

Describe the transformation of  $f(x) = x^2$  represented by  $g$ .

- $g(x) = x^2 - 9$
- $g(x) = \frac{1}{4}x^2 + 5$
- $g(x) = \frac{1}{2}x^2$
- $g(x) = x^2 - \frac{1}{2}$
- $g(x) = x^2 + 3$
- $g(x) = -2x^2 + 1$

Warm Up

• use a graphing calculator to view the transformations

• Review parent functions and how changes to the parent function effects the graph of the function.

Determine whether the binomial is a factor of the polynomial function.

- $g(x) = x^4 - 11x^2 + 21; x^2 - 3$
- $t(x) = x^4 + 4x^3 + 8x - 46; x^2 + 2$
- $f(x) = x^5 + 7x^4 + 7x + 49; x + 7$
- $s(x) = x^3 - 5x^2 - 51x + 255; x^2 - 51$

Cumulative Warm Up

• review of factoring

**Essential Question**  
How can you identify the domain and range of a radical function?

what you will learn:

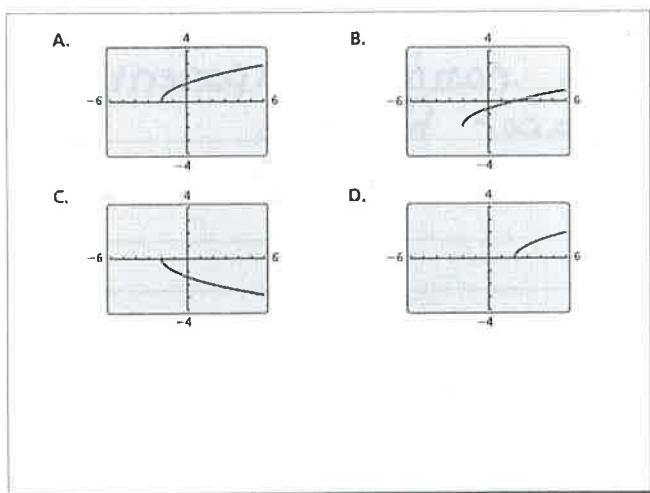
- Graph radical functions
- Write a transformation of a radical function
- Graph parabolas and circles

Essential Question

• Review domain and range

• discussion: How can we view a function? Do we have technology tools that can help us?





Exploration 2B

---

---

---

---

---

---

---

---

---

---

---

---

**Core Concept**

**Parent Functions for Square Root and Cube Root Functions**

The parent function for the family of square root functions is  $f(x) = \sqrt{x}$ . The parent function for the family of cube root functions is  $f(x) = \sqrt[3]{x}$ .

Domain:  $x \geq 0$ , Range:  $y \geq 0$

Domain and range: All real numbers

*Handwritten notes:*

$\sqrt{x+2}$   
 $D = x \geq -2$

Core Concept

Radical function: Contains a radical expression with the independent variable in the radicand.

---

---

---

---

---

---

---

---

---

---

---

---

Graph each function. Identify the domain and range of each function.

a.  $f(x) = \sqrt{\frac{1}{4}x}$

x	y
0	0
4	1
8	1.41
12	1.73
16	2

b.  $g(x) = -3\sqrt[3]{x}$

x	y
-2	3.78
-1	3
0	0
1	-3
2	-3.78

Example 1

a) radicand of a square root must be non-negative  
 domain  $x \geq 0$   
 range  $y \geq 0$   
 (use calculator to graph)

b) the radicand of a cube root can be any real number.  
 domain: all real #'s  
 range: all real #'s  
 (use calculator to graph)

**Core Concept**

Transformation	$f(x)$ Notation	Examples
<b>Horizontal Translation</b> Graph shifts left or right.	$f(x - h)$	$g(x) = \sqrt{x - 2}$ 2 units right $g(x) = \sqrt{x + 3}$ 3 units left
<b>Vertical Translation</b> Graph shifts up or down.	$f(x) + k$	$g(x) = \sqrt{x} + 7$ 7 units up $g(x) = \sqrt{x} - 1$ 1 unit down
<b>Reflection</b> Graph flips over $x$ - or $y$ -axis.	$f(-x)$ $-f(x)$	$g(x) = \sqrt{-x}$ in the $y$ -axis $g(x) = -\sqrt{x}$ in the $x$ -axis
<b>Horizontal Stretch or Shrink</b> Graph stretches away from or shrinks toward $y$ -axis.	$f(ax)$	$g(x) = \sqrt{3x}$ shrink by a factor of $\frac{1}{3}$ $g(x) = \sqrt{\frac{1}{2}x}$ stretch by a factor of 2
<b>Vertical Stretch or Shrink</b> Graph stretches away from or shrinks toward $x$ -axis.	$a \cdot f(x)$	$g(x) = 4\sqrt{x}$ stretch by a factor of 4 $g(x) = \frac{1}{3}\sqrt{x}$ shrink by a factor of $\frac{1}{3}$

Core Concept 2

\*If radicals are written with rational exponents  $\rightarrow$  power function

Describe the transformation of  $f$  represented by  $g$ . Then graph each function.

- a.  $f(x) = \sqrt{x}$ ,  $g(x) = \sqrt{x-3} + 4$       b.  $f(x) = \sqrt[3]{x}$ ,  $g(x) = \sqrt[3]{-8x}$

Example 2

1. Graph  $g(x) = \sqrt{x+1}$ . Identify the domain and range of the function.

2. Describe the transformation of  $f(x) = \sqrt[3]{x}$  represented by  $g(x) = -\sqrt[3]{x} - 2$ . Then graph each function.



Use a graphing calculator to graph  $\frac{1}{2}y^2 = x$ .

Identify the vertex and the direction that the parabola opens.

Example 5

---

---

---

---

---

---

---

---

---

---

---

---

Use a graphing calculator to graph  $x^2 + y^2 = 16$ . Identify the radius and the intercepts.

Example 6

---

---

---

---

---

---

---

---

---

---

---

---

5. Use a graphing calculator to graph  $-4y^2 = x + 1$ . Identify the vertex and the direction that the parabola opens.

6. Use a graphing calculator to graph  $x^2 + y^2 = 25$ . Identify the radius and the intercepts.

Monitoring Progress 5-6

---

---

---

---

---

---

---

---

---

---

---

---

• Writing Prompt: To graph  $g(x) = 2\sqrt{x-1} + 3, \dots$

---

---

---

---

---

---

---

---

---

---

---

Closure

