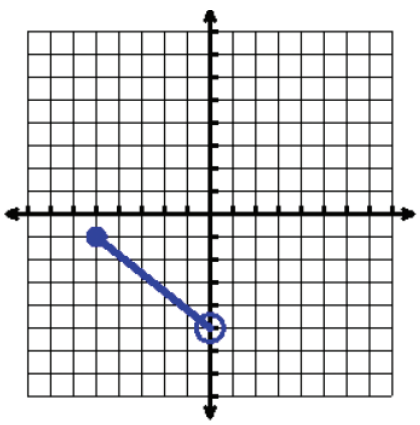
Source: http://esbailey.cuipblogs.net/files/2015/09/Domain-Range-Matching.pdf

13.
Domain: $\{-6 \leq x \leq 3\}$
Range: $\{-5 \leq y \leq -1\}$

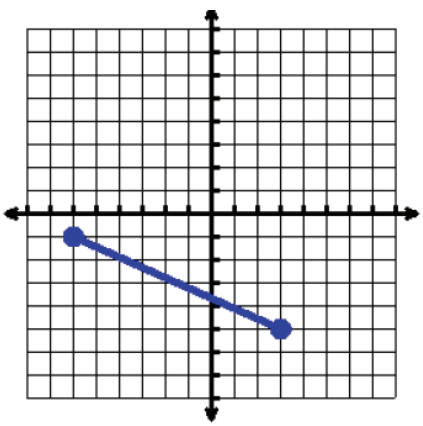
14.
Domain: $\{0 \leq x \leq 6\}$
Range: $\{0 \leq y \leq 7\}$

15.
Domain: $\{-5 \leq x < 0\}$
Range: $\{-5 < y \leq -1\}$

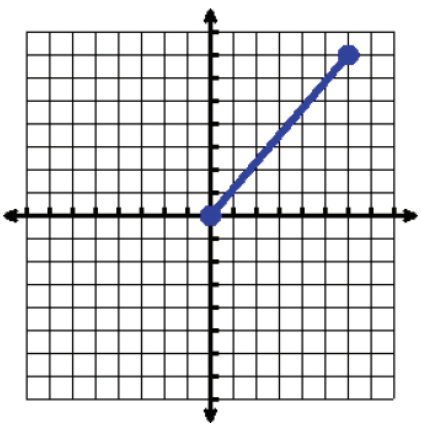
Graph A



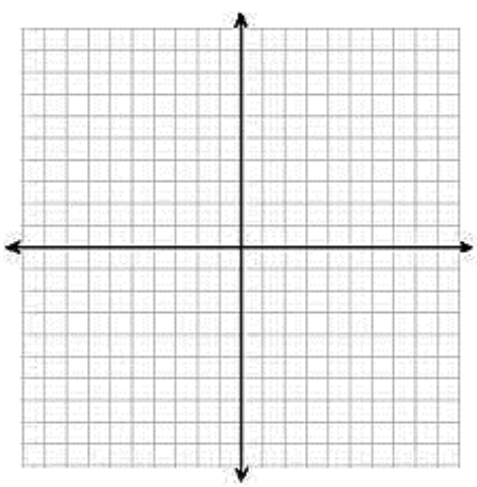
Graph B



Graph C



16. **Open Ended** Draw a graph with a domain of $(-2, 6]$ and a range of $[-1, 5)$.



Spiral REVIEW—Writing Equations

17. A. Maya and Earl live at opposite ends of the hallway in their apartment building. Their doors are 50 ft. apart. Each starts at his or her own door and walks at a steady pace toward each other and stops when they meet.

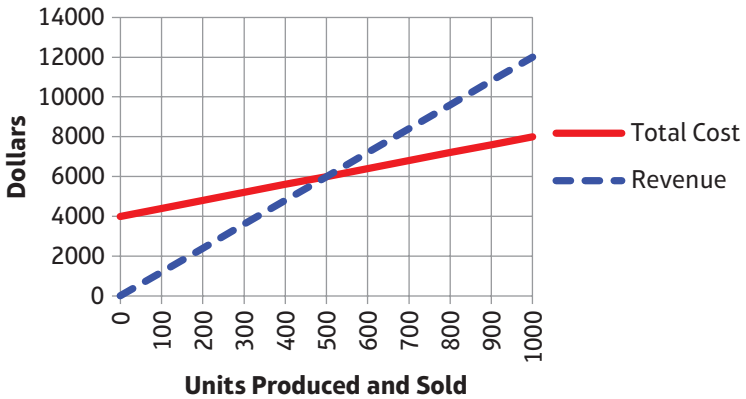
    Suppose that Maya walks at a constant rate of 2 ft. every second and Earl walks at a constant rate of 4 ft. every second starting from 50 ft. away. Create equations for each person's distance from Maya's door.

    Let y = distance from Maya's door in feet
    Let x = time in seconds

    B. **Challenge** How far are they from Maya's door at this time?

Spiral REVIEW—Interpreting Graphs and Points of Intersection

18. The graph at the right shows the revenue (or income) a company makes from designer coffee mugs and the total cost (including overhead, maintenance of machines, etc.) that the company spends to make the coffee mugs.



A. How are revenue and total cost related to the number of units of coffee mugs produced?

B. What is the meaning of the point (0,4000) on the total cost line?

C. What are the coordinates of the intersection point? What is the meaning of this point in this situation?