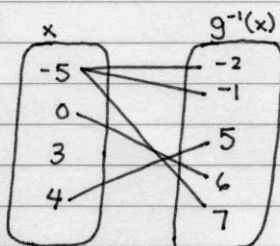


Inverses (Select)

x	$f^{-1}(x)$
-3	-5
0	-1
4	2
7	4
11	8



Graph: a. No b. No c. Yes

1. $y = x - 9$
 $x = y - 9$
 $x + 9 = y$
 $f^{-1}(x) = x + 9$

4. $y = \frac{3}{x} - 5$
 $x = \frac{3}{y} - 5$
 $x + 5 = \frac{3}{y}$

$y(x+5) = 3$
 $y = \frac{3}{x+5}$
 $b^{-1}(t) = \frac{3}{t+5}$

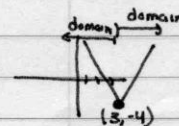
5. $g(x) = x^2 - 7$ $x \geq 0$ or $x \leq 0$
 $y = x^2 - 7$
 $x = y^2 - 7$
 $x + 7 = y^2$
 $\pm\sqrt{x+7} = y$
 $g^{-1}(x) = +\sqrt{x+7}$ or $g^{-1}(x) = -\sqrt{x+7}$

9. $y = 2\sqrt[5]{x} - 6$
 $x = 2\sqrt[5]{y} - 6$
 $x + 6 = 2\sqrt[5]{y}$
 $\frac{x+6}{2} = \sqrt[5]{y}$

$y = \left(\frac{x+6}{2}\right)^5$
 $k^{-1}(x) = \left(\frac{x+6}{2}\right)^5$

11. $y = \frac{1}{x-5}$ $w^{-1}(x) = \frac{5x+1}{x}$
 $x = \frac{1}{y-5}$
 $x(y-5) = 1$
 $xy - 5x = 1$
 $xy = 5x + 1$
 $y = \frac{5x+1}{x}$

7. vertex at (3, -4)
 follow example
 in notes



Compositions

asking $g(x)=9$ when?

Tables:

- | | |
|------------------------------------|---|
| 1. $f(g(0)) = f(4) = 5$ | 5. $g^{-1}(h(0)) = g^{-1}(9) = \emptyset$ |
| 2. $g(f(-5)) = g(2) = 1$ | 6. $f^{-1}(f(5)) = f^{-1}(0) = \emptyset$ |
| 3. $h(f(-5)) = h(2) = 0$ | 7. $g^{-1}(f^{-1}(-4)) = g^{-1}(10) = -4$ |
| 4. $h^{-1}(f(7)) = h^{-1}(7) = -4$ | 8. $g(h(f(-5))) = g(h(2)) = g(0) = 4$ |
- ↑
output

Algebraic (Select)

1. $f(g(x)) = 2(-x+2) - 3 = -2x + 4 - 3 = -2x + 1 \quad d: x \in \mathbb{R}$
2. $g(f(x)) = (x-4)^2 + 5 = (x^2 - 8x + 16) + 5 = x^2 - 8x + 21 \quad d: x \in \mathbb{R}$
3. $g(x) = 3x \rightarrow y = 3x \rightarrow x = \frac{y}{3} \rightarrow g^{-1}(x) = \frac{x}{3}$
 $f(g^{-1}(x)) = \left(\frac{x}{3}\right)^2 + 2\left(\frac{x}{3}\right) = \frac{x^2}{9} + \frac{2x}{3} = \frac{x^2}{9} + \frac{6x}{9} = \frac{x^2 + 6x}{9} \quad d: x \in \mathbb{R}$

8. $(f^{-1}(g(x)))^2 = (4x)^2 = 16x^2$ where $x \geq 0$

$\hookrightarrow f(x) = \sqrt{x} \quad x \geq 0 \rightarrow y = \sqrt{x} \rightarrow x = \sqrt{y} \rightarrow x^2 = y \rightarrow f^{-1}(x) = x^2 \quad x \geq 0$

9. $f(g(x)) = \left(\frac{1}{x+4}\right) + 4 = \frac{1}{x+4} + \frac{4(x+4)}{x+4} = \frac{1+4x+16}{x+4} = \frac{4x+17}{x+4} \quad d: x \in \mathbb{R} \neq -4$

13. $g(f(x)) = \left(\frac{x-1}{x-9}\right)^2 = \frac{(x-1)^2}{(x-9)^2}$ no need to expand $d: x \in \mathbb{R} \neq 9$

11. $f(g(x)) = \frac{\left(\frac{1}{2x}\right)}{\left(\frac{1}{2x}\right) + 1} = \frac{\frac{1}{2x}}{\frac{1}{2x} + \frac{2x}{2x}} = \frac{\frac{1}{2x}}{\frac{2x+1}{2x}} = \frac{1}{2x} \cdot \frac{2x}{2x+1} = \frac{1}{2x+1}$

$f(x) \rightarrow d: x \in \mathbb{R} \neq -1$

$g(x) \rightarrow d: x \in \mathbb{R} \neq 0$

$f(g(x)) \rightarrow d: x \in \mathbb{R} \neq -\frac{1}{2}$

overall $d: x \in \mathbb{R} \neq -1, -\frac{1}{2}, \text{ and } 0$

14. $f(g(x)) = \frac{2\left(\frac{1}{x+3}\right) - 5}{1} = \frac{2 - 5x - 15}{x+3} = \frac{-5x - 13}{x+3}$ overall: $d: x \leq \frac{17}{5}$

$f: d: x \geq \frac{5}{2}$
 $2x - 5 \geq 0 \quad \div 2.5$
 $2x \geq 5$

$g: d: x \in \mathbb{R} \neq -3$

$\frac{-5x-13}{x+3} \geq 0(x+3)$

$-5x + 17 \geq 0$

$-5x \geq -17$

$x \leq \frac{17}{5} \approx 3.4$