

### Example 4

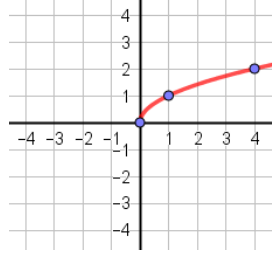
Write the equation for a radical function with a domain of  $x \geq -10$  and a range of  $y \leq 20$  that passes through the point  $(-1, 5)$ .

Use these given values in the equation to solve for  $a$ .

$h =$   
 $k =$   
 $b =$   
 $x =$   
 $y =$

## Graphing Square Root Functions

Parent graph:  $y = \sqrt{x}$



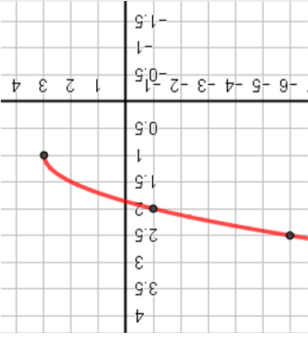
Shape is \_\_\_\_\_

Endpoint at ( , )

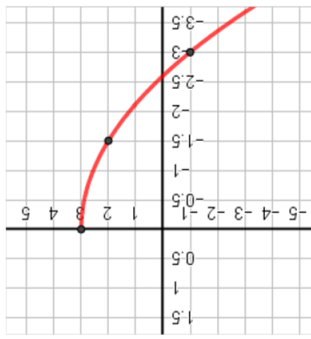
Passes through ( , ) and ( , )

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

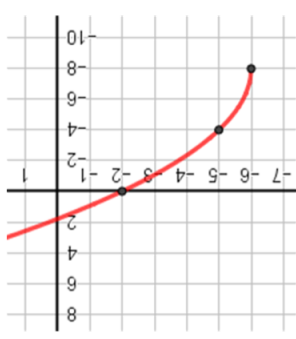
\_\_\_\_\_ from left to right



A]  $a =$   
 $b =$   
 $h =$   
 $k =$



B]  $a =$   
 $b =$   
 $h =$   
 $k =$



C]  $a =$   
 $b =$   
 $h =$   
 $k =$

The endpoint is  $(h, k)$  and  $a$  is the slope from the endpoint to the guide point exactly one point to the right or left of the endpoint. Be careful with  $b$ ! A reflection over the  $y$ -axis must be factored out in front of any horizontal translation, so double check your parenthesis!

$$y = a\sqrt{b(x-h)} + k$$

**Example 3** Write the equation from the graph

### Example 1 Describing transformations

$|a| > 1$  vertical stretch  
 $|a| < 1$  vertical shrink  
 $a < 0$  reflects over  $x$ -axis

$+k$  translation up  
 $-k$  translation down

$$y = a\sqrt{b(x-h)} + k$$

$|b| > 1$  horizontal shrink  
 $|b| < 1$  horizontal stretch  
 $b < 0$  reflects over  $y$ -axis

$(x-h)$  translation right  
 $(x+h)$  translation left

\*We won't look at horizontal dilations until PreCalc

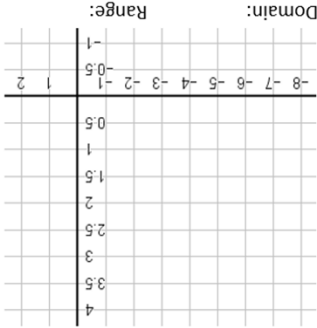
Describe each graph as compared to the parent graph.

A] $y = \frac{1}{2}\sqrt{x+3}$	B] $y = -\sqrt{x-1} + 4$	C] $y = -3\sqrt{-x}$	D] $y = \sqrt{-x+3}$ *warning!
--------------------------------	--------------------------	----------------------	-----------------------------------

### Example 2 Graphing with transformations

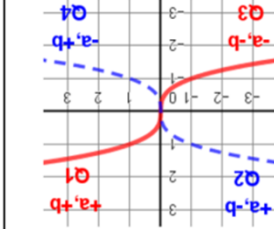
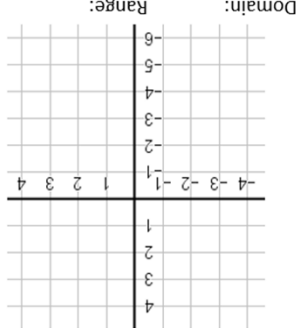
B]  $y = 0.5\sqrt{-(x-1)} + 1.5$

Endpoint  $(h, k)$ :  
 Heading toward:  
 Guide point using  $\pm a/1$ :  
 Y-intercept  $(0, y)$ :  
 Extra guide point:



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

Endpoint  $(h, k)$ :  
 Heading toward:  
 Guide point using  $\pm a/1$ :  
 Y-intercept  $(0, y)$ :  
 Extra guide point:



Step 1: Plot the center point  $(h, k)$ .  
 Step 2: Use the signs of  $a$  and  $b$  to decide which quadrants the curve is heading toward, then use  $\pm a/1$  to find the guide points in those directions.

Step 3: Substitute zero for  $x$  to find the  $y$ -intercept. Round to one decimal place when needed.

Step 4: Find more guide points. Pick  $x$ 's that make perfect cubes to make mental math easy. Use a calculator to approximate cube roots if needed.