

## Graph Square Root Functions

The graph of the parent square root function  $f(x) = \sqrt{x}$  can be transformed to graph any square root function  $g$ . You can use two forms of  $g$ . In the form  $g(x) = a\sqrt{x-h} + k$ , the points  $(0, 0)$  and  $(1, 1)$  are mapped to  $(h, k)$  and  $(h+1, k+a)$ , respectively. In the form  $g(x) = \sqrt{\frac{1}{b}(x-h)} + k$ , the points  $(0, 0)$  and  $(1, 1)$  are mapped to  $(h, k)$  and  $(h+b, k+1)$ , respectively.

Complete the steps to sketch the graph of the function  $g(x) = \frac{1}{2}\sqrt{x-3} - 2$ .

|                                                                                                                                    |                                                                                                                                                                |                                                                                                                                                                |
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| <b>Rewrite the function <math>g</math>.</b>                                                                                        | In the form $g(x) = a\sqrt{x-h} + k$ :<br>$g(x) = \boxed{\phantom{00}}\sqrt{x - \boxed{\phantom{00}}} + \boxed{\phantom{00}}$                                  | In the form $g(x) = \sqrt{\frac{1}{b}(x-h)} + k$ :<br>$g(x) = \sqrt{\boxed{\phantom{00}}(x - \boxed{\phantom{00}})} + \boxed{\phantom{00}}$                    |
| <b>Identify the values of the parameters.</b>                                                                                      | $a = \frac{1}{\boxed{\phantom{00}}}, h = \boxed{\phantom{00}}, k = \boxed{\phantom{00}}$                                                                       | $b = \boxed{\phantom{00}}, h = \boxed{\phantom{00}}, k = \boxed{\phantom{00}}$                                                                                 |
| <b>Map the points <math>(0, 0)</math> and <math>(1, 1)</math> from the graph of <math>f</math> to the graph of <math>g</math>.</b> | $(0, 0) \rightarrow (3, -2)$<br>$(1, 1) \rightarrow (3 + \boxed{\phantom{00}}, -2 + \boxed{\phantom{00}})$<br>$= (\boxed{\phantom{00}}, \boxed{\phantom{00}})$ | $(0, 0) \rightarrow (3, -2)$<br>$(1, 1) \rightarrow (3 + \boxed{\phantom{00}}, -2 + \boxed{\phantom{00}})$<br>$= (\boxed{\phantom{00}}, \boxed{\phantom{00}})$ |
| <b>Find two more points.</b>                                                                                                       | $g(7) = \frac{1}{2}\sqrt{7-3} - 2 = \boxed{\phantom{00}},$<br>$g(12) = \frac{1}{2}\sqrt{12-3} - 2 = \boxed{\phantom{00}}$                                      | $g(4) = \frac{1}{2}\sqrt{4-3} - 2 = \boxed{\phantom{00}},$<br>$g(12) = \frac{1}{2}\sqrt{12-3} - 2 = \boxed{\phantom{00}}$                                      |
| <b>Sketch the graph.</b>                                                                                                           | Use the above points. Draw a smooth curve through the points.                                                                                                  |                                                                                                                                                                |

1. Sketch the graph of  $g(x) = 2\sqrt{x+4} + 5$ . Show your work.