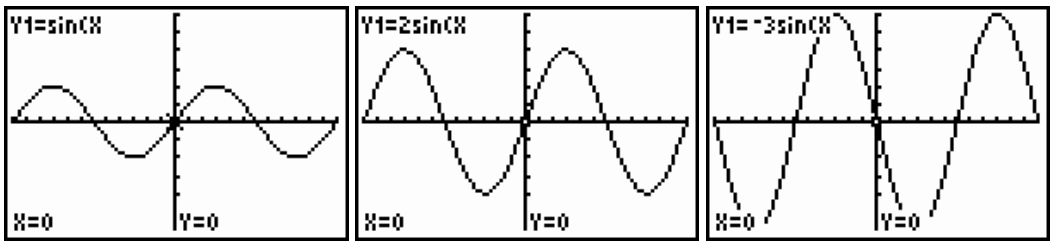
Investigation Transformations.

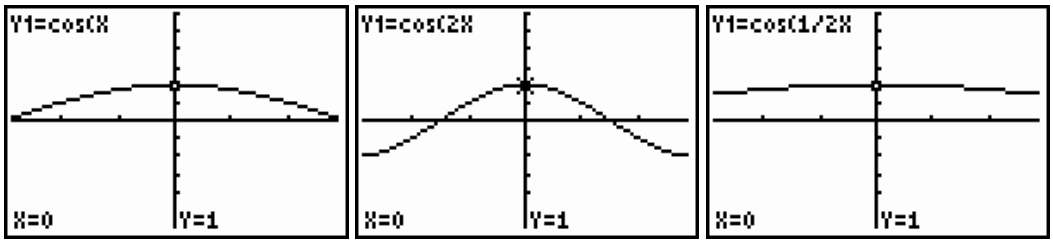
Part B:

Investigation # 1

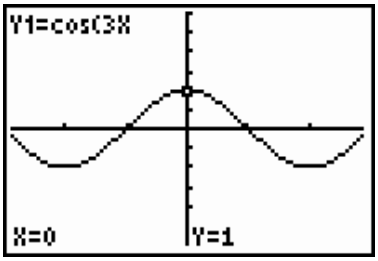


These transformations were of sin graphs. When the *a* value in y = a sin *k* (x-b) + d is positive the transformation is vertical and the graphs are stretched or compressed by a factor of *a*. When *a* is negative the transformation is inverted or reflected and stretched or compressed vertically by *a* as seen in y = -3sin(x). The period of all these graphs remains the same and all graphs intersect the origin and intersect the x axis at the same points. The maximums of these graphs are the numbers are the positive of the *a* values. So in y = 2sin(x), the maximum is 2. The minimum is the negative of the *a* value, so therefore in y = 2sin(x), -2 would be the minimum.

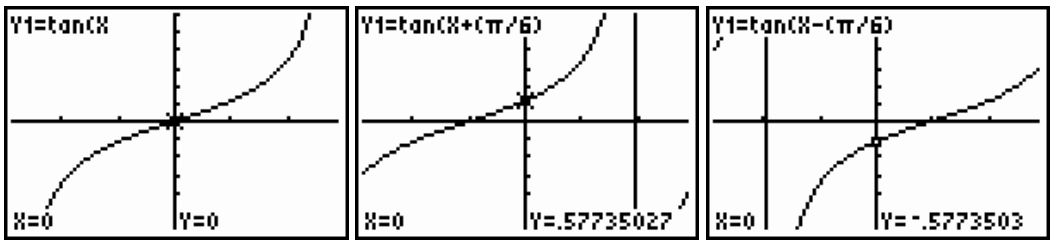
Investigation # 2



These transformations were of cos graphs. In this investigation the *k* value of the equations were changed. As shown when the *k* value is greater 1 the graph is compressed horizontally by the factor 1/*k* as seen in y = cos(2x). When the value of *k* is greater than 0 but less than 1 like in y = cos(1/2) the graph is stretched horizontally by a factor of 1/*k*. As you can see all the graphs pass through the y-axis at 1 but the graphs do not pass through the x-axis at the same points. The maximums and minimums of these graphs are all the same because the value was the same in all graphs. From these graphs we can determine that the value of *k* determines the number of cycles in the period of the graph. As seen in the following graph the *k* value was increased to 3 and it is shown that the more than one cycles appears in the period.

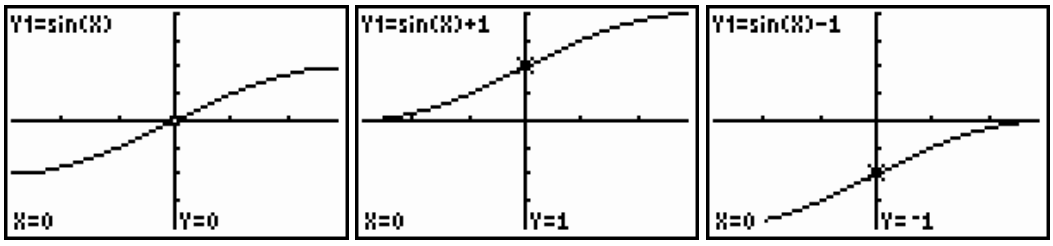


Investigation # 3



These transformations were of tan graphs and the *b* values were changed. From the graphs we can determine that when *b* is than 0 the graph is horizontally shifted *b* units to the left. When *b* is less than 0 the graph is horizontally shifted *b* units to the right. The *b* value is called the phase shift because it causes horizontal translations. The graphs do not pass through the same point on the y-axis.

Investigation # 4



These transformations were of sin graphs and the *d* values were changed. The *d* value determines the vertical shift. As seen in the graphs if *d* is greater than 0 the graph is vertically shifted d units up. And if *d* is less than 0 then the graph is vertically translated *d* units down. The graphs do not pass through the same point on the y-axis.

Summary

Changing any values in a graph can produce drastic changes in the graph. When *a* is changed in the graph of y = *a*sin *k*(x-b)+d the graph is stretched or compressed vertically depending on if a is greater than or less than 0. If *a* less than 0 the graph is reflected or inverted on the x-axis. If the *k* is changed in the graph the graph is compressed or stretched horizontally. If *k* is greater than 1 the graph is compressed by a

factor of 1/*k,* if *k* is less than 1 but greater than 0 then the graph is stretched by a factor of 1/*k.* When the *b* value is changed the graph is shifted horizontally left and right. So when b is greater than 0 the graph shifts *b* units to the left and if *b* is less than 0 the graph is shifted *b* units to the right. Finally if the *d* value is changed the graph is shifted vertically up and down. If *d* is greater than 0 the graph shifts *d* units up and if *d* is less than 0 the graph is shift *d* units down.