Composition of Functions

$f(g(x))$

Perform function "g" on x, to find g(x). This becomes the input value that you input into function "f."

$f(x) = 3x - 4$ and $g(x) = x^2 - 1$

This answer is a number.

What is the value of f(g(-3))?

$g(-3) = (-3)^2 - 1 = 8$

$f(8) = 3(8) - 4 = 20$

$f(g(-3)) = 20$

Write a simplified expression for f(g(x)).

$f(x) = 3x - 4$

$= 3(x^2 - 1) - 4 \rightarrow 3x^2 - 3 - 4 \rightarrow 3x^2 - 7$

These answers are expressions.

Write a simplified expression for g(f(x)).

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

$= (3x - 4)^2 - 1$

$= (3x - 4)(3x - 4) - 1$

$= 9x^2 - 24x + 16 - 1 \rightarrow 9x^2 - 24x + 15$

$f(x) = 4x^{-1}$ $\quad g(x) = 5x - 2$

Find $f(g(2)) \rightarrow 5(2) - 2 = 8$ $\quad f(8) = 4(8)^{-1} = \frac{4}{8} = \frac{1}{2}$

Find $g(f(2)) \rightarrow 4(2)^{-1} = \frac{4}{2} = 2$ $\quad g(2) = 5(2) - 2 = 8$

Simplify the composition and give the domain.

a.) $f(g(x)) \rightarrow 4x^{-1} \rightarrow 4(5x-2)^{-1} \rightarrow \frac{4}{5x-2}$

b.) $g(f(x)) \rightarrow 5x - 2 \rightarrow 5(4x^{-1}) - 2$

$\rightarrow \frac{20}{x} - 2$