

Honors Advanced Algebra

Name: Key

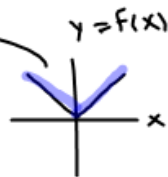
Absolute Value Functions TI-Nspire Activity

- Graph the following functions on your TI-Nspire calculator and answer all questions.

1. Graph $y = |x|$ and $y = x$ in the same window.

a) How does an absolute value functions compare to a linear function? What are the similarities and differences?

Absolute value
"Parent Graph"



Difference : • Shape

Similarity : • Both have same slope in 1st quadrant
• Both go through (0,0)

2. Graph the following functions in the same window:

- $y = |x + 3|$
- $y = |x - 3|$
- $y = |x + 1|$
- $y = |x - 1|$

} Look at graphs on next page

b) Compare the graphs. If $y = |x + h|$, how does the value of h change the graph?

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$f_1(x) = |x+3|$

$f_2(x) = |x-3|$

$f_3(x) = |x-1|$

$f_4(x) = |x+1|$

Document5

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Abs Value Functions TI-Nspire activity [Compatibility Mode] - Word

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2. Graph the following functions in the same window:

$$y = |x + 3|$$

$$y = |x - 3|$$

$$y = |x + 1|$$

$$y = |x - 1|$$

b) Compare the graphs. If $y = |x + h|$, how does the value of h change the graph?

- h changes the graph by shifting it left or right depending on the #. For example, $+3$ shifted the graph to left 3, the opposite direction. -1 shifted the graph to right one.

3. Graph the following functions in the same window:

$$y = 2|x| \quad y = 5|x| \quad y = \frac{1}{2}|x|$$

$$y = -2|x| \quad y = -5|x|$$

} see graph on next page

c) Compare the graphs. If $y = a|x|$, how does the value of a change the graph?

- a controls "slope"; how narrow or wide the graph gets.
- $a > 1$ (when a is greater than 1): Graph gets more narrow...
- $a < 0$ (when a is negative): Graph is reflected over x -axis. It flips!
- $0 < a < 1$ (when a is between 0 and 1): Graph gets wider...

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The main window displays a graph titled '*Unsaved' with a zoom level of 1.1. The graph shows five absolute value functions plotted on a coordinate plane with x and y axes ranging from -10 to 10. The functions are:

- $f_1(x) = 2 \cdot |x|$ (blue line)
- $f_2(x) = -2 \cdot |x|$ (red line)
- $f_3(x) = -5 \cdot |x|$ (black line)
- $f_4(x) = 5 \cdot |x|$ (magenta line)
- $f_5(x) = \frac{1}{2} \cdot |x|$ (green line)

The graph also shows a vertical dashed line at $x = 1$ and a horizontal dashed line at $y = 6.67$. The origin is marked with 1 on both axes.

The left side of the interface features a virtual keypad with various mathematical symbols and functions, including a numeric keypad, trigonometric functions, and algebraic symbols. The keypad is labeled 'TEXAS INSTRUMENTS' at the bottom.

Document6 x

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Abs Value Functions TI-Nspire activity [Compatibility Mode] - Word

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4. Graph the following functions in the same window:

$$y = |x| + 2$$

$$y = |x| - 2$$

$$y = |x| + 4$$

$$y = |x| - 4$$

d) Compare the graphs. If $y = |x| + k$, how does the value of k change the graph.

- k controls shift up or down: shift down means k is negative and shift up mean k is positive

5. The vertex is the point where both of the lines meet in an absolute value graph. It is the maximum or minimum output of the graph. Graph the following functions and write down the vertex point.

$y = x + 2$	Vertex =
$y = x - 3 + 2$	Vertex =
$y = x - 3 - 4$	Vertex =
$y = x + 1 - 6$	Vertex =
$y = 2 x + 5 - 1$	Vertex =

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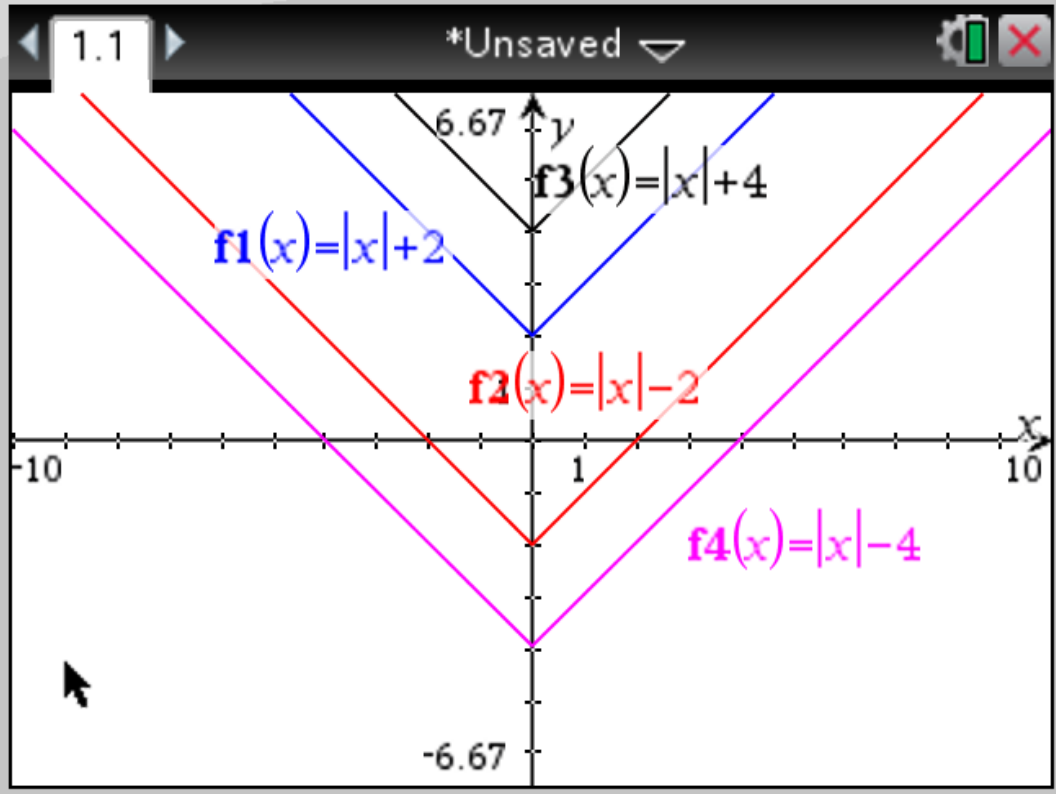
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TEXAS INSTRUMENTS

*Unsaved



1.1

$f_1(x) = |x| + 2$

$f_2(x) = |x| - 2$

$f_3(x) = |x| + 4$

$f_4(x) = |x| - 4$

6.67

10

1

10

-6.67

Document7 x

Page Size: Handheld 1.1 Settings Zoom: 200% Boldness: 100%

Abs Value Functions TI-Nspire activity [Compatibility Mode] - Word

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5. The vertex is the point where both of the lines meet in an absolute value graph. It is the maximum or minimum output of the graph. Graph the following functions and write down the vertex point.

$y = x + 2$	Vertex = $(0, 2)$
$y = x - 3 + 2$	Vertex = $(3, 2)$
$y = x - 3 - 4$	Vertex = $(3, -4)$
$y = x + 1 - 6$	Vertex = $(-1, -6)$
$y = 2 x + 5 - 1$	Vertex = $(-5, -1)$

e) Compare each vertex to its original equation

Do you notice anything?

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