Multiplying Functions { 6.4 }

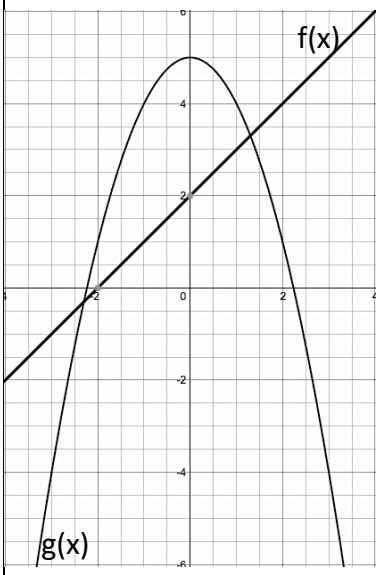
Secondary Math II Notes

OBJECTIVE: Combine functions using multiplication. Write a function to represent a scenario.

Multiplying Functions: The multiplication of two functions is written as *(fg)(x).* The function $(fg)(x) = (f \cdot g)(x) = f(x) \cdot g(x)$.

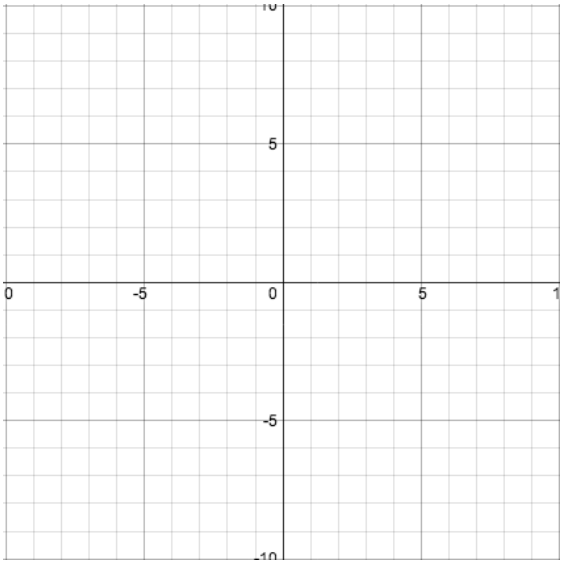
Graphically multiplying functions

Graph the function *(fg)(x)* given the following graphs of f*(x)* and g*(x)*



x	f(x)	g(x)	(fg)(x)
-3	-1	-4	4
-2	0	1	0
-1	1	4	4
0	2	5	10
1	3	4	12
2	4	1	4

(fg)(x)



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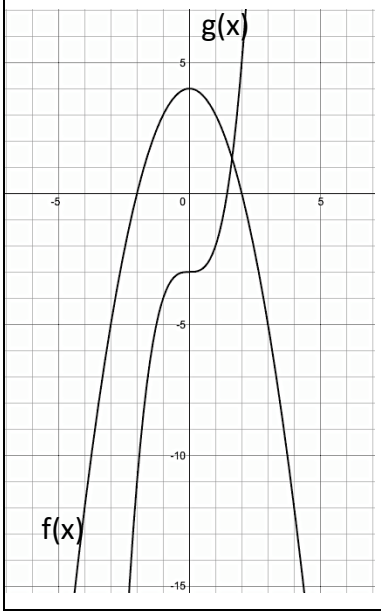
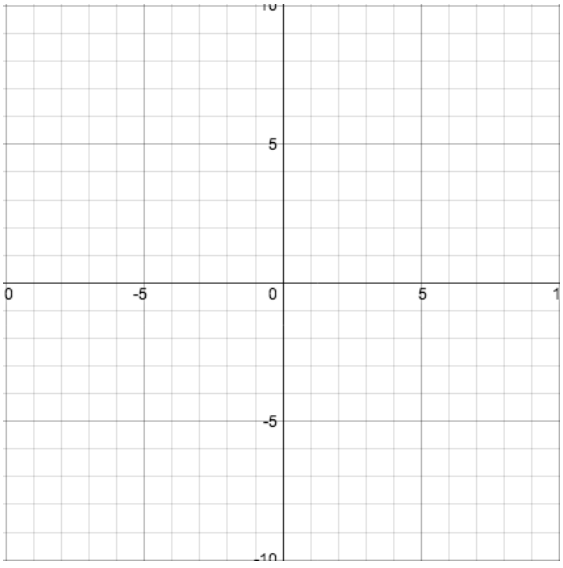


x	f(x)	g(x)	(fg)(x)
-2	0	-10	0
-1	3	-4	-12
0	4	-3	-12
1	3	-2	-6
2	0	4	0

(fg)(x)



Multiplying Functions Algebraically

Use the following functions for the problems below

$f(x) = -x^2 + 4x - 5$, $g(x) = 5x - 17$, $h(x) = 8x^2 + 26$, and $k(x) = -5x$

$(fk)(x)$
$= f(x) \cdot k(x)$
$= (-x^2 + 4x - 5)(-5x)$
$= 5x^3 - 20x^2 + 25x$

$(g \cdot h)(a)$
$= g(a) \cdot h(a)$
$= (5a - 17)(8a^2 + 26)$
$= 40a^3 - 136a^2 + 130a - 442$

$(fg)(-1)$
$(fg)(-1) = f(-1) \cdot g(-1)$
$= -10 \cdot -22$
$= 220$

$(f \cdot k)(-2)$
$= f(-2) \cdot k(-2)$
$= -17 \cdot 10$
$= -170$

$(h \cdot f)(b)$
$= h(b) \cdot f(b)$
$= (8b^2 + 26)(-b^2 + 4b - 5)$
$= -8b^4 + 32b^3 - 66b^2 + 104b + 130$

$k(s) \cdot g(s)$
$= -5s(5s - 17)$
$= -25s^2 + 85s$

$3(g \cdot h)(6)$
$= 3(g(6) \cdot h(6))$
$= 3(13 \cdot 314)$
$= 12246$

$(3kh)(6)$
$= 3 \cdot k(6) \cdot h(6)$
$= 3(-65 \cdot 314)$
$= -61230$

The side of a cube is represented by $x + 1$. Write the the volume, in terms of , as a function.

$V(x) = (x + 1)(x + 1)(x + 1)$
$V(x) = (x + 1)^3$

A square courtyard has a side length of 50 yards. The city plans to add *x* yards to each side so that it can pour a sidewalk all the way around it. Write a function to represent the area of the sidewalk in terms of *x*.

$s(x) = (2x + 50)(2x + 50) - 2500$
$s(x) = 4x^2 + 200x + 2500 - 2500$
$s(x) = 2x^2 + 200x$

The length of a rectangular window is 5 feet more than its width, *w*.

a) Write the area of the window as a function in terms of the width of window.

$A(w) = w(w + 5)$

b) Write the area of the window as a function in terms of the length of the window.

$A(l) = l(l - 5)$

c) Compare the functions written for the area of the window. Why are they different?

The differnce occurs because one is based off of the width variable and one is based off of the length variable. They will both still give the accurate area of the window.