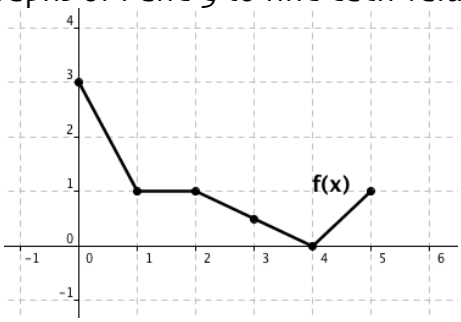
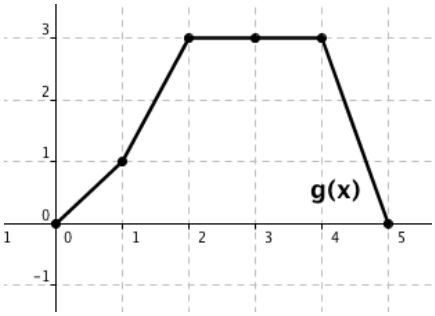
Function Compositions

1. Use the graphs of *f* and *g* to find each value.





a. $-2(f \circ g)(1)$ b. $(g \circ f)(5)$ c. $(f \circ (g \circ f))(4)$

2. Find the value of each expression, if possible.

$a(x) = 4x^{2/3}$ $b(x) = 8x^{1/2}$ $c(x) = -x^{-2}$ $d(x) = 64(x-2)^{-1}$

a. $(a \circ b)(27)$ b. $(c \circ b)(-4)$ c. $(a \circ d)(3)$ d. $(c \circ c)(2)$

3. Find each composition and the state the domain in ***set*** notation.

$f(x) = \sqrt{x-7}$ $g(x) = x^2 + 7$ $m(x) = \dfrac{1}{x}$ $n(x) = 4x^2 - 20x + 16$ $p(x) = x^{1/3}$ $q(x) = x + 4$

a. $(f \circ g)(x)$ b. $(g \circ f)(x)$ c. $(m \circ g)(x)$
d. $(g \circ g)(x)$ e. $(m \circ f)(x)$ f. $(p \circ q)(x)$
g. $(n \circ q)(x)$ h. $(m \circ n)(x)$ i. $(m \circ p)(x)$ j. $(m \circ f \circ q)(x)$

4. What composition produces each expression?

$a(x) = x^2$ $b(x) = \sqrt[3]{x-8}$ $c(x) = \dfrac{1}{x-9}$

a. $\sqrt[3]{x^2 - 8}$ b. $\dfrac{1}{x^2 - 18x + 81}$ c. x^6

ANSWERS

1.

a. -2

b. 1

c. 3

2.

a. 48
b. undefined
c. 64
d. -16

3.

a. $|x|$, $\{x|x \in R\}$

b. x, $\{x|x \geq 7\}$

c. $\frac{1}{x^2+7}$, $\{x|x \in R\}$

d. x^4+14x^2+56, $\{x|x \in R\}$

e. $\frac{\sqrt{x-7}}{x-7}$, $\{x|x > 7\}$

f. $(x+4)^{1/3}$, $\{x|x \in R\}$

g. $4x^{2/3}-20x^{1/3}+6$, $\{x|x \in R\}$

h. $\frac{1}{4x^2-20x+16}$, $\{x|x \neq 1,\ 4\}$

i. $\frac{x^{2/3}}{x}$, $\{x|x \neq 0\}$

j. $\frac{\sqrt{x-3}}{x-3}$, $\{x|x > 3\}$

4.

a. $(b \circ a)(x)$

b. $(a \circ c)(x)$

c. $(a \circ a \circ a)(x)$