SEE EXAMPLE 1 Given $f(x) = 8x + 13$ and $g(x) = x^2 - 5x$, find each function.

2. $(f+g)(x)$ 3. $(f-g)(x)$ 4. $(g-f)(x)$

SEE EXAMPLE 2 Given $f(x) = 2x^2 + 2x$ and $g(x) = x + 1$, find each function.

5. $(fg)(x)$ 6. $\left(\frac{f}{g}\right)(x)$ 7. $\left(\frac{g}{f}\right)(x)$

SEE EXAMPLE 3 Given $f(x) = 3x^2$ and $g(x) = 7 - x$, find each value.

8. $f(g(5))$ 9. $g(f(5))$ 10. $f(g(-2))$

SEE EXAMPLE 4 Given $f(x) = x^2$, $g(x) = 2x - 3$, and $h(x) = \sqrt{x+1}$, write each composite function. State the domain of each.

11. $f(g(x))$ 12. $g(f(x))$ 13. $f(h(x))$

PRACTICE AND PROBLEM SOLVING

Given $f(x) = 2x^2 - 8$, $g(x) = x^2 + 5x + 6$, and $h(x) = 2x + 4$, find each function.

15. $(f+g)(x)$ 16. $(f-g)(x)$ 17. $(f+h)(x)$

18. $(g-h)(x)$ 19. $(fg)(x)$ 20. $\left(\frac{f}{g}\right)(x)$

21. $\left(\frac{h}{f}\right)(x)$ 22. $(gh)(x)$ 23. $\left(\frac{g}{h}\right)(x)$

Given $f(x) = 2\sqrt{x+3}$ and $g(x) = -3x + 1$, find each value.

24. $f(g(1))$ 25. $g(f(1))$ 26. $f(g(4))$

27. $g(f(6))$ 28. $f\left(g\left(\frac{4}{3}\right)\right)$ 29. $g(f(97))$

Given $f(x) = 4x + 3$, $g(x) = \frac{x}{x+3}$, and $h(x) = -x^2 - 2$, write each composite function. State the domain of each.

30. $f(g(x))$ 31. $g(f(x))$ 32. $f(h(x))$

Use the tables to find each value.

39. $(g \circ f)(5)$ 40. $(f \circ g)(3)$

41. $g(f(4))$ 42. $f(g(2))$

x	2	3	4	5
$f(x)$	0	1	2	3

x	1	2	3	4
$g(x)$	1	2	4	8

43. **Critical Thinking** Can you use the tables to find $f(g(4))$? Explain your answer.

45. If $(f \circ g)(x) = (3x + 4)^2$, which of the following could be true?

Ⓐ $f(x) = 3x + 4$ and $g(x) = x^2$ Ⓒ $f(x) = (3x)^2$ and $g(x) = 4^2$

Ⓑ $f(x) = x^2$ and $g(x) = 3x + 4$ Ⓓ $f(x) = 3x + 4$ and $g(x) = \sqrt{x}$

46. If $f(x) = 2x + 1$ and $g(x) = 5x - 2$, then which of the following is $(fg)(5)$?

Ⓕ 253 Ⓗ 47

Ⓖ 53 Ⓙ 13

47. Given $f(x) = 4 - x^2$ and $g(x) = \frac{1}{2}x - 2$, which of the following is $(f \circ g)(x)$?

Ⓐ $(f \circ g)(x) = -\frac{1}{2}x^2$ Ⓒ $(f \circ g)(x) = -\frac{1}{2}x^3 + 2x^2 + 2x - 8$

Ⓑ $(f \circ g)(x) = -\frac{1}{4}x^2 + 2x$ Ⓓ $(f \circ g)(x) = -x^2 + \frac{1}{2}x + 2$

$f(g(x)) = f\left(\frac{1}{2}x - 2\right)$

$= 4 - \left(\frac{1}{2}x - 2\right)^2$

$= 4 - \left(\frac{1}{2}x - 2\right)\left(\frac{1}{2}x - 2\right)$

$4 - \left(\frac{1}{4}x^2 - 2x + 4\right)$

$4 - \frac{1}{4}x^2 + 2x - 4$

30. $f(g(x)) =$

$f\left(\frac{x}{x+3}\right) = 4\left(\frac{x}{x+3}\right) + 3$

$\frac{4}{1}$

$\frac{4x}{x+3} + 3 \quad (x+3)$

$\frac{4x}{x+3} + \frac{3x+9}{x+3} =$

$\frac{7x+9}{x+3}$

$$g(f(x))$$

$$g(4x+3) = \frac{4x+3}{4x+3+3} =$$

$$\frac{4x+3}{4x+6}$$