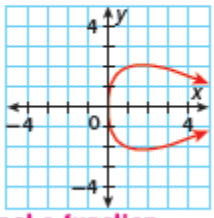
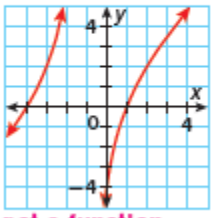
Answer Key for p. 453

## PRACTICE AND PROBLEM SOLVING

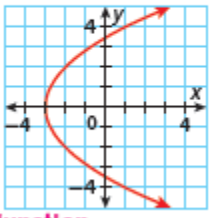
**Use the horizontal-line test to determine whether the inverse of each relation is a function.**

9. 

not a function

10. 

not a function

11. 

function

12. $f^{-1}(x) = \frac{5}{3}x$; function;
D: $\mathbb{R}$; R: $\mathbb{R}$

13. $f^{-1}(x) = \frac{\sqrt[3]{x}}{2}$; function;
D: $\mathbb{R}$; R: $\mathbb{R}$

14. $f^{-1}(x) = \frac{x}{1-x}$; function;
D: $\{x \mid x \neq 1\}$; R: $\{y \mid y \neq -1\}$

15. $f^{-1}(x) = \frac{6}{5}x - \frac{9}{5}$; function;
D: $\mathbb{R}$; R: $\mathbb{R}$

16. $y = \pm\sqrt{x} + 4$; not a function;
D: $\{x \mid x \geq 0\}$; R: $\mathbb{R}$

17. $f^{-1}(x) = (x-5)^2 - 8$; function;
D: $\{x \mid x \geq 5\}$; R: $\{y \mid y \geq -8\}$

**Determine by composition whether each pair of functions are inverses.**

18. $f(x) = \frac{5-2x}{9}$ and $g(x) = -\frac{9}{2}x + \frac{5}{2}$
yes

19. $f(x) = \frac{5}{x+1}$ and $g(x) = \frac{x-1}{5}$ for $x \neq -1$
no

20. $f(x) = 3\sqrt{x}$ and $g(x) = \frac{1}{3}x^2$ for $x \geq 0$
no

21. $f(x) = \log \frac{x}{2}$ and $g(x) = 2(10^x)$ for $x > 0$
yes

23a. $d(t) = \frac{t - 20}{2.5}$; $d$ is the distance that the pizza can be delivered $t$ minutes after it was ordered.

24. $y = -\frac{3}{8}x + \frac{7}{8}$; D: $\mathbb{R}$; R: $\mathbb{R}$

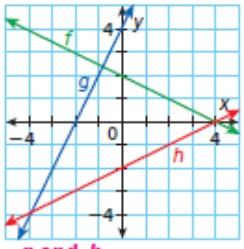
25. $y = \frac{5}{x} - 4$; D: $\{x \mid x \neq 0\}$; R: $\{y \mid y \neq -4\}$

26. $y = \pm\sqrt{\frac{x}{5}} - 6$; D: $\{x \mid x \geq 0\}$; R: $\mathbb{R}$

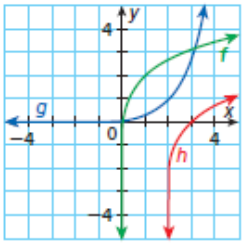
27. $y = x^3 + 12$; D: $\mathbb{R}$; R: $\mathbb{R}$

28. $y = \sqrt[3]{12x + 5}$; D: $\mathbb{R}$; R: $\mathbb{R}$

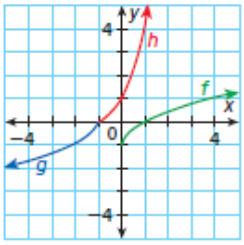
**For each graph, determine which two functions are inverses.**

33. 

$g$ and $h$

34. 

$f$ and $g$

35. 

$f$ and $h$

36. **Statistics** A person's standardized score on a test is given by the function $z(x) = \frac{x - 250}{40}$, where $x$ is the actual score on the test.

a. Find and interpret the inverse of $z(x)$.

b. If a person's standardized score on a test was 2.5, what was the person's actual score on the test? 350

36a. $x(z) = 40z + 250$; the inverse gives the actual score on a test with a given standardized score.

37. **Medicine** Nurses carefully track the height and weight of infants to ensure that they are healthy as they grow. The average height in inches of a girl in the first 3 years of life can be modeled by $h(a) = 3\sqrt{a} + 19$, where $a$ is the age of the girl in months.

a. Find and interpret the inverse of $h(a)$.

b. **Estimation** Estimate the age of a girl whose height is $32\frac{1}{2}$ inches. about 20.25 mo

37a. $a(h) = \left(\frac{h - 19}{3}\right)^2$; the inverse gives the age $a$ in months of a girl with height $h$ in inches.

**Answers**

**38a.** $t(h) = \frac{\sqrt{500 - h}}{4}$; the inverse gives the time in seconds it takes an object to reach a given height.

**38.** If an object is dropped from a hot-air balloon at an altitude of 500 ft, the object's height after $t$ seconds can be modeled by $h(t) = -16t^2 + 500$.

**a.** Find and interpret the inverse of $h(t)$.

**b.** How long does it take the object to hit the ground? $\approx$ **5.59 s**

**c.** How long does it take the object to fall if it lands on the roof of a building that is 128 ft tall? $\approx$ **4.82 s**

46. D

47. J

48. B

49. G

50. C