NAME ______________________________________ DATE ________________________ PERIOD ___________

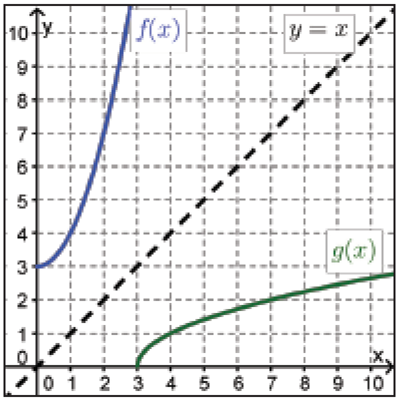
Study Guide and Intervention

Square Root Functions

Example **Using graphs and tables, verify whether or not $f(x) = x^2 + 3$ and $g(x) = \sqrt{x-3}$ are inverses if the domain of $f(x)$ is restricted to $\{x \mid x \geq 0\}$, including checking the domain restrictions. Compare and contrast the maximum or minimum values.**

Solution

Step 1 Graph f(x) with its domain restriction and g(x) on the same coordinate plane. Examine key attributes such as intercepts, domain/range and maximum/minimum value and use the line of reflection y = x to determine whether the functions could be inverses.



Step 2 Examine the tables side by side to determine whether the functions could be inverses.

x	$f(x)$
-1	4
0	3
1	4
2	7
3	12
4	19

x	$g(x)$
4	1
3	0
4	1
7	2
12	3
19	4

$f(x) = x^2 + 3$ and $g(x) = \sqrt{x-3}$ are inverses if the domain of f(x) is restricted to $\{x \mid x \geq 0\}$.

Exercises

Identify the endpoint of each function.

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

2. $f(x) = 3\sqrt{x+5}$

3. $f(x) = \sqrt{2x-6} - 7$

4. $f(x) = -\sqrt{x+5} + 3$

5. Using graphs and tables, verify whether or not $f(x) = x^2 + 2$ and $g(x) = \sqrt{x-2}$ are inverses, if the domain of $f(x)$ is restricted to $\{x \mid x \geq 0\}$, including checking the domain restrictions.

6. Using graphs and tables, verify whether or not $f(x) = (x-3)^2$ and $g(x) = -\sqrt{x} + 3$ are inverses if the domain of $f(x)$ is restricted to $\{x \mid x \geq 3\}$, including checking the domain restrictions.

7. Using graphs and tables, verify whether or not $f(x) = 0.5(x-1)^2$ and $g(x) = \sqrt{2x} + 1$ are inverses if the domain of $f(x)$ is restricted to $\{x \mid x \geq 0\}$, including checking the domain restrictions.

8. Using graphs and tables, verify whether or not $f(x) = (x+1)^2 - 7$ and $g(x) = -\sqrt{x+7} - 1$ are inverses if the domain of $f(x)$ is restricted to $\{x \mid x \leq -1\}$, including checking the domain restrictions.

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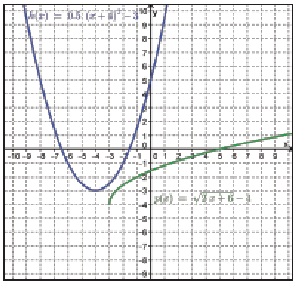
Study Guide and Intervention

Square Root Functions (cont.)

Example **Compare the domain and range as well as any intercepts, if they exist, of the functions graphed below. Write domain and range as inequalities, intervals, or in set builder notation.**



Solution

Step 1 **Determine the domain and range of the quadratic function h(x).**

Since *h*(*x*) is a quadratic function, its domain contains all real numbers.

The range of the quadratic function contains all values greater than or equal to -3.

Step 2 **Determine the domain and range of the square root function *p* (*x*).**

Since *p*(*x*) is a square root function, its domain is restricted. The restriction is to all real numbers greater than or equal to – 3.

The range of the square root function contains all values greater than or equal to – 4.

Step 3 Compare the domains and ranges of the two functions.

The range of *h*(*x*) is the same as the domain of *p*(*x*). However, the same is not true of the domain of *h*(*x*) and the range of *p*(*x*).

If the domain of *h*(*x*) were restricted to only those values greater than or equal to negative four, then it would be the same as the range of *p*(*x*).

Step 4 **Determine the x- and *y*-intercepts of *h*(*x*) and *p*(*x*).**

Looking at the graph, the x-intercepts of h(x) are approximately (– 6.5, 0) and (– 1.5, 0) and the x-intercept of p(x) is (5, 0).

The y-intercept of h(x) is (0, 5) and the y-intercept of p(x) is approximately (0, – 1.5).

Step 5 **Compare the intercepts of the two functions.**

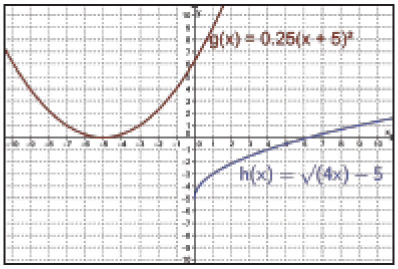
The *y*-intercept of *h*(*x*), (0, 5), is the inverse of the *x*-intercept of *p*(*x*), (5, 0). The *y*-intercept of *p*(*x*), (0, – 1.5), is approximately the inverse of one of the *x*-intercepts of *h*(*x*), (– 1.5, 0).

It appears that *p*(*x*) is the inverse of *h*(*x*) with a domain restriction of [– 4, ∞).

Exercises

Compare the domain and range as well as any intercepts, if they exist, of the functions graphed below. Write domain and range as inequalities, intervals, or in set builder notation.

9.



10.