Solve Me – One and Two-Step Inequalities

by – Amanda Williamson

Activity overview

Students will use the TI-Nspire CAS to check their steps used to solve one and two-step inequalities. They will also use the solve feature to verify that they have the correct solution at the end of each problem. While solving inequalities, many students make careless mistakes with simplifying and this activity helps students check each step of the inequalities instead of waiting to the end of the problem to check the solution.

Concepts

Solving one-step inequalities, Solving two-step inequalities

Teacher preparation

This activity offers students the opportunity to catch careless mistakes while using inverse operations to solve one and two-step inequalities. Students will solve the following inequalities with paper and pencil. After each step, students will verify that the operation used is the appropriate inverse operation or if they made an arithmetic error. Students should be familiar with how to solve one and two-step inequalities before completing this activity.

Classroom management tips

This activity is intended to be student centered and can be completed independently or within small cooperative groups (such as pairs). If cooperative groups are used, every student should have his/her own calculator and should solve the inequalities and enter them in the calculator. Cooperative groups allow students to verbally communicate on how to solve the equations and the mistakes they encounter along the way. If students are not familiar with the calculators, the teacher should demonstrate 1-2 problems to the students using the calculator.

There is no calculator file for this activity. There is a student worksheet for the student to record their work on.

TI-Nspire Applications

Calculator

Step-by-step directions

This activity provides 12 one and two-step inequalities for students to solve independently or with cooperative groups. Students are to complete each step on the student handout. After each step, students are to verify that the steps used produce the resulting inequality that is in their work is correct. Upon solving each equation, students are to use the solve feature on the calculator to verify their solution.

Inequalities to solve:

1. $x + 3 < -1$
2. $x/-6 < -3$
3. $-12x \geq -144$

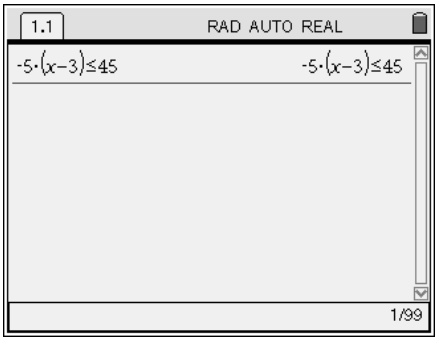
4. $3x + 18 > 12$
5. $4 + 9x \geq -23$
6. $10.5 < -4x + 2.5$
7. $19 - 3x \geq -2$
8. $-5(x - 3) \leq 45$
9. $\frac{1}{2}(x - 6) \leq 22$
10. $x/4 - 6 < -9$
11. $-31.4 \leq 2x + 1$
12. $5.8 > 1 + 0.2x$

To begin this activity, students need a new document. Go to (home) and choose 6.New Document. If it ask "Do you want to save this file?", click yes if that is the appropriate response and save it or (tab) to No and press enter. You then want to choose 1. Add Calculator. Students are now on page 1.1 of this document (see tab at top left of screen). Each problem will be completed on a new page. This document can be saved so that you can check their work on the calculator.

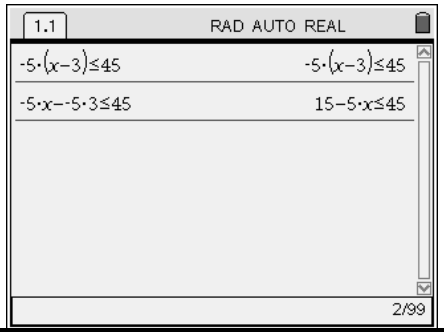
The following is an example of how should complete this activity. Problem #8 will be used for demonstration purposes.

Note: To enter ≤, you type on the calculator <=.

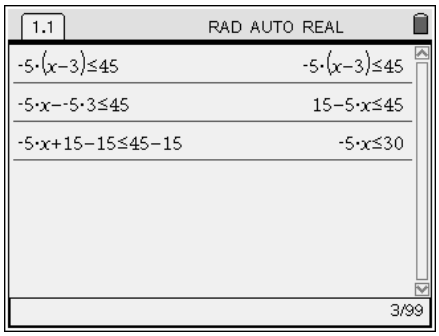
Student work
$-5(x - 3) \leq 45$



$-5(x) - (-5)(3) \leq 45$
$-5x + 15 \leq 45$

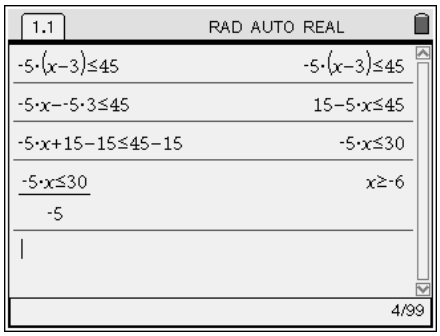


$-5x + 15 \leq 45$
$-15 \quad -15$
$-5x \leq 30$



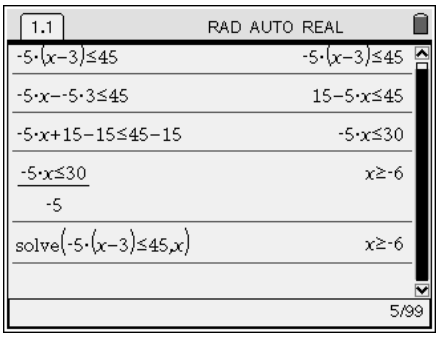
Note: The next step is to divide both sides of the inequality by -5 or multiply by -1/5. To do this on the calculator, you must multiply or divide the entire inequality.

$\frac{-5x}{-5} \leq \frac{30}{-5}$
$x \geq -6$



The last step is for students to use the solve feature on the calculator. To do this, press menu and choose 4. Algebra and 1: Solve. Students will then type in the original inequality followed by ,x (to tell the calculator which variable to solve for).

Solve(-5(x – 3)≤ 45,x)



Students should verify that the solution they found using inverse operations is the same as the solution found using the solve feature of the calculator.

Note: Make sure that students show all work on the worksheet. The solve feature is only one more way to verify their work.

Students should work each problem on a new page. To add a new page to the document, press (home) and 1. Calculator. There will be a new page and you can look at the top of the screen and verify the tab number. I would suggest that students work problem 1 on tab 1.1 and problem 2 on 1.2 etc. It will make checking their calculator work easier.

Note: To move between pages if a document, press CTRL and then left arrow to move to a previous page or CTRL right arrow to move forward.

To save a document, press CTRL (home), 1: File, 4: Save As, choose the folder to save it in, type in the file name and tab to OK. Click OK or press Enter. The file is saved. I would suggest having students name the files using their initials and solveineq.

Assessment and evaluation

- *The solve feature on the calculator provides students with a way to access themselves after each problem. If mistakes are made, they can go back at that point to find them and correct them.*

Evaluation: Answers to problems

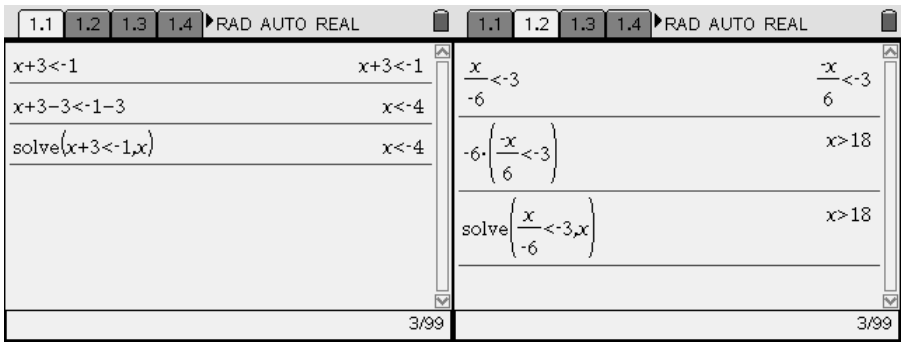
1. $x < -4$	*2. $x > 18$*	*3. $x \leq 12$*	*4. $x > -2$*	*5. $x \geq -3$*
6. $x < -2$	*7. $x \leq 7$*	*8. $x \geq -6$*	*9. $x \leq 50$*	*10. $x < -12$*
11. $x \geq -16.2$	*12. $x < 24$*			

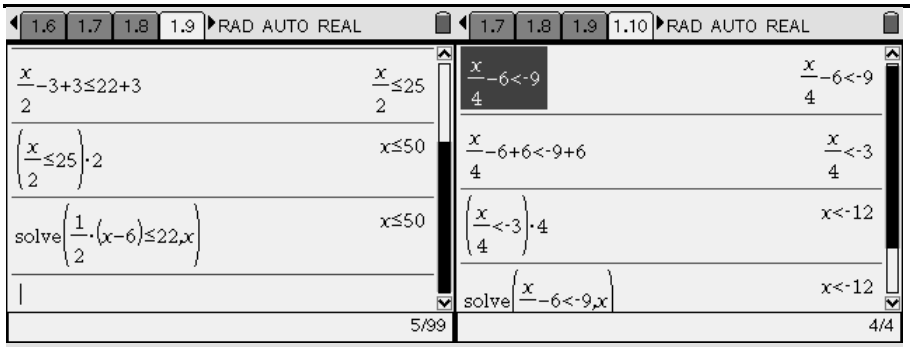
Activity extensions

- *If students had trouble with a specific type of inequality, have them create 3 inequalities of their own and work those and check the steps using the calculator.*

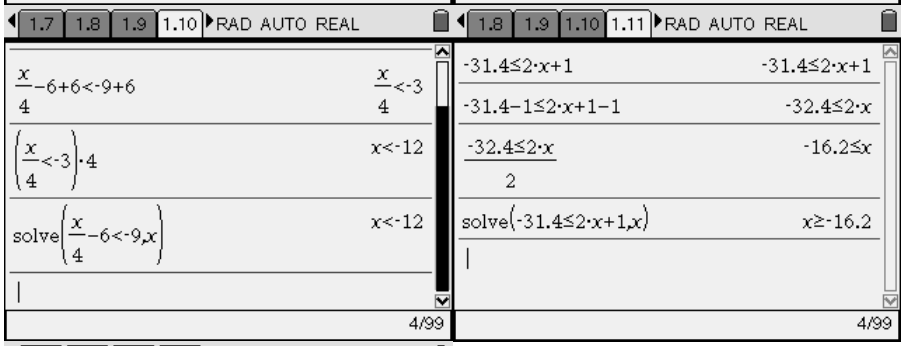
Student TI-Nspire Document

There is no calculator file for this document. The following are screenshots of what the students' calculator screens might look like.

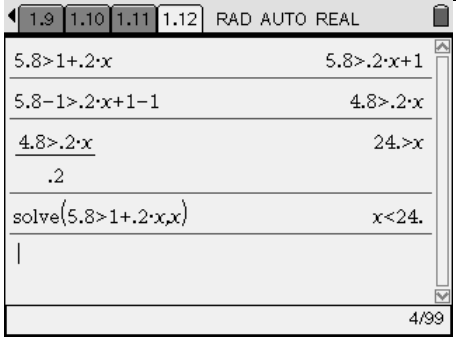



1.6 1.7 1.8 1.9 RAD AUTO REAL
x/2−3+3≤22+3 x/2≤25
(x/2≤25)·2 x≤50
solve((1/2)·(x−6)≤22,x) x≤50
5/99

1.7 1.8 1.9 1.10 RAD AUTO REAL
x/4−6<-9 x/4−6<-9
x/4−6+6<-9+6 x/4<-3
(x/4<-3)·4 x<-12
solve(x/4−6<-9,x) x<-12
4/4


1.7 1.8 1.9 1.10 RAD AUTO REAL
x/4−6+6<-9+6 x/4<-3
(x/4<-3)·4 x<-12
solve(x/4−6<-9,x) x<-12
4/99

1.8 1.9 1.10 1.11 RAD AUTO REAL
-31.4≤2·x+1 -31.4≤2·x+1
-31.4−1≤2·x+1−1 -32.4≤2·x
(-32.4≤2·x)/2 -16.2≤x
solve(-31.4≤2·x+1,x) x≥-16.2
4/99


1.9 1.10 1.11 1.12 RAD AUTO REAL
5.8>1+.2·x 5.8>.2·x+1
5.8−1>.2·x+1−1 4.8>.2·x
4.8>.2·x/.2 24.>x
solve(5.8>1+.2·x,x) x<24.
4/99

by: Amanda Williamson
Grade level: 9-12
Subject: Pre-Algebra/Algebra
Time required: 45 to 90 minutes

Solve Me – One and Two-Step Inequalities
Student Worksheet

Activity overview

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Note: To move between pages if a document, press CTRL and then left arrow to move to a previous page or CTRL right arrow to move forward.

Upon completing the problems, you are to save your document. To save a document, press CTRL (home), 1: File, 4: Save As, choose the folder to save it in, type in the file name as **solveineq*yourinitials*** and tab to OK. Click OK or press Enter. The file is saved.

Solve Me – One and Two-Step Inequalities
Student Worksheet

Complete all of your work in the following table. Make sure that you verify each of your steps using the calculator and use the solve feature to check the solution. To do this, press menu and choose 4. Algebra and 1: Solve. Then type in the original inequality followed by ,x (to tell the calculator which variable to solve for).

Student's Work	Verified with Calculator – Write down what the calculator displays after entering each step.
1. $x + 3 < -1$	
2. $x/-6 < -3$	
3. $-12x \geq -144$	
4. $3x + 18 > 12$	
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