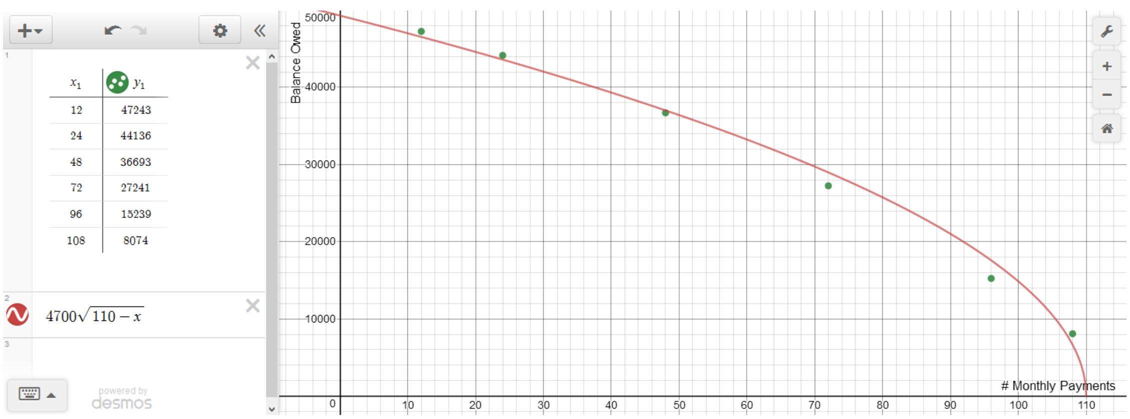
Mortgages *The balance owed y on a \$50,000 mortgage after x monthly payments is shown in the table that follows. The function that models the data is* [1]

$$y = 4700\sqrt{110 - x}$$

Monthly Payments	Balance Owed ($)
12	47,243
24	44,136
48	36,693
72	27,241
96	15,239
108	8074

a. *Is this a shifted root function?*

Let's take a look at the data and the given function, $y = 4700\sqrt{110 - x}$.



From this we can see that basic function for this graph is $y = \sqrt{x}$ and we can say, yes, this is a shifted square root function.

b. *What is the domain of the function in the context of this application?*

The domain of the function is all values that x can take on while still making sense in the context of the application. Since x represents the number of monthly payments, we can say that x is zero or more. That is, $x \geq 0$.

But, we also want the radicand, $110 - x$, to be non-negative and algebraically we say,

$$\begin{aligned} 110 - x &\geq 0 \\ -x &\geq -110 \\ x &\leq 110 \end{aligned}$$

So x is restricted to values greater than or equal to 0 and, at the same time, less than or equal to 110 and we can write, $0 \leq x \leq 110$.

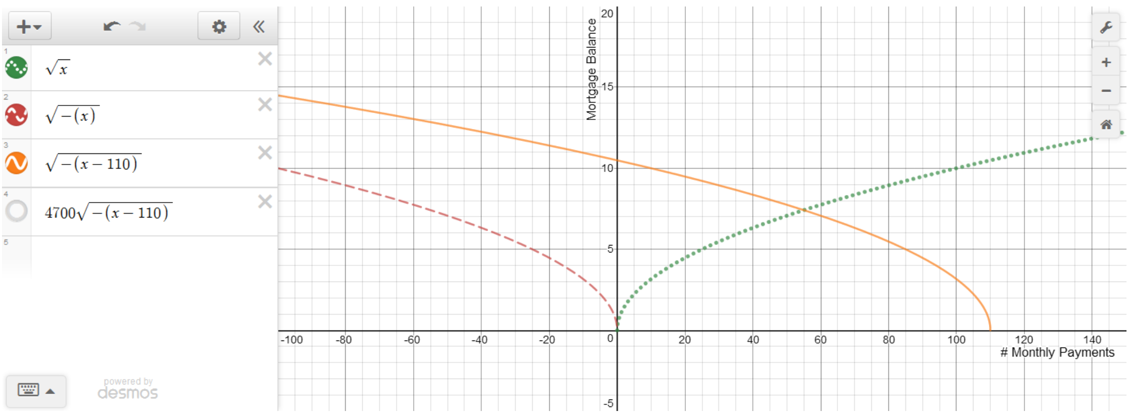
The domain of the function in the context of this application is $[0, 110]$.

[1] Harshbarger/Yocco, *College Algebra In Context, 5e*, p. 261, #64.

c. *Describe the transformations needed to obtain the graph from the graph of $y = \sqrt{x}$.*

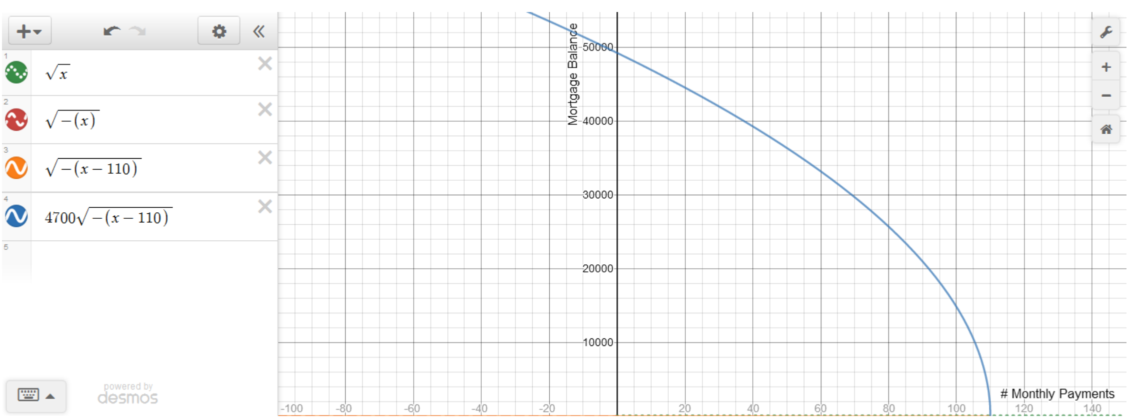
Let's start with the graph of $y = \sqrt{x}$ and transform it to get the graph of $y = 4700\sqrt{110 - x}$.

$y = \sqrt{x}$	The basic function. Shown in green dots.
$y = \sqrt{-(x)}$	Reflection across the y-axis. Shown in red dashes.
$y = \sqrt{-(x - 110)}$	Shift 110 units to the right. Shown in solid orange.



Finally, $y = \sqrt{-(x - 110)}$ is stretched vertically by a factor of 4700. I had to change the scale on the y-axis so the graph would show and the resulting equation,

$y = 4700\sqrt{-(x - 110)}$, is shown below in solid blue.



In short, the transformations are: a reflection across the y-axis, a horizontal shift 110 units to the right, and a vertical stretch using a factor of 4700.