Math Term: FUNCTION

CHARACTERISTICS

A graph must pass the Vertical Line Test to be called a function
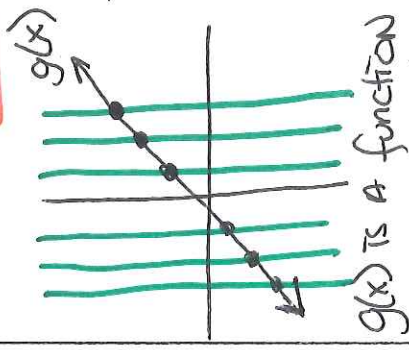
If a graph FAILS the Vertical Line test (vertical line touches graph @ more than 1 point) the graph is not a function

$g(x)$ is a function

NOT A FUNCTION EXAMPLE!
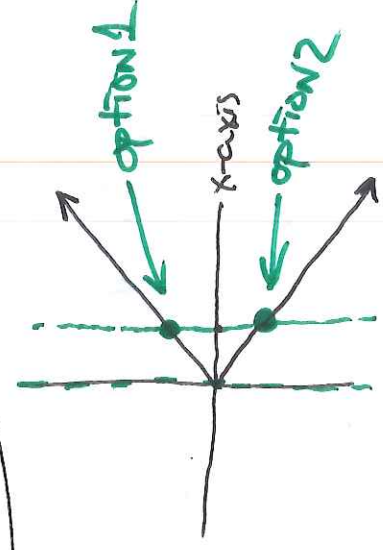
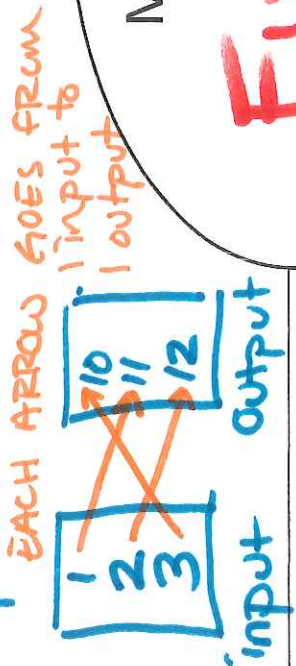ONE input goes to 2 outputs NOT A FUNCTION
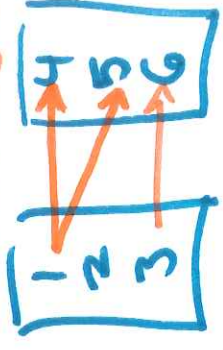
THE ARROWS ARE THE FUNCTION

option1   x-axis   option2

DEFINITION

A function is a RELATION between 2 variables, where every input has exactly one output.
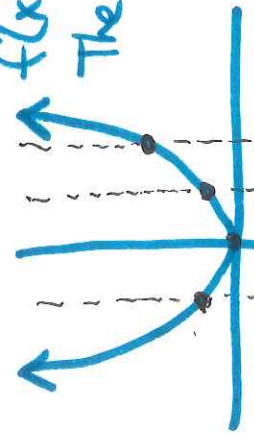
Ex: $y = x + 5$

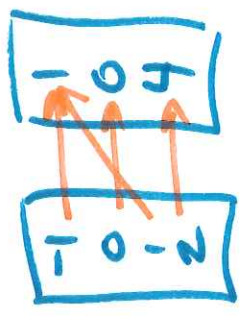EACH ARROW GOES FROM 1 input to 1 output

input → output

EXAMPLE:

$f(x) = x^2$
The function depends on x.

$f(x)$ means y

X	Y
-1	1
0	0
1	1
2	4

A PARABOLA IS A function

Function Operations $(+, -, \times, \div)$

Adding Functions

$$(f + g)(x) = f(x) + g(x)$$

$f(x) = x+5 \quad g(x) = x-3$

then $(f+g)(x) = f(x) + g(x)$

$\quad = (x+5) + (x-3)$

$(f+g)(x) = 2x+2$

Subtracting Functions

$$(f - g)(x) = f(x) - g(x)$$

$f(x) = x+5 \quad g(x) = x-3$

then $(f-g)(x) = f(x) - g(x)$

$\quad = (x+5) - (x-3)$

$\quad = x+5 -x+3$

$(f-g)(x) = 8$

Multiplying Functions

$$(f \cdot g)(x) = f(x) \bullet g(x)$$

multiply the 2 functions

let $f(x) = x+5 \quad g(x) = x+2$

$(f \cdot g)(x) = f(x) \cdot g(x)$

multiply

$\quad = (x+5)(x+2)$

$\quad = x^2 + 2x + 5x + 10$

$(f \cdot g)(x) = x^2 + 7x + 10$

Dividing Functions

$$(f/g)(x) = f(x) \div g(x)$$

Divide the 2 functions

$f(x) = x+5 \quad g(x) = x+2$

$(f/g)(x) = \dfrac{f(x)}{g(x)}$

$(f/g)(x) = \dfrac{x+5}{x+2}$

Algebra 2   Name_____

Function Operations HW Day#1   Date_____ Period_____

Perform the indicated operation.

1) $g(x) = 4x + 3$
   $h(x) = x^2 - 3x$
   Find $(g + h)(x)$

2) $g(n) = 2n + 4$
   $h(n) = n^2 + 2n$
   Find $(g + h)(n)$

3) $h(n) = 4n + 4$
   $g(n) = 4n + 2$
   Find $(h - g)(n)$

4) $g(a) = a^2 + 5a$
   $f(a) = -4a$
   Find $(g - f)(a)$

5) $g(n) = -3n$
   $h(n) = n^2 + 2$
   Find $(g \cdot h)(n)$

6) $h(x) = x^2 + 4x$
   $g(x) = 2x + 4$
   Find $(h \cdot g)(x)$

7) $f(x) = 3x + 2$
   $g(x) = x^3 + x$
   Find $\left(\dfrac{f}{g}\right)(x)$

8) $g(a) = 2a - 2$
   $f(a) = a^2 + 5$
   Find $\left(\dfrac{g}{f}\right)(a)$

9) $h(a) = a^2 + 5$
   $g(a) = 3a - 4$
   Find $(h - g)(a)$

10) $g(t) = 3t + 3$
    $h(t) = t^2 + 2 + 2t$
    Find $(g \cdot h)(t)$

-1-

11) $g(a) = 4a + 5$
$f(a) = a^2 + 3a$
Find $(g - f)(a)$

12) $g(t) = t^3 + 3t$
$h(t) = 3t$
Find $(g + h)(t)$

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

14) $g(n) = 4n - 3$
$f(n) = n^3 + 3n^2$
Find $\left(\dfrac{g}{f}\right)(n)$

15) $g(x) = 4x - 5$
$f(x) = x^3 + 3x$
Find $(g \cdot f)(x)$

16) $g(n) = n^2 + 4n$
$h(n) = 2n - 1$
Find $(g + h)(n)$

Perform the indicated operation at the given point.

17) $f(x) = 3x - 3$
$g(x) = 3x + 5$
Find $(f + g)(-10)$

18) $h(a) = a - 2$
$g(a) = 2a - 3$
Find $(h - g)(7)$

19) $g(x) = x^2 - x$
$h(x) = -x$
Find $(g \cdot h)(3)$

20) $f(n) = n - 2$
$g(n) = -3n + 4$
Find $(f \cdot g)(0)$

Algebra 2

Function Operations HW Day#1

Name __ANSWER KEY__

Date_____ Period_____

Perform the indicated operation. COMBINE LIKE terms

1) $g(x) = 4x + 3$
$h(x) = x^2 - 3x$
Find $(g + h)(x) = g(x) + h(x)$

$(4x+3) + (x^2-3x)$

$\boxed{x^2 + x + 3}$

2) $g(n) = 2n + 4$
$h(n) = n^2 + 2n$
Find $(g + h)(n) = g(n) + h(n)$

$(2n+4) + (n^2+2n)$

$\boxed{n^2 + 4n + 4}$

3) $h(n) = 4n + 4$
$g(n) = 4n + 2$
Find $(h - g)(n) = h(n) - g(n)$

$(4n+4) - (4n+2)$

DISTRIBUTE "−" to second polynomial

$4n+4 - 4n - 2 = \boxed{2}$

4) $g(a) = a^2 + 5a$
$f(a) = -4a$
Find $(g - f)(a) = g(a) - f(a)$

$(a^2+5a) - (-4a)$

$a^2 + 5a + 4a = \boxed{a^2 + 9a}$

5) $g(n) = -3n$
$h(n) = n^2 + 2$
Find $(g \cdot h)(n) = g(n) \cdot h(n)$

$(-3n)(n^2+2)$

$\boxed{-3n^3 - 6n}$

6) $h(x) = x^2 + 4x$
$g(x) = 2x + 4$
Find $(h \cdot g)(x) = h(x) \cdot g(x)$

$(x^2+4x)(2x+4)$

$2x^3 + 4x^2 + 8x^2 + 16x$

$\boxed{2x^3 + 12x^2 + 16x}$

7) $f(x) = 3x + 2$
$g(x) = x^3 + x$
Find $\left(\dfrac{f}{g}\right)(x) = \dfrac{f(x)}{g(x)}$

$\boxed{\dfrac{3x+2}{x^3+x}}$

8) $g(a) = 2a - 2$
$f(a) = a^2 + 5$
Find $\left(\dfrac{g}{f}\right)(a) = \dfrac{g(a)}{f(a)} = \boxed{\dfrac{2a-2}{a^2+5}}$

9) $h(a) = a^2 + 5$
$g(a) = 3a - 4$
Find $(h - g)(a) = h(a) - g(a)$

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

$a^2 + 5 - 3a + 4$

$\boxed{a^2 - 3a + 9}$

10) $g(t) = 3t + 3$
$h(t) = t^2 + 2 + 2t$
Find $(g \cdot h)(t) = g(t) \cdot h(t)$

$(3t+3)(t^2+2t+2)$

$3t^3 + 6t^2 + 6t + 3t^2 + 6t + 6$

$\boxed{3t^3 + 9t^2 + 12t + 6}$

-1-

11) $g(a) = 4a + 5$
$f(a) = a^2 + 3a$
Find $(g - f)(a) = g(a) - f(a)$

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

$4a + 5 - a^2 - 3a$

$\boxed{-a^2 + a + 5}$

12) $g(t) = t^3 + 3t$
$h(t) = 3t$
Find $(g + h)(t) = g(t) + h(t)$

$(t^3 + 3t) + (3t)$

$\boxed{t^3 + 6t}$

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

$(-x - 3) + (x^2)$

$\boxed{x^2 - x - 3}$

14) $g(n) = 4n - 3$
$f(n) = n^3 + 3n^2$
Find $\left(\dfrac{g}{f}\right)(n) = \dfrac{g(n)}{f(n)}$

$\boxed{\dfrac{4n - 3}{n^3 + 3n^2}}$

15) $g(x) = 4x - 5$
$f(x) = x^3 + 3x$
Find $(g \cdot f)(x) = g(x) \cdot f(x)$

$(4x - 5)(x^3 + 3x)$

$4x^4 + 12x^2 - 5x^3 - 15x$

$\boxed{4x^4 - 5x^3 + 12x^2 - 15x}$

16) $g(n) = n^2 + 4n$
$h(n) = 2n - 1$
Find $(g + h)(n) = g(n) + h(n)$

$(n^2 + 4n) + (2n - 1)$

$\boxed{n^2 + 6n - 1}$

Perform the indicated operation at the given point.

17) $f(x) = 3x - 3$ ~~substitute~~
$g(x) = 3x + 5$ -10 in for x in both equations
Find $(f + g)(-10) = f(-10) + g(-10)$

$[3(-10) - 3] + [3(-10) + 5]$

$[-30 - 3] + [-30 + 5]$

$\boxed{-58}$

18) $h(a) = a - 2$
$g(a) = 2a - 3$
Find $(h - g)(7) = h(7) - g(7)$

$[7 - 2] - [2(7) - 3]$

$5 - 11$

$\boxed{-6}$

19) $g(x) = x^2 - x$
$h(x) = -x$
Find $(g \cdot h)(3) = g(3) \cdot h(3)$

$[3^2 - 3] \cdot [-3]$

$[6] \cdot [-3]$

$\boxed{-18}$

20) $f(n) = n - 2$
$g(n) = -3n + 4$
Find $(f \cdot g)(0) = f(0) \cdot g(0)$

$[0 - 2] \cdot [-3(0) + 4]$

$-2 \cdot 4$

$\boxed{-8}$