*More Than Meets the Eye*

**Transformations of Graphs**

What we learned in Algebra II, $y = af(x - h) + k$  may be expanded to include a horizontal
stretch or compression and reflections over the y-axis.  From the textbook is the table below:

## SUMMARY OF GRAPHING TECHNIQUES

| To Graph: | Draw the Graph of $f$ and: | Functional Change to $f(x)$ |
|---|---|---|
| **Vertical shifts** | | |
| $y = f(x) + k, \quad k > 0$ | Raise the graph of $f$ by $k$ units. | Add $k$ to $f(x)$. |
| $y = f(x) - k, \quad k > 0$ | Lower the graph of $f$ by $k$ units. | Subtract $k$ from $f(x)$. |
| **Horizontal shifts** | | |
| $y = f(x + h), \quad h > 0$ | Shift the graph of $f$ to the left $h$ units. | Replace $x$ by $x + h$. |
| $y = f(x - h), \quad h > 0$ | Shift the graph of $f$ to the right $h$ units. | Replace $x$ by $x - h$. |
| **Compressing or stretching** | | |
| $y = af(x), \quad a > 0$ | Multiply each $y$-coordinate of $y = f(x)$ by $a$. Stretch the graph of $f$ vertically if $a > 1$. Compress the graph of $f$ vertically if $0 < a < 1$. | Multiply $f(x)$ by $a$. |
| $y = f(ax), \quad a > 0$ | Multiply each $x$-coordinate of $y = f(x)$ by $\frac{1}{a}$. Stretch the graph of $f$ horizontally if $0 < a < 1$. Compress the graph of $f$ horizontally if $a > 1$. | Replace $x$ by $ax$. |
| **Reflection about the $x$-axis** | | |
| $y = -f(x)$ | Reflect the graph of $f$ about the $x$-axis. | Multiply $f(x)$ by $-1$. |
| **Reflection about the $y$-axis** | | |
| $y = f(-x)$ | Reflect the graph of $f$ about the $y$-axis. | Replace $x$ by $-x$. |

**Determine the Function Obtained from a Series of Transformations**

Given the parent function: $y = |x|$

1. Shift left 2 units  2) Shift up 3 units.  3) Reflected about the y-axis.

**To graph a transformed function:**

- Identify the parent function
- What is being done to the parent?  Consider order of operation

Graph:      $f(x) = \sqrt{1 - x} + 2$