

Name: _____

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Class Examples: Composition of Functions

Honors PreCalculus

Use the functions $f(x) = |x - 2|$ and $g(x) = \frac{3}{x^2 + 2}$ to find the following values:

1. $(f \circ g)(4) = f(g(4))$ $g(4) = \frac{3}{18} = \frac{1}{6}$ 2. $(g \circ f)(2) = g(f(2))$ $f(2) = 0$
 $f(\frac{1}{6}) = |-\frac{11}{6}|$ $g(0) = \frac{3}{2}$
 $= \frac{11}{6}$

3. $(g \circ g)(0) = g(g(0))$ $g(0) = \frac{3}{2}$
 $g(\frac{3}{2}) = \frac{3}{\frac{9}{4} + 2} = \frac{3}{\frac{17}{4}} = \frac{12}{17}$

x	1	2	3	4	5	6
$f(x)$	2	3	5	1	6	3
$g(x)$	3	5	6	2	1	4

Use the table at the right to evaluate the following:

4. $f(g(2))$ $g(2) = 5$
 $f(5) = 6$

5. $g(f(2))$ $f(2) = 3$
 $g(3) = 6$

6. $f(f(1))$ $f(1) = 2$
 $f(2) = 3$

7. $g(g(2))$ $g(2) = 5$
 $g(5) = 1$

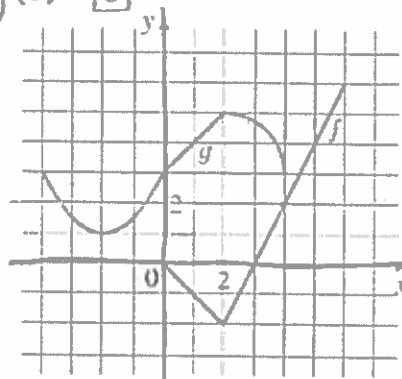
8. $(f \circ g)(6) = f(g(6))$ $g(6) = 4$
 $f(4) = 1$

9. $(g \circ f)(2) = g(f(2))$ $f(2) = 3$
 $g(3) = 6$

10. $(f \circ f)(5) = f(f(5))$ $f(5) = 6$
 $f(6) = 3$

11. $(g \circ g)(1) = g(g(1))$ $g(1) = 3$
 $g(3) = 6$

Use the graph of f and g to the right to find each of the following:



12. $g(f(0))$ $f(0) = 0$
 $g(0) = 3$

13. $(f \circ g)(0)$
 $f(g(0))$ $g(0) = 3$
 $f(3) = 0$

14. $(f \circ f)(4)$
 $f(f(4)) = f(3) = 2$
 $f(2) = -2$

15. $f(g(2))$ $g(2) = 5$
 $f(5) = 4$

16. $(g \circ f)(4)$ $f(4) = 3$
 $g(f(4)) = g(3) = 6$
 $g(2) = 5$

17. $(g \circ g)(-2)$ $g(-2) = 1$
 $g(g(-2)) = g(1) = 3$
 $g(1) = 3$

For the given functions f , g , and h , find $f(g(h(4)))$; $h(4) = 2, g(2) = -3$

18. $f(x) = x^4 + 1, g(x) = x - 5, h(x) = \sqrt{x}$
 $f(g(2))$
 $f(-3) = 82$

For the given functions $f(x) = 3x + 1$ and $g(x) = x^2$, find each and state the domain.

19. $(g \circ f)$

$$g(f(x)) = (3x+1)^2$$

$$= 9x^2 + 6x + 1$$

D: $(-\infty, \infty)$
ARN

20. $(g \circ g)$

$$g(g(x)) = (x^2)^2 = x^4$$

D: $(-\infty, \infty)$
ARN

For the given functions $f(x) = \frac{x}{x-1}$ and $g(x) = -\frac{4}{x}$, find each and state the domain.

21. $(f \circ g)$

$$f(g(x)) = \frac{-\frac{4}{x}}{-\frac{4}{x} - 1} \cdot \frac{x}{x}$$

$$= \frac{-4}{-4-x} = -\frac{4}{4+x}$$

D: $x \neq -4$
 $(-\infty, -4) \cup (-4, \infty)$

22. $(g \circ g)$

$$g(g(x)) = \frac{-4}{-\frac{4}{x}} = -\frac{4}{1} \cdot -\frac{x}{4}$$

$$= x$$

D: $(-\infty, \infty)$
ARN

For the given functions $f(x) = x^2 + 1$ and $g(x) = \sqrt{x-1}$, find each and state the domain.

23. $(f \circ g)$

$$f(g(x)) = (\sqrt{x-1})^2 + 1$$

$$= x - 1 + 1$$

$$= x$$

D: $(-\infty, \infty)$
ARN

24. $(g \circ g)$

$$g(g(x)) = \sqrt{\sqrt{x-1} - 1}$$

D: $x \geq 2$

$x-1 \geq 0$
 $x \geq 1$

$\sqrt{x-1} - 1 \geq 0$
 $\sqrt{x-1} \geq 1$
 $x-1 \geq 1$
 $x \geq 2$

25. An appliance dealer advertises a 10% discount on all his washing machines. In addition, the manufacturer offers a \$100 rebate on the purchase of a washing machine. Let x represent the sticker price of the washing machine.

a) Suppose only the 10% discount applies. Find a function f that models the purchase price of the washer as a function of the sticker price x . $f(x) = .90x$

b) Suppose only the \$100 rebate applies. Find a function g that models the purchase price of the washer as a function of the sticker price x . $g(x) = x - 100$

c) Find $f(g(x))$ and $g(f(x))$. Explain what these functions represent. Which is the better deal?

$$f(g(x)) = .90(x-100)$$

\$100 rebate taken off, then 10% off that price

$$g(f(x)) = (.90x) - 100$$

← better deal 10% off the price then a \$100 rebate off