

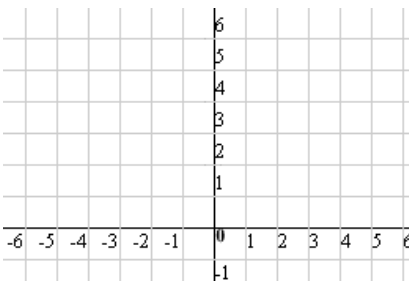
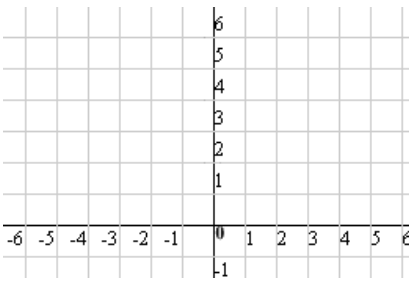
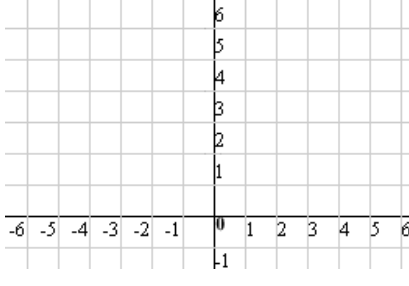
## Exploring Functions and Transformations with Parametric Representation

Materials needed: TI-84 Plus CE graphing calculator

In this activity, you will gain a deeper understanding of functions and transformations by exploring the parametric representation of functions.

For each of the following parametric functions:

- i) Graph the parametric function for  $-2 \leq t \leq 2$  in the same window.
- ii) Sketch a graph in the grid.
- iii) Write in functional notation and include the domain and range of the function.
- iv) Write a verbal description of the transformation from the quadratic parent function.

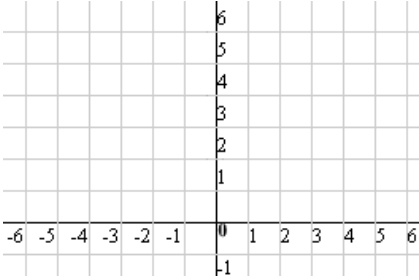
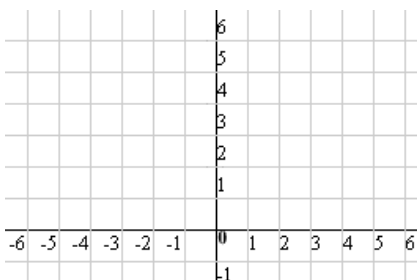
Parametric representation	Graph	Functional Notation and Domain/Range	Verbal Description of Transformation
$\begin{cases} x_1(t) = t \\ y_1(t) = t^2 \end{cases}$			
$\begin{cases} x_2(t) = t + 3 \\ y_2(t) = t^2 \end{cases}$			
$\begin{cases} x_3(t) = t \\ y_3(t) = t^2 + 3 \end{cases}$			

Finding the functional notation for each of these curves, we can relate functional transformation concepts to equations defined parametrically.

This can be especially helpful when trying to distinguish between the transformations  $y = af(x)$  and  $y = f(bx)$ . By using the built in domain and range restrictions that occur by the choice of values of  $t$ , it is easier to show that although for certain functions transformations may have the same graph, they are affecting the graph in “different” ways.

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Parametric representation	Graph	Functional Notation and Domain/Range	Verbal Description of Transformation
$\begin{cases} x_1(t) = t \\ y_1(t) = t^2 \end{cases}$			
$\begin{cases} x_2(t) = 2t \\ y_2(t) = t^2 \end{cases}$			
$\begin{cases} x_3(t) = t \\ y_3(t) = .25t^2 \end{cases}$	