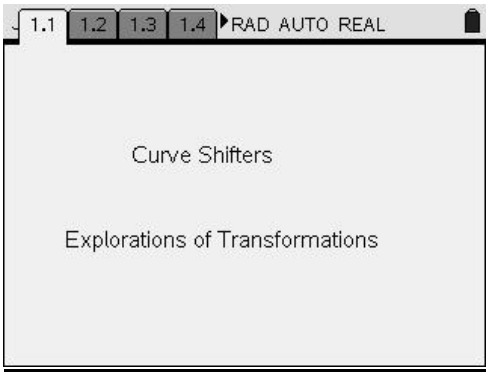
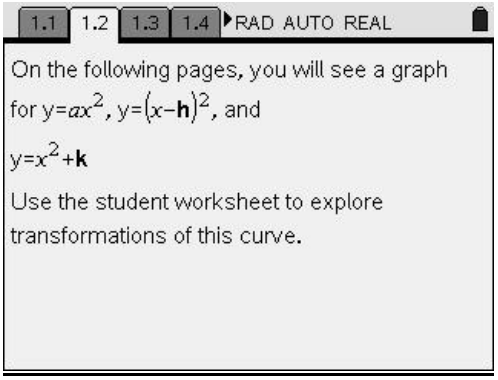
TI-Nspire Activity: *Curve Shifters*
By: Janet Andreasen

Graphing curves is an important aspect of algebraic thinking and connects throughout the mathematics curriculum from algebra to calculus. In this activity, you will examine patterns in the graphs of parabolas in order to graph parabolas and other curves quickly.

Using the TI-Nspire, open the file: CurveShifters.tns

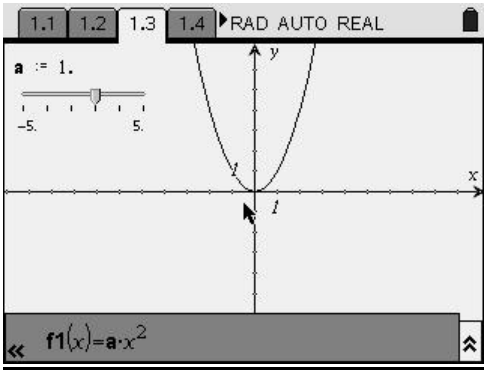
Work through the pages and problems of the file (Ctrl+right arrow), recording your answers to questions on the following pages:



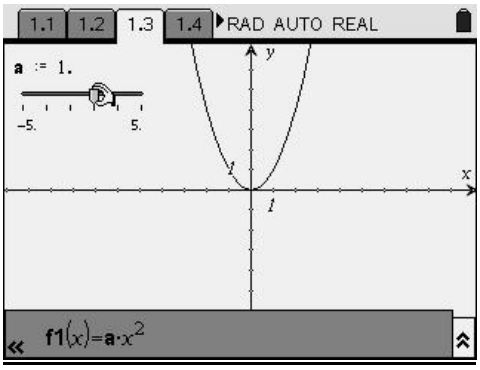


Part I
On page 1.3, the function $f(x) = a\,x^2$ is shown. A slider for the variable *a* is showing in the top left corner.

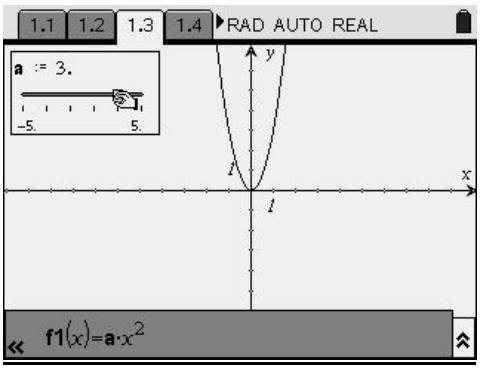
Press the tab button twice to obtain a cursor in the graph section.



Change the value of *a* using the slider. To do this, point the cursor at the tick mark on the slider. Hold down the center button of the navigation pad to select the slider. Move the slider to the right and to the left.
Be patient – the graph may take a minute to catch up.



1. What observations can you make about what happens to the curve as the value of *a* changes?



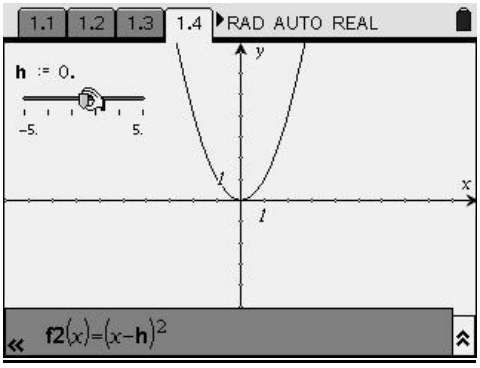
2. What if the value of *a* is positive?

3. What if the value of *a* is negative?

4. What would the graph of $f(x) = -4x^2$ look like? Sketch it here.

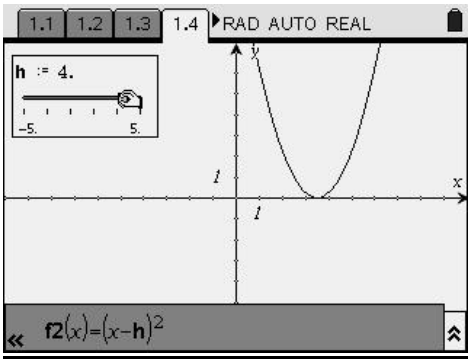
5. What would the graph of $f(x) = 2.4x^2$ look like? Sketch it here.

Part II:
On page 1.4, the graph of $f(x) = (x - h)^2$ is shown. Once again, there is a slider for the variable *h* in the top left corner.



Press the tab button twice to obtain a cursor in the graph section. Change the value of *h* using the slider. Be patient – the graph may take a minute to catch up.

1. What observations can you make about what happens to the curve as the value of *h* changes?



2. What if the value of *h* is positive?

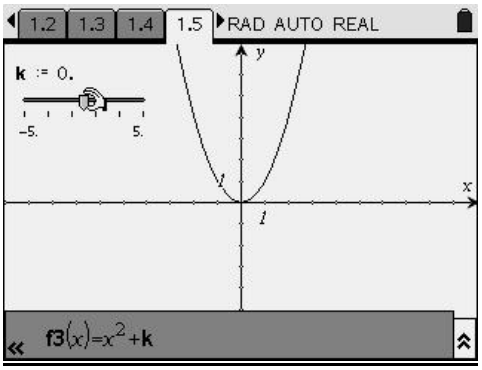
3. What if the value of *h* is negative?

4. What would the graph of $f(x) = (x + 4)^2$ look like? Sketch it here.

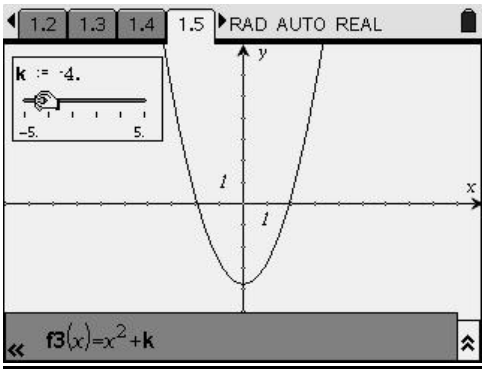
5. What would the graph of $f(x) = (x – 12)^2$ look like? Sketch it here.

Part III:
On page 1.5, the graph of $f(x) = x^2 + k$ is shown. Once again, there is a slider for the variable *k* in the top left corner.

Press the tab button twice to obtain a cursor in the graph section. Change the value of *k* using the slider. Be patient – the graph may take a minute to catch up.



1. What observations can you make about what happens to the curve as the value of *k* changes?



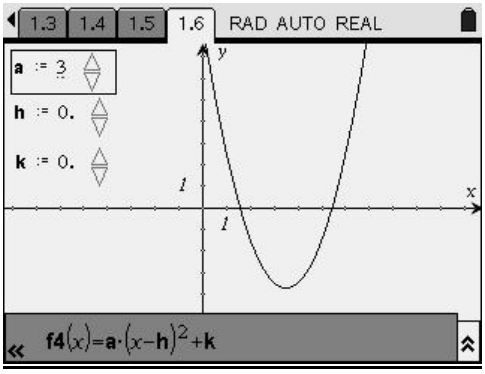
2. What if the value of *k* is positive?

3. What if the value of *k* is negative?

4. What would the graph of $f(x) = x^2 - 27$ look like? Sketch it here.

5. What would the graph of $f(x) = x^2 + 17$ look like? Sketch it here.

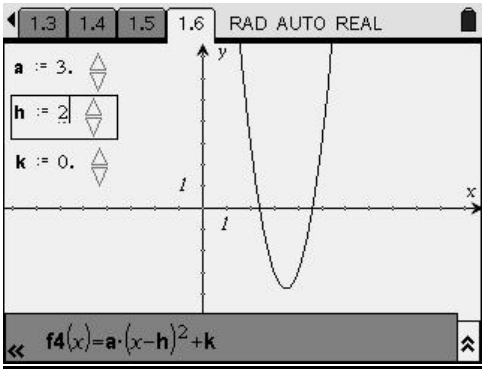
Part IV:
On page 1.6, the graph of $f(x) = a(x - h)^2 + k$ is shown. There are now sliders for *a, h,* and *k* which have up and down arrows.



1. Predict what the graph of $f(x) = 3(x - 2)^2 + 4$ would look like. Sketch it here.

2. Why did you predict the curve in problem 1?

3. Tab twice to have a cursor in the graph window. Move the cursor up to the sliders in the top left. Change the values of *a, h,* and *k* to those given in problem 1. To do this, click on the number. Use the key pad to change the values.



4. How well did you predict what the curve would look like?

5. What might you expect the function $f(x) = -5(x + 4)^3 - 7$ to look like compared to $f(x) = x^3$?