

## **4.6 Formalizing Relations and Functions**

Sunshine State Standards: MA.912.A.2.3  
MA.912.A.2.4

**Objective:** The student will determine whether a relation is a function

**Notes:****4.6 (Part 1) FORMALIZING RELATIONS AND FUNCTIONS**

**Relation:** A set (group) of ordered pairs.

**Domain:** The x coordinates  $\{2, 6, 8, 11\}$

**Range:** The y coordinates.  $\{3.25, 5.69, 7.14, 11\}$

X # items	Y Cost
2	<u>3.25</u>
6	5.69
8	7.14
11	11.00

$(2, 3)(1, 4)(3, 5)$

$D = \{2, 1, 3\}$

$R = \{3, 4, 5\}$

The 4 domains and ranges make up the relation

**Domain:**  $\{2, 6, 8, 11\}$

**Range:**  $\{3.25, 5.69, 7.14, 11.00\}$

These groups of ordered pairs makes up a relation.

**Notes:**

**Function:** Relation where a domain has only one range associated with it.

\* An x CANNOT have two y values \*

\* Different x's can have the same y value \*

(3, 4) (5, 6) (-3, 3) (7,4) This is a function.  
Different x's have the same y: (3,4) and (7,4)

(2,6) (1,7) (4, 8) (2,3) This is **NOT** a function. The same x has two different y values: (2,6) and (2,3)

**Example #1:** Draw a mapping diagram and determine if the relation is a function.

~~(-3, -6)~~, ~~(-1, -6)~~, ~~(5, -6)~~, ~~(8, -6)~~ ✓

$$D = \{-3, -1, 5, 8\}$$

$$R = \{-6\}$$

## Identifying Functions Using Mapping Diagrams

**Example #2:** Identify the domain and range of each relation. Represent the relation with a mapping diagram. Is the relation a function?

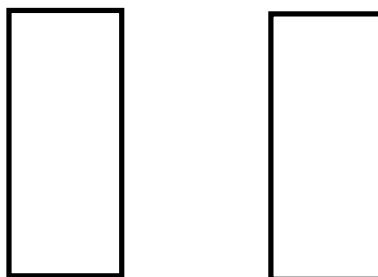
$$\{-2, 1), (0, 2), (4, 6), (5, 2)\}$$

**Step #1:** Identify the domain & range

X The domain is  $\{-2, 0, 4, 5\}$

Y The range is  $\{1, 2, 6, \quad\}$

**Step #2:** Write the domain and range in a mapping diagram.



**Step #3:** Draw arrows from the domain to the range to show the ordered pair.

**Practice #1:** Identify the domain and range of each relation. Represent the relation with a mapping diagram. Is the relation a function?

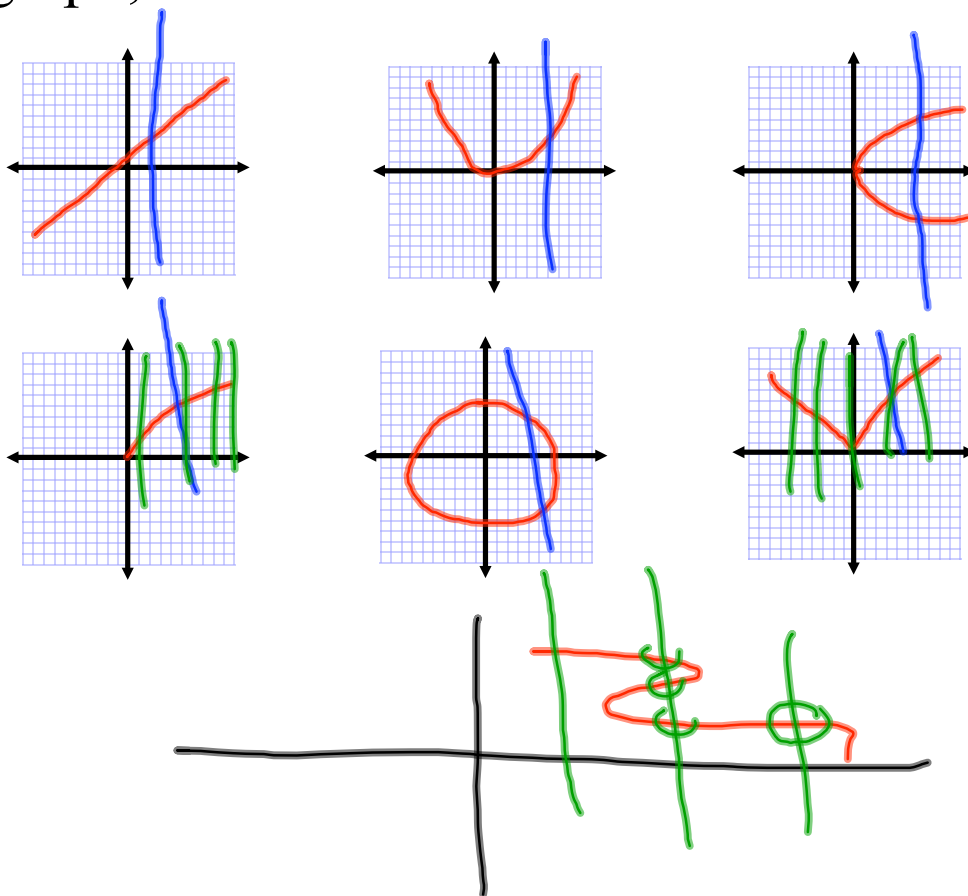
$$\{(-1, 1), (-2, 2), (4, -4), (7, -7)\}$$

**Practice #2:** Identify the domain and range of each relation. Represent the relation with a mapping diagram. Is the relation a function?

$$\{(-2, 0.5), (0, 2.5), (4, 6.5), (5, 2.5)\}$$

**Notes:** Another way to decide if a relation a function is to look at the graph.

**Vertical Line Test:** If any vertical line passes through more than one point of the graph, the relation is not a function.



**Notes:****4.6 (Part 2) EVALUATING A FUNCTION  
RULE AND FINDING THE RANGE:**

The problem will give you **x** and you calculate the answer (which is **y**) in the equation.  
y will change based on the value of x.

**Example #1:**

$$f(x) = 2x + 3$$

+	-	-
-	+	-
-	-	+

What is the range when the domain is  $\{-4, 2, 5\}$ ? x x x

$$\textcircled{1} f(-4) = 2(-4) + 3 = -8 + 3 = -5$$



$$\textcircled{2} f(2) = 2(2) + 3 = 4 + 3 = 7$$

$$\textcircled{3} f(5) = 2(5) + 3 = 10 + 3 = 13$$

The range is  $\{-5, 7, 13\}$  y y y

~~\*\*\* y depends on the value of x. Therefore x is called the INDEPENDENT variable and y is called the DEPENDENT variable.~~

Practice #1: Find the range of  $f(x) = -x + 4$  for the domain  $\{\cancel{-3}, \overset{x}{-2}, \overset{x}{-1}, \overset{x}{1}\}$

$$\textcircled{1} f(-2) = -(-2) + 4$$

$$2 + 4 = 6$$

$$\textcircled{2} f(-1) = -(-1) + 4$$

$$1 + 4 = 5$$

$$\textcircled{3} f(1) = -(1) + 4$$

$$-1 + 4 = 3$$

+	-	-
-	+	-
-	-	+

## Identifying a Reasonable Domain and Range



**Example #1** (p292)

You have 3qt of paint to paint the trim in your house.

A quart of paint covers 100ft<sup>2</sup>

The function  $A(q) = 100q$  represents the area  $A(q)$ , in square feet, that  $q$  quarts of paint covers.

What domain and range are reasonable for the function?

What is the graph of the function?

What do we **know**?



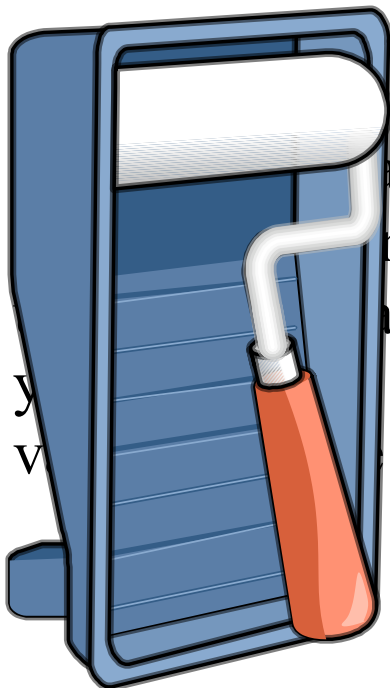
1 quart of paint covers 100ft<sup>2</sup>

We have 3qt of paint

What do we **need** to find?



Reasonable domain and range in order to graph the function



and  
amounts of paint  
area trim  
Use these  
a graph.

The **least** amount of paint you can use is **none**. So the least domain value is **0**.

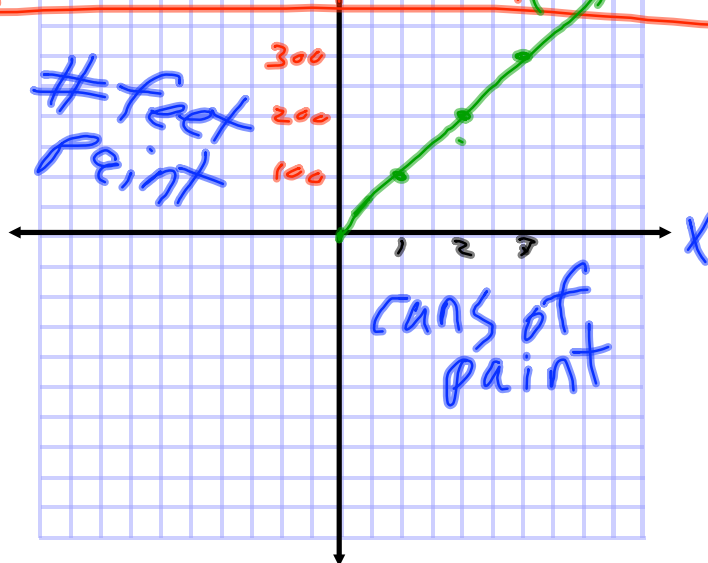
The **most** paint you can use is **3qt**. So the greatest domain value is 3

The domain is  
??????????

The domain is  $0 \leq q \leq 3$

The function:  $A(q) = 100q$

$q$	$A(q) = 100q$	$A(q)$	Point
0	$A(0) = 100(0)$	0	$(0, 0)$
1	$A(1) = 100(1)$	100	$(1, 100)$
2	$A(2) = 100(2)$	200	$(2, 200)$
3	$A(3) = 100(3)$	300	$(3, 300)$

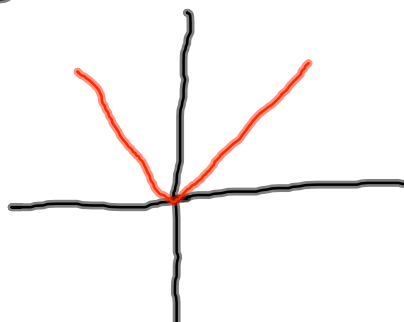


Practice: Textbook p 289

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② Is the relation in the graph a function

Use vertical line test



④ Write  $y = 2x + 7$  using function notation.

⑥ Is the relation a function



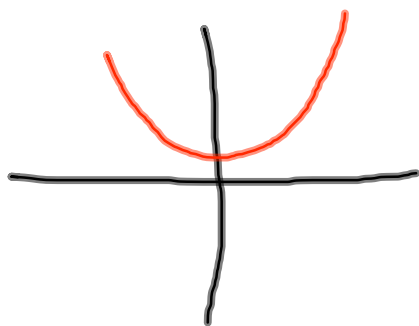
⑦ write the domain and range

$(6, 7), (5, -8), (1, 4), (7, 5)$

domain =  $\{$

range =  $\{$

⑫



Function?

P. 293

Find the range of each  
function for the given  
domain

④  $g(x) = -4x + 1$   $\{-5, -1, 0, 2, 10\}$

Time FUN

Textbook P 289-290  
1-11 odd

P. 293 3, 5

