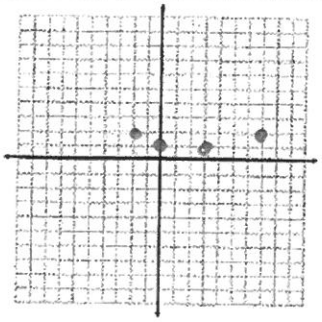
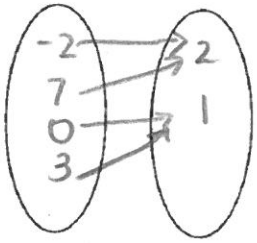
 Key

A relation is a mapping or pairing of input values with output values. It can be represented by:

Ordered Pairs	Table	Graph	Mapping Diagram
(-2,2) (7,2) (0,1) (3,1)	x | y -2 | 2 7 | 2 0 | 1 3 | 1		

A function is a special type of relation in which each element of the domain is paired with exactly one element of the range. (no repeat x's)

The Domain of a relation is the set of all first coordinates (x-coordinates or independent variable).

The range of a relation is the set of all second coordinates (y-coordinates or dependent variable).

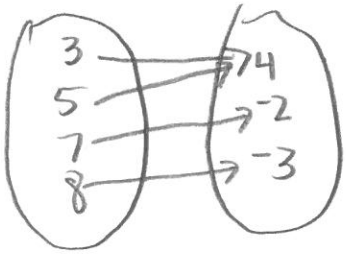
{(3, 4), (5, 4), (7, -2), (8, -3)} is a function since every x-value has exactly one y-value paired with it.

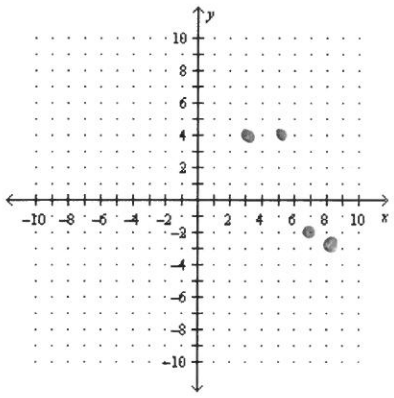
The domain is: {3, 5, 7, 8}

The range is: {4, -2, -3}

Write this function in the other 3 forms.

x	y
3	4
5	4
7	-2
8	-3





{(5, 2), (5, 3), (3, -1), (7, 0)} is NOT a function since the x-value of 5 has two y-values paired with it.

Is every function a relation? yes

Is every relation a function? no (see above)

A function is called 1-1 if every element of the range is also paired to exactly one element of the range.

Give an example of a function that is 1-1.

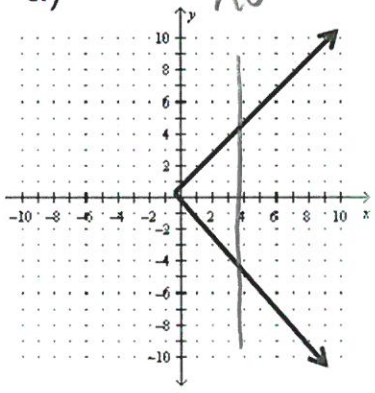
{(4,1) (3,2) (7,4)}

List its domain and range. D{4, 3, 7} no repeats
R{1, 2, 4} no repeats

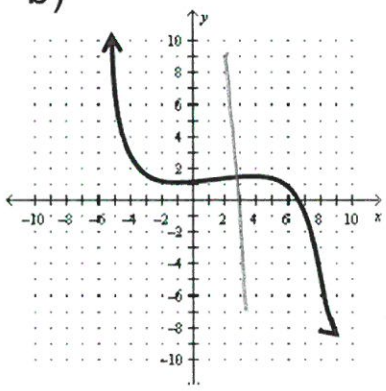
Graphically: vertical line test - If a vertical line passes through more than one point on the graph then the relation is NOT a function.

Are the following functions?

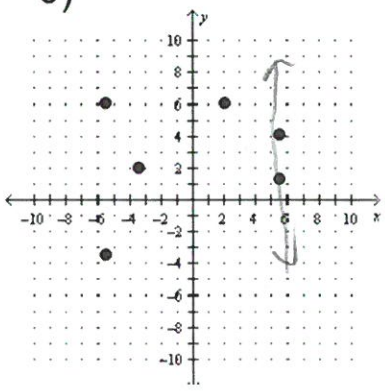
a) no



b) yes



c) no



List the domain and range of each.

D: $x \geq 10$ $[0, 10]$
R: $\mathbb{R}$ $(-\infty, \infty)$

D: $\mathbb{R}$ $(-\infty, \infty)$
R: $(-\infty, \infty)$

D: {-6, -3.5, 2, 5.5}
R: {-3.5, 1.2, 2, 4, 6}

Function notation.

For the equation y = 5x – 1, in function notation it would be written $f(x) = 5x - 1$

$f(x)$ is read as "f of x" This does NOT mean f times x !!!!

What is the value of y when x = 3 is also called $f(3)$?

The independent variable is inside the parenthesis, the dependent variable is outside . $f(3)$ is read as "f of 3": It means evaluate the function when x = 3. (plug 3 into the equation for x)

Any letters may be used C(d) h(t) $g(x)$ $h(x)$

Find f(2) for the following equations.

a. $f(x) = -x^2 + 1$

$f(2) = -(2)^2 + 1$
$-4 + 1 = -3$

b. $f(x) = |3x|$

$f(2) = |3 \cdot 2| = |6|$
$= 6$

c. $f(x) = \frac{9}{1-x}$

$f(2) = \frac{9}{1-2} = \frac{9}{-1}$
$= -9$

You can find a function value from any form of a function.

1. $b(x) = -4x - 5$

$b(2) = -4(2) - 5$
$= -8 - 5$
$= -13$

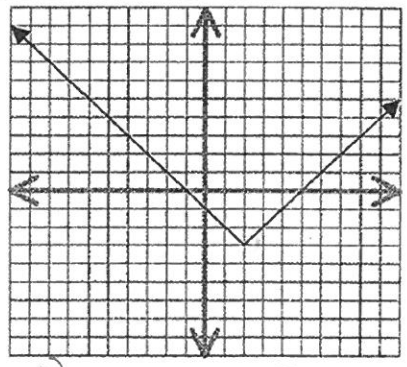
b(2) = -13

2.

x	k(x)
-1	5
0	3
1	-8
2	-10
3	-4
4	0

k(2) = -10
the y coordinate

3.



f(2) = -3

Remember in this case "2" is the independent variable (x) and you are looking for the dependent variable (y on the graph).

You can also find a function value for an expression. Using b(x) from above find: (simplify right side only) (your answer may have x in it)

a. b(2x) b. b(-2x) c. b(x+h) d. b(4a-1)

$b(2x) = -4(2x) - 5$
$= -8x - 5$

$b(-2x) = -4(-2x) - 5$
$= 8x - 5$

$b(x+h) = -4(x+h) - 5$
$= -4x - 4h - 5$

$b(4a-1) = -4(4a-1) - 5$
$= -16a + 4 - 5$
$= -16a - 1$

Using $f(x) = -x^2 + 1$, find f(x+h)

$f(x+h) = -(x+h)^2 + 1$
$= -(x+h)(x+h) + 1$
$= -(x^2 + xh + xh + h^2) + 1$
$= -x^2 - xh - xh - h^2 + 1$
$= -x^2 - 2xh - h^2 + 1$