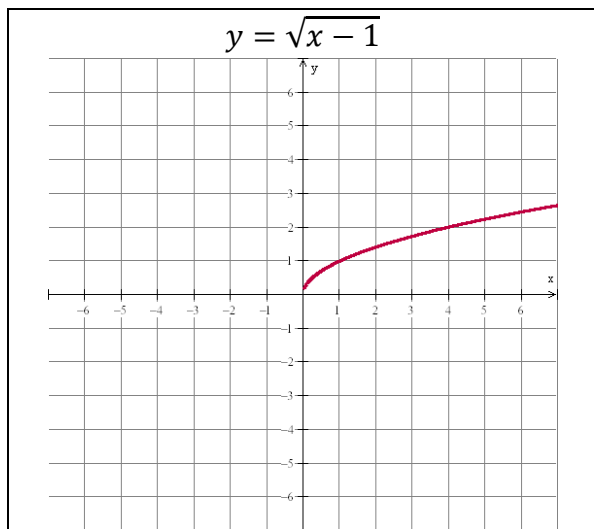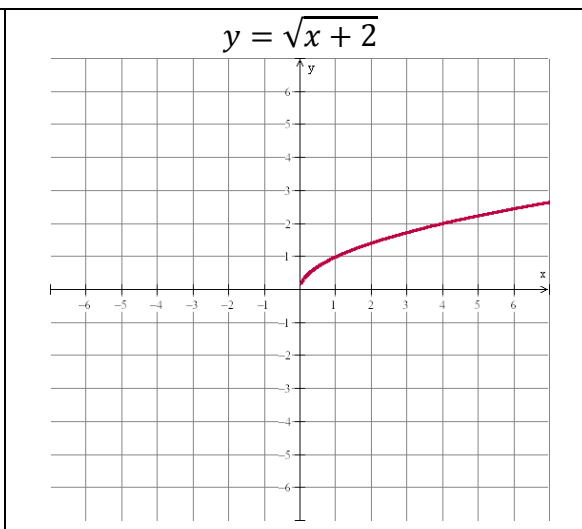College Prep Math
Graphing Radicals Investigation
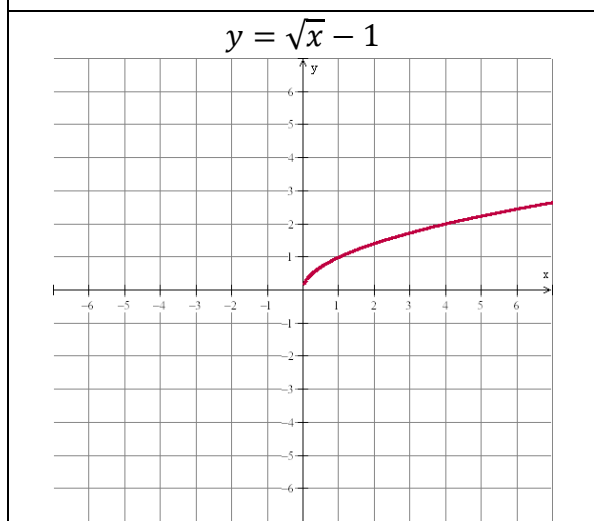
Directions: Each section below represents a specific shift of the graph of $y = \sqrt{x}$. Graph each equation given on the same graph as $y = \sqrt{x}$ using your graphing calculator. The graph of $y = \sqrt{x}$ has been provided for you. Sketch a picture on the graphs provided and label each graph with its corresponding equation. Then, explain how the graph differs from the graph of $y = \sqrt{x}$, using your graphs to justify your reasoning.
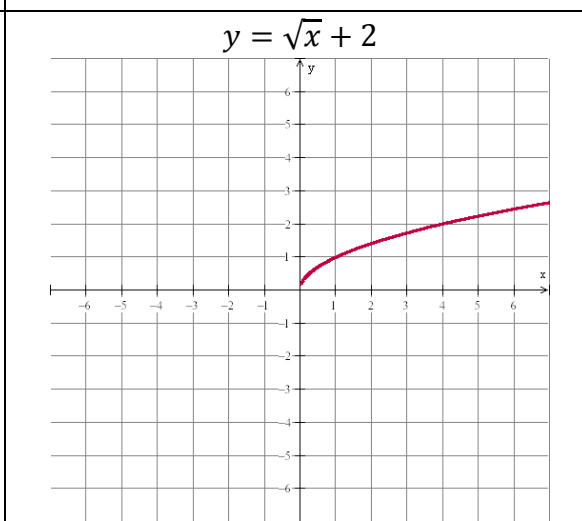
$y = \sqrt{x-1}$ Describe how this graph differs from $y = \sqrt{x}$.	$y = \sqrt{x+2}$ Describe how this graph differs from $y = \sqrt{x}$.
$y = \sqrt{x} - 1$ Describe how this graph differs from $y = \sqrt{x}$.	$y = \sqrt{x} + 2$ Describe how this graph differs from $y = \sqrt{x}$.

$$y = 2\sqrt{x}$$

Describe how this graph differs from $y = \sqrt{x}.$

$$y = \frac{1}{2}\sqrt{x}$$

Describe how this graph differs from $y = \sqrt{x}.$

$$y = 3\sqrt{x}$$
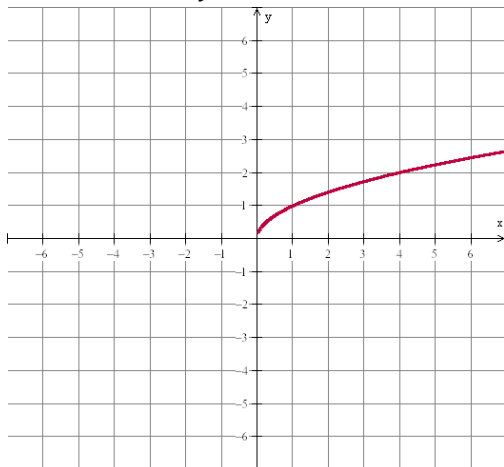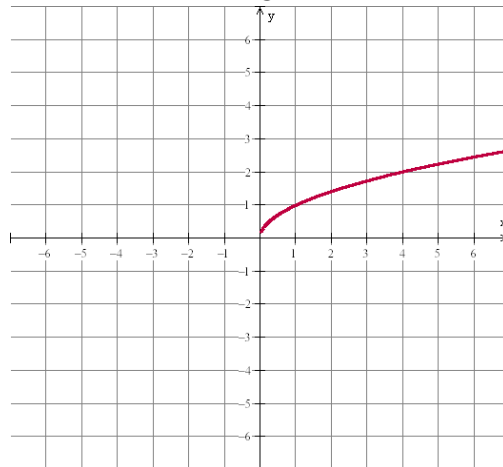
Describe how this graph differs from $y = \sqrt{x}.$

$$y = \frac{2}{3}\sqrt{x}$$

Describe how this graph differs from $y = \sqrt{x}.$

$$y = -\sqrt{x}$$

Describe how this graph differs from $y = \sqrt{x}$.
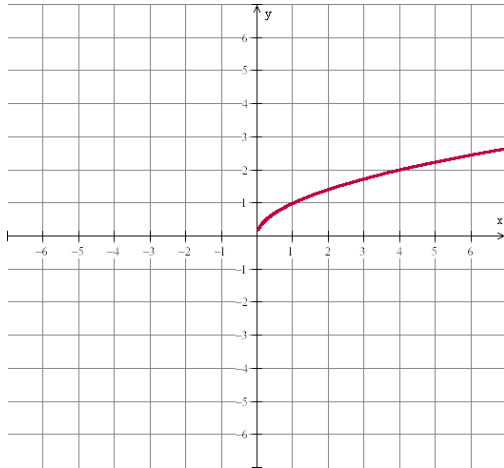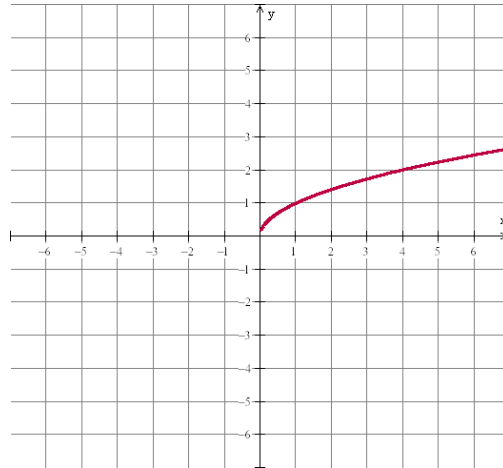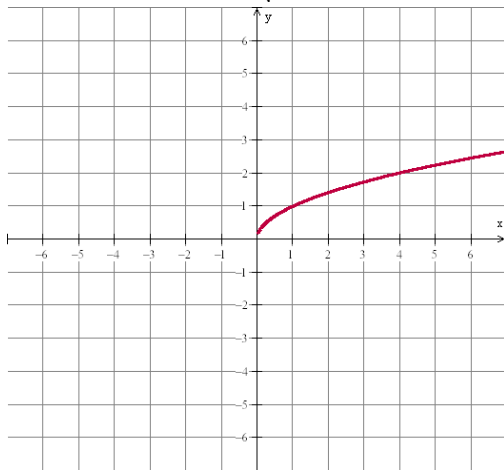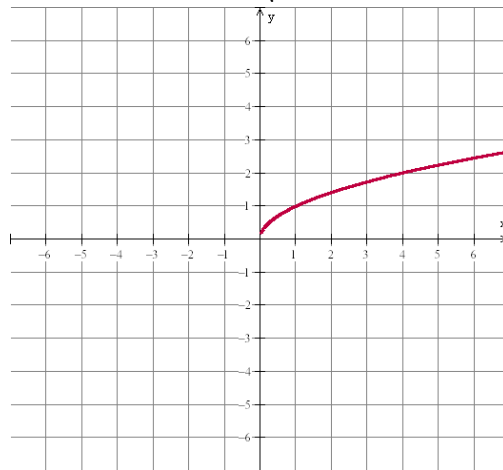
$$y = \sqrt{-x}$$

Describe how this graph differs from $y = \sqrt{x}$.
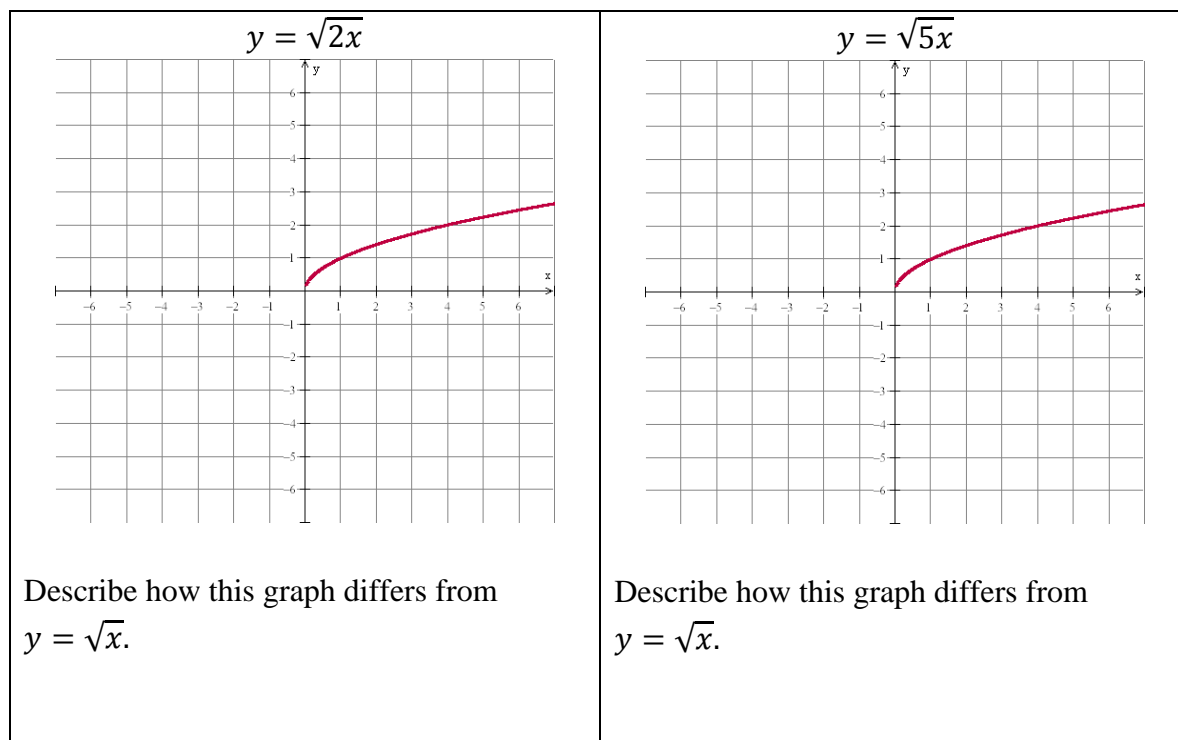
$$y = \sqrt{\frac{1}{2}x}$$

Describe how this graph differs from $y = \sqrt{x}$.

$$y = \sqrt{\frac{1}{3}x}$$

Describe how this graph differs from $y = \sqrt{x}$.

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$y = \sqrt{2x}$	$y = \sqrt{5x}$
Describe how this graph differs from $y = \sqrt{x}$.	Describe how this graph differs from $y = \sqrt{x}$.

Using the graphs above, explain what effect a, b, h, and k in the equation

$y = a\sqrt{(bx - h)} + k$ have on the graph of $y = \sqrt{x}$.

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The Cube Root Parent Function: $y = \sqrt[3]{x}$

Using the information gathered about $y = \sqrt{x}$, explain how each of the functions below will differ from the graph of $y = \sqrt[3]{x}$.

1. $y = -\frac{3}{4}\sqrt{x-5} + 8$ 2. $y = \sqrt{4x+1} - 2$ 3. $y = 5\sqrt{-x+7}$

Write an equation that matches each description.

4. A cube root function that has been reflected across the y-axis, translated 4 units right and 2 units down.
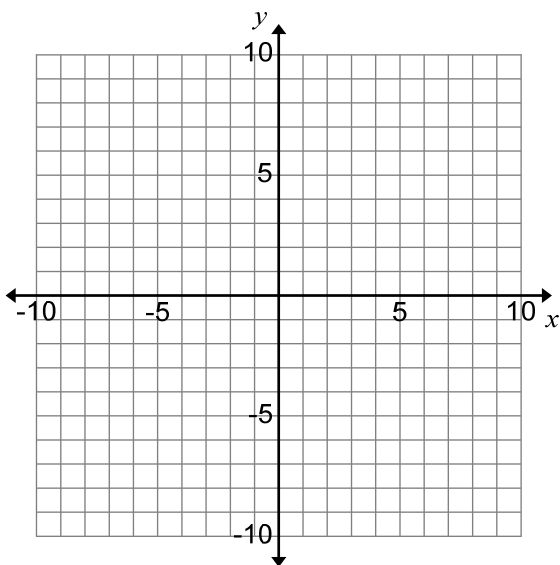
5. A square root function that has been reflected across the x-axis and has been translated up 9 units.

6. A square root function that has been reflected across the x-axis, has been vertically stretched by a factor of 2, and has been translated 1 unit left and three units up.
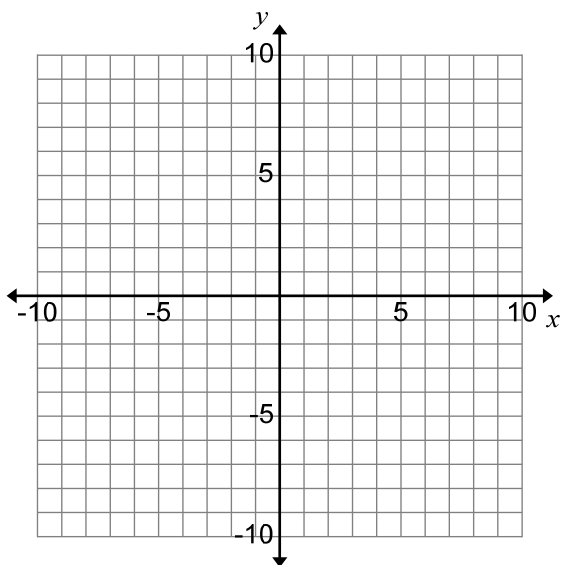
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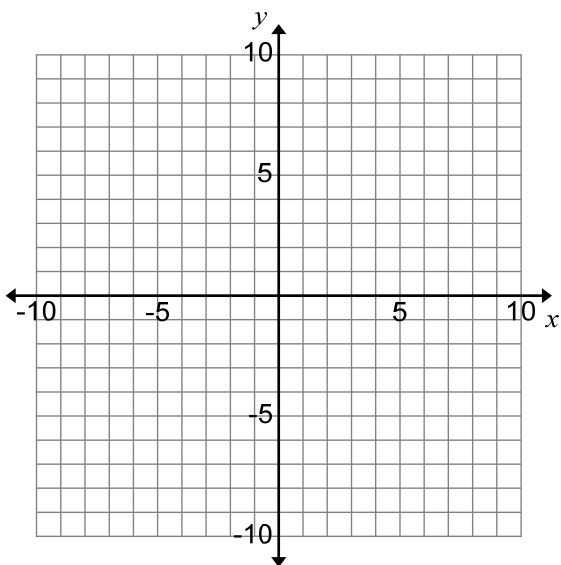Using transformations, graph the following.

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

2. $y = -\sqrt[3]{x - 2} + 4$

1. $y = \sqrt{-x} - 3$

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