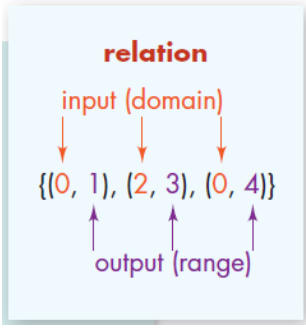
According to the text, what is a *relation*?



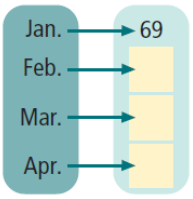
What are the four ways to represent a relation?

Problem 1 Representing a Relation

Got It? The average water temperature of the Gulf of Mexico in Key West, Florida varies during the year. In January, the average water temperature is 69° F; in February, 70° F; in March, 75° F; and in April, 78° F. How can you represent this relation in four different ways?

Complete each representation of the relation.

4. Mapping Diagram



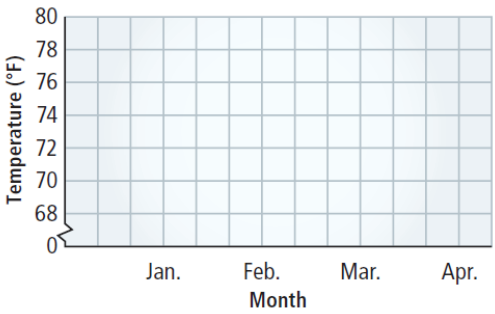
5. Ordered Pairs

$\{(\text{Jan.}, 69), (\text{Feb.}, \_\_), (\text{Mar.}, \_\_), (\text{Apr.}, \_\_)\}$

6. Table

x (Month)	y (°F)
Jan.	69
Feb.	
Mar.	
Apr.	

7. Graph



What is the *domain* of a relation?

What is the *range* of a relation?

Find the domain and the range of problem 1 (above) and problem 2 (below)

Problem 2 Finding Domain and Range

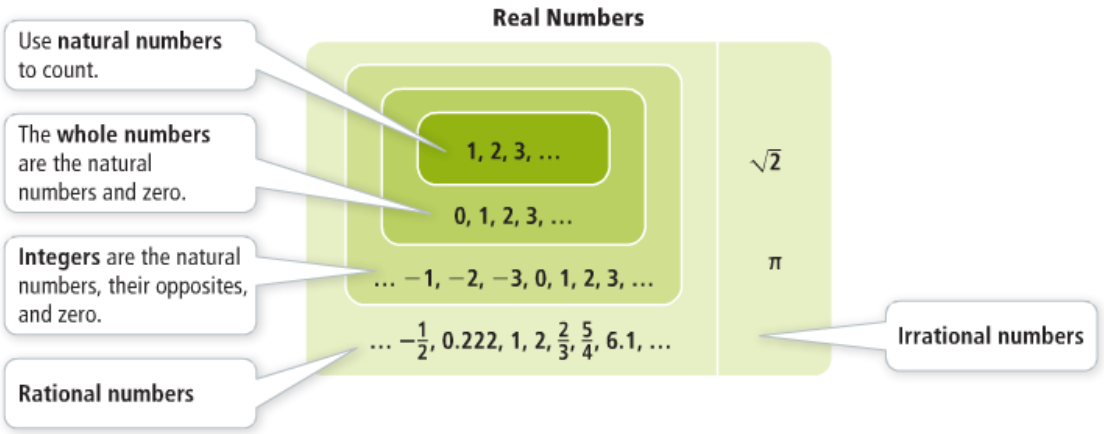
Got It? What are the domain and range of this relation?

$\{(-3, 14), (0, 7), (2, 0), (9, -18), (23, -99)\}$

8. Complete the reasoning model below.

Think	Write
First, I write the set of *x*-coordinates.	$\{-3, \square, \square, \square, \square\}$
Then I write the set of *y*-coordinates.	$\{14, \square, \square, \square, \square\}$

Sometimes a relation is an infinite number of ordered pairs, such as a continuous graph. In this case, it doesn't make sense to try to list ALL the possibilities for the domain and range. Instead we use **number categories** to describe the *domain* and *range.*



Rational numbers

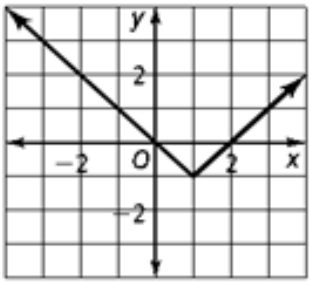
- are all numbers you can write as a quotient of integers $\frac{a}{b}$, $b \neq 0$.
- include terminating decimals. For example, $\frac{1}{8} = 0.125$.
- include repeating decimals. For example, $\frac{1}{3} = 0.\overline{3}$.

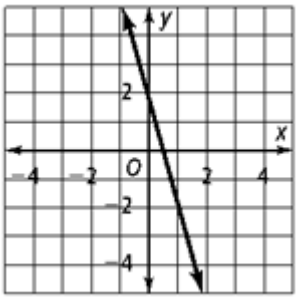
Irrational numbers

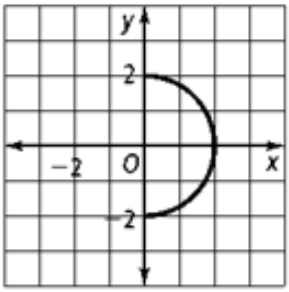
- have decimal representations that neither terminate nor repeat. For example, $\sqrt{2} = 1.414213\ldots$.
- cannot be written as quotients of integers.

OA.2, OA.3, and OA.4 Guided Notes Algebra 2
Section 2.1 in the textbook

What is the best way to describe the *domain* and *range* of the following three graphs?







What is a ***function?***

Circle the correct description: ***For every input of a function there is*** exactly / at least / at most ***one output.***

Got It? **3.** Is the relation a function?

a. Domain Range

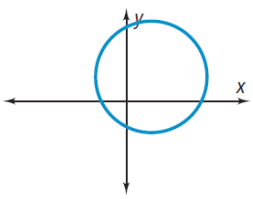
b. $\{(-7, 14), (9, -7), (14, 7), (7, 14)\}$

c. Reasoning How does a mapping diagram of a relation that is not a function differ from a mapping diagram of a function?

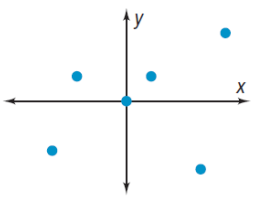
What is the ***Vertical Line Test*** and why does it work?

Which of the following graphs are functions? How do you know?

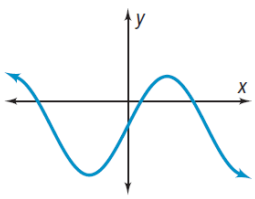
A



B



C



A **function rule** is an equation that represents an output value in terms of an input value. You can write a function rule in **function notation**. Shown below are examples of function rules.

$y = 3x + 2$ (Output, Input)

$f(x) = 3x + 2$ (Read as "f of x" or "function f of x.")

$f(1) = 3(1) + 2$ ("f of 1" is the output when 1 is the input.)

The **independent variable**, x, represents the input of the function. The **dependent variable**, $f(x)$, represents the output of the function. It is called the dependent variable because its value depends on the input value.

Problem 5 **Using Function Notation**

For $f(x) = -2x + 5$, what is the output for the inputs, -3, 0, and $\frac{1}{4}$?

Plan

How do you find the output?
Substitute the input into the function rule and simplify.

x Input	Function Rule $f(x) = -2x + 5$	$f(x)$ Output
-3	$f(-3) = -2(-3) + 5$	11
0	$f(0) = -2(0) + 5$	5
$\frac{1}{4}$	$f\left(\frac{1}{4}\right) = -2\left(\frac{1}{4}\right) + 5$	$4\frac{1}{2}$

Why is function notation useful? (See Mrs. Kramer's diagram for an explanation.)

Ex: Suppose $f(x) = -4x + 1$. What is $f(-2)$? What does this symbolize?

Ex: The relation between the length of the femur f, the bone from the knee to the hip joint, and the height of an adult woman h is modeled by the function $h(f) = 2.3f + 24$. In the following ordered pairs, the first coordinate is the femur length and the second coordinate is the corresponding height, in inches. Find the unknown measure in the following ordered pairs.

a. $(13, t)$ **b.** $(m, 56.2)$