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# Graphing Square Root Functions Guide Notes

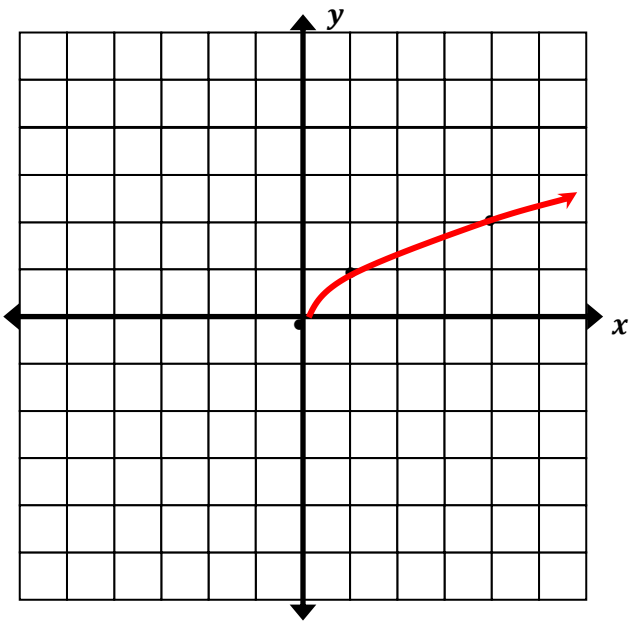
A square root function is a function containing a square root with the independent variable in the radicand. The parent square root function is $y = \sqrt{x}$.

The domain of $y = \sqrt{x}$ is $x \geq 0$.

The range of $y = \sqrt{x}$ is $y \geq 0$.

The table and graph below show the parent square root function $y = \sqrt{x}$

| x | y |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 2 | 1,41 |
| 4 | 2 |




## Transformations

**General form of a square root function is:** $y = a\sqrt{x - h} + k$

$a$ - Represents vertical stretch or compression $a < 0$ ------- reflection across the x-axis

$h$ - Represents **Horizontal Translation** $(x - h)$: $h$ units to the right

$(x + h)$: $h$ units to the left

$k$ - Represents **Vertical Translation** $+k$: $k$ units up

$-k$: $k$ units down

## Graphing Procedure

1. Identify the horizontal and vertical translations
2. Apply the translations to the parent square root function's table
3. Graph the coordinate points
4. Identify the Domain & Range

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# Graphing Square Root Functions Guide Notes

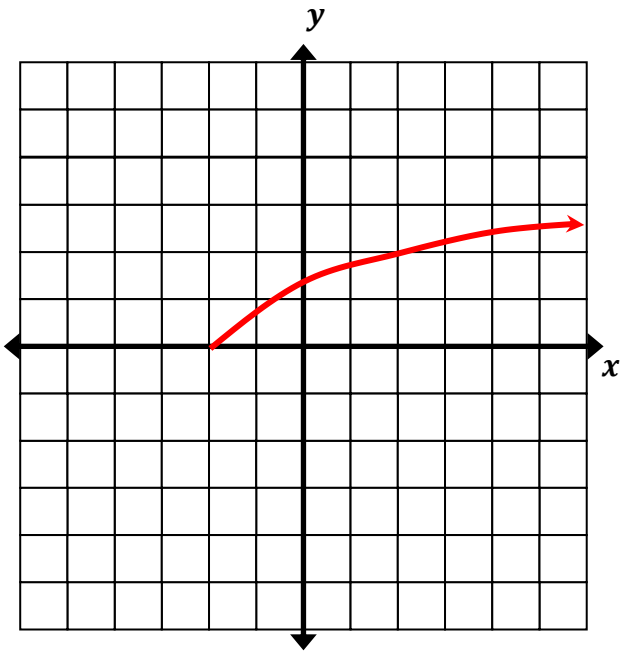
**Sample Problem 1:** Graph function and identify its domain and range

**a.** $y = \sqrt{x+2}$

1. Horizontal Shift: Left 2, No Vertical Shift
2. Table

| x | y |
|---|---|
| -2 | 0 |
| 0 | 1,41 |
| 2 | 2 |
| 4 | 2,44 |
| 6 | 2,85 |

3. Graph




4. Domain
   $x + 2 \geq 0$
   $x \geq -2$
   **D**: $[-2, \infty]$

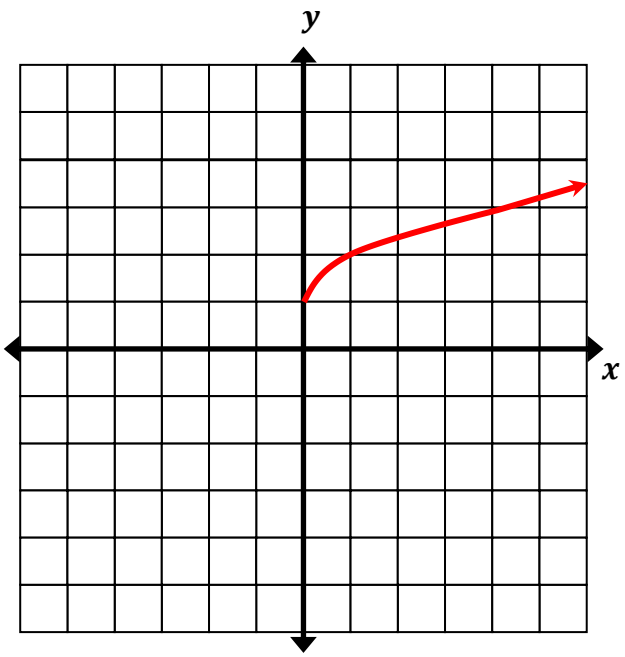
   Range
   $y \geq 0$
   **R** : $[0, \infty]$

**b.** $y = \sqrt{x} + 1$

1. No Horizontal Shift: Vertical Shift up 1
2. Table

| x | y |
|---|---|
| o | 1 |
| 1 | 2 |
| 4 | 3 |
| 5 | 3,23 |
| 6 | 3,44 |

3. Graph




4. Domain
   $x \geq 0$
   **D**: $[0, \infty]$

   Range
   $y \geq 1$
   **R** : $[0, \infty]$

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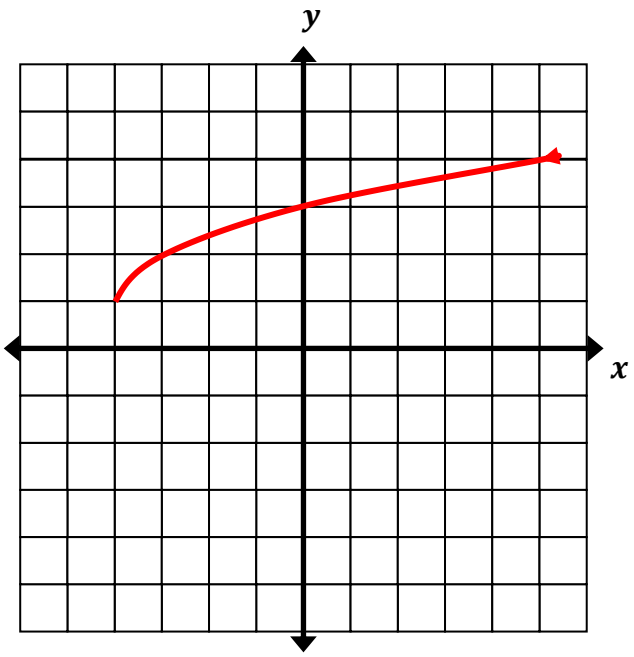
# Graphing Square Root Functions Guide Notes

**c.** $y = \sqrt{x+4} + 1$

1. Horizontal Shift: Left 4, Vertical Shift: Up 1
2. Table

| x | y |
|---|---|
| -4 | 1 |
| -3 | 2 |
| 0 | 3 |
| 5 | 4 |




3. Graph

4. Domain
   $x + 4 \geq 0$
   $x \geq -4$
   **D**: $[-4, \infty]$

   Range
   $y \geq 1$
   **R** : $[1, \infty]$

**Writing Transformed Square-Root Functions**

**Sample Problem 2:** **Use the description to write the square root function $g(x)$ .**

**a.** The parent function $f(x) = \sqrt{x}$ is reflected across the x-axis, and translated down 5 units.

$g(x) = -\sqrt{x} - 5$

**b.** The parent function $f(x) = \sqrt{x}$ and translated up 5 units and 3 units left

$g(x) = \sqrt{x+3} - 5$

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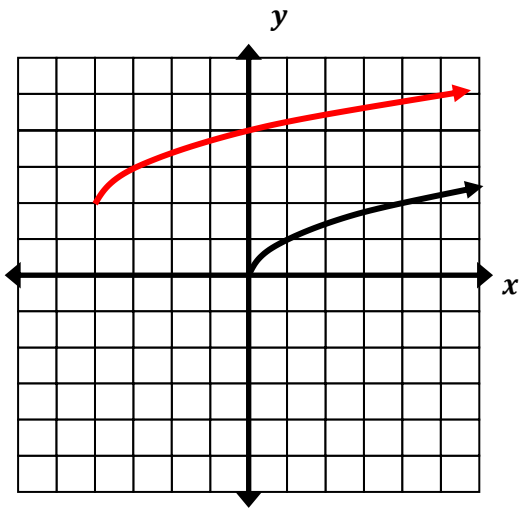
# Graphing Square Root Functions Guide Notes

**Applying Multiple Transformations**

**Sample Problem 3:** Use the graph shown as a guide, write the equation and describe the transformation.

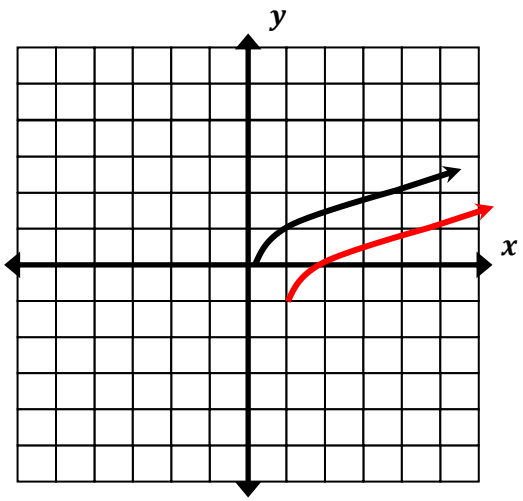
**a.**




$g(x) = \sqrt{x+4} + 2$

The parent function $f(x) = \sqrt{x}$ translates 4 units left, and 2 units up

**b.**




$g(x) = \sqrt{x-1} - 1$

The parent function $f(x) = \sqrt{x}$ translates 1 unit right, 1 unit down