Warm Up

1) Evaluate 3x + 2y, when x = -2 and y = 3.

$$3(-2) + 2(3) = 0$$
$$-6 + 6$$

2) Evaluate $x^2 + 2x + 1$ when x = 3.

$$(3)^2 + 2(3) + 1$$
$$9 + 6 + 1$$
$$16$$

Algebra 1 ~ U2B Day 1   **Functions and Relations NOTES**

Terms to Know:
◎ Relation: Any set of ___input___ that has an ___output___ .

◎ Function: A ___relation___ such that every single ___input___ has exactly ___ONE___ output. *"x cannot repeat"*

◎ Domain: ___x-values, input, or independent variable___

◎ Range : ___y-values, output, or dependent variable___

How do I determine if a relation is a function?

◎ Each input must have ___ONE___ output.

◎ Look at the graph….The vertical line test: **No** vertical line can pass through ___move than 1 point___ ~~points~~ on the graph.

Here are 2 examples of functions and the 3rd is NOT a function:
1. Input the number of seconds after the starting gun in a race to get an output of the number of meters the runner has covered.

Race Chart

X	Number of Seconds (input)	1	4	7	8
y	Meters Covered (output)	5	20	35	40

2. $y = x - 6$, where x is the place holder for the input and y is the place holder for the output.

Function: $y = x - 6$

x (input)	-3	0	7	8
y (output)	-9	-6	1	2

3. The rule about only **one output** each time is crucial and must not be violated.

**Not a Function**

input	3	2	0	3
output	4	-1	2	-3

Why is this not a function? ___3's repeat___

You try these: Are these relations functions?
1. {(3,2),(4,3),(5,4),(6,5)} *Yes*
2.   *NO*
3.   *Yes*
4. *NO*
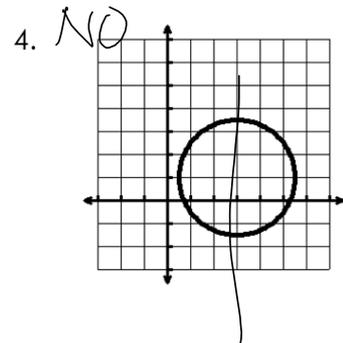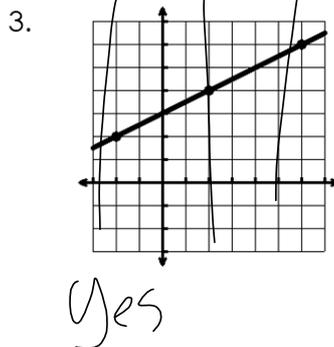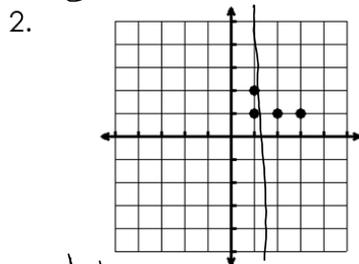
Function Notation:

◎ Function notation is __a way of expressing a function__. It is pronounced __$f(x) \to$ "f of x"__.

◎ f(x) is a fancy way of writing __y__ in an __equation__.

  o Example: f(x) = 2x + 4 is the same as y = 2x + 4

$y = -3a + 4$
$f(a) = -3a + 4$

Function Notation	x-y Notation
$f(x) = 5x + 2$	$y = 5x + 2$
$f(x) = -3x - 7$	$y = -3x - 7$

Evaluating Functions:

8. Given $f(x) = 2x + 3$, find $f(-2)$.	9. Given $f(x) = 2x + 3$, find f(x) = 9.
$f(-2) = 2(-2) + 3$ $= -4 + 3$ $= -1$ $f(-2) = -1$	$9 = 2x + 3$ $-3 \quad\quad -3$ $6 = 2x$ $3 = x$ or $f(3) = 9$
10. Given f(x) = 3^x + 4, find f(2).	11. Givin f(x) = -2(x – 5), find f(x) = –20.
$f(2) = 3^2 + 4$ $= 9 + 4$ $= 13$ $f(2) = 13$	$-20 = -2(x - 5)$ $-20 = -2x + 10$ $-10 \quad\quad -10$ $-30 = -2x$ $x = 15 \quad$ or $f(15) = -20$

Honors Algebra: Given f(x) = 2x – 4 and g(x) = 3x + 1,

| 1) f(x) + g(x)	2) f(x) – g(x)	3) f(x) · g(x)
$(2x - 4) + (3x + 1)$ $5x - 3$	$(2x - 4) - (3x + 1)$ $-x - 5$	$(2x - 4)(3x + 1)$ $6x^2 - 10x - 4$

3) f(x) · g(x) table:

	2x	-4
3x	$6x^2$	-12x
+1	2x	-4

Algebra 1 ~ U2B Day 2   **Function & Function Notation HW**   Name: _____

Decide whether the graph represents y as a function of x.

1. *NO*

2. *YES*

3. *NO*

4. *Yes*

5. *Yes*

6. *NO*
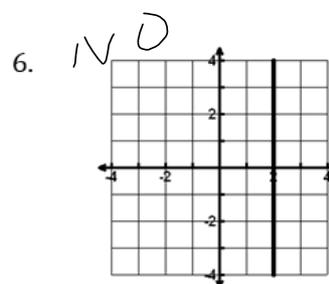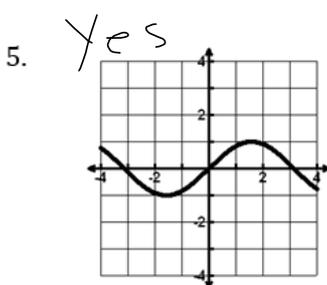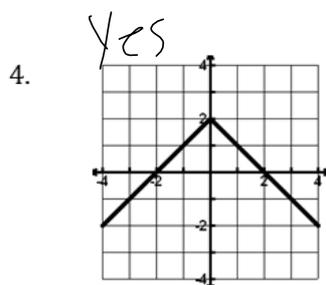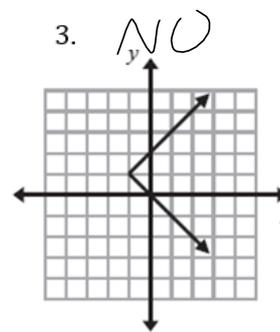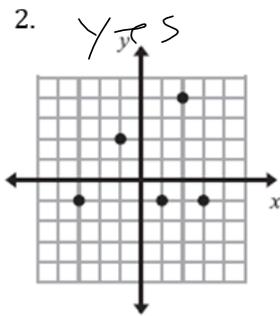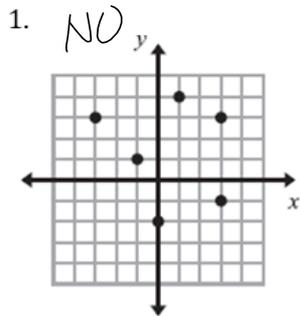
Decide whether the relation is a function.

7. *x* *y* | Input   Output

NO

8. Input   Output

yes

9. Input   Output

Yes

Identify the domain and range of each relation. Then determine if the relation is a function.

10. {(0,3), (5,7), (7,7), (8,9)}
Domain: *0,5,7,8*
Range: *3,7,7,9*
Function? *yes*

11. {(5,-4), (3,-5), (4,-3), (6,4)}
Domain: *5,3,4,6*
Range: *-4,-5,-3,4*
Function? *yes*

12. {(1,5), (3,2), (1,6), (5,2), (7,4)}
Domain: *1,3,1,5,7*
Range: *5,2,6,2,4*
Function? *NO*

13. {(-2,-7), (4,7), (-8,9), (-2,1)}
Domain: *-2,4,-8,-2*
Range: *-7,7,9,1*
Function? *NO*

Evaluate the function for the given values.

14. $f(x) = 2x - 5$, f(x) = -15

$2x - 5 = -15$
$2x = ^-10$
$x = 5$

15. $h(x) = 6x + 2$, h(x)= 20

$6x + 2 = 20$
$6x = 18$
$x = 3$

16. $g(x) = 2.4x$, g(x) = 12

$2.4x = 12$
$x = 5$

17. $f(x) = 2x^2 - 3$, f(-2)

$2(-2)^2 - 3$
$2(4) - 3$
5

18. $h(x) = x^3 - 4x$, $h(2)$

$(2)^3 - 4(2)$
$8 - 8$
0

19. $f(x) = (x + 2)^2 - 6$, f(3)

$(3 + 2)^2 - 6$
$(5)^2 - 6$
$25 - 6$
19

If $f(x) = 2x - 3$, $g(x) = x^3 - 2$, and $h(x) = x^2 - 3x + 5$, find each of the following:

20. f(4) = $2x - 3$
$2(4) - 3$
$8 - 3$
$= 5$

21. h(-3) = $x^2 - 3x + 5$
$(-3)^2 - 3(-3) + 5$
$9 + 9 + 5$
23

22. g(-2) = $x^3 - 2$
$(-2)^3 - 2$
$^-8 - 2$
$^-10$

23. The function w(x) = 60x represents the number of words w(x) you can type in x minutes. How many words can you type in 9 minutes?
$60(9) = 540$ words

24. Sound travels about 343 meters per second. The function d(t) = 343t gives the distance d(t) in meters that sound travels in t seconds. How far does sound travel in 8 seconds?
$343(8) = 2744$ m

Honors Algebra 1   Name: _____

<u>Function Notation and Operations Worksheet</u>

Use the functions below to answer the given questions:

$f(x) = 3x - 4$	$g(x) = 2x + 5$	$h(x) = 8 - 3x$	$p(x) = 4x - 9$

Find the value of each function.

1)   f(-3) $3(-3)-4$
$$-13$$

4)   g(-1) $2(-1)+5$
$$+3$$

7)   p(5) $4(5)-9$
$$11$$

2)   f(6) $3(6)-4$
$$14$$

5)   g(4) $2(4)+5$
$$13$$

8)   h(-2) $8-3(-2)$
$$14$$

3)   f(1/3) $3\left(\frac{1}{3}\right)-4$
$$1-4$$
$$-3$$

6)   p(0) $4(0)-9$
$$-9$$

9)   h(-5) $8-3(-5)$
$$23$$

Perform the operations to the functions given above.

10)   h(x) + f(x)
$$(8-3x)+(3x-4)$$
$$\boxed{4}$$

11)   f(x) − h(x)
$$(3x-4)-(8-3x)$$
$$\boxed{6x-12}$$

12)   g(x) − p(x)
$$(2x+5)-(4x-9)$$
$$\boxed{-2x+14}$$

13)   2·g(x)
$$2(2x+5)$$
$$\boxed{4x+10}$$

14)   p(x) · f(x)
$$(4x-9)(3x-4)$$

	4x	− 9
3x	12x²	−27x
−4	−16x	+36

$$\boxed{12x^2-43x+36}$$

15)   g(x) · p(x)
$$(2x+5)(4x-9)$$

	2x	5
4x	8x²	20x
−9	−18x	−45

$$\boxed{8x^2+2x-45}$$

16)   f(x) · h(x)
$$(3x-4)(-3x+8)$$

	−3x	+ 8
3x	9x²	24x
−4	12x	−32

$$\boxed{-9x^2+36x-32}$$

17)   h(x) − g(x) + f(x) + p(x)
$$(8-3x)-(2x+5)+(3x-4)+(4x-9)$$
$$(8-3x)+(-2x-5)+(3x-4)+(4x-9)$$
$$\boxed{2x-10}$$