Algebra 2 Workbook

Manipulating functions

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COMBINATIONS OF FUNCTIONS

■ 1. Find $(f+g)(x)$.

$$f(x) = 2x^2 - x + 5$$

$$g(x) = x^2 + 4x - 7$$

■ 2. Find $(f-g)(2)$.

$$f(x) = 4x^2 - 2$$

$$g(x) = 3x^2 - 5x$$

■ 3. Find $(f-g)(x)$.

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

$$g(x) = 2x - 3$$

■ 4. Find $(f \cdot g)(x)$.

$$f(x) = 2x - 3$$

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

■ 5. Find $(f \div g)(x)$.

$$f(x) = x^2 + 6x$$

$$g(x) = x$$

■ 6. Find $(g \div f)(x)$.

$$f(x) = x^2 + 6x$$

$$g(x) = x$$

COMPOSITE FUNCTIONS

■ 1. Find the composite function $(g \circ f)(x)$.

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

$$g(x) = 3x^2$$

■ 2. Find $f(g(x)) - g(f(x))$.

$$f(x) = x^2 - 4x + 3$$

$$g(x) = 2x + 1$$

■ 3. Find the composite function $(g \circ h)(x) - (h \circ h)(x)$.

$$g(x) = \frac{8}{x^3}$$

$$h(x) = \sqrt[3]{x + 4}$$

■ 4. Find the composite function $(h \circ g)(x)$.

$$g(x) = \frac{8}{x^3}$$

$$h(x) = \sqrt[3]{x + 4}$$

■ 5. Find the composite function $g(g(x))$.

$$g(x) = \frac{1}{x}$$

$$h(x) = 3x^2 - x$$

■ 6. Find the composite functions $h(g(2))$ and $g(h(2))$.

$$g(x) = \frac{1}{x}$$

$$h(x) = 3x^2 - x$$

DOMAINS OF COMPOSITE FUNCTIONS

■ 1. What is the domain of $f \circ g$?

$$f(x) = \frac{1}{x}$$

$$g(x) = x + 5$$

■ 2. What is the domain of $f \circ g$?

$$f(x) = \frac{2}{x - 1}$$

$$g(x) = \sqrt{x - 4}$$

■ 3. What is the domain of $f \circ g$?

$$f(x) = \frac{1}{x} + 4$$

$$g(x) = \frac{3}{2x - 7}$$

■ 4. What is the domain of $f \circ g$?

$$f(x) = \frac{2}{x - 3}$$

$$g(x) = \frac{4}{x+2}$$

■ 5. What is the domain of $f \circ g$?

$$f(x) = \frac{1}{x^2 - 3}$$

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

■ 6. What is the domain of $f \circ g$?

$$f(x) = 2x^2 - x + 1$$

$$g(x) = x - 3$$

DECOMPOSING COMPOSITE FUNCTIONS

■ 1. Write $f(x)$ as the composition of two functions.

$$f(x) = \frac{4}{(2x^2 - 5x)^3}$$

■ 2. Write $f(x) = \ln(\ln x)$ as the composition of two functions.

■ 3. Write $f(x) = 5(2\sqrt[3]{x})^2 - 8$ as the composition of two functions.

■ 4. Write $f(x)$ as the composition of two functions.

$$f(x) = \frac{\frac{1}{x+1}}{\frac{1}{x+1} - 1}$$

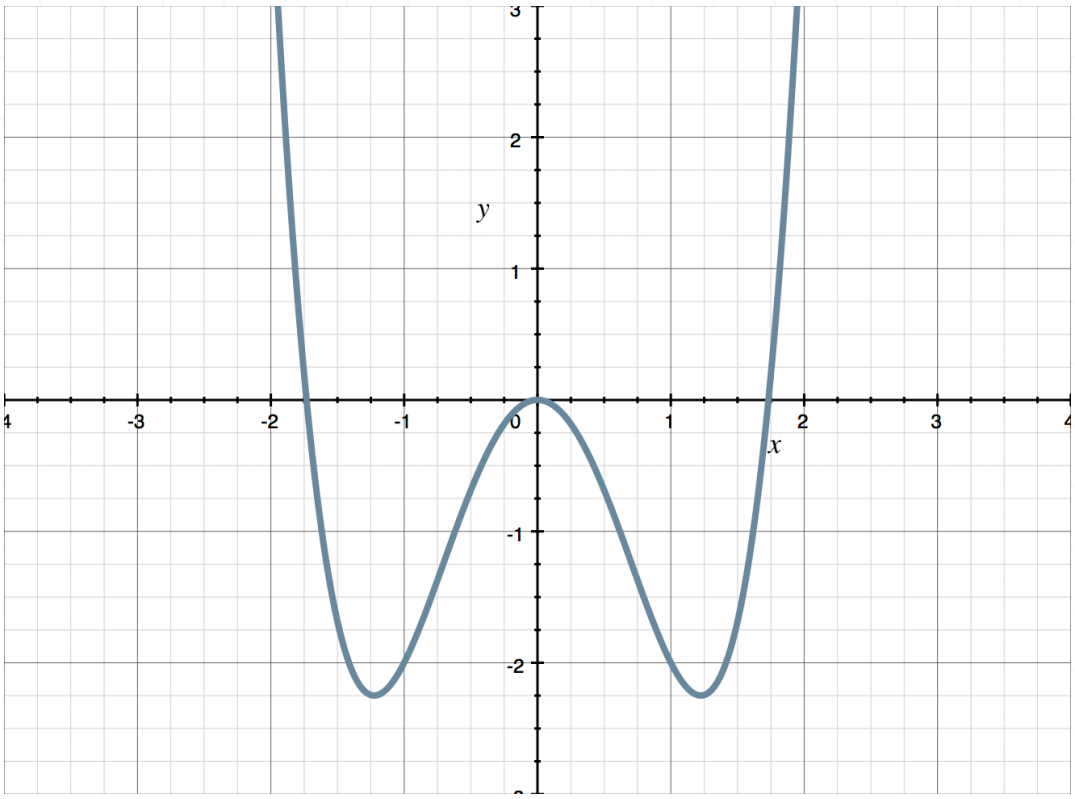
■ 5. Write $f(x) = 5(2x + 3)^4 + 3(2x + 3)^2 - 7$ as the composition of two functions.

■ 6. Write $f(x)$ as the composition of two functions.

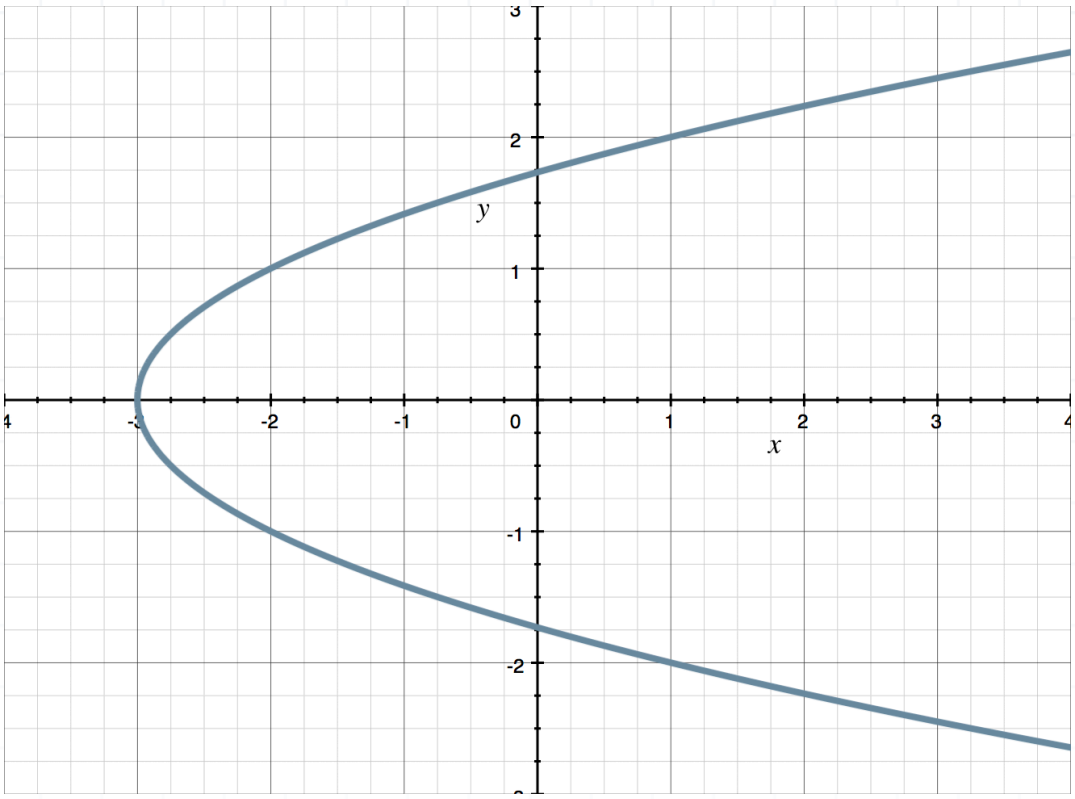
$$f(x) = \frac{4}{x^2 - 7}$$

ONE-TO-ONE FUNCTIONS AND THE HORIZONTAL LINE TEST

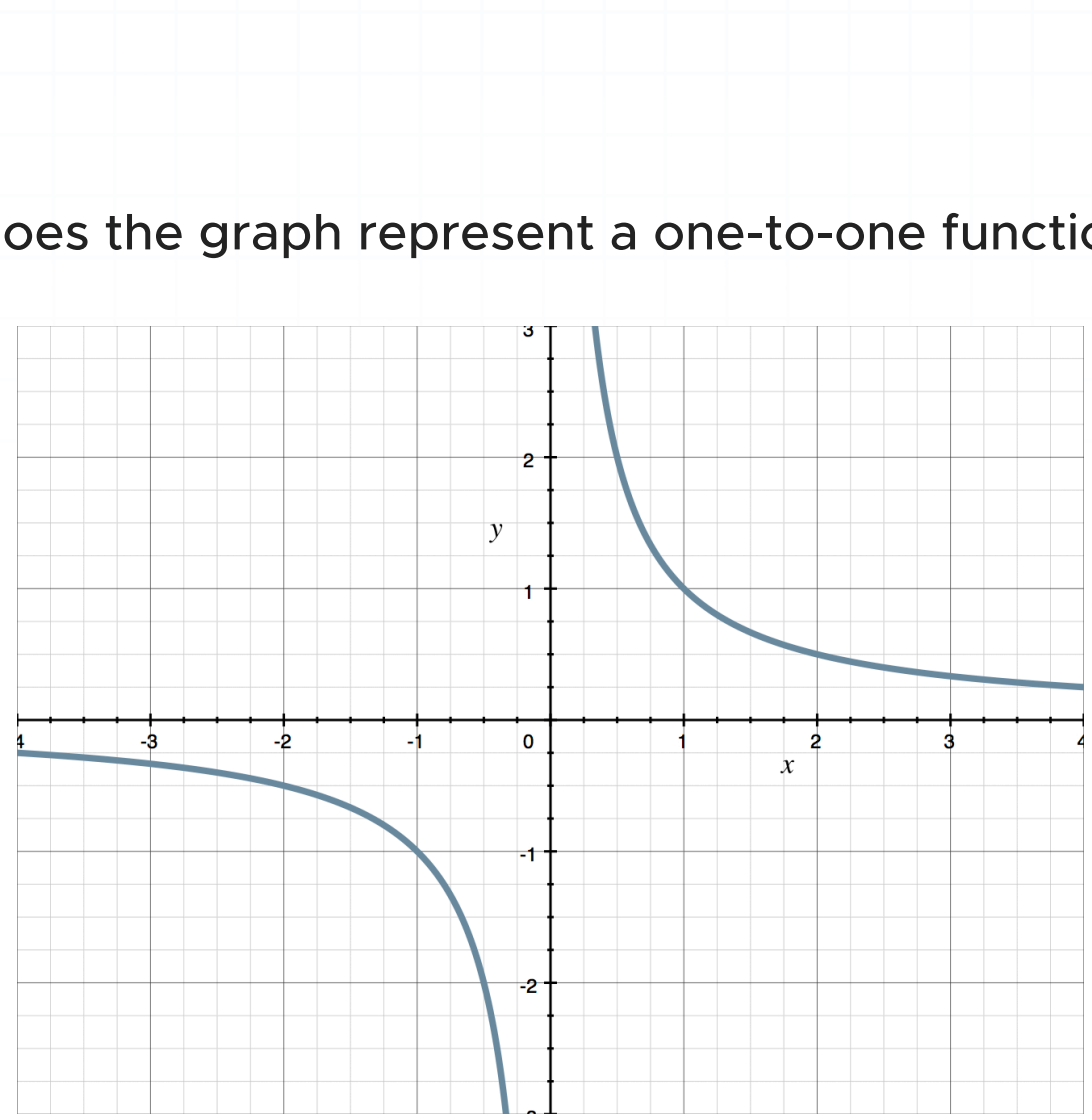
1. Does the graph represent a one-to-one function?



2. Does the graph represent a one-to-one function?



3. Does the graph represent a one-to-one function?



■ 4. Show that the function is one-to-one by showing that $f(a) = f(b)$ leads to $a = b$.

$$f(x) = 3x - 4$$

■ 5. Show that the function is one-to-one by showing that $f(a) = f(b)$ leads to $a = b$.

$$f(x) = \frac{x + 1}{x - 5}$$

■ 6. Show that the function is not one-to-one by showing that $f(a) = f(b)$ does not lead to $a = b$.

$$f(x) = (x + 3)(x - 2)$$

INVERSE FUNCTIONS

1. What is the inverse of the function?

$$f(x) = \frac{1}{2}x - 3$$

2. What is the inverse of the function?

$$f(x) = -4x + 5$$

3. What is the inverse of the function?

$$f(x) = \frac{2x}{x - 5}$$

4. What is the inverse of the function?

$$f(x) = \frac{1}{x} + 3$$

5. What is the inverse of the function?

$$f(x) = -\frac{3}{x - 2} - 4$$

6. What is the inverse of the function?

$$f(x) = \frac{x-2}{x+3}$$

FINDING A FUNCTION FROM ITS INVERSE

■ 1. Find $f(x)$ if $f^{-1}(x)$ is a linear function.

$$f^{-1}(1) = -2$$

$$f^{-1}(-3) = -1$$

■ 2. Find $f(x)$ if $f^{-1}(x)$ is a linear function.

$$f^{-1}(0) = 3$$

$$f^{-1}(-2) = 1$$

■ 3. Find $f(x)$ if $f^{-1}(x)$ is a linear function.

$$f^{-1}(2) = 5$$

$$f^{-1}(4) = 9$$

■ 4. Find $f(x)$ if $f^{-1}(x)$ is a linear function.

$$f^{-1}(-4) = 7$$

$$f^{-1}(-1) = 14$$

■ 5. Find $f(x)$ if $f^{-1}(x)$ is a linear function.

$f^{-1}(5) = -4$

$f^{-1}(10) = -12$

■ 6. Find $f(x)$ if $f^{-1}(x)$ is a linear function.

$f^{-1}(1) = 3$

$f^{-1}(2) = 6$