

### 3.1 Evaluating Functions

Objective: Students will be able to identify what a function is, and evaluate a function for a specific value.

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A **function** is a relation in which each element in the domain (the inputs, x's) of the relation corresponds to exactly one element in the range (the outputs, y's) of the relation.

Function notation:  $f(x)$  "f of x"

means: function named f is written using x's

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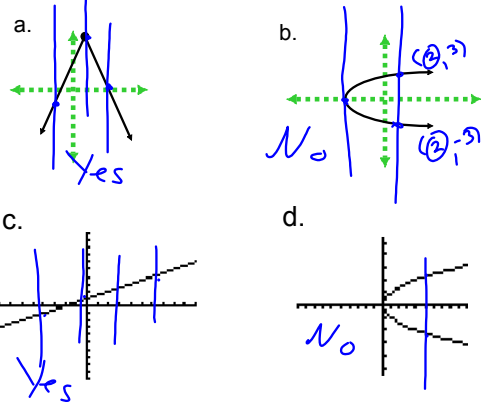
### Function or not a function?

- graphically: passes the vertical line test

Means: draw a vertical line, if it touches the graph once it's a function.

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### Function or not a function?



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### Tables

Function or not a function?

x	y
2	1
4	2
6	3
8	2

Yes

x	y
2	5
2	8
5	12
13	-12

No

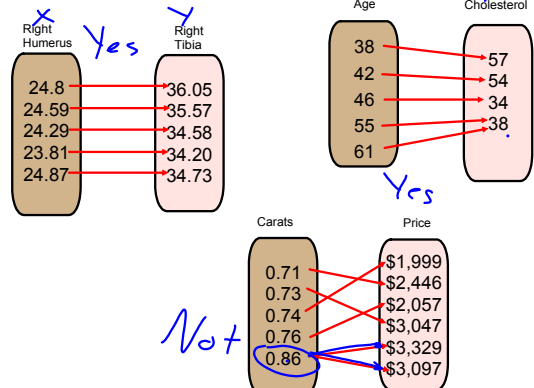
x	y
-6	2
-2	2
0	2
1	2

Yes

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### Relations

Function or not a function?



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Ordered Pairs

Function or not a function?

a)  $\{(1, 3), (-1, 4), (0, 6), (3, 8)\}$   
*Yes*

b)  $\{(-2, 6), (-1, 3), (0, 2), (1, 3), (2, 6)\}$   
*Yes*

c)  $\{(0, 3), (1, 4), (4, 5), (9, 5), (4, 1)\}$   
*No*

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Evaluating Functions

Example:  $f(9) = 3(9) + 2$   
 $f(x) = 3x + 2 = 27 + 2 = 29$   
 $f(9) = 29$   
 input      output

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Evaluate

$f(x) = x^2 + 6x$

$f(3) = (3)^2 + 6(3)$   
 $= 9 + 18 = 27$   
 (3, 27)

$f(-2) = (-2)^2 + 6(-2)$   
 $= 4 - 12 = -8$

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$h(z) = 4z + 3$

$h(z+3) = 4(z+3) + 3$   
 $= 4z + 12 + 3 = 4z + 15$

$h(3) = 4(3) + 3 = 12 + 3 = 15$

$h(z) + h(3) = (4z + 3) + 15 = 4z + 18$

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You try

$f(x) = 3x + 2$        $g(x) = -2x^2 + x - 3$

$f(4) = 3(4) + 2 = 12 + 2 = 14$

$g(-2) = -2(-2)^2 + (-2) - 3 = -2(4) + (-2) - 3 = -8 + (-2) - 3 = -13$

$f(2) = 3(2) + 2 = 8$

$f(x-2) = 3(x-2) + 2 = 3x - 6 + 2 = 3x - 4$

$f(x) - f(2) = (3x + 2) - 8 = 3x - 6$

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Graph  $f(x) = x^2$  by plotting points.

x	f(x)
0	0
1	1
2	4
3	9
-1	1
-2	4

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The function  $f(p) = -p^2 + 200p$  represents the daily revenue earned from selling iPhones at  $p$  phones for  $0 < p < 200$ .

Evaluate  $f(20)$ . Provide an explanation of what  $f(20)$  means.

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