6.3 Functions

Obj:

1. to add, sub & mult functions.
2. To find compositions of functions.

Things to remember:

•f(x) is the notation for a function. Ex f(x)=3x-7

•Plug in for x whatever is in the parentheses.

•Make sure you distribute negatives.

•$(x-4)^2 = (x-4)(x-4)$ FOIL

Given: $f(x) = x^2 - 4x + 5$ $\quad g(x) = 2x + 5$

$h(x) = x - 8$ $\quad k(x) = 2x^2 + 5x$

Ex: $f(x) + k(x) =$ $x^2 - 4x + 5 + 2x^2 + 5x$

$3x^2 + x + 5$

$g(x) - h(x) =$ $2x + 5 + (-x + 8)$

$x + 13$

$h(x) \cdot g(x) =$ $(x-8)(2x+5)$

$2x^2 + 5x - 16x - 40$

$2x^2 - 11x - 40$

Given: $f(x) = x^2 - 4x + 5$ $g(x) = 2x + 5$ $h(x) = x - 8$ $k(x) = 2x^2 + 5x$

Ex:

$f(0) = 5$

$g(2) = 2(2)+5$
9

$k(-3) =$
$2(-3)^2 + 5(-3)$
$18 - 15$
3

$g(3w) = 2(3w) + 5$
$6w + 5$

$h(5x+3) = 5x + 3 - 8$
$5x - 5$

$f(x+5) = (x+5)^2 - 4(x+5) + 5$

$(x+5)(x+5)$
$x^2 + 10x + 25 - 4x - 20 + 5$
$x^2 + 6x + 10$

$g(x+6) = 2(x+6) + 5$
$2x + 12 + 5 = 2x + 17$

$g(x) + 6 = 2x + 5 + 6 = 2x + 11$

Given: $f(x) = x^2 - 4x + 5$ $g(x) = 2x + 5$ $h(x) = x - 8$ $k(x) = 2x^2 + 5x$

Ex:

$h(10) = 10 - 8$
2

$g(h(10)) = 2(2) + 5$
9

$f(0) = 0^2 - 4(0) + 5$
5

$k(f(0)) = 2(5)^2 + 5(5)$
$50 + 25$
75

$g(-2) = 2(-2) + 5$
1

$f(g(-2)) = 1^2 - 4(1) + 5$
$1 - 4 + 5$
$-3 + 5$
2

$h(k(-1)) = k(-1) = 2(-1)^2 + 5(-1)$
$2 - 5$
-3
$-3 - 8 = -11$

$h(g(6)) = g(6) = 2(6) + 5$
17
$17 - 8$
9

Given: $f(x) = x^2 - 4x + 5$ $g(x) = 2x + 5$
$h(x) = x - 8$ $k(x) = 2x^2 + 5x$

Ex: Composition of functions (plug 1 function into another)

$h(g(x)) = 2x + 5 - 8$
$= 2x - 3$

$g(h(x)) = 2(x - 8) + 5$
$2x - 16 + 5$
$2x - 11$

Given: $f(x) = x^2 - 4x + 5$ $g(x) = 2x + 5$
$h(x) = x - 8$ $k(x) = 2x^2 + 5x$

Ex: Composition of functions (plug 1 function into another)

$f(h(x)) =$
$(x - 8)^2 - 4(x - 8) + 5$
$x^2 - 16x + 64 - 4x + 32 + 5$
$x^2 - 20x + 101$

$(x - 8)(x - 8)$
$x^2 - 8x - 8x + 64$

$h(f(x)) =$
$x^2 - 4x + 5 - 8$
$x^2 - 4x - 3$

Given:

$$f(x) = \frac{3}{4}x - 6 \qquad h(x) = \frac{3}{4x}$$

$$g(x) = \frac{4}{3}x + 8 \qquad k(x) = \frac{2}{x}$$

$f\left(g\left(x\right)\right) =$	$g\left(f\left(x\right)\right) =$
$\frac{3}{4}\left(\frac{4}{3}x + 8\right) - 6$	$\frac{4}{3}\left(\frac{3}{4}x - 6\right) + 8$
$x + 6 - 6$	$x - 8 + 8$
x	x

Given:

$$f(x) = \frac{3}{4}x - 6 \qquad h(x) = \frac{3}{4x}$$

$$g(x) = \frac{4}{3}x + 8 \qquad k(x) = \frac{2}{x}$$

$k\left(h\left(x\right)\right) =$	$h\left(k\left(x\right)\right) =$
$\dfrac{2}{\frac{3}{4x}} = 2 \cdot \dfrac{4x}{3} = \dfrac{8x}{3}$	$\dfrac{3}{4\left(\frac{2}{x}\right)} = \dfrac{3}{\frac{8}{x}}$
	$= 3 \cdot \dfrac{x}{8} = \dfrac{3x}{8}$

Think of it like this: $2 \div \frac{3}{4x}$

apply rule for $\div$ fractions