

5.6

Extra Practice

In Exercises 1–8, let $f(x) = \sqrt{x+3}$, $g(x) = 4x - 3$, and $h(x) = 3x^2 + 3$. Find the indicated value.

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|---------------|--------------|----------------|---------------|
| 1. $f(g(9))$ | 2. $g(f(6))$ | 3. $g(h(1))$ | 4. $h(g(0))$ |
| 5. $h(f(-2))$ | 6. $f(h(5))$ | 7. $g(g(1.5))$ | 8. $f(f(-2))$ |

In Exercises 9–16, let $f(x) = \sqrt{x-6}$, $g(x) = 2x - 5$, and $h(x) = x^2 - 3$. Find the indicated value.

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| 9. $f(g(10))$ | 10. $g(f(31))$ | 11. $g(h(1))$ | 12. $h(g(2))$ |
| 13. $f(h(5))$ | 14. $h(f(42))$ | 15. $g\left(g\left(\frac{3}{2}\right)\right)$ | 16. $h(h(1))$ |

In Exercises 17–26, find (a) $f(g(x))$, (b) $g(f(x))$, and (c) $f(f(x))$. State the domain of each composition.

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| 17. $f(x) = 6x$, $g(x) = x - 2$ | 18. $f(x) = x + 7$, $g(x) = x - 9 $ |
| 19. $f(x) = 4x^2$, $g(x) = x - 2$ | 20. $f(x) = x^2 + 2$, $g(x) = 2x - 3$ |
| 21. $f(x) = 2x^{-1}$, $g(x) = 3x - 9$ | 22. $f(x) = -3x^{-1}$, $g(x) = x^2 - 4$ |
| 23. $f(x) = 2x + 5$, $g(x) = \sqrt{x - 3}$ | 24. $f(x) = 3x - 2$, $g(x) = \sqrt{2x - 2}$ |
| 25. $f(x) = x + 2$, $g(x) = x^2 + 3x - 7$ | 26. $f(x) = 2x - 1$, $g(x) = x^2 - 3x + 2$ |

In Exercises 27 and 28, let $f(x) = x^2 + 2$ and $g(x) = 5x$. Describe and correct the error in performing the composition.

27.

$$\begin{aligned} \times \quad f(g(x)) &= 5(x^2 + 2) \\ &= 5x^2 + 10 \end{aligned}$$

28.

$$\begin{aligned} \times \quad g(f(x)) &= g(x^2 + 2) \\ &= 5x^2 + 2 \end{aligned}$$

29. The function $C(x) = 10x + 85$ represents the cost (in dollars) of producing x handbags. The number of handbags produced in t hours is represented by $x(t) = 5t$.

- a. Find $C(x(t))$.
- b. Evaluate $C(x(40))$ and explain what it represents.