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Assignment: 2.8 Combining Functions;
Composite Functions

1. Complete the following statement.

If $f(x) = x$ and $g(x) = 1$, then $(f \circ g)(x) =$ _____.

What is the value of $(f \circ g)(x)$?

(Simplify your answer.)

2. For $f(x) = 5x$ and $g(x) = -x$, find each of the following.

a. $(f + g)(-1)$

b. $(f - g)(0)$

c. $(f \cdot g)(1)$

d. $\left(\frac{f}{g}\right)(2)$

a. $(f + g)(-1) =$ (Simplify your answer.)

b. $(f - g)(0) =$ (Simplify your answer.)

c. $(f \cdot g)(1) =$ (Simplify your answer.)

d. $\left(\frac{f}{g}\right)(2) =$ (Simplify your answer.)

3. Given $f(x) = x - 7$ and $g(x) = 3x^2$, first find $f + g$, $f - g$, fg , and $\frac{f}{g}$. Then determine the domain for each function.
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$(f + g)(x) =$ (Simplify your answer.)

What is the domain of $f + g$?

- ☐ A. $[0, \infty)$
- ☒ B. $(-\infty, \infty)$
- ☐ C. $\left(\frac{15}{4}, \infty\right)$
- ☐ D. $\left(-\infty, \frac{15}{4}\right) \cup \left(\frac{15}{4}, \infty\right)$

$(f - g)(x) =$ (Simplify your answer.)

What is the domain of $f - g$?

- ☐ A. $[0, \infty)$
- ☐ B. $\left(\frac{1}{2}, \infty\right)$
- ☐ C. $\left(-\infty, \frac{1}{2}\right) \cup \left(\frac{1}{2}, \infty\right)$
- ☒ D. $(-\infty, \infty)$

$(fg)(x) =$ (Simplify your answer.)

What is the domain of fg ?

- ☐ A. $(-\infty, 8) \cup (8, \infty)$
- ☐ B. $(-\infty, 7) \cup (7, \infty)$
- ☐ C. $[0, \infty)$
- ☒ D. $(-\infty, \infty)$

$\left(\frac{f}{g}\right)(x) =$ (Simplify your answer.)

What is the domain of $\frac{f}{g}$?

- ☐ A. $(8, \infty)$
- ☒ B. $(-\infty, 0) \cup (0, \infty)$
- ☐ C. $[0, \infty)$
- ☐ D. $(-\infty, \infty)$
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4. The functions $f(x) = \sqrt{x}$ and $g(x) = x - 13$ are given. Find each of the following functions and state its domain.

$$f + g, f - g, fg, \text{ and } \frac{f}{g}$$

$$(f + g)(x) = \sqrt{x} + x - 13 \quad (\text{Simplify your answer.})$$

What is the domain of $f + g$?

$$[0, \infty)$$

(Type your answer in interval notation.)

$$(f - g)(x) = \sqrt{x} - x + 13 \quad (\text{Simplify your answer.})$$

What is the domain of $f - g$?

$$[0, \infty)$$

(Type your answer in interval notation.)

$$(fg)(x) = x\sqrt{x} - 13\sqrt{x} \quad (\text{Simplify your answer.})$$

What is the domain of fg ?

$$[0, \infty)$$

(Type your answer in interval notation.)

$$\left(\frac{f}{g}\right)(x) = \frac{\sqrt{x}}{x - 13} \quad (\text{Simplify your answer.})$$

What is the domain of $\frac{f}{g}$?

$$[0, 13) \cup (13, \infty)$$

(Type your answer in interval notation.)

5. Find the domain of each of the following functions if $f(x) = \sqrt{x + 3}$; $g(x) = \sqrt{16 - x^2}$.

a. $f \cdot g$ b. $\frac{f}{g}$

a. The domain of $f \cdot g$ is $[-3, 4]$.

(Type your answer in interval notation.)

b. The domain of $\frac{f}{g}$ is $[-3, 4)$.

(Type your answer in interval notation.)

6. Use the diagram to the right to evaluate $(g \circ f)(x)$. Then evaluate $(g \circ f)(3)$ and $(g \circ f)(-2)$.



$$(g \circ f)(x) = 2x^2 + 1 \quad (\text{Simplify your answer.})$$

$$(g \circ f)(3) = 19 \quad (\text{Simplify your answer.})$$

$$(g \circ f)(-2) = 9 \quad (\text{Simplify your answer.})$$

7. Let $f(x) = 2x + 3$ and $g(x) = 4x^2 - 4$. Evaluate $(f \circ g)(-1)$.

$(f \circ g)(-1) =$ (Simplify your answer.)

8. Let $f(x) = 4x + 3$ and $g(x) = 4x^2 - 2$. Evaluate $(f \circ g)(2)$.

$(f \circ g)(2) =$ (Simplify your answer.)

9. The functions f and g are given. Evaluate $f \circ g$ and find the domain of the composite function $f \circ g$.

$f(x) = \sqrt{x - 6}$; $g(x) = 2 - 3x$

$(f \circ g)(x) =$

(Simplify your answer. Type an exact answer, using radicals as needed.)

The domain of $f \circ g$ is .

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)

10. Let $f(x) = 5x - 3$ and $g(x) = x + 6$. Find each composite function and describe the domain of the resulting function.

a. $f \circ g$

b. $g \circ f$

c. $f \circ f$

d. $g \circ g$

a. $(f \circ g)(x) =$ (Simplify your answer.)

The domain of $f \circ g$ is . (Type your answer in interval notation.)

b. $(g \circ f)(x) =$ (Simplify your answer.)

The domain of $g \circ f$ is . (Type your answer in interval notation.)

c. $(f \circ f)(x) =$ (Simplify your answer.)

The domain of $f \circ f$ is . (Type your answer in interval notation.)

d. $(g \circ g)(x) =$ (Simplify your answer.)

The domain of $g \circ g$ is . (Type your answer in interval notation.)

11. Express the given function H as a composition of two functions f and g such that $H(x) = (f \circ g)(x)$.

$H(x) = \sqrt{x + 9}$

What are two possible functions for f and g ?

- ☐ **A.** $f(x) = x + 9$; $g(x) = \sqrt{x}$
- ☐ **B.** $f(x) = \sqrt{x}$; $g(x) = \sqrt{x + 9}$
- ☒ **C.** $f(x) = \sqrt{x}$; $g(x) = x + 9$
- ☐ **D.** $f(x) = \sqrt{x + 9}$; $g(x) = \sqrt{x}$

12. Find functions f and g so that $f \circ g = H$.

$$H(x) = |6x + 4|$$

Choose the correct pair of functions.

- ☐ A. $f(x) = |-x|$, $g(x) = \frac{x-4}{6}$
- ☐ B. $f(x) = 6x + 4$, $g(x) = |x|$
- ☒ C. $f(x) = |x|$, $g(x) = 6x + 4$
- ☐ D. $f(x) = \frac{x-4}{6}$, $g(x) = |-x|$
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13. Watch the video and then solve the problem given below.

[Click here to watch the video.](#)¹

Let $f(x) = 2x^2 + 7$ and $g(x) = 3x - 1$. Find the composite function $(f \circ g)(x)$.

$$(f \circ g)(x) = 18x^2 - 12x + 9$$

(Simplify your answer.)

1: <http://mediaplayer.pearsoncmg.com/assets/MG9MYU1ElpTyxJF19TJXp5xPACns6vjq?clip=3>
