TI-nspire™

Grade level: 6-12
Subject: Pre-Algebra/Algebra
Time required: 45 to 90 minutes

Solve Me – Multi-Step Equations

by – Amanda Williamson

Activity overview

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

Concepts

Solving two-step, solving multi-step equations, and solving equations with variables on both sides

Teacher preparation

This activity offers students the opportunity to catch careless mistakes while using inverse operations to solve multi-step equations. Students will solve the following equations 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 multi-step equations and equations with variables on both sides 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 equations 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 multi-step equations 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 equation 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.

Equations to solve:

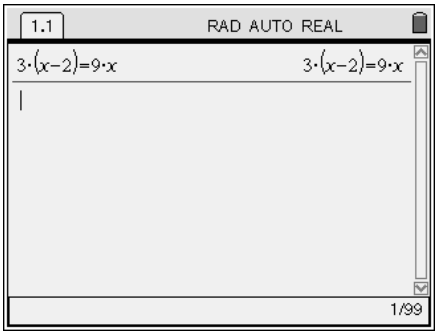
1. $10 - 5x = 15$
2. $62 = -12x + 14$
3. $x + 5 - 2x = -10$
4. $24 = 2(x - 2) - 4x$

5. 5 – 2x – 5 = 27
6. 8 – x/2 = 53
7. 3/5x + 18 = 24
8. 2x + 6 = 5x
9. 3(x – 2) = 9x
10. 8(x + 3) = 10x – 32
11. ¼(x – 8) = ¾ x
12. 4(x – 2.1) = x + 0.6

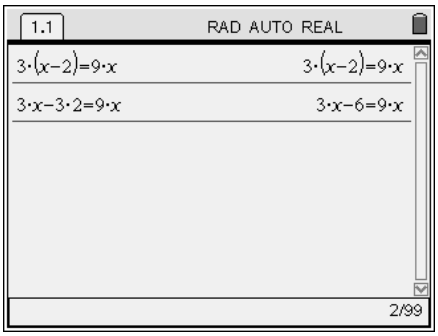
To begin this activity, students need a new document. Go to (home) and choose 6.New Document. If it ask "Do you want to save this file?", click yes if that is the appropriate response and save it or (tab) to No and press enter. You then want to choose 1. Add Calculator. Students are now on page 1.1 of 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 #9 will be used for demonstration purposes.

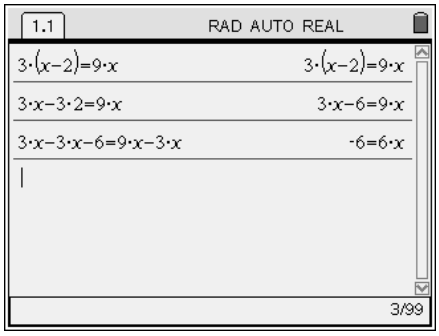
Student work
3(x - 2)= 9x



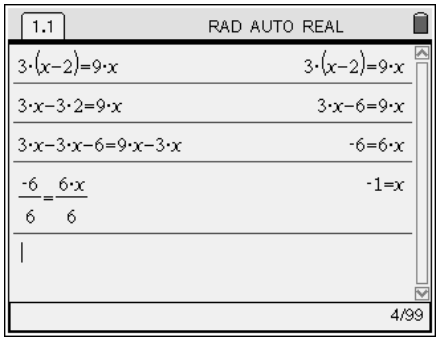
3(x) – 3(2) = 9x
3x – 6 = 9x



3x – 6 = 9x
-3x -3x
-6 = 6x

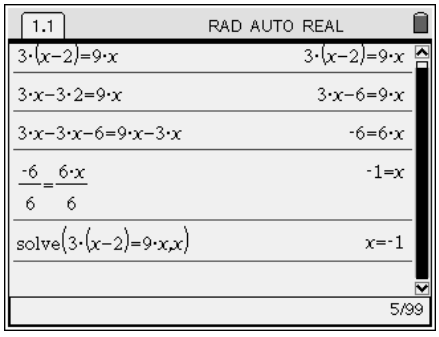


$\frac{-6}{6} = \frac{6x}{6}$
-1 = x



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 equation followed by ,x (to tell the calculator which variable to solve for).

Solve(3(x – 2) = 9x,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 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 solvemseq.

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

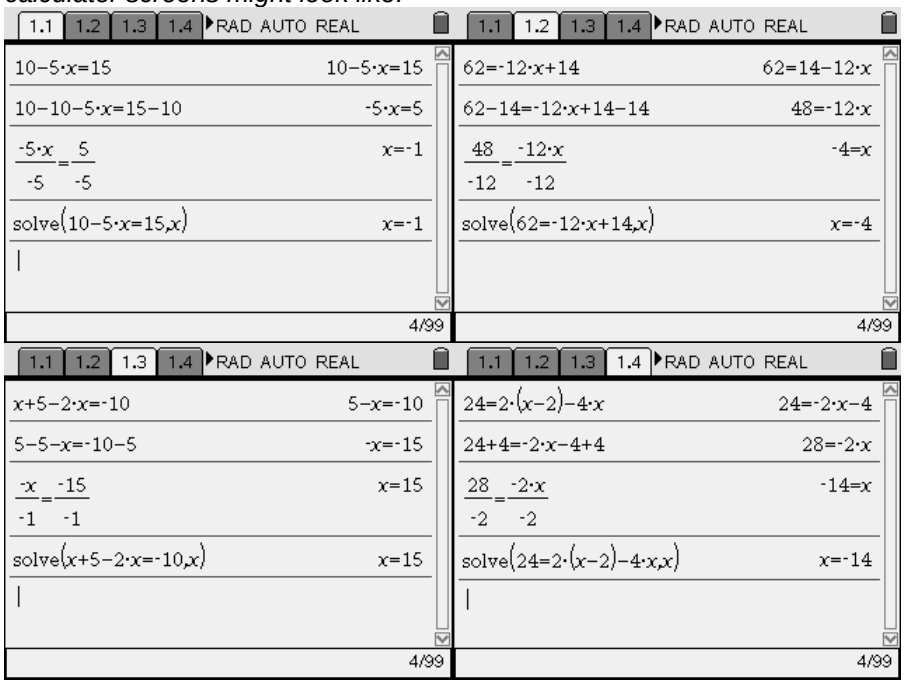
1. -1	*2. -4*	*3. 15*	*4. -14*	*5. -13.5 or -27/2*
6. -90	*7. 10*	*8. 2*	*9. -1*	*10. 28*
11. -4	*12. 3*			

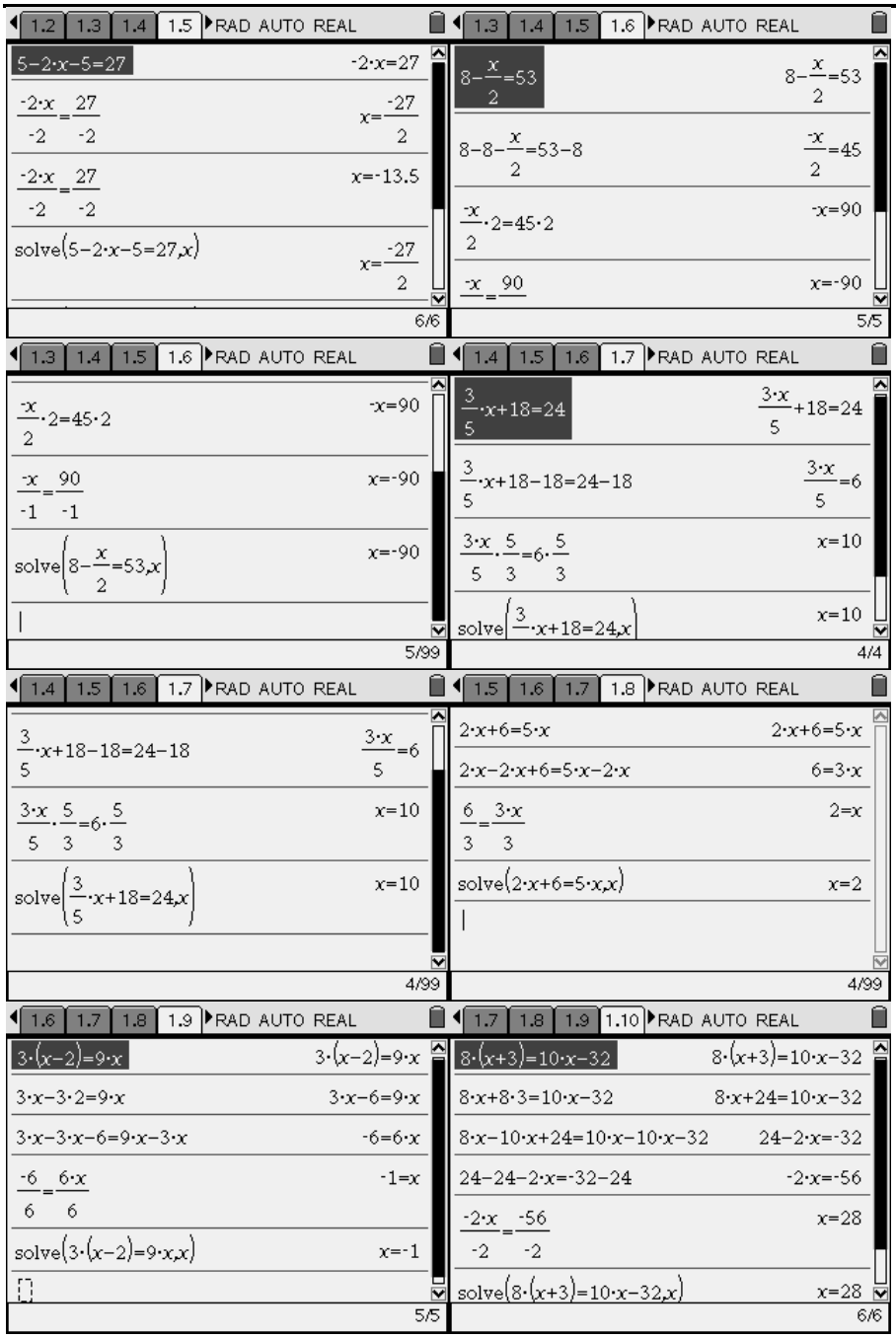
Activity extensions

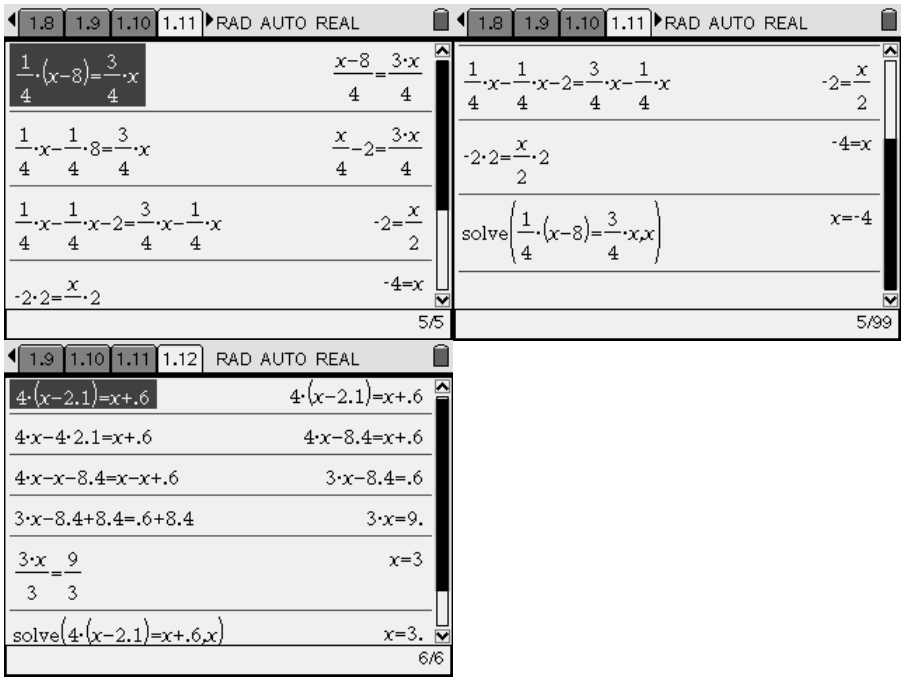
- *If students had trouble with a specific type of equation, have them create 3 equations of their own and work those and check the steps using the calculator.*

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.




1.2 1.3 1.4 1.5 RAD AUTO REAL
5−2·x−5=27
-2·x=27
-2·x/-2=27/-2
x=-27/2
-2·x/-2=27/-2
x=-13.5
solve(5−2·x−5=27,x)
x=-27/2
6/6
1.3 1.4 1.5 1.6 RAD AUTO REAL
8−x/2=53
8−x/2=53
8−8−x/2=53−8
-x/2=45
-x/2·2=45·2
-x=90
-x=90
x=-90
5/5
1.3 1.4 1.5 1.6 RAD AUTO REAL
-x/2·2=45·2
-x=90
-x/-1=90/-1
x=-90
solve(8−x/2=53,x)
x=-90
5/99
1.4 1.5 1.6 1.7 RAD AUTO REAL
3/5·x+18=24
3·x/5+18=24
3/5·x+18−18=24−18
3·x/5=6
3·x/5·5/3=6·5/3
x=10
solve(3/5·x+18=24,x)
x=10
4/4
1.4 1.5 1.6 1.7 RAD AUTO REAL
3/5·x+18−18=24−18
3·x/5=6
3·x/5·5/3=6·5/3
x=10
solve(3/5·x+18=24,x)
x=10
4/99
1.5 1.6 1.7 1.8 RAD AUTO REAL
2·x+6=5·x
2·x+6=5·x
2·x−2·x+6=5·x−2·x
6=3·x
6/3=3·x/3
2=x
solve(2·x+6=5·x,x)
x=2
4/99
1.6 1.7 1.8 1.9 RAD AUTO REAL
3·(x−2)=9·x
3·(x−2)=9·x
3·x−3·2=9·x
3·x−6=9·x
3·x−3·x−6=9·x−3·x
-6=6·x
-6/6=6·x/6
-1=x
solve(3·(x−2)=9·x,x)
x=-1
5/5
1.7 1.8 1.9 1.10 RAD AUTO REAL
8·(x+3)=10·x−32
8·(x+3)=10·x−32
8·x+8·3=10·x−32
8·x+24=10·x−32
8·x−10·x+24=10·x−10·x−32
24−2·x=-32
24−24−2·x=-32−24
-2·x=-56
-2·x/-2=-56/-2
x=28
solve(8·(x+3)=10·x−32,x)
x=28
6/6



Solve Me – Multi-Step Equations
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 **solvemseq*yourinitials*** and tab to OK. Click OK or press Enter. The file is saved.

Solve Me – Multi-Step Equations
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 equation 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. $10 - 5x = 15$	
2. $62 = -12x + 14$	
3. $x + 5 - 2x = -10$	
4. $24 = 2(x - 2) - 4x$	

5. $5 – 2x – 5 = 27$	
6. $8 – x/2 = 53$	
7. $3/5x + 18 = 24$	
8. $2x + 6 = 5x$	
9. $3(b – 2) = 9b$	

10. $8(x+3)=10x-32$	
11. $\frac{1}{4}(x-8)=\frac{3}{4}x$	
12. $4(x-2.1)=x+0.6$	