1.

First find $f + g$, $f - g$, fg and $\dfrac{f}{g}$. Then determine the domain for each function.

$f(x) = 5x - 1$, $g(x) = x - 2$

$(f + g)(x) = $ _____ (Simplify your answer.)

What is the domain of $f + g$?

○ $\left(\dfrac{1}{2}, \infty\right)$

○ $\left(-\infty, \dfrac{1}{2}\right) \cup \left(\dfrac{1}{2}, \infty\right)$

○ $(-\infty, \infty)$

○ $[0, \infty)$

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

What is the domain of $f - g$?

○ $\left(-\infty, -\dfrac{1}{4}\right) \cup \left(-\dfrac{1}{4}, \infty\right)$

○ $(-\infty, \infty)$

○ $[0, \infty)$

○ $\left(-\dfrac{1}{4}, \infty\right)$

$(fg)(x) = $ _____

What is the domain of fg?

○ $(-\infty, 2) \cup (2, \infty)$

○ $(-\infty, \infty)$

○ $\left(-\infty, \dfrac{1}{5}\right) \cup \left(\dfrac{1}{5}, \infty\right)$

○ $[0, \infty)$

$\left(\dfrac{f}{g}\right)(x) = $ _____

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

○ $(-\infty, \infty)$

○ $[0, \infty)$

○ $(-\infty, 2) \cup (2, \infty)$

○ $(2, \infty)$

2. The function $f(x) = 9x + 5$ is one-to-one.

Find an equation for $f^{-1}(x)$, the inverse function.

$f^{-1}(x) = $ _____

(Type an expression for the inverse. Use integers or fractions for any numbers in the expression.)

---

3. Select the correct choice that completes the sentence below.

The graph of $y = -f(x)$ is the graph of $y = f(x)$ reflected about the (1) _____

(1) ○ x-axis.
    ○ y-axis.

---

4. Use transformations of the graph of $f(x) = x^3$ to determine the graph of the given function.

   $g(x) = (x + 4)^3$

Select all the transformations that are needed to graph the given function using $f(x) = x^3$.

☐ **A.** Stretch the graph horizontally by a factor of 4.

☐ **B.** Shift the graph 4 units to the right.

☐ **C.** Shift the graph 4 units up.

☐ **D.** Stretch the graph vertically by a factor of 4.

☐ **E.** Shift the graph 4 units to the left.

☐ **F.** Shift the graph 4 units down.

☐ **G.** Shrink the graph horizontally by a factor of 4.

☐ **H.** Reflect the graph about the y-axis.

☐ **I.** Shrink the graph vertically by a factor of 4.

☐ **J.** Reflect the graph about the x-axis.

Use the graphing tool to graph the function.

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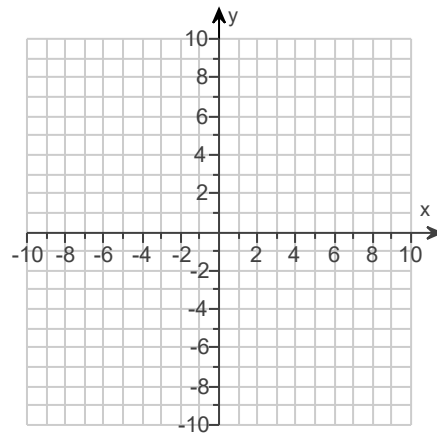
5. Find $f(g(x))$ and $g(f(x))$ and determine whether the pair of functions f and g are inverses of each other.

   $f(x) = 8x + 4$ and $g(x) = \dfrac{x - 4}{8}$

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

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

c.
   ○ f and g are inverses of each other.
   ○ f and g are not inverses of each other.

6. Fill in the blanks so that the resulting statement is true.

   If the function g is the inverse of the function f, then f(g(x)) = (1) _____ and g(f(x)) = (2) _____
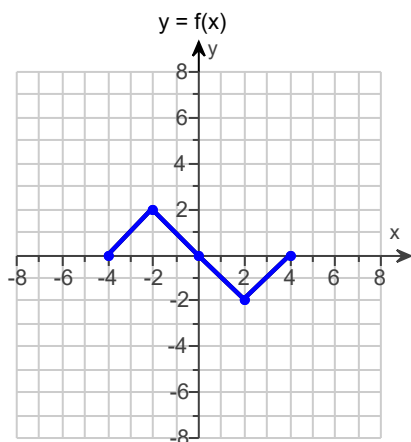
   (1) ○ x   (2) ○ x.
       ○ y   ○ y.

7. Fill in the blanks.

   The function (g ∘ f)(x) is found by replacing each occurrence of x in the equation for _____ with _____.

   The function (g ∘ f)(x) is found by replacing each occurrence of x in the equation for (1) _____ with
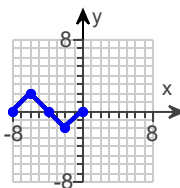
   (2) _____

   (1) ○ g   (2) ○ f(x).
       ○ f   ○ g(f).
       ○ g(f)   ○ g(x).
       ○ f(g)   ○ x.

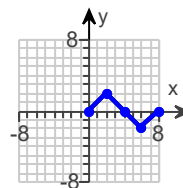8. Use the graph of y = f(x) to graph the function g(x) = f(x) − 4.   Choose the correct graph of g below.

   y = f(x)

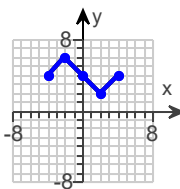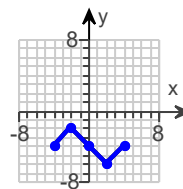
   ○ A.   ○ B.

   ○ C.   ○ D.

9. Find f(g(x)) and g(f(x)) and determine whether the pair of functions f and g are inverses of each other.

$$f(x) = 7x - 2 \quad \text{and} \quad g(x) = \frac{x + 7}{2}$$

a. f(g(x)) = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression.)
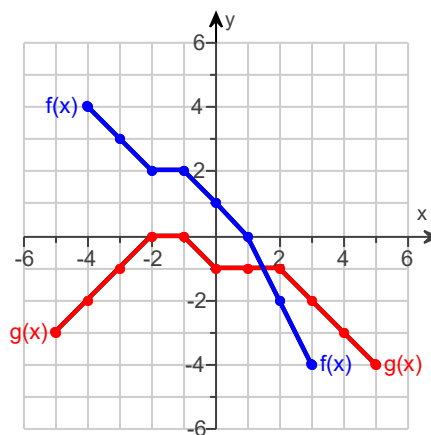
b. g(f(x)) = _____
(Simplify your answer. Use integers or fractions for any numbers in the expression.)

c.
○ f and g are not inverses of each other.
○ f and g are inverses of each other.

---

10. Use the graphs of f and g to find (f + g)(2).

(f + g)(2) = _____

---

11. For f(x) = 5x − 1 and g(x) = 5x² − 4, find the following functions.

a. (f ○ g)(x); **b.** (g ○ f)(x); **c.** (f ○ g)(0); **d.** (g ○ f)(0)

a. (f ○ g)(x) = _____   (Simplify your answer.)

b. (g ○ f)(x) = _____   (Simplify your answer.)

c. (f ○ g)(0) = _____   (Simplify your answer.)

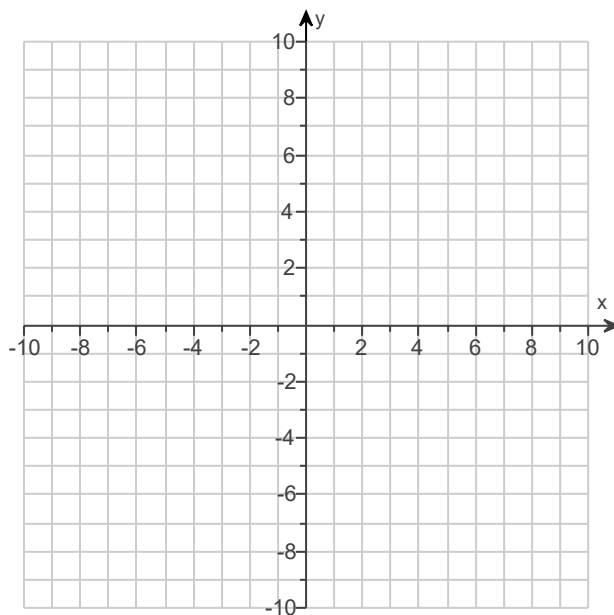**d.** (g ○ f)(0) = _____   (Simplify your answer.)

12. Use transformations of $f(x) = x^2$ to graph the following function.
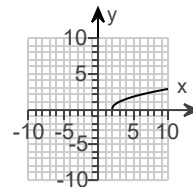
$$g(x) = x^2 + 5$$

Select all the transformations that are needed to graph the given function using $f(x) = x^2$.

☐ **A.** Stretch the graph horizontally by a factor of 5.

☐ **B.** Reflect the graph about the y-axis.

☐ **C.** Shift the graph 5 units to the right.

☐ **D.** Stretch the graph vertically by a factor of 5.

☐ **E.** Shrink the graph vertically by a factor of 5.

☐ **F.** Reflect the graph about the x-axis.

☐ **G.** Shift the graph 5 units down.

☐ **H.** Shift the graph 5 units to the left.

☐ **I.** Shrink the graph horizontally by a factor of 5.

☐ **J.** Shift the graph 5 units up.

Use the graphing tool to graph the function.

---

13. For $f(x) = 6x$ and $g(x) = x + 7$, find the following functions.

a. $(f \circ g)(x)$; **b.** $(g \circ f)(x)$; **c.** $(f \circ g)(2)$; **d.** $(g \circ f)(2)$

---

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

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

c. $(f \circ g)(2) = $ _____

d. $(g \circ f)(2) = $ _____

14. Fill in the blanks.

The function (f o g)(x) is found by replacing each occurrence of x in the equation for _____ with _____.

The function (f o g)(x) is found by replacing each occurrence of x in the equation for (1) _____ with

(2) _____

(1) ○ f(g)   (2) ○ g(x).
    ○ f   ○ x.
    ○ g(f)   ○ g(f).
    ○ g   ○ f(g).

---

15. Use transformations of $f(x) = \sqrt{x}$ to graph the following function.

$g(x) = \sqrt{x} + 2$

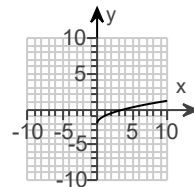Select all the transformations that are needed to graph the given function using $f(x) = \sqrt{x}$.

☐ A. Shrink the graph horizontally by a factor of 2.

☐ B. Shift the graph 2 units down.

☐ C. Stretch the graph vertically by a factor of 2.

☐ D. Shrink the graph vertically by a factor of 2.

☐ E. Stretch the graph horizontally by a factor of 2.

☐ F. Shift the graph 2 units to the left.

☐ G. Shift the graph 2 units up.

☐ H. Shift the graph 2 units to the right.

☐ I. Reflect the graph about the x-axis.

☐ J. Reflect the graph about the y-axis.
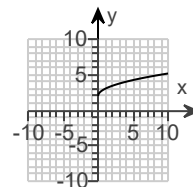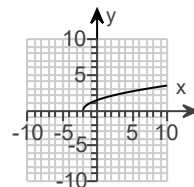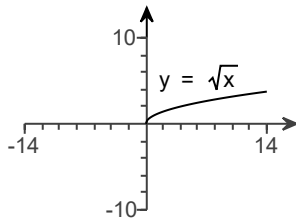
Choose the correct graph below.

○ A.

○ B.

○ C.

○ D.

16. Graph the function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown below.
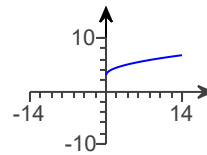
$$h(x) = \sqrt{x+3}$$

y = √x

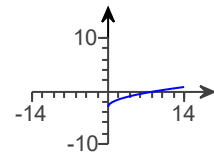Select all the transformations that are needed to graph the given function using $y = \sqrt{x}$.

- [ ] **A.** Stretch the graph vertically by a factor of 3.
- [ ] **B.** Shift the graph 3 units up.
- [ ] **C.** Reflect the graph about the y-axis.
- [ ] **D.** Stretch the graph horizontally by a factor of 3.
- [ ] **E.** Shift the graph 3 units to the right.
- [ ] **F.** Shrink the graph horizontally by a factor of 3.
- [ ] **G.** Shrink the graph vertically by a factor of 3.
- [ ] **H.** Shift the graph 3 units down.
- [ ] **I.** Reflect the graph about the x-axis.
- [ ] **J.** Shift the graph 3 units to the left.

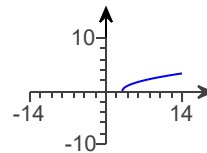Choose the correct graph below.
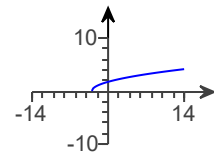
- ○ **A.**

- ○ **B.**

- ○ **C.**

- ○ **D.**

17. Use transformations of $f(x) = x^2$ to graph the following function.

$$h(x) = (x + 4)^2 + 3$$

Select all the transformations that are needed to graph the given function using $f(x) = x^2$.

- ☐ **A.** Shrink the graph horizontally by a factor of 3.
- ☐ **B.** Shift the graph 4 units to the right.
- ☐ **C.** Shift the graph 3 units down.
- ☐ **D.** Shrink the graph vertically by a factor of 4.
- ☐ **E.** Shift the graph 4 units to the left.
- ☐ **F.** Reflect the graph about the y-axis.
- ☐ **G.** Reflect the graph about the x-axis.
- ☐ **H.** Shift the graph 3 units up.
- ☐ **I.** Stretch the graph vertically by a factor of 4.
- ☐ **J.** Stretch the graph horizontally by a factor of 3.

Use the graphing tool to graph the function.

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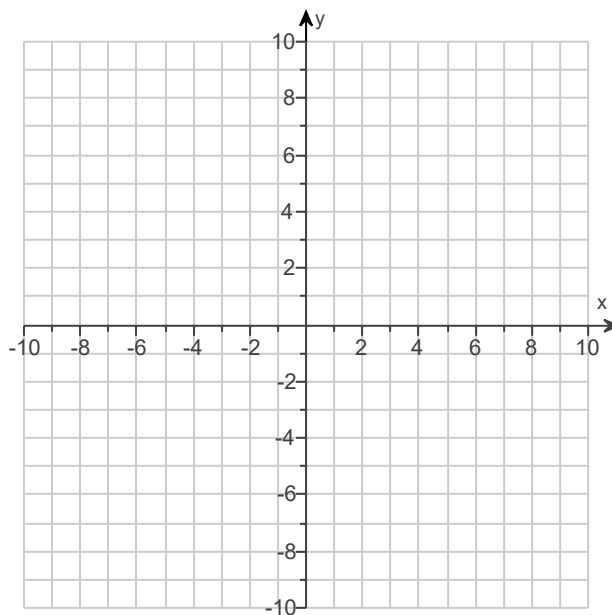
18. For $f(x) = 5x - 1$ and $g(x) = \dfrac{x + 1}{5}$, find the following functions.

a. $(f \circ g)(x)$; **b.** $(g \circ f)(x)$; **c.** $(f \circ g)(9)$; **d.** $(g \circ f)(9)$

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

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

c. $(f \circ g)(9) = $ _____

d. $(g \circ f)(9) = $ _____

19. Complete the sentence below.

Suppose that the graph of a function g is known. The graph of y = g(x) + 2 may be obtained by a _____ shift of the graph of g _____ a distance of 2 units.

Suppose that the graph of a function g is known. The graph of y = g(x) + 2 may be obtained by a (1) _____

shift of the graph of g (2) _____ a distance of 2 units.

(1) ○ horizontal   (2)   ○ down
    ○ vertical   ○ to the left
                           ○ to the right
                           ○ up

20. Does the graph represent a function that has an inverse function?
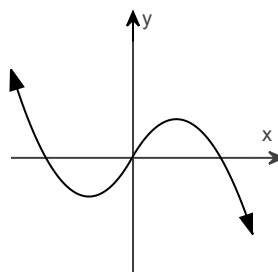
Choose the correct answer below.

○ No
○ Yes

1. $6x - 3$

   $(-\infty,\infty)$

   $4x + 1$

   $(-\infty,\infty)$

   $5x^2 - 11x + 2$

   $(-\infty,\infty)$

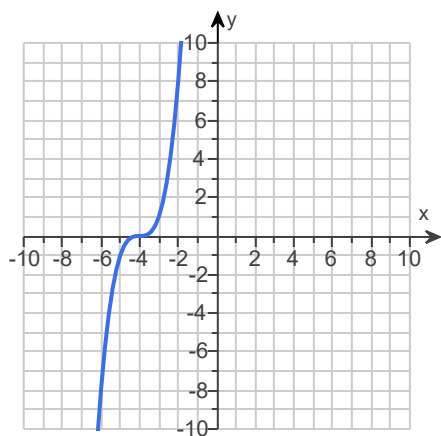 $\dfrac{5x - 1}{x - 2}$

   $(-\infty,2)\cup(2,\infty)$

---

2. $\dfrac{x - 5}{9}$

---

3. (1) x-axis.

---

4. E. Shift the graph 4 units to the left.

---

5. x

   x

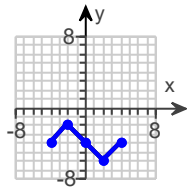   f and g are inverses of each other.

---

6. (1) x

   (2) x.

---

7. (1) g

   (2) f(x).

8.

D.

---

9. $\dfrac{7x + 45}{2}$

$\dfrac{7x + 5}{2}$

f and g are not inverses of each other.
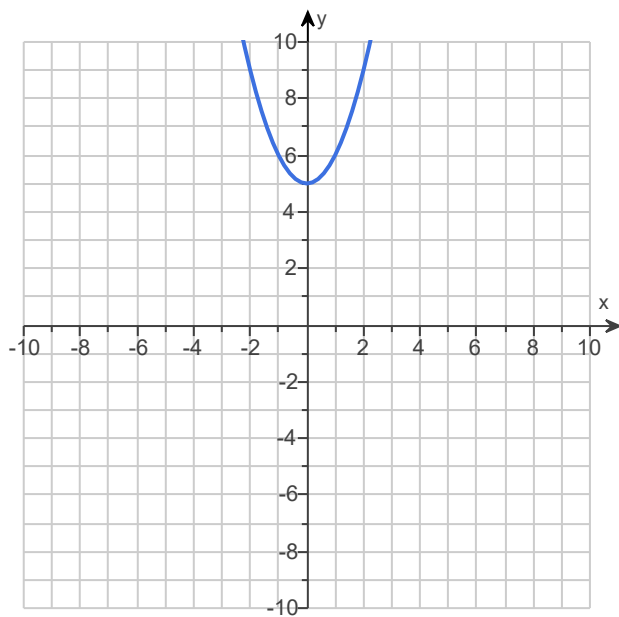
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10. -3

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11. $25x^2 - 21$

$125x^2 - 50x + 1$

-21

1

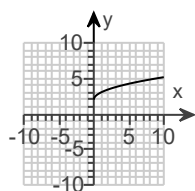---

12. J. Shift the graph 5 units up.

13. 6x + 42

6x + 7

54

19

14. (1) f

(2) g(x).
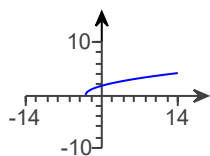
15. G. Shift the graph 2 units up.

C.
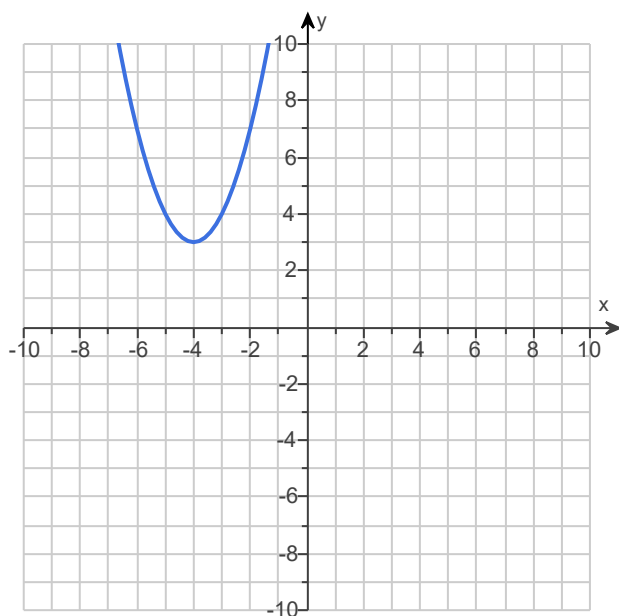
16. J. Shift the graph 3 units to the left.

D.

17. E. Shift the graph 4 units to the left., H. Shift the graph 3 units up.

18. x

x

9

9

19. (1) vertical

(2) up

20. No