

Functions in Five Forms – Reference

Name: _____ Date: _____ Class Period: _____

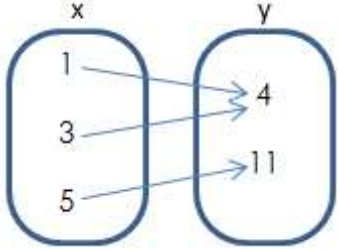
A _____ is a set of INPUT and OUTPUT values, usually written as a set of (x, y) ordered pairs. For example: $\{(1, 4), (3, -2), (4, 3), (0, -1), (-2, 4)\}$

The set of x-values are known as the _____.

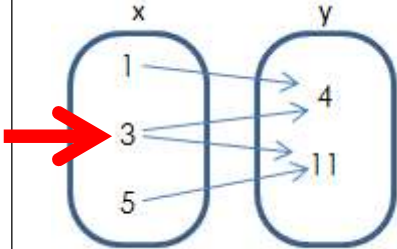
The set of y-values are known as the _____.

If no x-values are repeated, then the relation is called a _____, because there is only one input (x-value) for every output (y-value).

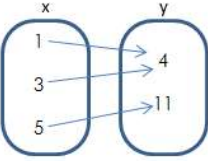
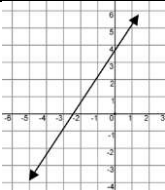
Examples of functions:

$\{(1, 4), (3, -2), (4, 3), (0, -1), (-2, 4)\}$	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="padding: 2px 5px;">x</td><td style="padding: 2px 5px;">-7</td><td style="padding: 2px 5px;">2</td><td style="padding: 2px 5px;">-2</td><td style="padding: 2px 5px;">4</td></tr> <tr><td style="padding: 2px 5px;">y</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">4</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">4</td></tr> </table>	x	-7	2	-2	4	y	0	4	0	4	
x	-7	2	-2	4								
y	0	4	0	4								

Here are examples of relations that are NOT functions:

$\{(1, 4), (3, -2), (1, 3), (0, -1), (-2, 4)\}$	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="padding: 2px 5px;">x</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">-2</td><td style="padding: 2px 5px;">4</td></tr> <tr><td style="padding: 2px 5px;">y</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">4</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">4</td></tr> </table>	x	0	0	-2	4	y	0	4	0	4	
x	0	0	-2	4								
y	0	4	0	4								
<p>This relation is not a function because the "1" repeats in the x-values.</p>	<p>This relation is not a function because the "0" repeats in the x-values.</p>	<p>This relation is not a function because the "3" repeats in the x-values.</p>										

Easy, right! The tricky part is identifying functions (or non-functions) in each of the five formats:

Set of Ordered Pairs	Table	Mapping	Graph	Equations								
$\{(4,2), (6,5), (2,0)\}$	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="padding: 2px 5px;">x</td><td style="padding: 2px 5px;">y</td></tr> <tr><td style="padding: 2px 5px;">3</td><td style="padding: 2px 5px;">0</td></tr> <tr><td style="padding: 2px 5px;">5</td><td style="padding: 2px 5px;">0</td></tr> <tr><td style="padding: 2px 5px;">7</td><td style="padding: 2px 5px;">2</td></tr> </table>	x	y	3	0	5	0	7	2			$y = mx + b$ or $f(x) = mx + b$
x	y											
3	0											
5	0											
7	2											

Functions in Five Forms – With Practice

Name: _____ Date: _____ Class Period: _____

Which relations are functions?

1. $\{(-6, 1), (-5, 2), (-3, 6), (1, -6), (2, -5)\}$	3. $\{(2, 0), (2, 1), (2, 2), (2, 3), (2, 4)\}$
2. $\{(0, 2), (1, 2), (2, 2), (2, 3), (2, 4)\}$	4. $\{(-5, 1), (-3, 2), (-1, 1), (0, 2), (0, 4)\}$

Complete these sentences:

6. The relation $\{(3, 1), (-4, 2), (-3, 3), (1, 0), (2, -1)\}$ IS a function because:

7. The relation $\{(2, 0), (2, 1), (2, 2), (2, 3), (2, 4)\}$ is NOT a function because:

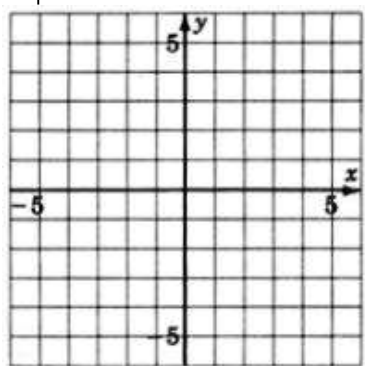
8. The relation $\{(-2, -2), (-1, -1), (0, 0), (1, 1), (2, 2)\}$ IS or IS NOT a function because:

9. The relation $\{(4, 0), (5, -1), (3, 0), (4, 8), (6, 2)\}$ IS or IS NOT a function because:

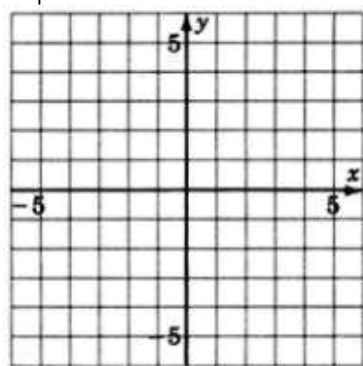
10. Give an example of a relation that IS a function with five ordered pairs:

11. Give an example of a relation that IS NOT a function with five ordered pairs:

12. Plot the points from number 6 above:



13. Plot the points from number 7 above:

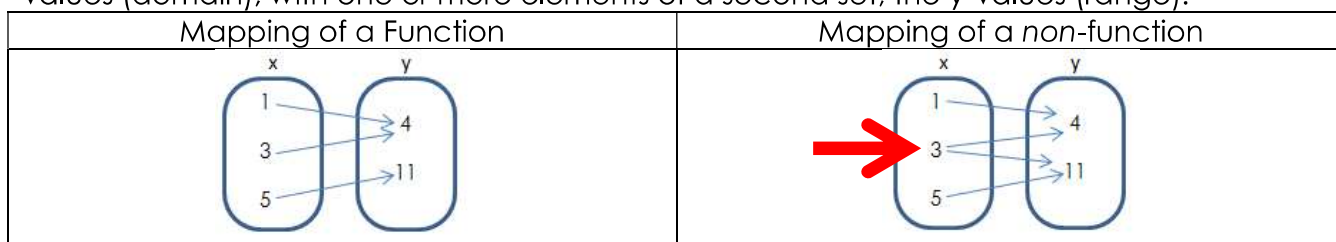


- Can you draw a vertical line (up-and-down) line through any two points on #12? YES or NO
- What about any two points on #13? YES or NO

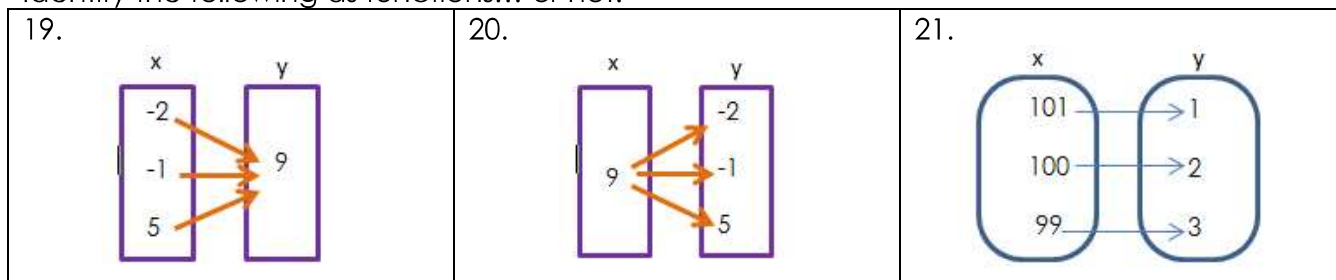
This is called the *vertical line test*. If you can draw a vertical line through a graph and hit more than one point, it is NOT a function. Use the vertical line test to tell whether the following are functions:

<p>14.</p>	<p>15.</p>	<p>16.</p>	<p>17.</p>	<p>18.</p>
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A mapping is an operation that shows the association between each element of the x-values (domain), with one or more elements of a second set, the y-values (range).



Identify the following as functions... or not:



Tables display relations in an easy-to-read and work-with format. Tables can be either horizontal or vertical.

Transfer these relations into tables and determine whether they are functions or not:

<p>22. $\{(0, 2), (1, 3), (2, 4), (5, 3)\}$</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">x</th> <th style="width: 50%;">y</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	x	y									<p>23. $\{(-1, -1), (-2, -2), (-3, -3), (-4, -4)\}$</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">x</th> <th style="width: 50%;">y</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	x	y									<p>24. $\{(2, 0), (3, 1), (2, 4), (3, 5)\}$</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">x</th> <th style="width: 50%;">y</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	x	y									<p>25. $\{(10, 0), (8, 0), (6, 0), (4, 0)\}$</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">x</th> <th style="width: 50%;">y</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	x	y								
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Function or NOT a function	Function or NOT a function	Function or NOT a function	Function or NOT a function																																								

Because there are an infinite number of types of equations, general guidelines are needed to do basic determinations of functions and non-functions.

IS a function	Is NOT a function
Any LINEAR equation is a function, $y = 2x + 7$ $y = -3x + 4$ $y = 8$ $2x + 7y - 3 = 0$ (note both x and y are to the first power)	EXCEPT those linear equations that create a line that is vertical, which will appear in the form $X = \text{some number like } x = -2 \text{ or } x = 100 \text{ or } x = 4.2$
A parabola (quadratic equation) that opens up or down: $y = 2x^2 + 4x + 4$	A parabola that opens left or right: $x = 2y^2 + 4x + 4$
An absolute value equation: $y = x $ or $y = - x $ or $y = x + 4 $	Except those where "y" is in the absolute value bars: $x = y $
An exponential function (where the exponent is a variable): $y = 2^x$	

Identify the following as a function... or not:

26. $y = -3x + 7$	27. $x = 14$	28. $y = 3x^2 - 10$	29. $y = 3 x $	30. $x = y^2 - 11$
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