

TASK 1: Evaluating Functions using $f(x) = x + 4$ and $g(x) = x^2$

a) $f(2) = 2 + 4$

$f(z) = 6; (z, 6)$

b) $g(-1) = (-1)^2$

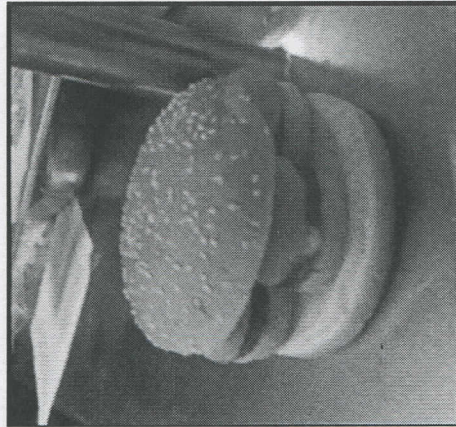
$g(-1) = 1; (-1, 1)$

c) $f(100) = 100 + 4$
 $f(100) = 104$
 $(100, 104)$

d) $g(d) = d^2$
 (d, d^2)

OBJECTIVE 1: Composition of Functions

"Function Composition" is applying one function to the results of another:



The result of $f()$ is sent through $g()$

It is written: $(g \circ f)(x)$

Which means: $g(f(x))$

TASK 2: Let $f(x) = 2x + 1$ and $g(x) = 6x$. Perform the composition of functions.

a) $(f \circ g)(x) = f(g(x))$
 $= 2(6x) + 1$
 $= 12x + 1$

b) $(g \circ f)(x) = g(f(x))$
 $= 6(2x + 1) = 12x + 6$

TASK 3: Let $f(x) = x^2 + 1$ and $g(x) = x - 1$. Perform the composition of functions.

a) $f(g(x)) = (f \circ g)(x)$
 $= (x-1)^2 + 1 = (x-1)(x-1) + 1$
 $= x^2 - 2x + 2$

b) $g(f(x)) = (g \circ f)(x)$
 $= (x^2 + 1) - 1$
 $= x^2$

TASK 4: Show that $\frac{f \circ g}{g \circ f} = 1$, if $f(x) = x^2$ and $g(x) = x$.

$$\frac{x^2}{x^2} = 1$$

TASK 5: Let $f(x) = 4x - 3$ and $g(x) = x^2 + 4$. Find each value.

a) $(f \circ g)(2) = f(g(2))$
 $g(2) = 2^2 + 4 = 8$
 $f(8) = 4(8) - 3 = 29$

b) $g(f(-1)) = (g \circ f)(-1)$
 $f(-1) = 4(-1) - 3 = -7$
 $g(-7) = (-7)^2 + 4 = 53$

$$g(f(-1)) = 53$$

$$(-1, 53)$$

TASK 6: Let $f(x) = x^2 + 2$ and $g(x) = 3x - 8$. Perform the composition of functions.

a) $(f \circ f)(x) = f(f(x))$
 $= (x^2 + 2)^2 + 2$
 $= (x^2 + 2)(x^2 + 2) + 2$
 $= x^4 + 4x^2 + 6$

b) $(g \circ g)(x) = g(g(x))$
 $= 3(3x - 8) - 8$
 $= 9x - 24 - 8$
 $= 9x - 32$

TASK 7: Let $f(x) = x^2$ and $g(x) = x - 1$. For which value of x is...

a) $(f \circ f) \geq (g \circ f)$?
 $(x-1)^2 \geq x^2 - 1$
 $x^2 - 2x + 1 \geq x^2 - 1$
 $x < 1$ $[-\infty, 1]$

b) $(f \circ g) \leq (g \circ f)$?
 $(x-1)^2 \leq x^2 - 1$
 $x^2 - 2x + 1 \leq x^2 - 1$
 $x > 1$ $[1, \infty)$

REMINERS TO MYSELF:

Still need help with: