Exploring Absolute Value Transformations with TI-Nspire Student Activity
Algebra II

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Activity Overview: Students will explore the characteristics of an absolute value 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.

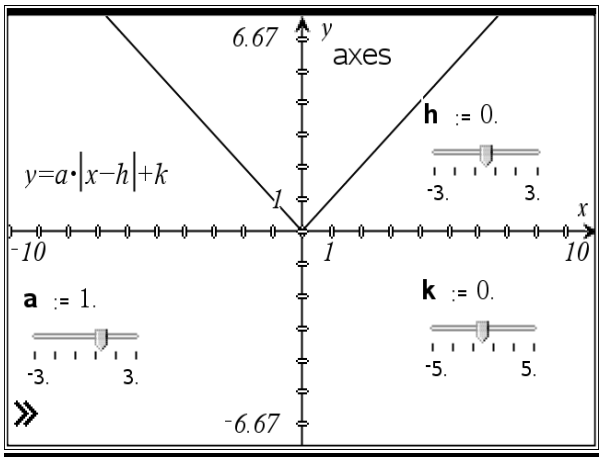
✓ 3103.3.11 Describe and articulate the characteristics and parameters of a parent function.

- **Open the TI-Nspire document Exploring AbsoluteValue Transformations**
- **Press ctrl ▸ to move to page 1.2 and begin the lesson**

1. Write the **vertex form** of an absolute value function. _____.

2. Observe the characteristics of the absolute value 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 $-1 < a < 1$? _____
_____.

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Algebra II

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 **parent functions**. Vertex form: $y = 1\|x - 0\| + 0$ Simplify $y = \|x\|$ Identify the coordinates of the minimum. (,)
Parameters: $a = .5$ $h = -3$ $k = 0$	How did the function move? Vertex form: Identify the coordinates of the minimum. (,)
Parameters: $a = 2$ $h = 1$ $k = 2.5$	How did the function move? Vertex form: Identify the coordinates of the minimum. (,)
Parameters: $a = -\frac{1}{3}$ $h = -2.3$ $k = -1.5$	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)_____
_____
_____

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Algebra II

Assessment:

On a piece of paper, do the following:

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

a.) $y = 3|x - 4| - 2$

b.) $y = -|x + 4| + 2$

c.) $y = \frac{1}{2}|x + 1| + 3$

d.) $y = -2|x - 3|$