

Worksheet 1-3: Domain and Range

The domain of a relation is the set of all values of the first coordinates of the ordered pairs, or the independent variables, in a relation (usually the  $x$ -values).

The range of a relation is the set of all values of the second coordinates of the ordered pairs, or the dependent variable, in a relation (usually the  $y$ - values).

Domain and range can be expressed

- in words,
- as lists (for finite number of values),
- as sets of numbers (for all natural numbers, integers, or real numbers), **or**
- as intervals (when there is a limitation or restriction on a number set).

There are real-life factors that affect the domain and range of a relation (such as negative real numbers cannot be included for time and distance).

Practice:

For each of the following relation,

- (a) state whether it is a function.
- (b) state the domain and range of each relation.

1.  $\{(2, 3), (4, 0), (6, -1), (0, 3)\}$  (a) It's a function.

(b) Domain =  $\{2, 4, 6, 0\}$   
 Range =  $\{3, 0, -1\}$

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

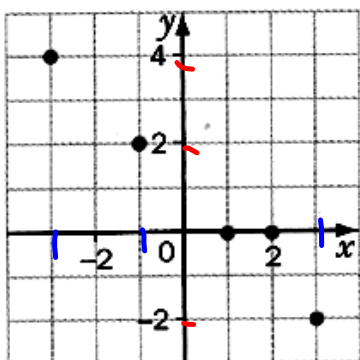
↑

↑

(a) It's not a function

(b) Domain =  $\{-1, 0, 2\}$   
 Range =  $\{0, 2, 5\}$

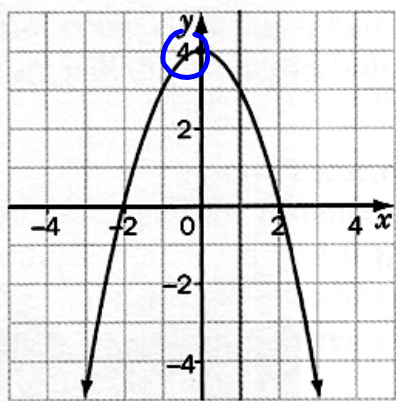
3.



(a) It's a function

(b) Domain =  $\{-3, -1, 1, 2, 3\}$   
 Range =  $\{4, 2, 0, -2\}$

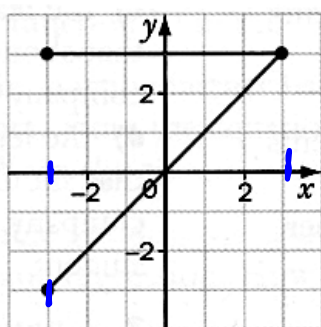
4.



(a) It's a function.

(b) Domain =  $\{x \in \mathbb{R}\}$   
 Range =  $\{y \in \mathbb{R} \mid y \leq 4\}$   
 $(-\infty, 4]$

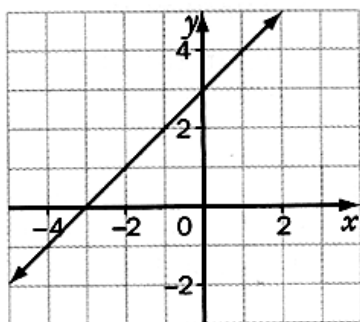
5.



(a) It's not a function

(b) Domain =  $\{x \in \mathbb{R} \mid -3 \leq x \leq 3\}$   
 $[-3, 3]$   
 Range =  $\{y \in \mathbb{R} \mid -3 \leq y \leq 3\}$   
 $[-3, 3]$

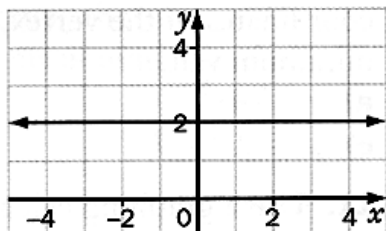
6.



(a) It's a function

(b) Domain =  $\{x \in \mathbb{R}\} (-\infty, \infty)$   
 Range =  $\{y \in \mathbb{R}\} (-\infty, \infty)$

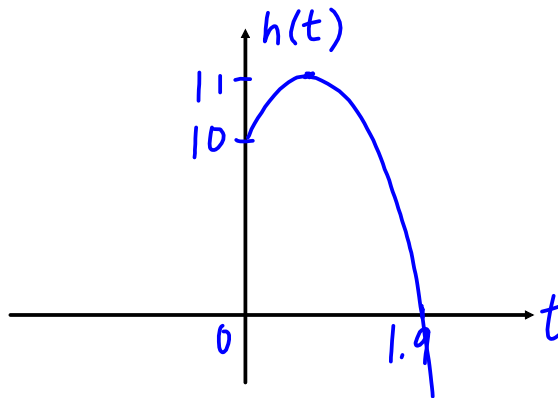
7.



(a) It's a function

(b) Domain =  $\{x \in \mathbb{R}\} (-\infty, \infty)$   
 Range =  $\{2\}$

8. From the top of a 10-m cliff, a diver jumps 1 m into the air, does a front flip, falls, and hits the water 1.9 s after jumping.
- (a) Sketch a graph of Height versus Time for the relation that models the diver's jump. Don't forget to include major points on your graph.



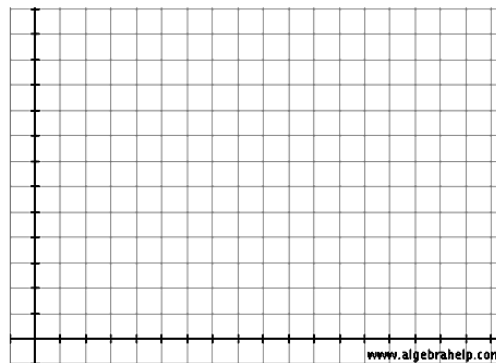
- (b) Write the domain and range of the relation.  
Do we have any real-life restrictions/factors to consider?

Domain =  $\{t \in \mathbb{R} \mid 0 \leq t \leq 1.9\}$   $[0, 1.9]$

Range =  $\{h(t) \in \mathbb{R} \mid 0 \leq h(t) \leq 11\}$   $[0, 11]$

9. A rectangular field will be built using 100 m of fencing.  $P=100$
- (a) Create a table of value and draw a graph of Width versus Length.  $\frac{P}{2}=50$   $w+l=50$

W	L
0.....	49.....
1	49
2	48
⋮	
49	1



- (b) Describe the domain and range in words.

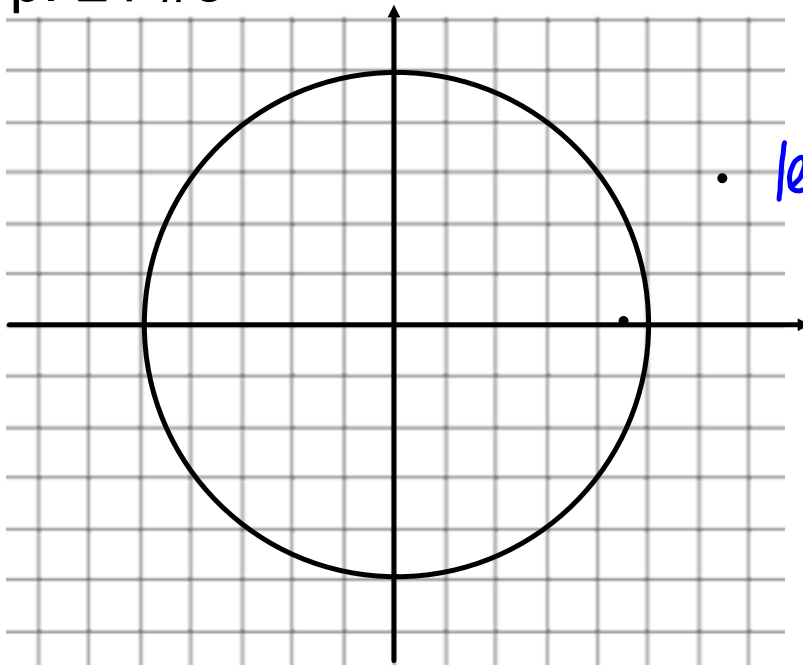
Domain =  $\{w \in \mathbb{R} \mid 0 < w < 50\}$   $(0, 50)$

Range =  $\{L \in \mathbb{R} \mid 0 < L < 50\}$   $(0, 50)$

The domain is the set of real numbers between 0 and 50 excluding 0 and 50.  
The range is the set of real numbers between 0 and 50 excluding 0 and 50.

↑ This is the answer for (b).  
(In English)

p. 21 #3



between

• least  $\leq x \leq$  greatest  
greater than  
or equal to  
 $x \geq ?$

less than or  
equal to

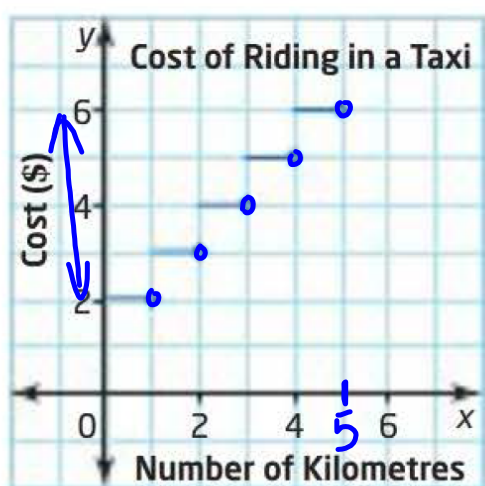
$x \leq ?$

$$D = \{x \in \mathbb{R} \mid -5 \leq x \leq 5\}$$

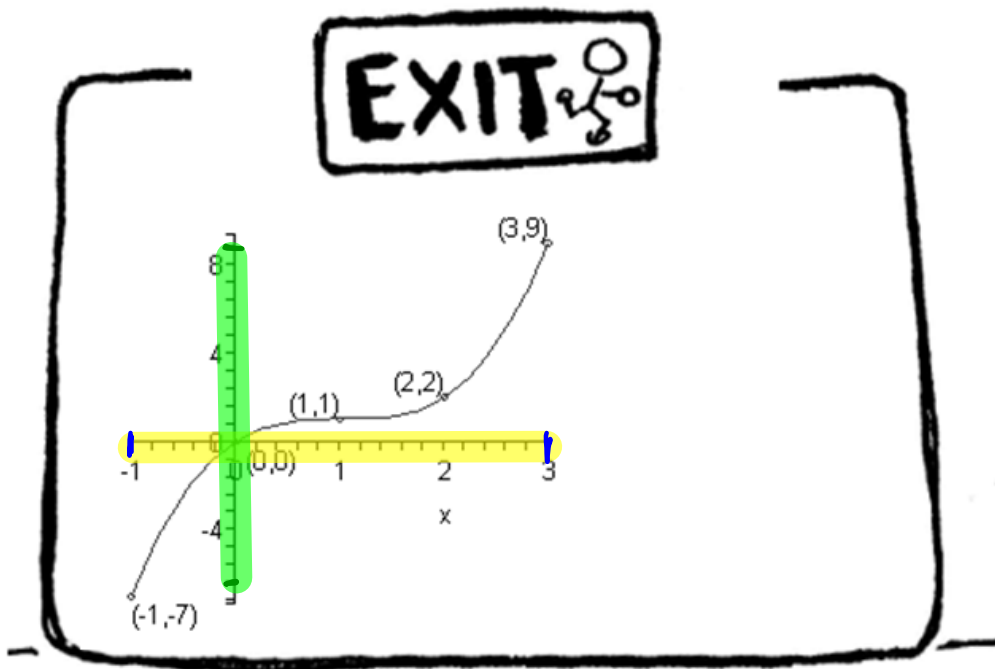
$$\text{Range} = \{y \in \mathbb{R} \mid -5 \leq y \leq 5\}$$

p. 21 #6

6. The graph shows the cost of riding in a taxi. The pattern continues. The open dot at the right end of a line segment means that the point is not on the graph.

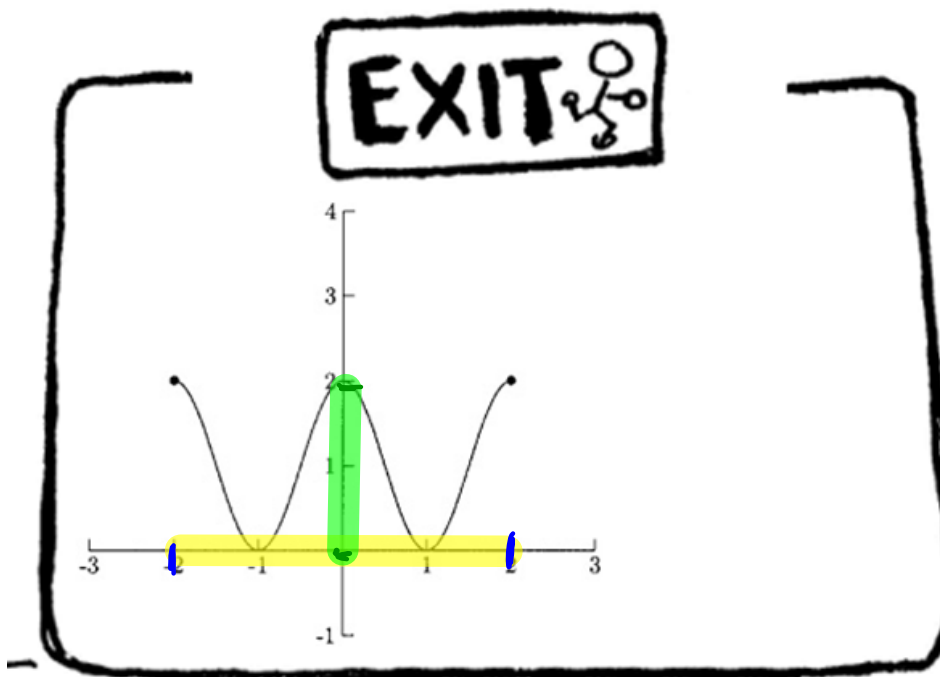


$$\text{Domain} = \{x \in \mathbb{R} \mid 0 \leq x < 5\}$$
$$\text{Range} = \{y \in \mathbb{I} \mid 2 \leq y \leq 6\}$$



$$D = \{x \in \mathbb{R} \mid -1 < x < 3\}$$

$$R = \{y \in \mathbb{R} \mid -7 < y < 9\}$$



$$D = \{x \in \mathbb{R} \mid -2 \leq x \leq 2\}$$

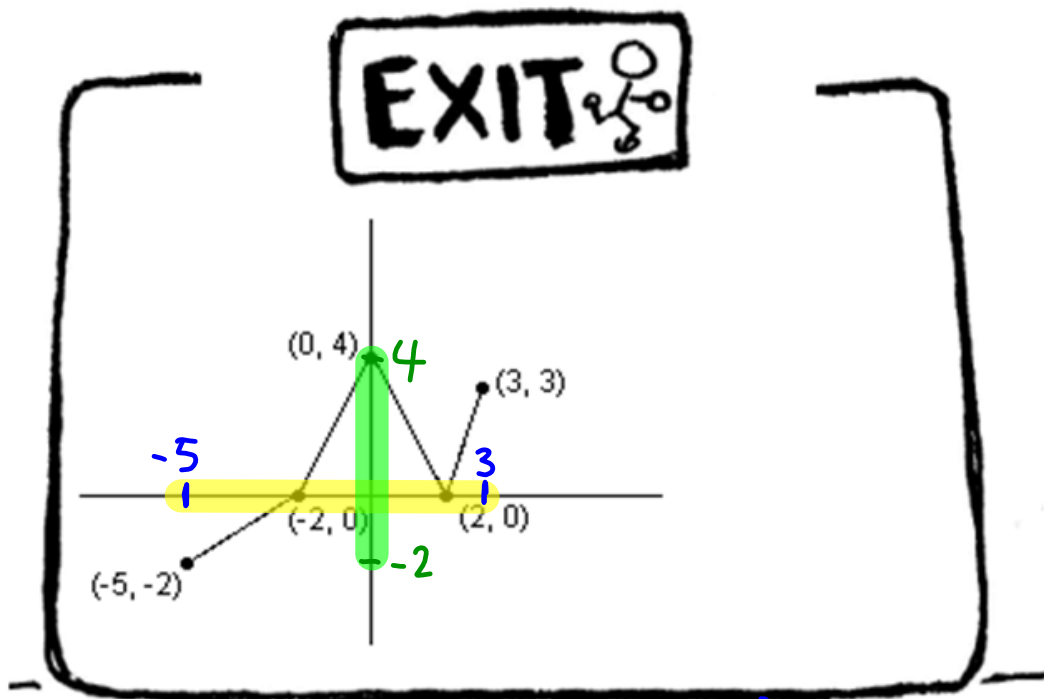
$$R = \{y \in \mathbb{R} \mid 0 \leq y \leq 2\}$$

greater than

$$x > \#$$

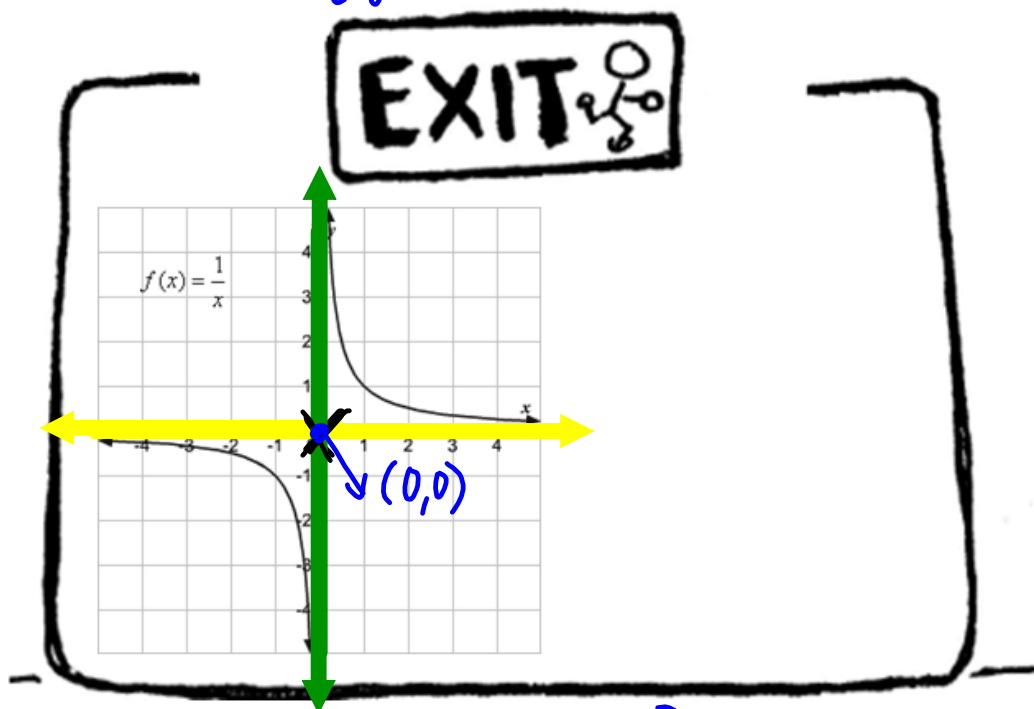
less than

$$x < \#$$



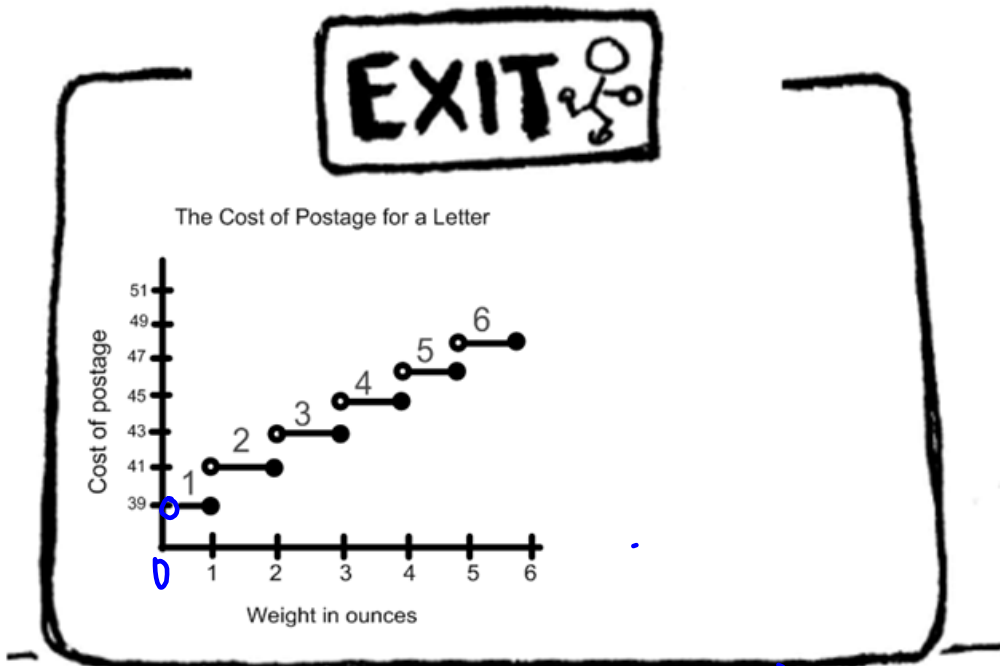
$$D = \{x \in \mathbb{R} \mid -5 \leq x \leq 3\}$$

$$R = \{y \in \mathbb{R} \mid -2 \leq y \leq 4\}$$



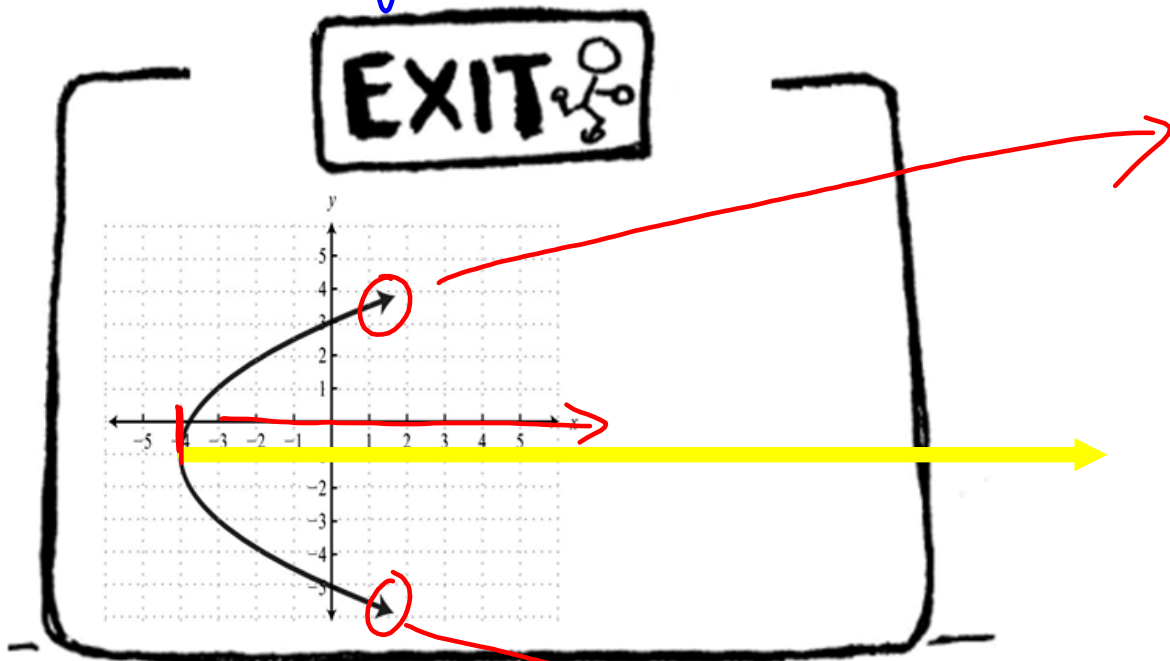
$$D = \{x \in \mathbb{R} \mid x \neq 0\}$$

$$R = \{y \in \mathbb{R} \mid y \neq 0\}$$



$$D = \{x \in \mathbb{R} \mid 0 < x \leq 6\}$$

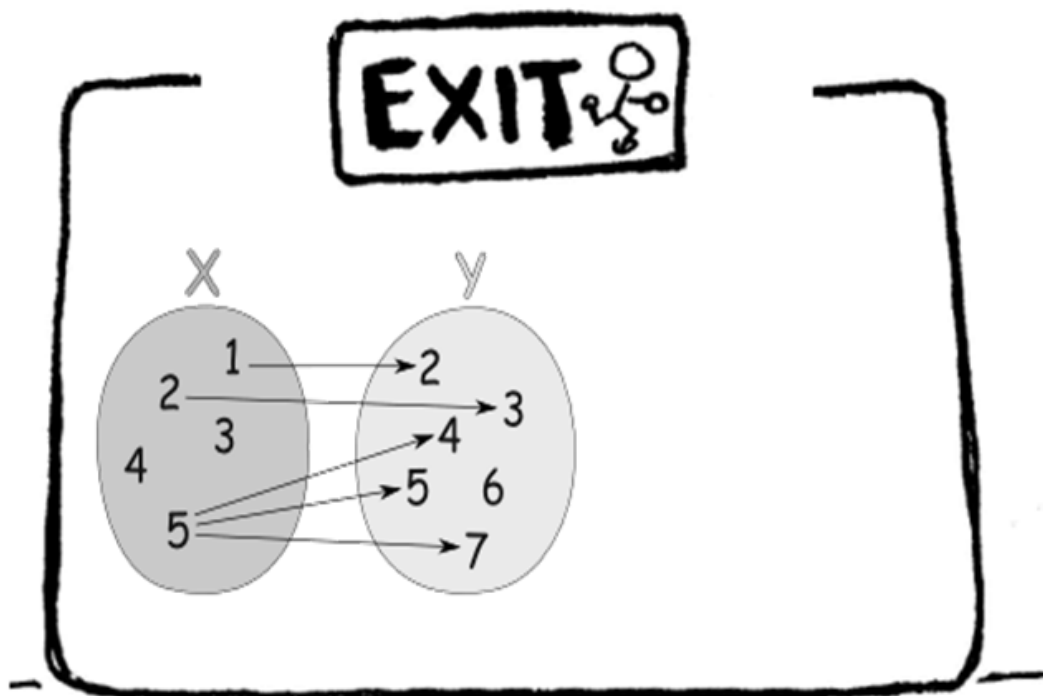
$$R = \{y \in \mathbb{I} \mid 39 \leq y \leq 48\}$$



$$D = \{x \in \mathbb{R} \mid x \geq -4\}$$

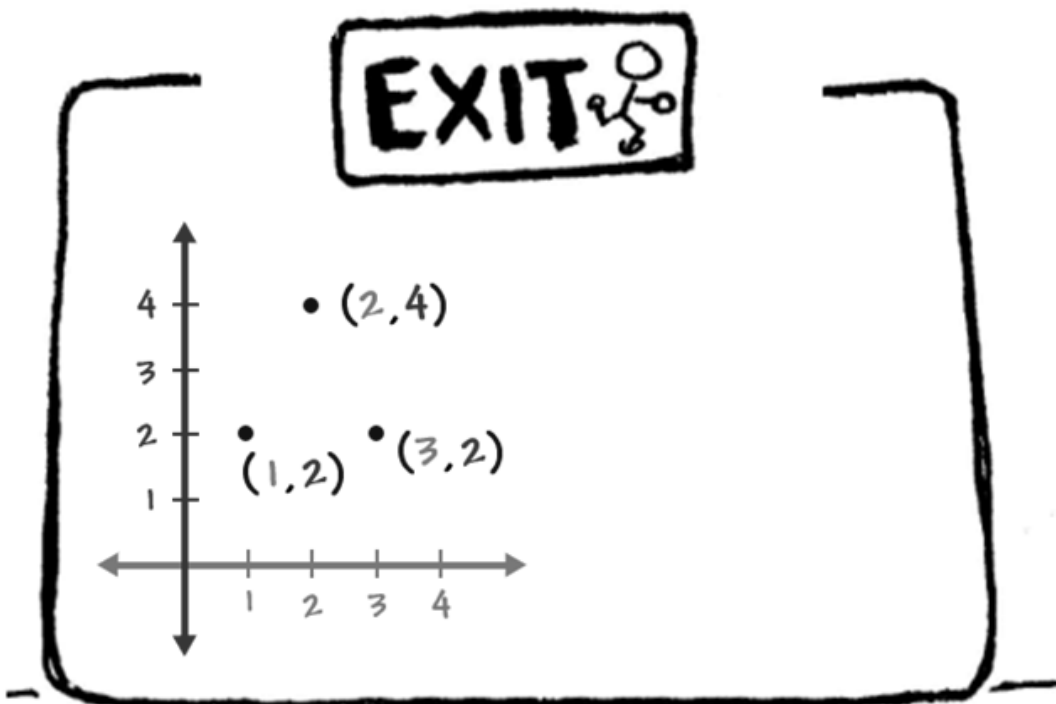
$$R = \{y \in \mathbb{R}\}$$





$$D = \{1, 2, 5\}$$

$$R = \{2, 3, 4, 5, 7\}$$



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

$$R = \{2, 4\}$$