

Introducing Absolute Value

ID: 8743

Time required
45 minutes

Activity Overview

This activity introduces absolute value from a data value perspective. Students examine data by comparing individual data points to the mean by finding the difference (positive or negative) and the distance from the mean. They then plot the distances versus the differences and examine the shape of the plot. This leads to an investigation of the absolute value function as a model of the relationship between the differences and the distances. A second problem, completed individually, guides students through an investigation of another absolute value equation by examining tables and graphs.

Topic: Linear Equations

- *Solve a linear equation involving absolute value.*

Teacher Preparation and Notes

- *This activity is designed for use in an Algebra 1 classroom.*
- *Prior to beginning this activity, students should have experience graphing linear functions and analyzing simple graphs and function tables.*
- *Notes for using the TI-Nspire™ Navigator™ System are included throughout the activity. The use of the Navigator System is not necessary for completion of this activity.*
- ***To download the student TI-Nspire document (.tns file) and student worksheet, go to education.ti.com/exchange and enter “8743” in the keyword search box.***

Associated Materials

- *IntroducingAbsoluteValue_Student.doc*
- *IntroducingAbsoluteValue.tns*

Suggested Related Activities

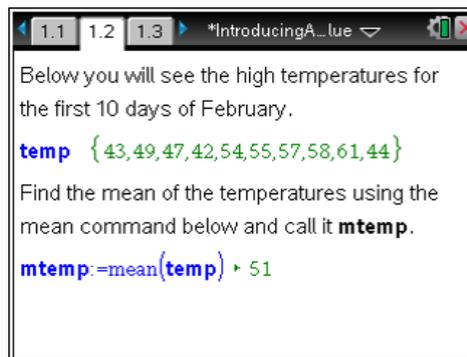
To download any activity listed, go to education.ti.com/exchange and enter the number in the keyword search box.

- *Absolute Value Equations (TI-Nspire technology) — 12944*
- *Writing Absolute Value Equations (TI-Nspire technology) — 10157*
- *Absolute Value (TI-Nspire technology) — 16906*

Step-by-step directions

Problem 1 – Difference vs. Distance

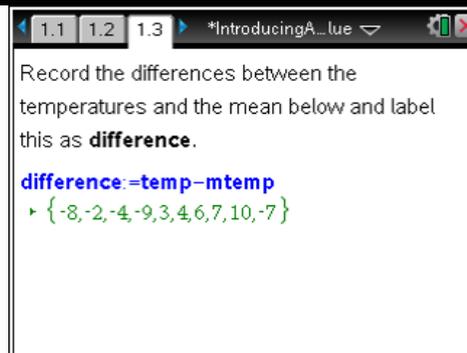
The high temperatures for the first ten days of February are shown in the notes page on page 1.2. Direct students to find the mean of the 10 temperatures by pressing **Enter** inside of the math textbox **mtemp:=mean(temp)**.



TI-Nspire Navigator Opportunity: Screen Capture

See Note 1 at the end of this lesson.

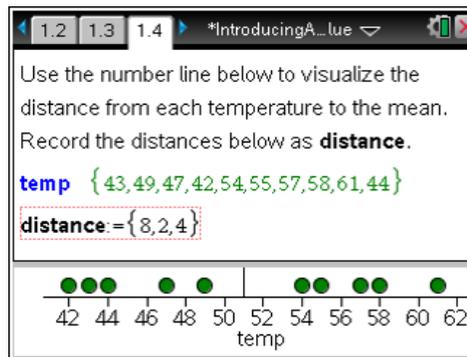
On page 1.3, the students will calculate the difference between the mean temperature (**mtemp**) and each of the high temperatures for the first ten days of February. Again students will need to place a cursor inside of the math textbox **difference:=temp-mtemp** and press **Enter** to find the difference.



On page 1.4, students will need to find the distance from the mean of the temperatures and enter them in the math textbox.

distance:={ 8, 2, 4, 9, 3, 4, 6, 7, 10, 7} is the correct distance.

To help them visualize the distance, the **temp** data has been plotted on a number line. The vertical line represents the mean of 51.

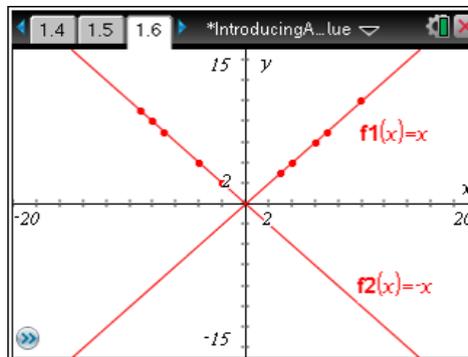


TI-Nspire Navigator Opportunity: Quick Poll

See Note 2 at the end of this lesson.

On page 1.6, a scatter plot is shown to compare the differences and distances. The **Difference** list is the x-values and **Distance** list is the y-values.

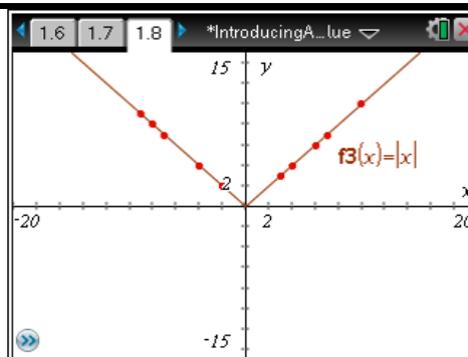
Students are going to graph the functions $f_1(x) = x$ and $f_2(x) = -x$. They will notice that each function contains half of the scatter plot.



TI-Nspire Navigator Opportunity: Screen Capture

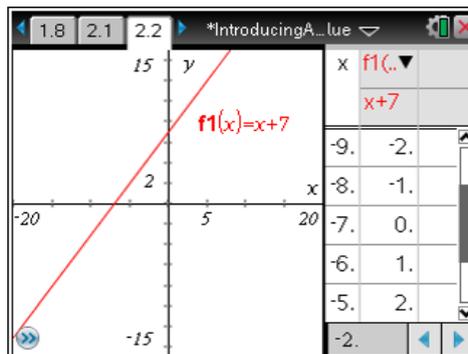
See Note 3 at the end of this lesson.

On page 1.8, the scatter plot for distances and differences is shown once again for the students. Students will graph $f_3(x) = \text{abs}(x)$. They should notice that the function contains both halves of the scatter plot.

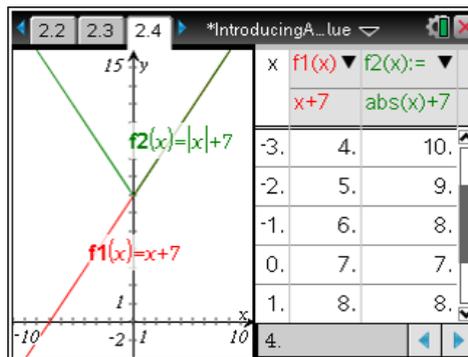


Problem 2 – Another Absolute Value Equation

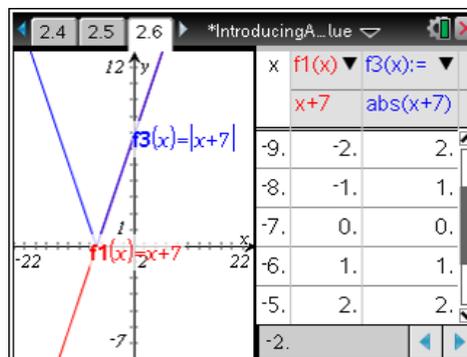
On page 2.2, students will graph the linear equation $y = x + 7$ and describe characteristics of the function.



On page 2.4, students will graph the linear equation $y = x + 7$ and compare it to the graph of $y = |x| + 7$.



On page 2.6, students will graph the linear equation $y = x + 7$ and compare it to the graph of $y = |x + 7|$.



Sample student answers.

- 51
- Difference $\{-8, -2, -4, -9, 3, 4, 6, 7, 10, -7\}$
 - The numbers are both positive and negative.
 - 10; -9
 - Negative when the temperature is below the average. Positive when the temperature is above the average.
- Distance $\{8, 2, 4, 9, 3, 4, 6, 7, 10, 7\}$
 - The numbers are always positive.
 - The distance is the positive value of the differences.
- When x is positive, y is positive. When x is negative, y is positive.
 - y will never be negative; x is negative when the temperature is below the average.
 - $y = x$ contains the values where the temperature is above the average.
 - $y = -x$ contains the values where the temperature is below the average.
 - They are opposite signs of each other.
 - Both are equal to zero at zero.
- $y = |x|$ contains all points of the scatter plot.
- $f1(x)$ is positive when $x > -7$; $f1(x)$ is negative when $x < -7$; $f1(x) = 0$ when $x = -7$.
- For $x > 0$ they are the same.
 - Answers will vary.
 - For $f1(x)$ at $x = -7$, but $f2(x)$ is never equal to zero.
- For $x > -7$ they are the same.
 - Answers will vary.
 - Both at $x = -7$.

TI-Nspire Navigator Opportunities**Note 1****Problem 1, *Screen Capture***

This would be a good place to do a screen capture to verify students are entering in the mathbox correctly.

Note 2**Problem 1, *Quick Poll***

You may choose to use Quick Poll to request each students distance values.

Note 3**Problem 1, *Screen Capture***

This would be a good place to do a screen capture to verify students are entering in the functions correctly.