5-Minute Check

Over Lesson 5–4

Identify the domain and range of $y = \sqrt{2x + 5}$.

Identify the domain and range of $y = \sqrt{3x - 2}$.

Identify the domain and range of $y = \sqrt{x - 5} + 4$.

Graph $y = -\sqrt{x - 4}$.

5-Minute Check

Over Lesson 5–4

Identify the domain and range of $y = \sqrt{2x + 5}$.

$$D = \left\{x \mid x \geq -\frac{5}{2}\right\},\ R = \{y \mid y \geq 0\}$$

$a\sqrt{x - h} + k$

$\frac{2x}{2} + \frac{5}{2}$

$x + \frac{5}{2}$

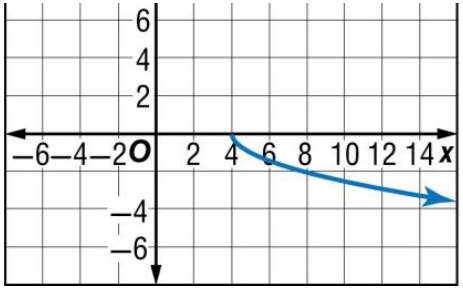
Identify the domain and range of $y = \sqrt{3x - 2}$.

$$D = \left\{x \geq \frac{2}{3}\right\},\ R = \{y \mid y \geq 0\}$$

Identify the domain and range of $y = \sqrt{x - 5} + 4$.

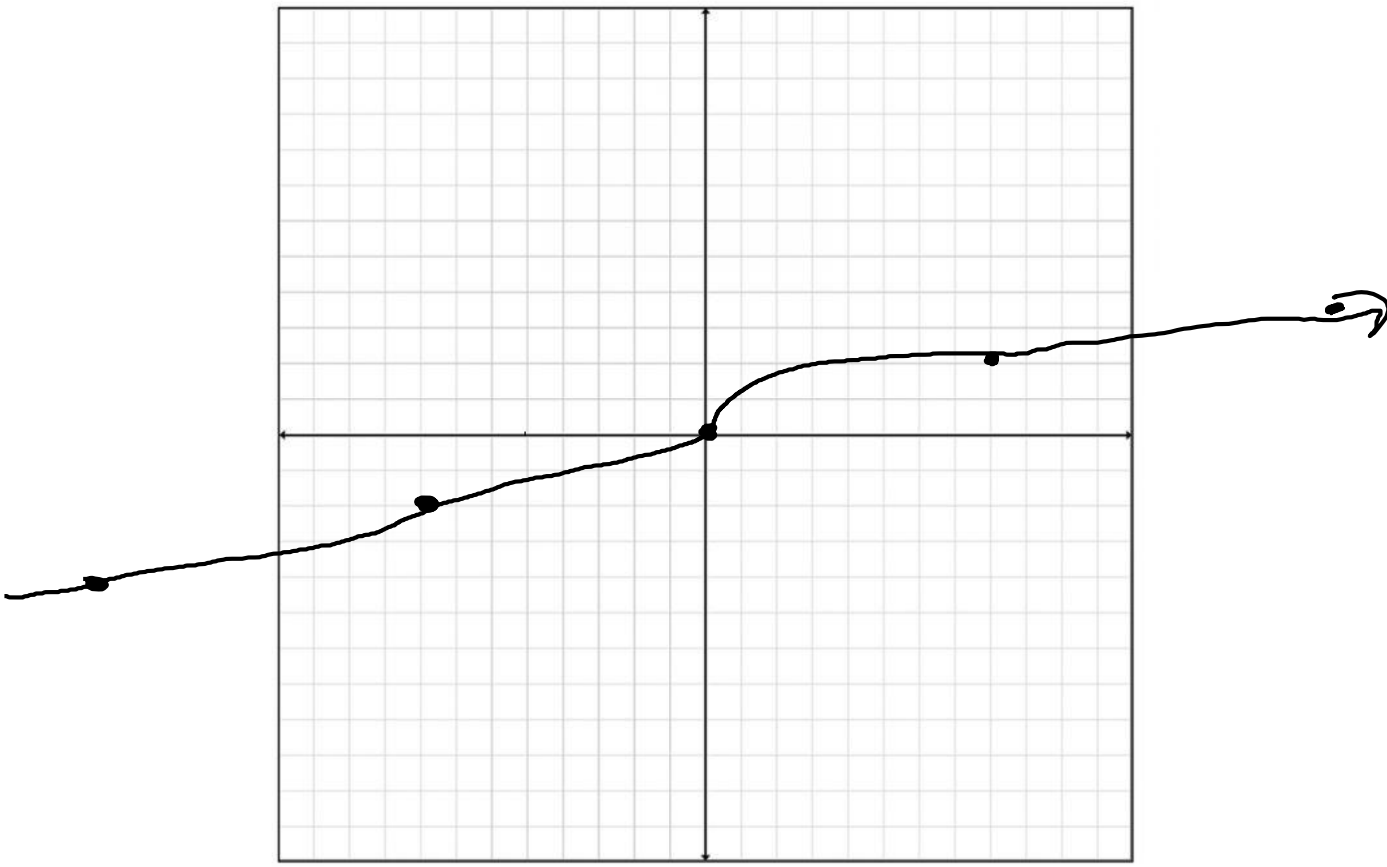
D = {$x \mid x \geq 5$}; R = {$f(x) \mid f(x) \geq 4$}

Graph $y = -\sqrt{x - 4}$.



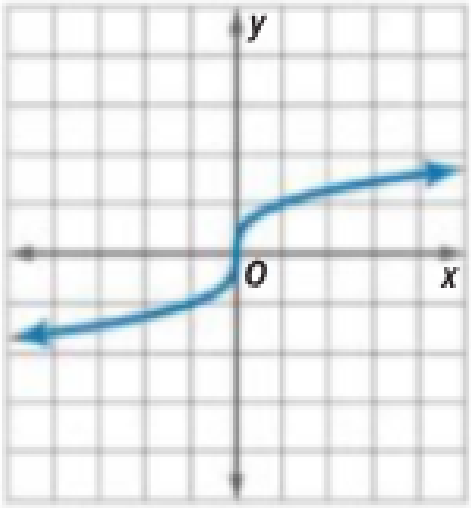
Use a table of values to graph $f(x) = \sqrt[3]{x}$

x	y
0	0
8	2
27	3
−8	−2
−27	−3



Key Concept Parent Function of Cube Root Functions

Parent function:	$f(x) = \sqrt[3]{x}$
Domain:	$\{x \mid -\infty < x < +\infty\}$ or $(-\infty, +\infty)$
Range:	$\{f(x) \mid -\infty < f(x) < +\infty\}$ or $(-\infty, +\infty)$
Intercepts:	$x = 0, y = 0$
Symmetry:	★ Point symmetry about the origin
End behavior:	$f(x) \to +\infty$ as $x \to +\infty$, $f(x) \to -\infty$ as $x \to -\infty$
Extrema	None
Inflection point	(0, 0)



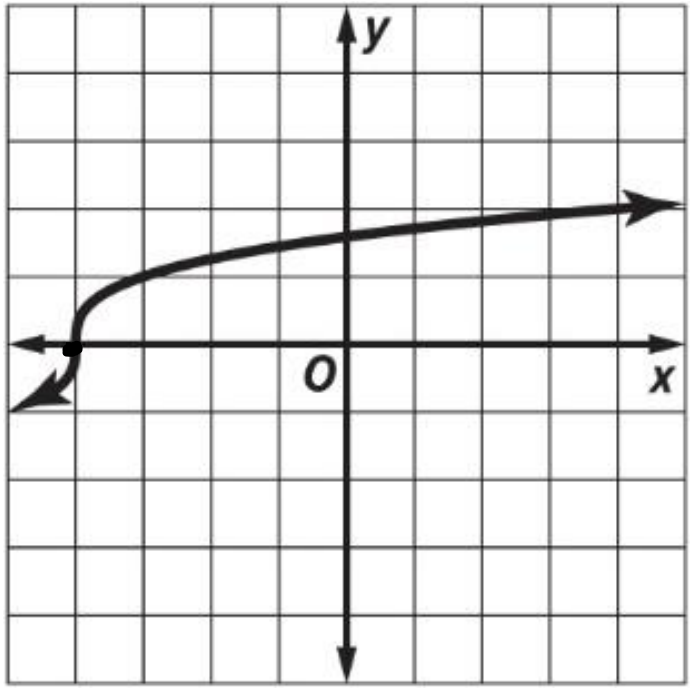
Inflection Point is where the curve changes direction.

★ ***Point Symmetry*** *is when every part has a matching part the same distance from the central* ***point*** *but in the opposite direction.*

Example 1

Describe Key Characteristics Cube Root Functions

Describe the key characteristics of $f(x) = \sqrt[3]{x+4}$.
Describe the attributes of the graph.



What is the Domain?

$\{x \mid -\infty < x < \infty\}$

What is the Range?

$\{f(x) \mid -\infty f(x) < \infty\}$

Describe the end behavior. as $x \to +\infty$, $f(x) \to +\infty$

as $x \to -\infty$, $f(x) \to -\infty$

What is the point of inflection? $(-4, 0)$

Key Concept Transformations of Cube Root Functions

$f(x) = a\sqrt[3]{x-h}+k$	Inflection Point (h, k)
h—Horizontal Translation	**k—Vertical Translation**
h units right if h is positive $\lvert h \rvert$ units left if h is negative	k units up if k is positive $\lvert k \rvert$ units down if k is negative
The domain is all real numbers.	The range is all real numbers.

a—Orientation and Shape

- If $a < 0$, the graph is reflected across the x-axis.
- If $\lvert a \rvert > 1$, the graph is stretched vertically.
- If $0 < \lvert a \rvert < 1$, the graph is compressed vertically.

Example 2 Graph Cube Root Functions

Describe the key characteristics and then graph the function.

$$y = 2\sqrt[3]{x-1}+1$$

What is the Domain? $\{x \mid -\infty < x < \infty\}$

What is the Range? $\{f(x) \mid -\infty < f(x) < \infty\}$

Describe the end behavior. $x \to +\infty,\ f(x) \to +\infty$; $x \to -\infty,\ f(x) \to -\infty$

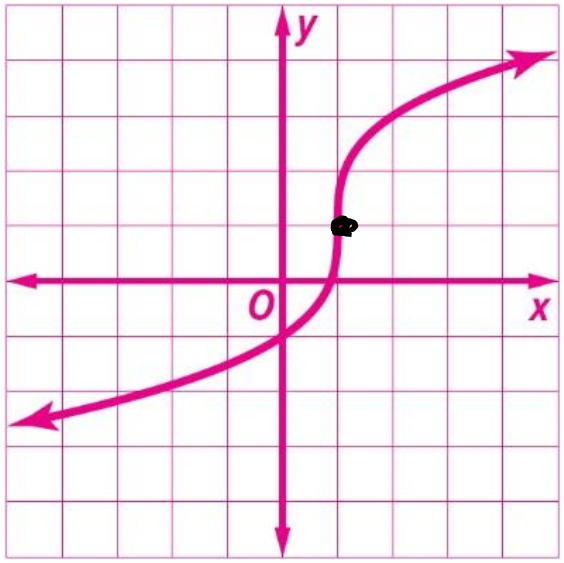
What is the point of inflection? $(1, 1)$

To determine the shape of the function use the parent function of a cube root as your guide.

Example 2 Graph Cube Root Functions

$$y = 2\sqrt[3]{x-1}+1$$

↑ Stretch vertically



D = $\{x \mid -\infty < x < +\infty\}$ or $(-\infty, +\infty)$

R = $\{f(x) \mid -\infty < f(x) < +\infty\}$ or $(-\infty, +\infty)$;

end behavior: The values of y decrease as the values of x increase.

inflection point: (1, 1)

Example 2 Graph Cube Root Functions

Describe the key characteristics and then graph the function.

$$y = -3\sqrt[3]{x-4}+5$$

flips end behavior

What is the Domain?

What is the Range?

Describe the end behavior.

$x \to \infty \quad f(x) \to -\infty$

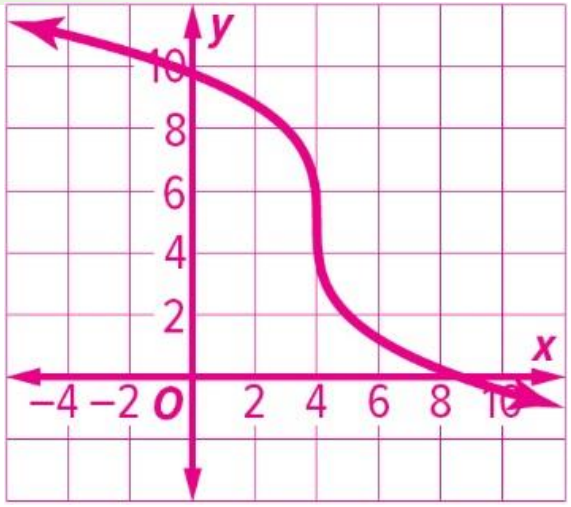
$x \to -\infty \quad f(x) \to \infty$

What is the point of inflection? $(4, 5)$

To determine the shape of the function use the parent function of a cube root as your guide.

Example 2 Graph Cube Root Functions

$$y = -3\sqrt[3]{x-4} + 5$$



What is the Domain? $D = \{x \mid -\infty < x < +\infty\}$

What is the Range? $R = \{f(x) \mid -\infty < f(x) < +\infty\}$

Describe the end behavior. As $x \to +\infty$, $f(x) \to -\infty$

The values of y decrease as the values of x increase.

As $x \to -\infty$, $f(x) \to +\infty$

What is the point of inflection? (4, 5)