A coordinate system is formed by the intersection of two number lines, the horizontal axis and the vertical axis.

An ordered pair or coordinate looks like $(x,y)$
A set of ordered pairs is called a relation

\{(2,3), (4,7), (5,6), (9,0), (1, 8)\}

A mapping illustrates how each element of the domain is paired with an element of the range
Other Ways to Represent Relations

Table

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>11</td>
<td>18</td>
</tr>
</tbody>
</table>

Graph
The set of x-values is called the domain

The set of y-values is called the range

What is the domain and range of the following relation

\{(2,3), (4,7), (5,6), (9,0), (1, 8)\}  ?
Function

INPUT $x$

FUNCTION $f$: 

OUTPUT $f(x)$
Function

• A function assigns exactly one output for each input. (x's cannot be repeated)

• A function must pass the vertical line test.
Relation or Function?
Relation or Function?

Fails VLT
Are the following relations functions?

Diagram:

- From left set:
  - 0
  - 5
  - 6
  - 8
  - 10

- To right set:
  - 4
  - 9
  - 12
  - 17
Are the following relations functions?

\{(2,6), (3,9), (3,12), (4,15), (5,10)\}

Not a Function

Only a Relation
What is the domain and range of the following?

\[ D: [-1, 5] \]
\[ -1 \leq x \leq 5 \]

\[ R: [-1, 2] \]
\[ -1 \leq y \leq 2 \]
What is the domain and range of the following?

\[ \text{D: } \left[ 1, 3 \right] \]
\[ 1 \leq x \leq 3 \]

\[ \text{R: } \left( 0, 5 \right] \]
\[ 0 < y \leq 5 \]
What is the domain and range of the following?

D: \((-\infty, +\infty)\)
\(-\infty < x < +\infty\)

R: \([0, +\infty)\)
\(0 \leq y < +\infty\)
What is the domain and range of the following?

\[ D: \quad [0, +\infty) \]  
\[ 0 \leq x < +\infty \]  
\[ R: \quad (-\infty, +\infty) \]  
\[ -\infty < y < +\infty \]
Domain and Range:

Function: