Essential Question:

How can you use what you know about transformations of functions to graph radical functions?

CONCEPT

Radical Function

A **radical function** is a function of the form $f(x) = a\sqrt[n]{x - h} + k$, where

a determines a vertical stretch or compression.	*h* determines a horizontal translation.	*k* determines a vertical translation.

CONCEPT Summary

Use Transformations to Graph Radical Functions

ALGEBRA Understand how the values of a radical function transform the graph of the parent function.
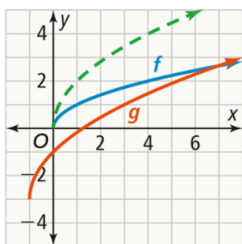
$$f(x) = a\sqrt[n]{x - h} + k$$

a determines a vertical stretch or compression.

h determines a horizontal translation.

k determines a vertical translation.

GRAPHS Understand the relationship between the graph of the parent function and the graph of the radical function.

$f(x) = \sqrt{x}$ is the parent square root function.

$g(x) = 2\sqrt{x + 1} - 3$ is the result of a vertical stretch by a factor of 2, a translation 1 unit left, and a translation 3 units down from the parent function.
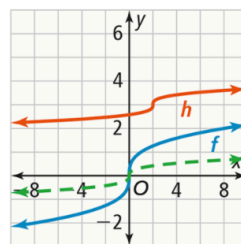
$f(x) = \sqrt[3]{x}$ is the parent cube root function.

$h(x) = \frac{1}{3}\sqrt[3]{x - 2} + 3$ is the result of a vertical compression by a factor of 3, a translation 2 units right, and a translation 3 units up from the parent function.

Q: How do transformation define the equation and the graph of a radical function?

Examples & Questions
Examples 1
Part A

Q: How do you find x-values that make the radicand of $\sqrt{ax}$ a perfect square?

Q: Why is it important to be sure that the radicand of a square root function remains positive?

Part B

Q: Why is the cube root function allowed to have negative values in the radicand?

Examples 2

Q: How can you describe the effects of the coefficient of the radical, a, to the result of the radical expression and the graph?

Q: What key features can be determined from h and k of a square root function before graphing?

Examples 3

Q: What does it mean to rewrite the radical function to identify the transformation?

Q: What must be done to the radicand to rewrite the radical function in the correct form?

Examples 4

Q: How can you tell that there might have been a vertical stretch by a factor of 2?

Examples 5

Q: Explain why the domain is restricted in the radical function problem.

Q: Could you find the exact values represented by the radical function?

Practice and Problem Solving

Complete MathXL for School: Practice and Problem Solving (online)

Complete MathXL for School: Enrichment (online)

Challenge: #12, 15, 28, 29, 32 – key will be posted in Power School Learning.

Lesson Quiz 5.1/Notes