



UNDERSTAND

9. **Reason** Explain how to find the range of the inverse of $f(x) = \sqrt{2x - 3}$ without finding $f^{-1}(x)$.
10. **Error Analysis** Describe and correct the error a student made in finding the inverse of the function $f(x) = x^2 - 4$.

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

$$x = y^2 - 4$$

$$\sqrt{x} = \sqrt{y^2 - 4}$$

$$\sqrt{x} = y - 2$$

$$\sqrt{x} + 2 = y$$

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

11. **Higher Order Thinking** What is the inverse operation of raising a number to the 4th power? How can you use the inverse operation of a number raised to the 4th power to find the inverse of the function $f(x) = x^4 - 1$? Is the inverse of f a function? Explain.
12. **Communicate Precisely** A function has the ordered pairs (1, 3), (7, 4), (8, 6), and (9, y). What restrictions are there on the value of y so that the inverse of the function is also a function? Explain.
13. **Construct Arguments** What is the inverse of the function $a(b) = \frac{1}{4}b^2$? Show how to use composition of functions to prove you found the correct inverse.
14. **Construct Arguments** A relation has one element in its domain and two elements in its range. Is the relation a function? Is the inverse of the relation a function? Explain.
15. **Mathematical Connections** Find the x - and y -intercepts of the function $y = 2x + 1$. What are the intercepts of the inverse function? How are the intercepts related?

PRACTICE

Identify the inverse relation. Is it a function?

SEE EXAMPLE 1

16.

x	-2	-1	0	1	2	3
y	9	3	-4	8	-6	3

17.

x	-2	1	0	1	2	3
y	-7	6	8	-1	3	7

Write an equation to represent the inverse of f . Sketch the graphs of f , $y = x$, and the inverse of f on the same coordinate axes. Is the inverse of f a function? SEE EXAMPLE 2

18. Let $f(x) = x + 3$. 19. Let $f(x) = 4x - 1$.
20. Let $f(x) = x^2 + 1$. 21. Let $f(x) = \sqrt{x + 5}$.

Find the inverse of the function by identifying an appropriate restriction of its domain. SEE EXAMPLE 3

22. $f(x) = x^2 + 4x + 4$ 23. $f(x) = x^2 - 6x + 9$
24. $f(x) = x^2 - 2$ 25. $f(x) = x^2 + 5$

Find an equation of the inverse function, and state the domain of the inverse. SEE EXAMPLE 4

26. $f(x) = 2x^2 - 5$ 27. $f(x) = \sqrt{x + 6}$
28. $f(x) = 3x + 10$ 29. $f(x) = \sqrt{x - 9}$

Use composition to determine whether f and g are inverse functions. SEE EXAMPLE 5

30. $f(x) = 2x - 9$, $g(x) = \frac{1}{2}x + 9$
31. $f(x) = \sqrt{\frac{x+4}{3}}$, $g(x) = 3x^2 - 4$

32. A manager purchased cones for ice cream. Find a formula for the length of the radius, r , of a cone in terms of its volume, V . Then find the length of the radius of a cone if the volume is $290\pi \text{ cm}^3$ and the height is 15 cm. SEE EXAMPLE 6

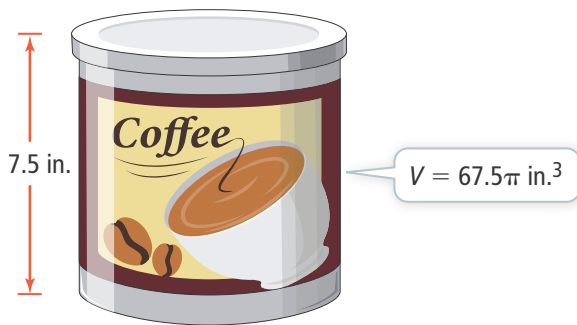


APPLY

33. **Model With Mathematics** The formula for converting Celsius to Fahrenheit is $F = \frac{5}{9}(C - 32)$. Find the inverse formula, and use it to find the Celsius temperature when the Fahrenheit temperature is 56° F.
34. **Reason** A DJ charges an hourly fee and an equipment setup fee.



- Write a function for the cost, C , of hiring a DJ for n hours.
 - Find the inverse of the cost function. What does the function represent?
 - If the DJ charged \$550, for how many hours was she hired? Use the inverse function.
35. **Reason** A coffee can is in the shape of a cylinder.



- Find the formula that gives the radius of the coffee can r in terms of the volume V and height h .
- Describe any restrictions on the formula.
- What is the radius of a coffee can given the volume is $67.5\pi \text{ in.}^3$ and the height is 7.5 in.?

ASSESSMENT PRACTICE

36. Choose Yes or No to tell whether each function has an inverse that is a function.

	Yes	No
a. $f(x) = 2x - 9$	<input type="checkbox"/>	<input type="checkbox"/>
b. $f(x) = x^2 + 4$	<input type="checkbox"/>	<input type="checkbox"/>
c. $f(x) = x^3 - 6$	<input type="checkbox"/>	<input type="checkbox"/>
d. $f(x) = \sqrt{2x + 7}$	<input type="checkbox"/>	<input type="checkbox"/>
e. $f(x) = x^2 - 10x + 25$	<input type="checkbox"/>	<input type="checkbox"/>

37. **SAT/ACT** What is the range of the inverse of $f(x) = \sqrt{-ax + b} - c$, where a , b , and c are real numbers?
- $y \geq \frac{a}{b}$
 - $y \leq \frac{b}{a}$
 - $y \geq -\frac{a}{b}$
 - $y \geq -\frac{b}{a}$
 - $y \geq c$

38. **Performance Task** The table shows several functions and some of the inverses of those functions. The table also shows whether some of the inverses are functions.

Function	Inverse	Is the inverse a function?
$f(x) = x$	$f^{-1}(x) = x$	yes
$g(x) = x^2$	$g^{-1}(x) = \pm\sqrt{x}$	no
$h(x) = x^3$	$h^{-1}(x) = \sqrt[3]{x}$	yes
$k(x) = x^4$		
$m(x) = x^5$		
$n(x) = x^6$		

Part A Determine the inverses of the remaining functions in the table.

Part B Determine if the inverses of the remaining functions in the table are functions.

Part C Make a conjecture about the power of a function if the inverse of that function is a function.