

NAME: _____

1. If $f(x) = 5x - 3$ and $g(x) = x - 4$, find $g(f(-3))$.
2. If $f(x) = 5x - 2$ and $g(x) = x - 5$, find $f(g(2))$.
3. If $f(x) = 2x$ and $g(x) = x + 5$, find $g(f(3))$.
[A] 11 [B] 14 [C] 8 [D] 16 [E] 6

4. Given $f(x) = \frac{x+4}{x}$ and $g(x) = x^2 + 3$, find $(g \circ f)(6)$.
[A] $\frac{52}{9}$ [B] $\frac{84}{25}$ [C] $\frac{43}{39}$ [D] $\frac{14}{3}$

5. Given $f(x) = \frac{x+7}{x}$ and $g(x) = x^2 + 7$, find $(g \circ f)(5)$.
[A] $\frac{39}{32}$ [B] $\frac{1033}{144}$ [C] $\frac{319}{25}$ [D] $\frac{47}{5}$

6. If $g(x) = 2x^2$ and $f(x) = 3x + 8$, find $g(f(3))$ and $f(g(-2))$.

7. Compare the quantity in Column A with the quantity in Column B.

$$f(x) = 2x - 5 \quad g(x) = \frac{1}{2}(x + 5)$$

Column A Column B

$$f(2) \qquad g(f(2))$$

- [A] The quantity in Column A is greater.
[B] The quantity in Column B is greater.
[C] The two quantities are equal.
[D] The relationship cannot be determined on the basis of the information supplied.

8. Compare the quantity in Column A with the quantity in Column B.

$$f(x) = x + 2, \quad g(x) = 3x - 1$$

Column A Column B

$$f(g(3)) \qquad g(f(3))$$

- [A] The quantity in Column A is greater.
[B] The quantity in Column B is greater.
[C] The two quantities are equal.
[D] The relationship cannot be determined on the basis of the information supplied.

9. Write two function rules $f(x)$ and $g(x)$ such that $f(g(-1)) = 6$.

10. If $q(x) = 5 - x^2$ and $p(q(x)) = \frac{4 - x^2}{x^2}$ when $x \neq 0$, then what is $p\left(\frac{1}{4}\right)$ equal to? Show each of your steps in finding the answer. Explain each of the steps.

11. Find $g(f(x))$ where $f(x) = x - 9$ and $g(x) = \frac{x+2}{2}$.

$$[A] \frac{3x-16}{2}$$

$$[B] \frac{x-16}{2}$$

$$[C] \frac{x-7}{2}$$

$$[D] \frac{x^2-7x-18}{2}$$

12. Find $g(f(x))$ where $f(x) = x - 5$ and $g(x) = \frac{x-2}{7}$.

$$[A] \frac{x^2-7x+10}{7}$$

$$[B] \frac{x-37}{7}$$

$$[C] \frac{8x-37}{7}$$

$$[D] \frac{x-7}{7}$$

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13. Given $f(x) = \frac{x+3}{x}$ and $g(x) = x+6$, find $(g \circ f)(x)$ and state the domain.

[A] $\frac{x+6}{x+9}$, $\{x|x \neq -9\}$

[B] $\frac{x^2+7x+3}{x}$, $\{x|x \neq 0\}$

[C] $\frac{x+9}{x+6}$, $\{x|x \neq -6\}$

[D] $\frac{x^2+9x+18}{x}$, $\{x|x \neq 0\}$

14. Given $f(x) = \frac{x+7}{x}$ and $g(x) = x+3$, find $(g \circ f)(x)$ and state the domain.

[A] $\frac{x+10}{x+3}$, $\{x|x \neq -3\}$

[B] $\frac{x^2+4x+7}{x}$, $\{x|x \neq 0\}$

[C] $\frac{x+3}{x+10}$, $\{x|x \neq -10\}$

[D] $\frac{x^2+10x+21}{x}$, $\{x|x \neq 0\}$

15. Given $f(x) = -8x^2$, $g(x) = -3x+9$, and $h(x) = \sqrt{x}$, find $[(f+g) \circ h](x)$.

[A] $-8x-3\sqrt{x}+9$ [B] $24x+\sqrt{x}+9$

[C] $-8\sqrt{x}-3x+9$ [D] $-8x^2-3\sqrt{x}+9$

16. Given $f(x) = 7x^2$, $g(x) = 8x-3$, and $h(x) = \sqrt{x}$, find $[(f+g) \circ h](x)$.

[A] $7x^2+8\sqrt{x}-3$ [B] $7x+8\sqrt{x}-3$

[C] $7\sqrt{x}+8x-3$ [D] $56x+\sqrt{x}-3$

17. Given $f(x) = \frac{3}{8}x+4$ and $g(x) = x^3$, find $(g^{-1} \circ f^{-1})(19,683)$.

[A] 3 [B] -1 [C] 4 [D] -3

18. Given $f(x) = \frac{2}{3}x+8$ and $g(x) = x^3$, find $(f^{-1} \circ g^{-1})(-8)$. Round to the nearest tenth.

[A] -15.0 [B] -4.2 [C] -2.9 [D] -16.3

19. Given $f(x) = \frac{2}{7}x+1$ and $g(x) = x^3$, find $(f^{-1} \circ f^{-1})(-2)$. Round to the nearest tenth.

20. Given $f(x) = \frac{1}{6}x+3$ and $g(x) = x^3$, find $(g^{-1} \circ f^{-1})(-4)$. Round to the nearest tenth.

[1] $g(f(-3)) = -22$ _____

[15] A

[2] $f(g(2)) = -17$ _____

[16] B

[3] A

[17] A

[4] A

[18] A

[5] C

[19] -40.3

[6] $g(f(3)) = 578, f(g(-2)) = 32$ _____

[20] -3.5

[7] B

[8] B

Answers may vary. Sample: $f(x) = 2x$ and

[9] $g(x) = x + 4$ _____

To get $p\left(\frac{1}{4}\right)$, $q(x)$ will have to equal $\frac{1}{4}$.

That means $5 - x^2 = \frac{1}{4}$ or $x^2 = \frac{19}{4}$ which

makes $x = \frac{\sqrt{19}}{2}$. Substituting that into $p(q(x))$

$$\text{gives } p\left(\frac{1}{4}\right) = \frac{4 - \frac{19}{4}}{\frac{19}{4}} = \frac{16 - 19}{19} = -\frac{3}{19}.$$

OR

Find $p(x)$ by factoring $q(x) = 5 - x^2$ out of

$p(q(x))$.

$$p(q(x)) = \frac{4 - x^2}{x^2} = \frac{(5 - x^2) - 1}{5 - (5 - x^2)} \Rightarrow p(x) = \frac{x - 1}{5 - x},$$

$$p(x) = \frac{\frac{1}{4} - 1}{5 - \frac{1}{4}} = \frac{-\frac{3}{4}}{\frac{19}{4}} = -\frac{3}{4} \cdot \frac{4}{19} = -\frac{3}{19}.$$

[10] _____

[11] C

[12] D

[13] C

[14] A