

## C6L6 Notes

### Function Operations

Perform the operation indicated.

1. Let  $f(x) = 3x + 7$  and  $g(x) = 5x - 8$ . Find  $f(x) + g(x)$ .

$$\begin{aligned} & f(x) + g(x) \\ & 3x + 7 + 5x - 8 \\ & 8x - 1 \end{aligned}$$

↓  
SAME AS  
 $(f+g)(x)$

2. Let  $f(x) = 4x^2 - 2x - 5$  and  $g(x) = 7x^2$ . Find  $f(x) + g(x)$ .

$$\begin{aligned} & f(x) + g(x) \\ & 4x^2 - 2x - 5 + 7x^2 \\ & 11x^2 - 2x - 5 \end{aligned}$$

3. Let  $f(x) = 6x - 9$  and  $g(x) = 3x + 5$ . Find  $f(x) - g(x)$ .

$$\begin{aligned} & f(x) - g(x) \\ & 6x - 9 - (3x + 5) \\ & 6x - 9 - 3x - 5 \\ & 3x - 14 \end{aligned}$$

↓  
SAME AS  
 $(f-g)(x)$

4. Let  $f(x) = 8x^2 + 4$  and  $g(x) = -3x^2 + 5x - 7$ . Find  $f(x) - g(x)$ .

$$\begin{aligned} & f(x) - g(x) \\ & 8x^2 + 4 - (-3x^2 + 5x - 7) \\ & 8x^2 + 4 + 3x^2 - 5x + 7 \\ & 11x^2 - 5x + 11 \end{aligned}$$

5. Let  $f(x) = 4x^3$  and  $g(x) = 8x^2 - 5x + 1$ . Find  $f(x) \cdot g(x)$ .

$$\begin{aligned} & f(x) \cdot g(x) \\ & 4x^3 (8x^2 - 5x + 1) \\ & 32x^5 - 20x^4 + 4x^3 \end{aligned}$$

↓  
SAME AS  
 $(f \cdot g)(x)$

6. Let  $f(x) = 3x - 7$  and  $g(x) = 8x + 9$ . Find  $f(x) \cdot g(x)$ .

$$\begin{aligned} & f(x) \cdot g(x) \\ & (3x-7)(8x+9) \\ & 24x^2 + 27x - 56x - 63 \\ & 24x^2 - 29x - 63 \end{aligned}$$

7. Let  $f(x) = 4x + 1$  and  $g(x) = x - 2$ . Find  $\frac{f(x)}{g(x)}$ .

$$\begin{aligned} & \frac{f(x)}{g(x)} \quad x-2 \neq 0 \\ & \frac{4x+1}{x-2} ; x \neq 2 \end{aligned}$$

↓  
SAME AS  
 $(\frac{f}{g})(x)$

8. Let  $f(x) = 3x - 5$  and  $g(x) = x + 5$ . Find  $\frac{f(x)}{g(x)}$ .

$$\begin{aligned} & \frac{f(x)}{g(x)} \quad x+5 \neq 0 \\ & \frac{3x-5}{x+5} ; x \neq -5 \end{aligned}$$

9. Let  $f(x) = 4x + 7$  and  $g(x) = 2x - 5$ . Find  $(f \circ g)(x)$ . → SAME AS  $f(g(x))$

$$\begin{aligned} (f \circ g)(x) &= f(g(x)) \\ & 4(2x-5) + 7 \quad \rightarrow 8x - 13 \\ & 8x - 20 + 7 \end{aligned}$$

10. Let  $f(x) = x^2$  and  $g(x) = x + 4$ . Find  $(f \circ g)(x)$ .

$$\begin{aligned} & f(g(x)) \\ & (x+4)^2 \\ & (x+4)(x+4) \\ & x^2 + 4x + 4x + 16 \\ & x^2 + 8x + 16 \end{aligned}$$

11. Let  $f(x) = x^2 + 5x$  and  $g(x) = x^2$ . Find  $(f \circ g)(x)$ .

$$\begin{aligned} f(g(x)) \\ (x^2)^2 + 5(x^2) \\ x^4 + 5x^2 \end{aligned}$$

12. Let  $f(x) = 3x^2$  and  $g(x) = x + 4$ . Find  $(f \circ g)(x)$ .

$$\begin{aligned} f(g(x)) \\ 3(x+4)^2 \\ 3(x+4)(x+4) \\ 3(x^2 + 4x + 4x + 16) \end{aligned} \rightarrow \begin{aligned} 3(x^2 + 8x + 16) \\ 3x^2 + 24x + 48 \end{aligned}$$

13. Let  $f(x) = x^2 + 5$  and  $g(x) = 4x$ . Find  $(f \circ g)(x)$ .

$$\begin{aligned} f(g(x)) \\ (4x)^2 + 5 \\ 16x^2 + 5 \end{aligned}$$

14. Let  $f(x) = -6x + 10$  and  $g(x) = 2x - 3$ . Find  $(f \circ g)(x)$  and  $(g \circ f)(x)$ .

$$\begin{aligned} f(g(x)) \\ -6(2x-3) + 10 \\ -12x + 18 + 10 \\ -12x + 28 \end{aligned}$$

$$\begin{aligned} g(f(x)) \\ 2(-6x+10) - 3 \\ -12x + 20 - 3 \\ -12x + 17 \end{aligned}$$

15. Let  $f(x) = x - 4$  and  $g(x) = x^2$ . Find  $(f \circ g)(x)$  and  $(g \circ f)(x)$ .

$$\begin{aligned} f(g(x)) \\ (x^2) - 4 \\ x^2 - 4 \end{aligned}$$

$$\begin{aligned} g(f(x)) \\ (x-4)^2 \\ (x-4)(x-4) \\ x^2 - 4x - 4x + 16 \\ x^2 - 8x + 16 \end{aligned}$$

16. Let  $f(x) = -3x - 8$  and  $g(x) = -5x + 7$ . First, find  $(f \circ g)(x)$ . Then find  $(f \circ g)(-9)$ .

$$\begin{aligned} f(g(x)) \\ -3(-5x+7) - 8 \\ 15x - 21 - 8 \\ 15x - 29 \end{aligned}$$

$$\begin{aligned} f(g(-9)) \\ 15(-9) - 29 \\ -135 - 29 \\ -164 \end{aligned}$$

17. Let  $f(x) = x + 5$  and  $g(x) = x^2$ . First, find  $(g \circ f)(x)$ . Then find  $(g \circ f)(-4)$ .

$$\begin{aligned} g(f(x)) \\ (x+5)^2 \\ (x+5)(x+5) \\ x^2 + 5x + 5x + 25 \\ x^2 + 10x + 25 \end{aligned}$$

$$\begin{aligned} g(f(-4)) \\ (-4)^2 + 10(-4) + 25 \\ 16 - 40 + 25 \\ -24 + 25 \\ 1 \end{aligned}$$