

Find each composite.

6. Given $f(x) = -9x + 3$ and $g(x) = x^4$, find $(f \circ g)(x)$

$$f \circ g(x) = f(g(x)) = f(x^4) = -9(x^4) + 3 = -9x^4 + 3$$

7. Given $f(x) = 2x - 5$ and $g(x) = x + 2$, find $(f \circ g)(x)$

$$\begin{aligned} f \circ g(x) &= f(g(x)) = f(x+2) = 2(x+2) - 5 \\ &= 2x + 4 - 5 \\ &= 2x - 1 \end{aligned}$$

8. Given $f(x) = x^2 + 7$ and $g(x) = x - 3$, find $(f \circ g)(x)$

$$\begin{aligned} f \circ g(x) &= f(g(x)) = f(x-3) = (x-3)^2 + 7 \\ &= x^2 - 6x + 9 + 7 \\ &= x^2 - 6x + 16 \end{aligned}$$

distribute ↙

9. Given $f(x) = 4x + 3$ and $g(x) = x^2$, find $(g \circ f)(x)$

$$\begin{aligned} g \circ f(x) &= g(4x+3) = (4x+3)^2 = 16x^2 + 24x + 9 \\ &= 16x^2 + 24x + 9 \end{aligned}$$

↙
 $(a+b)^2 = a^2 + 2ab + b^2$

10. Given $f(x) = x - 1$ and $g(x) = x^2 + 2x - 8$, find $(g \circ f)(x)$

$$\begin{aligned} g \circ f(x) &= g(f(x)) = g(x-1) = (x-1)^2 + 2(x-1) - 8 \\ &= x^2 - 2x + 1 + 2x - 2 - 8 \\ &= x^2 - 9 \end{aligned}$$