

Exploring Quadratic Transformations with TI-Nspire Algebra II

Student Activity

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Activity Overview: Students will explore the characteristics of a quadratic function.

TN Algebra II Standards:

CLE 3103.3.2 Understand, analyze, transform and generalize mathematical patterns, relations and functions using properties and various representations. (*Level 4 on Webb's Depth of Knowledge*)

SPI 3103.3.10 Identify and/or graph a variety of functions and their translations.

✓ 3103.3.4 Analyze the effect of changing various parameters on functions and their graphs.

✓ 3103.3.11 Describe and articulate the characteristics and parameters of a parent function.

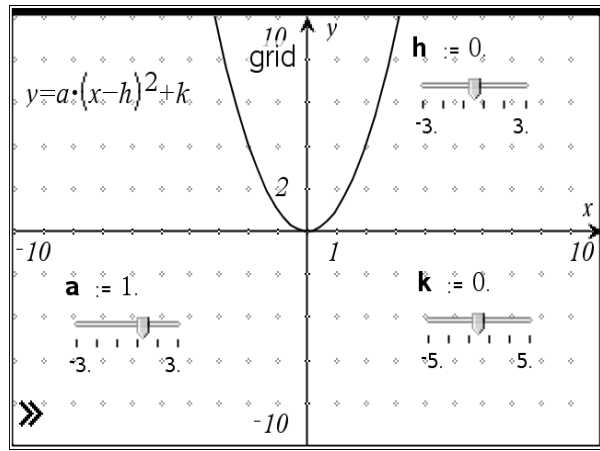
➤ **Open the TI-Nspire document Exploring Quadratic Transformations**

➤ **Press  to move to page 1.2 and begin the lesson**

1. Write the **vertex form** of a quadratic function. _____.

2. Observe the characteristics of the quadratic parent function on page 1.2.

List the characteristics observed: _____



Exploring “a.”

3. Increase and decrease the value of “a.” Describe what is happening to the function.

4. Complete the statements below.

When “a” positive, the function _____

Therefore, when “a” is positive, the function has a _____
 (*Maximum or Minimum*)

When “a” negative, the function _____

Therefore, when “a” is negative, the function has a _____
 (*Maximum or Minimum*)

5. What happens when $a = 0$ and $-1 < a < 1$? _____

Exploring “h.”

6. Increase and decrease the value of “h.” Describe what is happening to the function.

The function moves _____.

7. Complete the statements below.

When “h” positive, the function _____.

When “h” negative, the function _____.

Exploring “k.”

8. Increase and decrease the value of “k.” Describe what is happening to the function.

The function moves _____.

9. Complete the statements below.

When “k” positive, the function _____.

When “k” negative, the function _____.

10. Use your TI-Nspire to discover **how to find the Vertex?**

Fill in the chart:

Parameters: $a = 1$ $h = 0$ $k = 0$	This is called the <u>parent functions.</u> Vertex form: $y = 1(x - 0)^2 + 0$ Simplify $y = x^2$ Identify the coordinates of the minimum. (,)
Parameters: $a = 1$ $h = 3$ $k = 0$	How did the function move? Vertex form: Identify the coordinates of the minimum. (,)
Parameters: $a = -2$ $h = 1.5$ $k = 2$	How did the function move? Vertex form: Identify the coordinates of the minimum. (,)
Parameters: $a = .7$ $h = -2$ $k = -3.5$	How did the function move? Vertex form: Identify the coordinates of the minimum. (,)

11. Define vertex. (Use h , k and vertex form in your definition) _____

Assessment:

On a piece of paper, do the following:

- Make a sketch of the quadratic functions without plotting points.
- Identify the vertex.
- Is there a maximum or minimum? Why?

a.) $y = 2(x - 2)^2 + 3$

b.) $y = -(x + 1)^2 + 4$

c.) $y = -\frac{1}{4}(x - 5)^2 - 2$

d.) $y = 4(x + 2)^2$