

Chapter Summary

Chapter 10: Radical Functions and Equations

Core Vocabulary

A **square root function** is a function that contains a square root with the independent variable in the radicand.

A **radical function** is a function that contains a radical expression with the independent variable in the radicand.

A **cube root function** is a radical function with an index of 3.

A **radical equation** is an equation that contains a radical expression with a variable in the radicand.

An **inverse relation** switches the input and output values of the original relation.

Inverse functions are functions that undo each other.

Games

- Equation Tic-Tac-Toe
- Transform Me

These are available online in the *Game Closet* at www.bigideasmath.com.

Essential Questions

What are some of the characteristics of the graph of a square root function?

What are some of the characteristics of the graph of a cube root function?

How can you solve an equation that contains square roots?

How are a function and its inverse related?

Learning Goals

Graph square root functions.

Compare square root functions using average rates of change.

Solve real-life problems involving square root functions.

Graph cube root functions.

Compare cube root functions using average rates of change.

Solve real-life problems involving cube root functions.

Solve radical equations.

Identify extraneous solutions.

Solve real-life problems involving radical equations.

Find inverses of relations.

Explore inverses of functions.

Find inverses of functions algebraically.

Find inverses of nonlinear functions.

Core Concept

Squaring Each Side of an Equation

- If two expressions are equal, then their squares are also equal.
- If $a = b$, then $a^2 = b^2$.

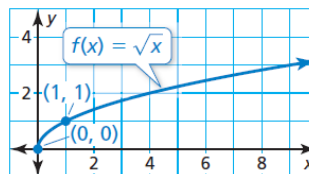
Inverse Relation

- When a relation contains (a, b) , the inverse relation contains (b, a) .

Core Concept

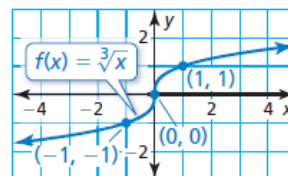
Square Root Functions

- A square root function is a function that contains a square root with the independent variable in the radicand.
- The parent function for the family of square root functions is $f(x) = \sqrt{x}$.
- The domain of f is $x \geq 0$, and the range of f is $y \geq 0$.



Cube Root Functions

- A cube root function is a radical function with an index of 3.
- The parent function for the family of cube root functions is $f(x) = \sqrt[3]{x}$.
- The domain and range of f are all real numbers.



Transformations of Square Root Functions

Transformation	$f(x)$ Notation
Horizontal Translation Graph shifts left or right.	$f(x - h)$
Vertical Translation Graph shifts up or down.	$f(x) + k$
Reflection Graph flips over x - or y -axis.	$f(-x)$ $-f(x)$
Horizontal Stretch or Shrink Graph stretches away from or shrinks toward y -axis.	$f(ax)$
Vertical Stretch or Shrink Graph stretches away from or shrinks toward x -axis.	$a \cdot f(x)$

Finding Inverses of Functions Algebraically

Step 1 Set y equal to $f(x)$.

Step 2 Switch x and y in the equation.

Step 3 Solve the equation for y .

Horizontal Line Test

- The inverse of a function f is also a function if and only if no horizontal line intersects the graph of f more than once.

What's the Point?

The STEM Videos available online show ways to use mathematics in real-life situations.

The Chapter 10: Tsunami! STEM Video is available online at www.bigideasmath.com.

Additional Review

- Comparing Square Root Functions Using Average Rates of Change, p. 546
- Comparing Cube Root Functions Using Average Rates of Change, p. 554
- Identifying Extraneous Solutions, p. 562
- Finding Inverses of Nonlinear Functions, p. 570