Linear Transformations:

For each domain and range coordinates apply effects of multiplication (A & B) before addition (C & D). [[B before C]] and [[A before D]]

Effects the Domain (*inversely*) . . . . "x" variable position - $\langle$ *Horizontal Change* $\rangle$

$$if\ \ B\ is\ negative\ the\ function\ is\ "Reflected\ Horizontally\ (flipped)\ over\ the\ y-axis"$$

$B:$ $if\ \ \underline{\underline{|B|\ >1}}\ \ the\ function\ is\ "Compressed\ Horizontally\ (squeezed)\ toward\ the\ y-axis\ by\ a\ factor\ of\ \left|\frac{1}{B}\right|\ "$

$if\ \ \underline{\underline{0\ <\ |B|\ <1}}\ \ the\ function\ is\ "Expanded\ Horizontally\ (streched)\ from\ the\ y-axis\ by\ a\ factor\ of\ \left|\frac{1}{B}\right|\ "$

$C:$

$if\ \ \underline{\underline{C\ <1}}\ \ the\ function\ is\ "Translated\ Horizontally\ (shift\ or\ slide)\ \ C\ \ units\ to\ the\ right\ "$

$if\ \ \underline{\underline{C\ >1}}\ \ the\ function\ is\ "Translated\ Horizontally\ (shift\ or\ slide)\ \ C\ \ units\ to\ the\ left\ "$

$$y = A\,f\left(\,B\left[x + C\right]\right) + D$$

Effects the Range (*directly*) . . . . "y" variable position - $\langle$ *Vertical Change* $\rangle$

$$if\ \ A\ is\ negative\ the\ function\ is\ \text{"Reflected}\ Vertically\ (flipped)\ over\ the\ x-axis"$$

$A:$ $if\ \ \underline{\underline{|A|\ >1}}\ \ the\ function\ is\ "Expanded\ Vertically\ (stretched)\ from\ the\ x-axis\ by\ a\ factor\ of\ |A|\ "$

$if\ \ \underline{\underline{0\ <\ |A|\ <1}}\ \ the\ function\ is\ "Compressed\ Vertically\ (streched)\ toward\ the\ y-axis\ by\ a\ factor\ of\ |A|\ "$

$D:$

$if\ \ \underline{\underline{D\ <1}}\ \ the\ function\ is\ "Translated\ Vertically\ (shift\ or\ slide)\ \ D\ \ units\ to\ the\ down\ "$

$if\ \ \underline{\underline{D\ >1}}\ \ the\ function\ is\ "Translated\ Vertically\ (shift\ or\ slide)\ \ D\ \ units\ to\ the\ up\ "$

1. Describe the graph of $f(x) = 4\sqrt{2(x-3)} - 1$ as a transformation from the parent function $R(x) = \sqrt{x}$
.

1st Compress (Squeeze) the points of the parent function to positions $\frac{1}{2}$ as far from the y-axis..

2nd Translate (Slide) the points of the graph horizontally 3 units to the right..

3rd Expand (Stretch) the points of the graph vertically from the x-axis to positions 4 times as far from the x-axis.

4th Translate (Slide) the points of the graph 1 units down.

2. Describe the graph of $g(x) = -3\left|\frac{1}{2}(x+4)\right| - 5$ as a transformation from the parent function $A(x) = |x|$.

1st Expand (Stretch) the points of the graph horizontally to positions 2 times as far from the y-axis.

2nd Translate (Slide) the points of the parent function 4 units to the left.

3rd Reflect the points of the graph over the x-axis, then Expand (Stretch) them vertically to positions 3 times as far from the x-axis.

4th Translate (Slide) the points of the graph 5 units down.

3. Describe the graph of $p(x) = \frac{1}{4}\left[-\frac{5}{3}(x-8)\right]^3 + 7$ as a transformation from the parent function $C(x) = x^3$.

1st Reflect the points of the graph over the y-axis, then Compress (Squeeze) them horizontally to positions $\frac{3}{5}$ as far from the y-axis.

2nd Translate (Slide) the points of the parent function 8 units to the right

3rd Compress (Squeeze) the points of the graph vertically toward the x-axis to positions $\frac{1}{4}$ as far from the x-axis.

4th Translate (Slide) the points of the graph 7 units up.