Absolutely!

ID: 8794

Time required
60 minutes

Activity Overview

In this activity, students will solve linear absolute value equations in a single variable and use their graphing calculator to verify solutions. Next, students will write absolute value inequalities as compound inequalities. Finally, students will solve absolute value inequalities.

Topic: Linear Inequalities

- *Solve a linear inequality involving an absolute value and graph the solution set.*
- *Solve a compound inequality involving AND or OR and graph the solution set.*

Teacher Preparation and Notes

- *This activity is designed for use in an Algebra 1 or Pre-Algebra classroom.*
- *This activity is intended to be **teacher-led** with periods of independent work. It is recommended that you guide students through each problem, and then allow them enough time to complete the exercises as individuals or small groups with your assistance.*
- *Prior to beginning the activity, students should have experience solving and graphing compound inequalities.*
- ***To download the calculator program ABSINEQ and student worksheet, go to education.ti.com/exchange and enter "8794" in the keyword search box.***

Associated Materials

- *Absolutely_Student.doc*
- *ABSINEQ.8xp*

Problem 1– Solving absolute value equations

In this problem students will use the properties of equality to solve an absolute value equation. An example is given on the student worksheet. Make sure that students understand that if there is more than one term in the absolute value bars, $|x - 1| = 5$, they will need to solve two separate equations to find the solutions.

Students are to use the calculator to check their answers to the exercises. To do this, they need to store their possible solution value as X and then evaluate the absolute value equation.

- **abs(** command is entered by pressing MATH and moving to the **NUM** menu.

- **=** is entered by pressing 2nd [TEST].

- 0 is false, 1 is true
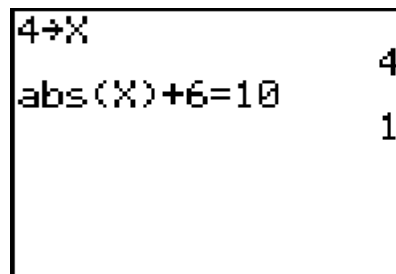
If using Mathprint OS:

When students select the abs(function from the menu, the absolute value bars will appear on the Home screen instead of the function name. They can enter X inside the bars and then press ▶ to move outside the bars and type the rest of the equation..
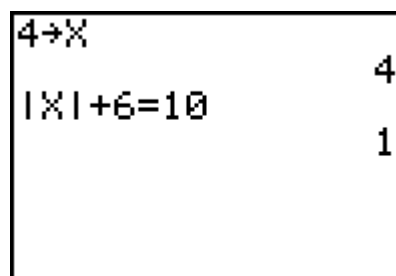
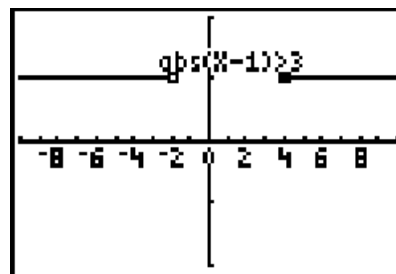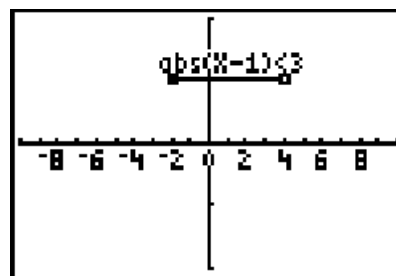**Problem 2 – Absolute value inequalities**

Students will now write absolute value inequalities as compound inequalities and use the ABSINEQ to see the graph.

Discuss as a class what the graph shows when they all graph |x – 1| < 3.

Make sure that students understand that a "closed circle" or is shown as a cross and an "open circle" is shown as a square.

Then students will graph |x – 1| > 3 and from the graph determine that the inequality can be written as a compound inequality, *x* < –2 or *x* > 4.

Make sure that students understand the rules before completing the exercises.

Rules for absolute value inequalities

An inequality of the form $|A| < b$ is equivalent to $-b < |A| < b$.

An inequality of the form $|A| > b$ is equivalent to $A < -b$ or $A > b$.

An inequality of the form $|A| \leq b$ is equivalent to $-b \leq |A| \leq b$.

An inequality of the form $|A| \geq b$ is equivalent to $A \leq -b$ or $A \geq b$.

Problem 3 – Solving absolute value inequalities

In this problem, students are to simplify the absolute value inequality before writing it as a compound inequality. An example is given for them on the worksheet.

They will use **3:Compare Ineq.** in the **ABSINEQ** problem to check their answers by comparing the graph of the original (unsolved) inequality with the solution.

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Left side?4abs(X
+1)
Right side?16
```

Solutions
Problem 1

1. $x = 2$ or $x = -2$ **2.** no solution   **3.** $x = 4$ or $x = -4$ **4.** $x = 4$ or $x = -8$

5. $x = 5$ or $x = -5$ **6.** $x = -2$ **7.** $x = -6$ or $x = 12$ **8.** $x = 5$ or $x = -2$

Problem 2

1. c   **2.** a   **3.** f   **4.** b   **5.** e   **6.** d

7. $x + 7 < -9$ or   **8.** $-6 \leq 3x \leq 6$ **9.** $x < -10$ or   **10.** $-4 < 2.5x < 4$
$x + 7 > 9$ $x > 10$

Problem 3

1. $x \leq -11$ or $x \geq -5$ **2.** $1 \leq x \leq 3$ **3.** $-1 \leq x \leq 7$ **4.** $x < -2$ or $x > 7$

5. $x \leq -2$ or $x \geq 5$ **6.** $x < -2$ or $x > -2$ **7.** $-6 < x < 12$ **8.** $-6 < x < 2$
                                   (or $x \neq -2$)