

## Functions (8.1)

## Math 91

*Functions are used to show a relationship between two quantities. We will represent functions with words, tables, symbols, and graphs. Not all relationships can be considered functions however.*

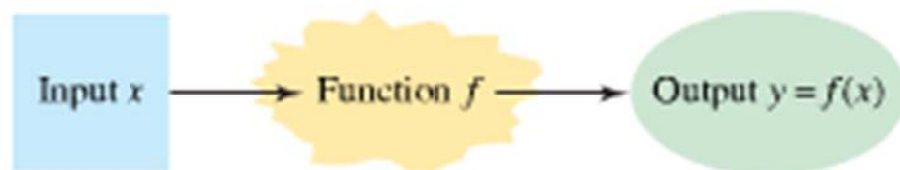
**Function** – a relationship between two sets of quantities, where

**The Input** –

**The Output** –

**Function Notation** –

**A picture:**



**Wages Example** –

**1. Is it a Function?**

**a) Input \$1 to Quarter (25¢) Change Machine (what's the output?)**

**vs.**

**Input \$1 into Slot Machine (what's the output?)**

**b)**

<b>Input – Baseball Team</b>	<b>Output – Baseball City</b>

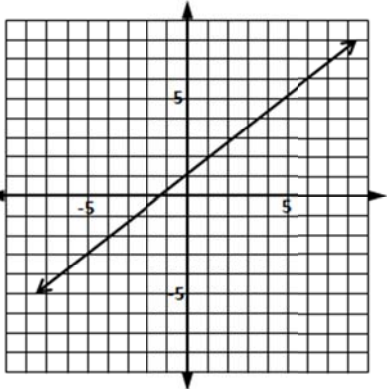
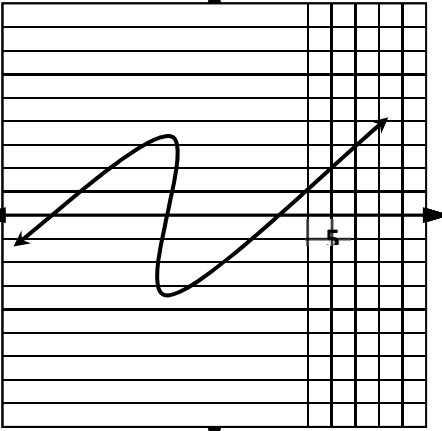
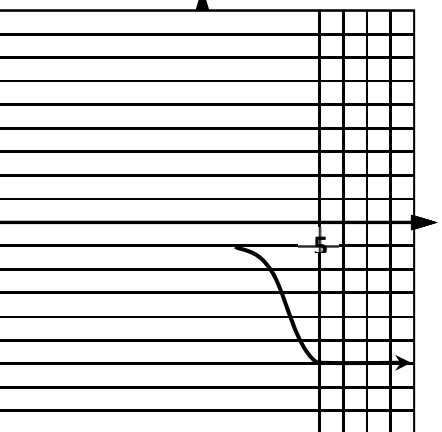
**c)**

<b>Input – Baseball City</b>	<b>Output – Baseball Team</b>

**We need to be able to:**

- Decide if a relationship is a function
- Evaluate a function
- Graph a function
- Determine what numbers or values are allowed as inputs (Domain)
- Determine what numbers or values can result as outputs (Range)

2. For each of the examples in the table below, state whether the table, graph, or words do or do not describe a functional relationship. If it does not, provide an explanation or circle the features you used to make your decision.

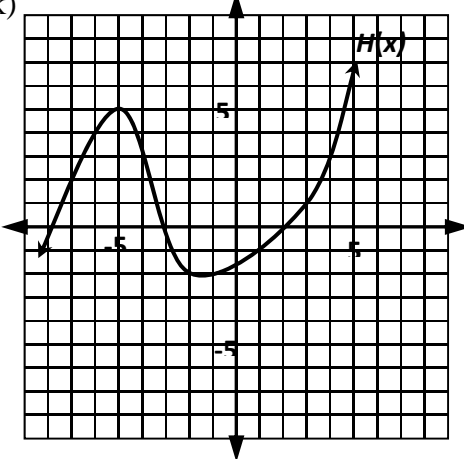
Tables	Graphs	Words												
<p>a)</p> <table border="1"> <thead> <tr> <th><math>t</math></th> <th><math>C</math></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>4</td> </tr> <tr> <td>3</td> <td>9</td> </tr> <tr> <td>4</td> <td>16</td> </tr> <tr> <td>5</td> <td>25</td> </tr> </tbody> </table> <p>Is <math>C</math> a function of <math>t</math>?</p>	$t$	$C$	1	1	2	4	3	9	4	16	5	25	<p>b)</p> 	<p>c) Is the amount you pay your babysitter for an evening out a function of the time you are gone if she charges \$6 an hour?</p>
$t$	$C$													
1	1													
2	4													
3	9													
4	16													
5	25													
<p>d)</p> <table border="1"> <thead> <tr> <th><math>t</math></th> <th><math>C</math></th> </tr> </thead> <tbody> <tr> <td>15</td> <td>100</td> </tr> <tr> <td>30</td> <td>200</td> </tr> <tr> <td>45</td> <td>100</td> </tr> <tr> <td>0</td> <td>150</td> </tr> <tr> <td>15</td> <td>100</td> </tr> </tbody> </table> <p>Is <math>C</math> a function of <math>t</math>?</p>	$t$	$C$	15	100	30	200	45	100	0	150	15	100	<p>e)</p>  <p>Does this graph show <math>y</math> as a function of <math>x</math>?</p>	<p>f) Is the amount you are charged in sales tax a function of the cost of a taxable item purchased in Seattle?</p>
$t$	$C$													
15	100													
30	200													
45	100													
0	150													
15	100													
<p>g)</p> <table border="1"> <thead> <tr> <th><math>y</math></th> <th><math>x</math></th> </tr> </thead> <tbody> <tr> <td>-3</td> <td>5</td> </tr> <tr> <td>-2</td> <td>6</td> </tr> <tr> <td>0</td> <td>7</td> </tr> <tr> <td>-3</td> <td>8</td> </tr> <tr> <td>1</td> <td>9</td> </tr> </tbody> </table> <p>Is <math>x</math> a function of <math>y</math>?</p> <p>Is <math>y</math> a function of <math>x</math>?</p>	$y$	$x$	-3	5	-2	6	0	7	-3	8	1	9	<p>h)</p>  <p>Does this graph show <math>y</math> as a function of <math>x</math>?</p>	<p>i) Is the amount you are charged in federal income taxes a function of the amount you earn?</p>
$y$	$x$													
-3	5													
-2	6													
0	7													
-3	8													
1	9													

**Vertical Line Test –**

**Evaluating Functions** - The first step is being able to read and interpret the symbols in the name of a function.

$$f(x)$$

**3.** In the following examples, use the tables, graphs, and symbols to evaluate the given functions.

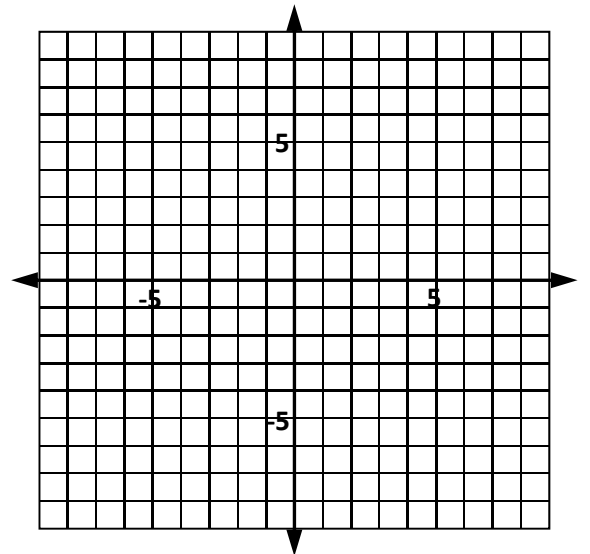
Tables	Graphs	Symbols												
<p>j)</p> <table border="1"> <thead> <tr> <th><math>n</math></th> <th><math>p(n)</math></th> </tr> </thead> <tbody> <tr> <td>6</td> <td>21</td> </tr> <tr> <td>-1</td> <td>6</td> </tr> <tr> <td>2</td> <td>13.5</td> </tr> <tr> <td>0</td> <td>9</td> </tr> <tr> <td>-4</td> <td>-1</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Compute <math>p(0)</math></li> <li>• Find <math>p(-1)</math></li> <li>• Find <math>n</math> such that <math>p(n)=13.5</math></li> </ul>	$n$	$p(n)$	6	21	-1	6	2	13.5	0	9	-4	-1	<p>k)</p>  <ul style="list-style-type: none"> <li>• Compute <math>H(1)</math></li> <li>• What is <math>H(-7)</math></li> <li>• For what values of <math>x</math> is <math>H(x)=5</math></li> </ul>	<p>l) If <math>f(r) = 2 + 7r - r^2</math>,</p> <ul style="list-style-type: none"> <li>• Compute <math>f(3)</math></li> <li>• Evaluate <math>f(r)</math> at <math>r = 8</math></li> <li>• Find <math>f(-2)</math></li> </ul>
$n$	$p(n)$													
6	21													
-1	6													
2	13.5													
0	9													
-4	-1													

## Graphing a function

2. To graph a function, use the “creating a table of values” approach.

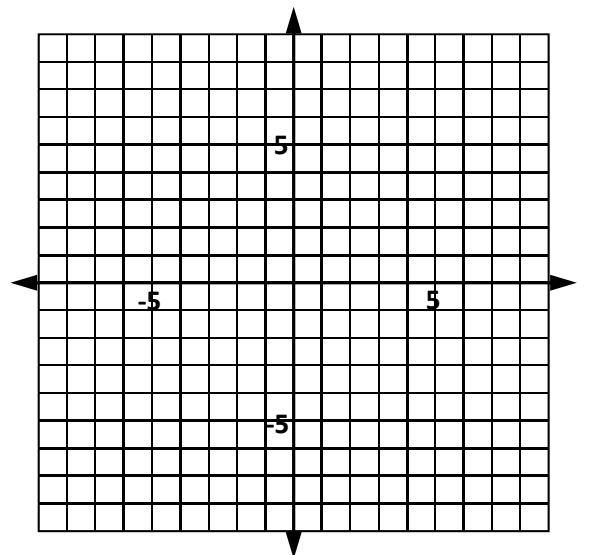
a) Graph  $f(x) = 3x - 5$

$x$	$f(x)$



b) Graph  $q(x) = x^2 - 3$

$x$	$q(x)$



c) Graph  $s(x) = 3\sqrt{x}$

$x$	$q(x)$

