Relations, Functions and Their Graphs

Relation - a set of ordered pairs (resulting from a rule) (x, y)

ex) G is a relation defined by G = {(2, 1), (3, 2), (5, 6)}
Ordered pairs of the relation are:

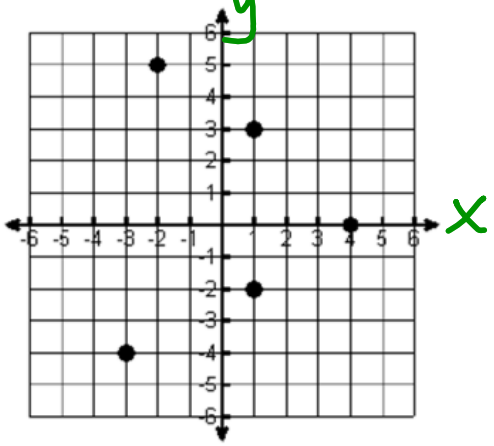
(2,1) (3,2) (5,6)

Domain - the set of all x -values of the ordered pair
Range - the set of all y -values of the ordered pair

ex) Given H = {(6, 1), (3, 1), (2, 4), (6, 4)}.
State domain and range.

D: {6,3,2} R: {1,4}

ex) Given the function,
state domain and range.

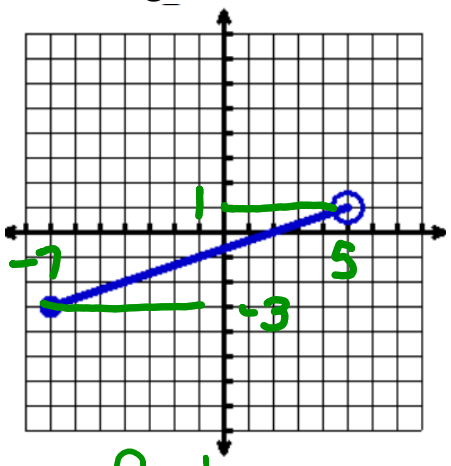


D: {-3,-2,1,4}

R: {5,3,0,-2,-4}

Notation

Domain and range can be represented using two notations. The first type is set notation.



D: $\{x|-7 \leq x < 5\}$

R: $\{y|-3 \leq y < 1\}$

Set Notation

D: {x| }

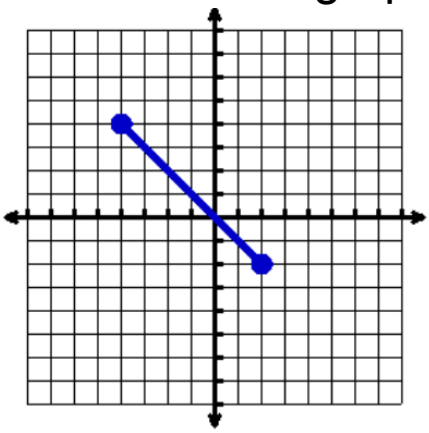
R: {y| }

- point is included use ≤ or ≥
- ○ point is not included use < or >

If all values use x∈R or y∈R (means, x or y belongs to all real numbers)

Types of graphs:

A continuous graph with two endpoints:

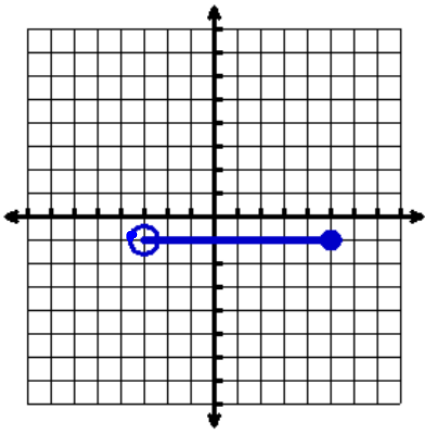


$D: \{x \mid -4 \leq x \leq 2\}$

$R: \{y \mid -2 \leq y \leq 4\}$

Important Note:

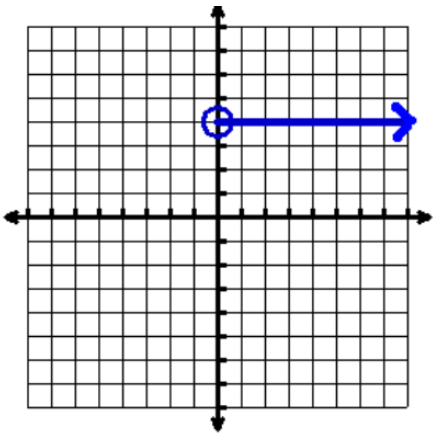
- To find the domain for a graph with two endpoints, always identify the x-values of the point farthest to the left and the point farthest to the right.
- For the range, you want the y-values of the lowest point and the highest point.



$D: \{x \mid -3 < x \leq 5\}$

$R: \{y \mid y = -1\}$

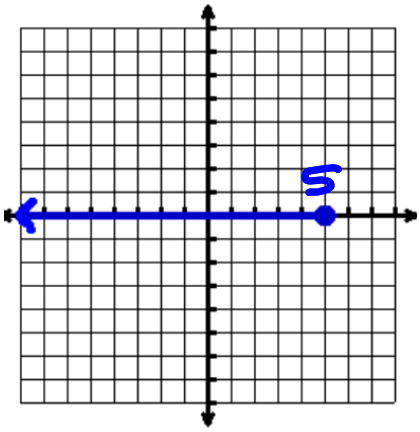
A continuous graph with only one endpoint (continues forever in the other direction):



D: $\{x \mid x > 0\}$

R: $\{y \mid y = 4\}$

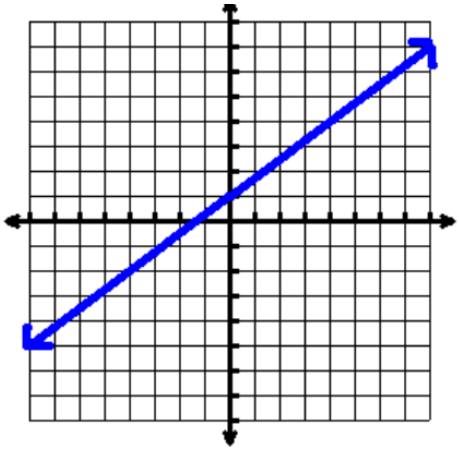
Note: If the arrow were pointing to the left, the domain would be ≤ the x-value. If the arrow were pointing down, the range would ≤ the y-value.



D: $\{x \mid x \leq 5\}$

R: $\{y \mid y = 0\}$

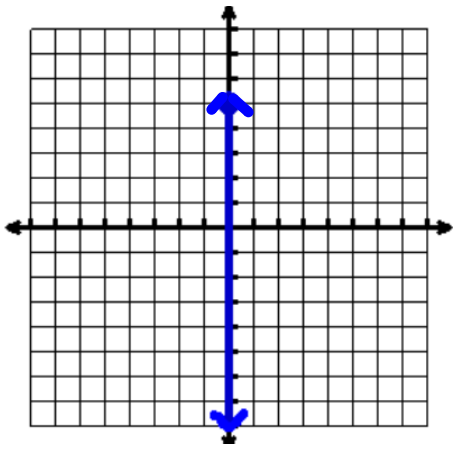
A continuous graph that has two arrows:



$D: \{x \mid x \in \mathbb{R}\}$

$R: \{y \mid y \in \mathbb{R}\}$

Note: If one of the arrows were pointing up and one of the arrows were pointing down, then the range would be all real numbers.



$D: \{x \mid x = 0\}$

$R: \{y \mid y \in \mathbb{R}\}$