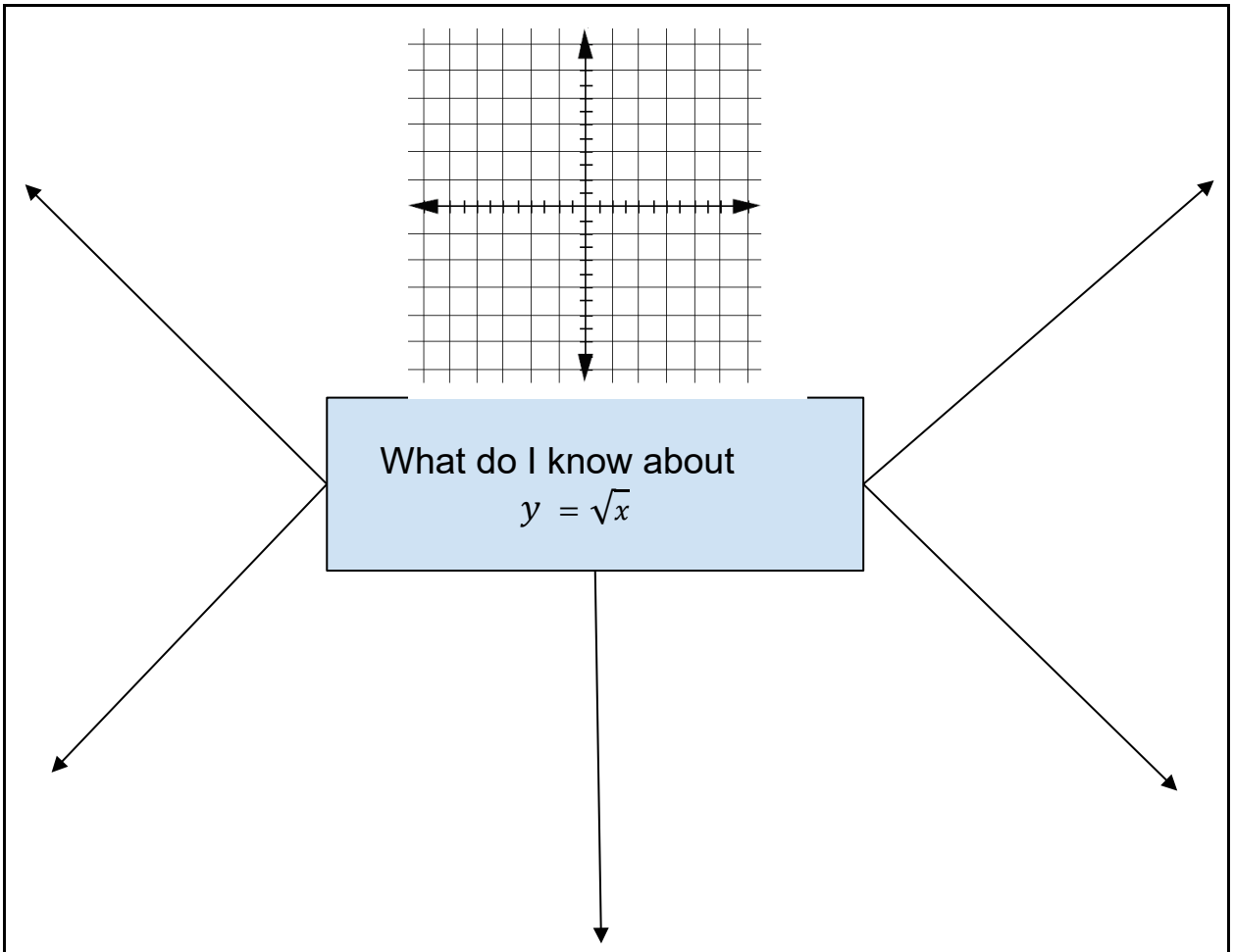
**Transformation of Functions**

## Part One: Lets Observe

Use your graphing device to graph y = $\sqrt{x}$. What characteristics do you notice about this function, such as **domain, range, intercepts, graph, table of values, symmetry**, etc.?




**Lets Connect:**

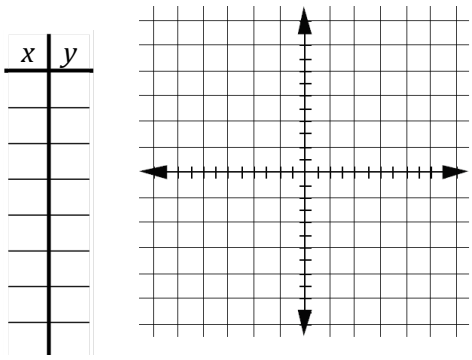
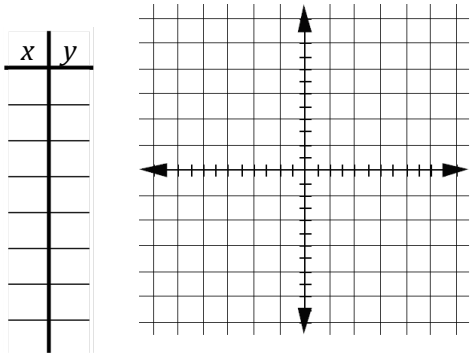
The equation for this function is y = $\sqrt{x}$. Why does the graph for this function **not** appear in quadrants II, III, or IV?

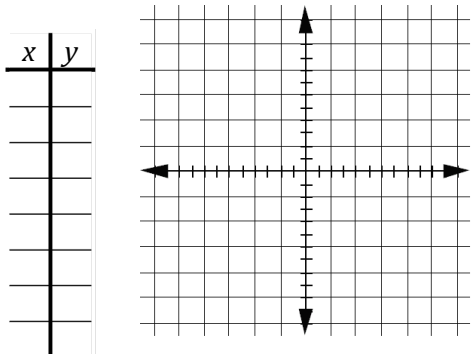
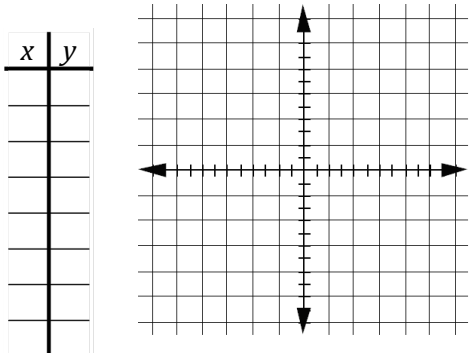
**<u>Part Two: Lets Explore</u>**

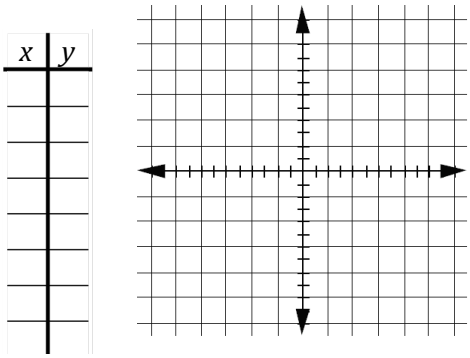
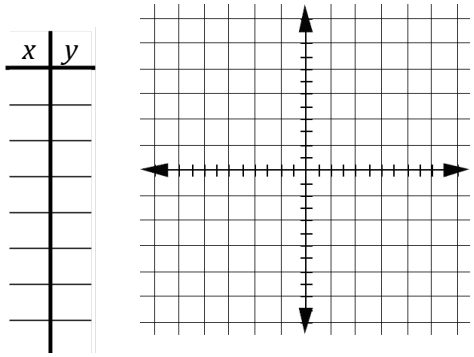
Use the transformation graphing on the TI-84CE by pressing APPS and select Transfrm.

Press Y= and for **$Y_1$ enter** $\sqrt{x}$ ***and in*** $Y_2$ **enter** $A\sqrt{(X-B)}$**+C**

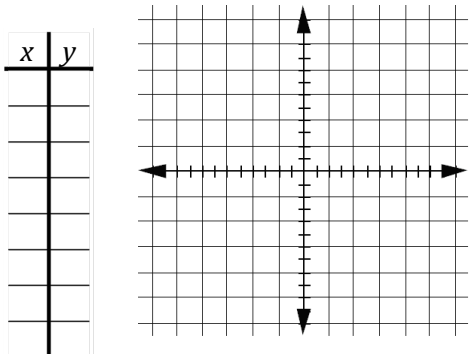
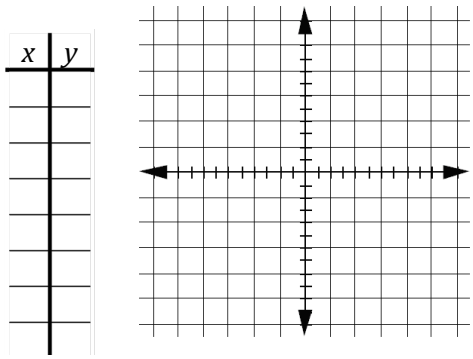
The values of A, B, and C can be changed by using the arrow and number keys. The up-down arrows move the cursor from A to B to C. The left-right arrows increase or decrease the value of each letter. To change the values using the left-right values by a desired increment, go to alpha, graph, and then down to Step=

| **Change in the Equation** | **Effect on the Graph** |
|---|---|
| Let **A**=1, **B**=0, **C**=0 | This is the parent function.<br>Explain why this is true. |
| **The "A" value changes** | |
| Let A values increase, 0<A<1, with B=0, C=0.<br>  | Describe what happens to the graph as A increases from 0 to 1. Include a sketch to compare how these graphs compare to the graph of the parent function. |
| Let A values increase, A>1, with B=0, C=0<br>  | Describe what happens to the graph as A increases. Include a sketch to compare how these graphs compare to the graph of the parent function. |

| | |
|---|---|
| Let A values decrease. -1<A<0, with B=0, C=0. Enter $Y_3 = -\sqrt{x}$<br>  <br> | Describe what happens to the graph as A decreases from 0 to -1. Include a sketch to compare how these graphs compare to the graph of the $Y_3$. |
| Let A values decrease, A<-1, with B=0, C=0<br>  <br> | Describe what happens to the graph as A decreases. Include a sketch to compare how these graphs compare to the graph of $Y_3$. |
| **Reflect:** Explain what effect changing the A value has on the graph of the function. | |

| **Change in the Equation** | **Effect on the Graph** |
|---|---|
| **The "B" value changes** | |
| Let A=1, B>0, and keep C=0<br>Let B increase<br>  | Describe what happens to the graph as B increases. Include a sketch to compare how these graphs compare to the graph of the parent function. |
| Let A=1, B<0, and keep C = 0<br>Let B decrease<br>  | Describe what happens to the graph as B decreases. Include a sketch to compare how these graphs compare to the graph of the parent function. |

**Reflect:** Explain what effect changing the B value has on the graph of the function.

| **The "C" value changes** | |
|---|---|
| Let A=1, B=0, C>0<br>Let C increase<br>  | Describe what happens to the graph as C increases. Include a sketch to compare how these graphs compare to the graph of the parent function. |
| Let A=1, B=0, C<0<br>Let C decrease<br>  | Describe what happens to the graph as B decreases. Include a sketch to compare how these graphs compare to the graph of the parent function. |
| **Reflect:** Explain what effect changing the C value has on the graph of the function. | |

**<u>Part Three: Lets Apply what we have learned</u>**

**Info Gap - Partner activity**

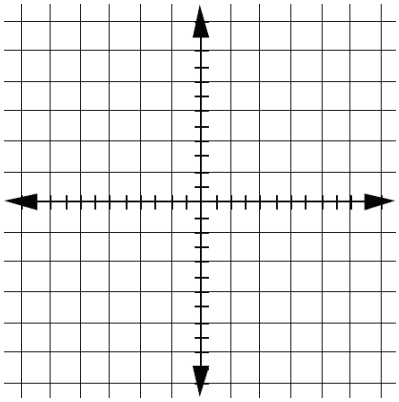
Each partner receives a card. One has a question, the other has some information. The person with the question must ask for specific information from the person with the info. The person with the info must ask why they need this info before giving it to them. When the person with the info has the required information, both solve the problem without seeing the other's cards. After solving, they share their solutions and their work and compare. Use y = $\sqrt{x}$ as the parent function.

Use a graphing calculator to verify your answers.

| | |
|---|---|
| Card 1: Info<br><br>A=2, vertical shift of 3, domain: x$\geq -2$ | Card 1: Problem<br>Give an equation for the transformed function. |
| Card 2: Info<br>Vertex at (1,3) with a = -1. | Card 2: Problem<br>What transformations have occurred? |
| Card 3: Info<br>A=-1, Passes through (2,1) with a horizontal shift to the left 7 units. | Card 3: Problem<br>What is the vertical shift? |

**<u>Part Four:  We've Got This!</u>**(Exit Ticket)

Without using your graphing device, what characteristics do you KNOW about this function, such as **domain, range, intercepts, graph, table of values, symmetry**, **increasing, decreasing,** etc.?



What do I know about

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