

6.3 EXERCISES

HOMWORK KEY

- = **WORKED-OUT SOLUTIONS**
on p. WS1 for Exs. 3, 13, and 45
- ★ = **TAKS PRACTICE AND REASONING**
Exs. 11, 38, 39, 44, 48, and 49
- ◆ = **MULTIPLE REPRESENTATIONS**
Ex. 46

SKILL PRACTICE

1. **VOCABULARY** Copy and complete: The function $h(x) = g(f(x))$ is called the ? of the function g with the function f .
2. **WRITING** Tell whether the sum of two power functions is *sometimes*, *always*, or *never* a power function. *Explain* your reasoning.

EXAMPLE 1

on p. 428
for Exs. 3–11

ADD AND SUBTRACT FUNCTIONS Let $f(x) = -3x^{1/3} + 4x^{1/2}$ and $g(x) = 5x^{1/3} + 4x^{1/2}$. Perform the indicated operation and state the domain.

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|--|------------------|------------------|-------------------|
| 3. $f(x) + g(x)$ | 4. $g(x) + f(x)$ | 5. $f(x) + f(x)$ | 6. $g(x) + g(x)$ |
| 7. $f(x) - g(x)$ | 8. $g(x) - f(x)$ | 9. $f(x) - f(x)$ | 10. $g(x) - g(x)$ |

11. **TAKS REASONING** What is $f(x) + g(x)$ if $f(x) = -7x^{2/3} - 1$ and $g(x) = 2x^{2/3} + 6$?

- (A) $5x^{2/3} - 5$ (B) $-5x^{2/3} + 5$ (C) $9x^{2/3} + 7$ (D) $-9x^{2/3} - 7$

EXAMPLE 2

on p. 429
for Exs. 12–19

MULTIPLY AND DIVIDE FUNCTIONS Let $f(x) = 4x^{2/3}$ and $g(x) = 5x^{1/2}$. Perform the indicated operation and state the domain.

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|-------------------------|---|-------------------------|-------------------------|
| 12. $f(x) \cdot g(x)$ | 13. $g(x) \cdot f(x)$ | 14. $f(x) \cdot f(x)$ | 15. $g(x) \cdot g(x)$ |
| 16. $\frac{f(x)}{g(x)}$ | 17. $\frac{g(x)}{f(x)}$ | 18. $\frac{f(x)}{f(x)}$ | 19. $\frac{g(x)}{g(x)}$ |

EXAMPLE 4

on p. 430
for Exs. 20–27

EVALUATE COMPOSITIONS OF FUNCTIONS Let $f(x) = 3x + 2$, $g(x) = -x^2$, and $h(x) = \frac{x-2}{5}$. Find the indicated value.

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|----------------|---------------|----------------|----------------|
| 20. $f(g(-3))$ | 21. $g(f(2))$ | 22. $h(f(-9))$ | 23. $g(h(8))$ |
| 24. $h(g(5))$ | 25. $f(f(7))$ | 26. $h(h(-4))$ | 27. $g(g(-5))$ |

EXAMPLE 5

on p. 430
for Exs. 28–38

FIND COMPOSITIONS OF FUNCTIONS Let $f(x) = 3x^{-1}$, $g(x) = 2x - 7$, and $h(x) = \frac{x+4}{3}$. Perform the indicated operation and state the domain.

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|---------------|---------------|---------------|---------------|
| 28. $f(g(x))$ | 29. $g(f(x))$ | 30. $h(f(x))$ | 31. $g(h(x))$ |
| 32. $h(g(x))$ | 33. $f(f(x))$ | 34. $h(h(x))$ | 35. $g(g(x))$ |

ERROR ANALYSIS Let $f(x) = x^2 - 3$ and $g(x) = 4x$. Describe and correct the error in the composition.

36.

$$\begin{aligned} f(g(x)) &= f(4x) \\ &= (x^2 - 3)(4x) \\ &= 4x^3 - 12x \end{aligned}$$



37.

$$\begin{aligned} g(f(x)) &= g(x^2 - 3) \\ &= 4x^2 - 3 \end{aligned}$$

