TI-Nspire™

Introduction to the Absolute Value Function

Students will explore the properties of the absolute value function via its definition.

Michele Leschik
10/17/2008

Introduction to the Absolute Value Function Using the TI-Nspire™

Concepts

- Properties of the absolute value function
- Writing the absolute value function algebraically and graphically
- Determine the effect a constant has on the graph of the absolute value function.

Overview

Students will explore the properties of the absolute value function via its definition.

Materials

- TI-Nspire™
- TI-Nspire™ document *absval.tns*
- Student worksheet

NCTM Standards

All students should…

Grade 9-12 Geometry Standards:

1. analyze properties and determine attributes of two- and three dimensional objects

2. draw and construct representations of two-and three-dimensional geometric objects using a variety of tools

3. use geometric models to gain insight into, and answer questions in, other areas of mathematics

Grade 9-12 Geometry Standards:

1. general patterns using explicitly defined and recursively defined functions

2. identify essential quantitative relationships in a situation and determine the class or classes of functions that might model the relationships

Specific Pre-requisite Knowledge

Students should be familiar with…

- the definition of the **absolute value of a number**

- the definition of a **translation**

- the symbol used to denote the absolute value of a number

- graphing points and lines on the Cartesian Plane

- how to navigate through a TI-Nspire™ document

Materials Required/Classroom Set-up and Preparation

1. Each student should have access to a TI-Nspire™ math and science learning handheld with the document *absval.tns.*

2. Each student should have a copy of the enclosed student handout.

Lesson Notes

1. Step-by-step directions are given in the student handout to form the graph of the absolute value function via its definition.

2. The intent of the lesson is to begin by examining the parent function $f(x) = |x|$ via its definition and proceed to examine the graphs and table of values for the function $f(x) = |x - h|$ in a similar manner.

3. Extensions could involve examining the piecewise definition of the graph of an absolute value function and examining the effect of a constant *outside* the absolute value symbol. ($f(x) = |x - h| + k$)

4. Students will need to be given directions on how to enter the symbol for absolute value into the handheld. (Type *abs(x)*)

The Calculator Application

1. Turn on the TI-Nspire™ handheld.

    *   If the screen shown in Figure 1 is not displayed, press ⌂ to open the Home window.

Figure 1

2. Press ⟨7⟩ for 7: My Documents (Figure 1).

    Note: The document *absval.tns* should be loaded on the student's calculators prior to the start of the activity.

3. Click on *absval.tns* document.

    Note: The students will need to read all informational slides and fill out any information that is requested of them on their worksheets.

Figure 2

4. On page 3 of Problem 1, grab the movable point at (-6,0) to the positive side of the x-axis. The fixed point is at (0, 0). (Figure 2)

5. The distance from the fixed point to the movable point is shown on the top right of the screen and will be captured automatically into the spreadsheet on page 5 of Problem 1. (Figure 3)

    Note: All student data captured into the spreadsheet will be different. Further, students will write down a portion of this table on their worksheets in order to answer the discussion questions.
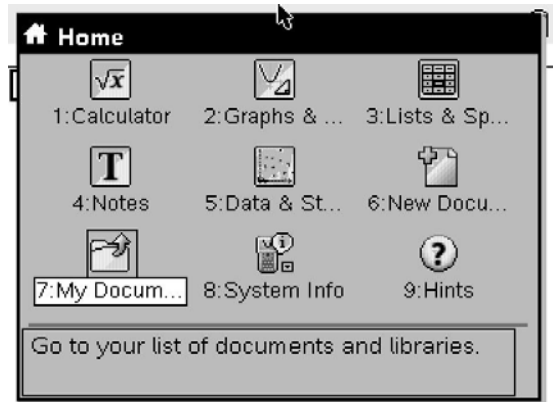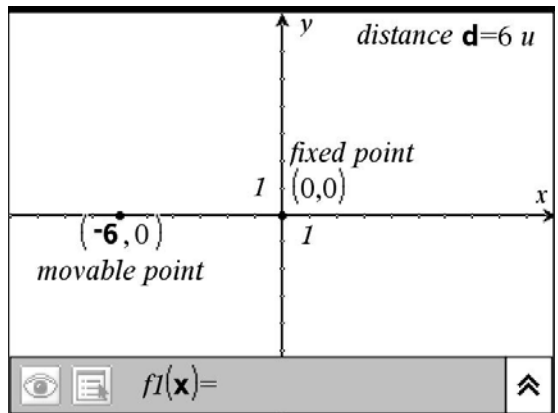

Figure 3

6. Insert a **Graphs & Geometry** application page to your document next to the spreadsheet on page 5. (Figure 4)

Figure 4
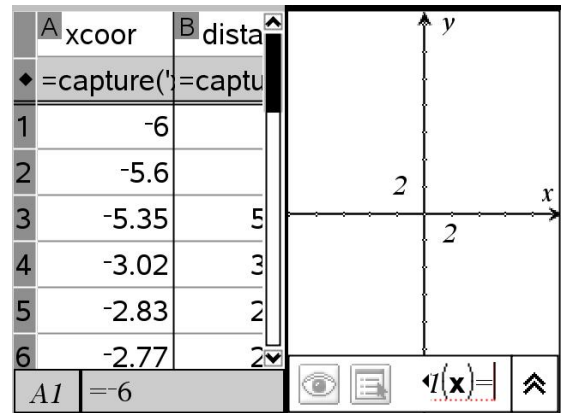
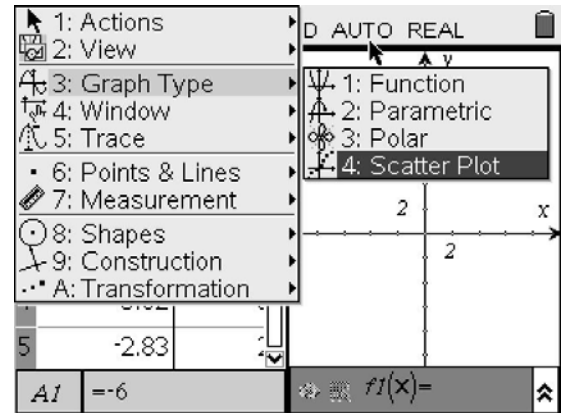7. Press (menu) (3) (4) for Menu 3: Graph Type, 4: Scatter Plot (Figure 5)

Figure 5

8. Choose *xcoor* for the **x-axis** and *distance* as the **y-axis** to show the graph for the data collected in the spreadsheet. (Figure 6)
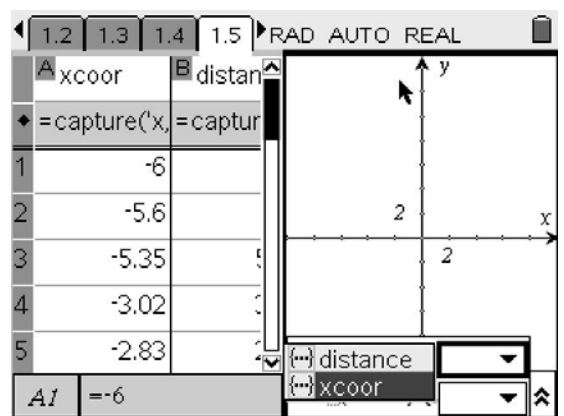
Figure 6

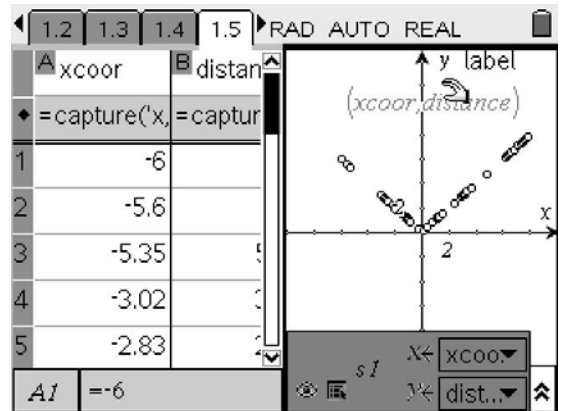9. The graph of the function $f(x) = |x|$ should appear on the scatter plot. (Figure 7)

Figure 7

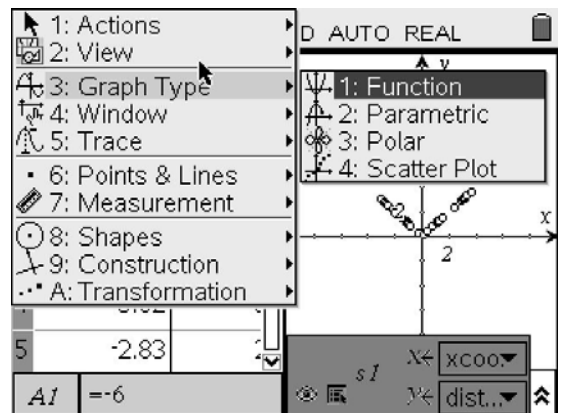10. Press (menu) (3) (1) for Menu 3: Graph Type, 4: Function (Figure 8)

Figure 8

11. Type *abs(x)* into f1(x) and press (enter). The points on the scatter plot will be traced over by the graph of the function $f(x) = |x|$.
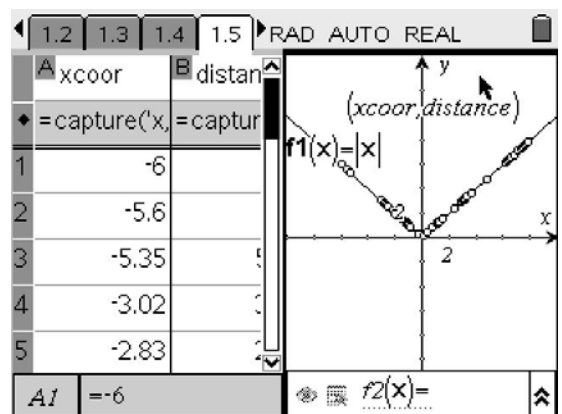
Figure 9

12. If time permits, the students can complete Problem 2 and Problem 3. These problems are done in the same manner as Problem 1, except that the fixed point is not at the origin.

(Figures 10 & 11)

Notes:

1) Students will have to repeat steps 4-11 for Problems 3&4. Students will also have to manipulate the parent function to have their scatter plot points traced over correctly.

2) Students will also have to use *(xcoor2,dist2)* and *(xcoor3,dist3)* for the scatter plots for Problem 2 and Problem 3 respectively.

Figure 10

Figure 11