

# Subtracting Functions

6.3

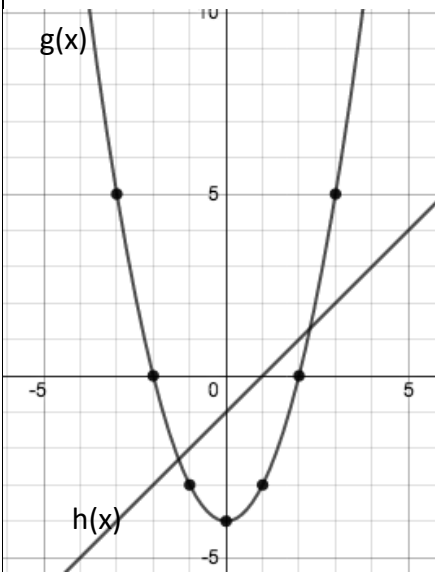
Secondary Math II Notes

**OBJECTIVE:** Subtract functions graphically and algebraically. Combine functions to model a scenario.

**Subtracting Functions:** The difference of two functions is written as  $(f-g)(x)$ . The function  $(f-g)(x)=f(x)-g(x)$ .

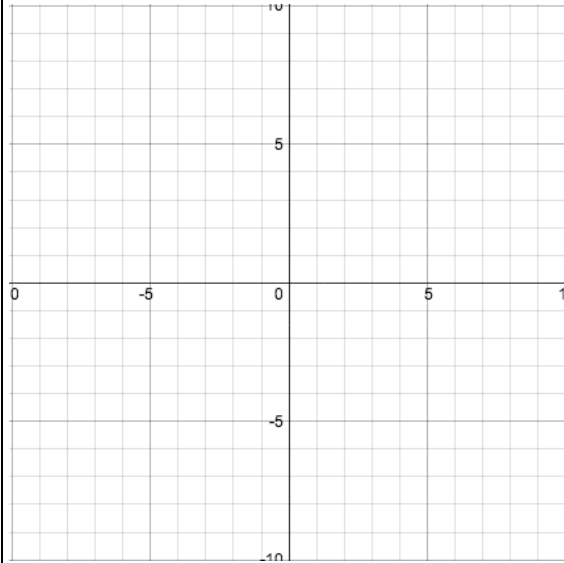
## Graphically subtracting functions

Graph the function  $(h-g)(x)$  given the following graphs of  $h(x)$  and  $g(x)$



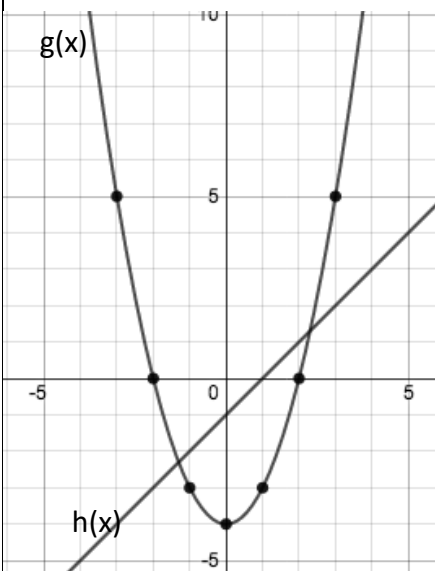
x	h(x)	g(x)	(h-g)(x)
-3	-4	5	1
-2	-3	0	-3
-1	-2	-3	-5
0	-1	-4	-5
1	0	-3	-3
2	1	0	1

$(h-g)(x)$



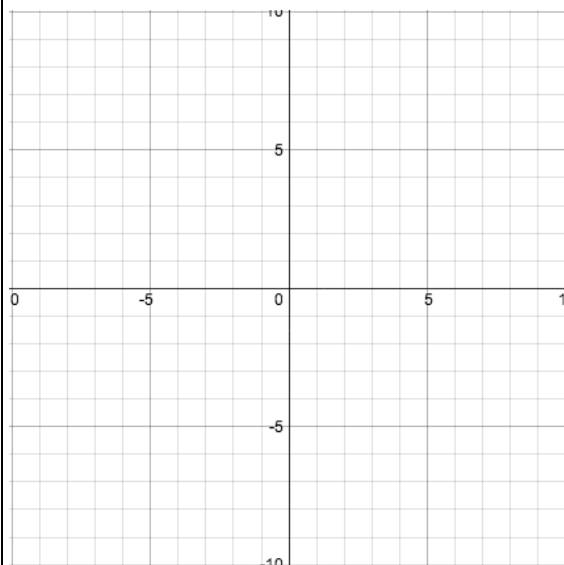
When we subtract two functions, the graph can be created by adding the two y-values corresponding to the same x-value.

Graph the function  $(g-h)(x)$  given the following graphs of  $g(x)$  and  $h(x)$



x	h(x)	g(x)	(g-h)(x)
-3	-4	5	1
-2	-3	0	3
-1	-2	-3	-1
0	-1	-4	-3
1	0	-3	-3
2	1	0	-1

$(g-h)(x)$



When we subtract two functions, the order matters.  $(h-g)(x) \neq (g-h)(x)$

### Algebraically subtracting functions

Use the following functions for the problems below.

$$f(x) = x^2 - 4x + 2, \quad g(x) = -3x^2 + 5, \quad h(x) = 4x - 5, \quad k(x) = 4$$

$(f - h)(x)$ $(f - h)(x) = f(x) - g(x)$ $(f - h)(x) = x^2 - 4x + 2$ $\quad - (4x - 5)$ $(f - h)(x) = x^2 - 8x + 7$	$(g - k)(z)$ $(g - k)(z) = g(z) - k(z)$ $(g - k)(z) = (-3z^2 + 5) - 4$ $(g - k)(z) = -3z^2 + 1$	$(k - 3h)(-5)$ $(k - 3h)(5) = k(5) - 3h(5)$ $(k - h)(5) = 4 - 3(-25)$ $(k - h)(5) = 79$	$(f - k)(7)$ $(f - k)(7) = f(7) - k(7)$ $\quad = 23 - 4$ $\quad = 19$
$(h - f)(x)$ $(h - f)(x) = h(x) - f(x)$ $(h - f)(x) = (4x - 5) - (x^2 - 4x$ $\quad + 2)$ $(h - f)(x) = -x^2 + 8x - 7$	$(f - g)(3s)$ $(f - g)(3s) = f(3s) - g(3s)$ $= (3s)^2 - 4(3s) + 2 - (-3(3s)^2$ $\quad + 5)$ $= 36s^2 - 12s - 3$	$(4f - g)(-2)$ $(4f - g)(-2) = 4f(-2) - g(-2)$ $(4f - g)(-2) = 56 - (-7)$ $(g - k)(z) = 63$	$(g - h)(2)$ $(g - h)(2) = g(2) - k(2)$ $(g - k)(2) = -7 - 4$ $(g - k)(2) = -11$

### Representing scenarios through functions

Fluffy Pet Products sells a pet toy that brings in revenue represented by the function  $r(x) = -0.05x^2 + 100x + 100$ , where  $x$  is the number of pet toys. The production cost for the pet toy is represented by the function  $c(x) = 0.42x + 50$ . Write the function that represents the profit Fluffy Pet Products earns on the pet toy.

Profit is the revenue subtract the cost. So the profit for Fluffy Pet Products is represented by  $p(x) = -0.05x^2 + 99.58x + 150$

Lazy Lizard Landscaping offers lawn aeration that has revenue represented by the function  $R(s) = 7.50s^2$  where  $s$  is the side-length of a lawn. The cost for fuel and aerator is represented by the function  $c(s) = 2.50s + 75$ . Write the function that represents the profit Lazy Lizard Landscaping earns on aeration.

Profit is the revenue subtract the cost. So the profit for Lazy Lizard Landscaping is represented by  $p(s) = 7.50s^2 - 2.50s - 75$