

## FUNCTION NOTATION

Algebraic (How to Write It)	Verbal (How to Read/Say It)
$(f \circ g)(x) = f(g(x))$	"f of g of x"

### Making Observations

$f(x) = 3x^2 + 1$	$g(x) = x - 2$	<table border="1"> <thead> <tr> <th>x</th> <th>h(x)</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>-28</td> </tr> <tr> <td>0</td> <td>-7</td> </tr> <tr> <td>2</td> <td>14</td> </tr> </tbody> </table>	x	h(x)	-2	-28	0	-7	2	14	
x	h(x)										
-2	-28										
0	-7										
2	14										

Find the following using the given functions above.

$$\begin{aligned} f(-1) &= 3(-1)^2 + 1 \\ &= 4 \end{aligned}$$

$$h(0) = -7$$

$$\begin{aligned} (f \circ g)(x) &= f(g(x)) = 3(g(x))^2 + 1 \\ &= 3(x-2)^2 + 1 \\ &= 3x^2 - 12x + 13 \end{aligned}$$

$$\begin{aligned} (h \circ k)(4) &= h(k(4)) \\ &= h(4) \\ &= 14 \end{aligned}$$

### Verbalizing Observations

### Applying Observations

Use your generalization to answer the question below.

Given functions  $f(x) = 3x - 5$  and  $g(x) = x^2 - 3$ , what is the value of  $f(g(-2))$ ?

(A) -124

(B) -26

(C) -2

(D) 1

(E) 118

## FUNCTION NOTATION

Algebraic (How to Write It)	Verbal (How to Read/Say It)
$(f \pm g)(x) = f(x) \pm g(x)$	"the sum/difference of $f$ and $g$ "
$(fg)(x) = f(x) \cdot g(x)$	" $f$ of $x$ times $g$ of $x$ "

### Making Observations

$$f(x) = 3x^2 + 1$$

$$g(x) = x - 2$$

Find the following using the given functions above.

$$\begin{aligned} (f + g)(x) &= f(x) + g(x) \\ &= (3x^2 + 1) + (x - 2) \\ &= 3x^2 + x - 1 \end{aligned}$$

$$\begin{aligned} (f - g)(x) &= f(x) - g(x) \\ &= (3x^2 + 1) - (x - 2) \\ &= 3x^2 - x + 3 \end{aligned}$$

$$\begin{aligned} (fg)(x) &= f(x) \cdot g(x) \\ &= (3x^2 + 1)(x - 2) \\ &= 3x^3 - 6x^2 + x - 2 \end{aligned}$$

$$\begin{aligned} (f + g)(-2) &= f(-2) + g(-2) \\ &= (3(-2)^2 + 1) + ((-2) - 2) \\ &= 13 + (-4) \\ &= 9 \end{aligned}$$

### Verbalizing Observations

#### Applying Observations

Use your generalization to answer the question below.

Let the polynomial functions  $f$  and  $g$  be defined as  $f(x) = 2x^2 - 3x$  and  $g(x) = x^2 - 3x + 4$ . Let  $h(x) = f(x) - g(x)$ .

What are all the values of  $x$  for which  $h(x) = 0$ ?

(F)  $-2$  and  $-\frac{2}{3}$

(G)  $-2$  and  $2$

(H)  $0$  and  $\frac{3}{2}$

(J)  $-1$  and  $4$

(K)  $-2i$  and  $2i$