

Examining Linear Equations

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Materials:

- TI-Nspire™ (non-CAS)
- LinearEquationAlg1.tns
- LinearEquationAlg1.pdf
- TI-Nspire™ Software (for editing)

Level: Beginning Algebra 1

Classroom setup:

- Can be used as a teacher directed demonstration or lesson introduction.
- Can be used as a class activity with students working alone or in groups.

This activity is designed will allow beginning level algebra students to experience multiple representations for the concept of solving linear equations. Students should approach this activity knowing the process for solving simple linear equations algebraically. A certain degree of calculator knowledge is also assumed, such as maneuvering the calculator page, using the “grab” hand, graphing lines, and finding intersection points.

This activity uses the TI-Nspire (non-CAS) to examine linear equations algebraically, geometrically and graphically.

1. *Algebraically:* Students solve simple linear equations using a paper and pencil approach, but use the calculator to check or verify their work. The “nSolve” command is shown as a checking mechanism. In addition, the concept of storing the “answer” in the calculator and then checking the equation for a “true” or “false” reading is presented.
2. *Geometrically:* Students manipulate Algebra tiles as a visual verification that the solution to a linear equation is correct. Using the “grab” hand, students actually move the tile pieces to see the solution to the equation.
3. *Graphically:* Students graph the left and right hand sides of the equation separately on the coordinate axes. The point of intersection is found. The x -coordinate of the intersection point is the solution to the equation.

Note to teachers: The .tns file shows solutions to the algebraic and graphic sections of this activity, for the purpose of clarity of the activity. Using your handheld, or your TI-Nspire software, remove the solutions from these two sections, as the solutions should be completed by the students.

Practice problems are provided to reinforce these concepts of multiple representations. If your students need additional practice solving linear equations “by hand”, have them solve the equations before starting the activity. The activity will then be used to “check” their work. Ask students to show their calculations to the class or ask groups to present solutions.

Screen shots:

FILE: LinearEquationAlg1.tns
LEVEL: Beginning Algebra 1
DEVICE: TI-Nspire (non-CAS)

1.1 1.2 1.3 1.4 ▸ RAD AUTO REAL

Examining Linear Equations

1. algebraically
2. geometrically
3. graphically

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1. Algebraic approach

This first approach will show you two ways to check to see if you have solved your linear equation correctly.

- a. use the "nSolve" feature
- b. use the "store" feature ("sto")

1.1 1.2 1.3 1.4 ▸ RAD AUTO REAL

1. The algebraic approach:

Solve: $x + 2 = 3$

- a. In CATALOG, find "nSolve".
(equation, variable).
- b. Store answer using "sto", then type equation.

nSolve(x+2=3,x)	1.
1 → x	1
x+2=3	true
[]	
	3/99

1.1 1.2 1.3 1.4 ▸ RAD AUTO REAL

2. Geometric approach

The second approach will visually represent the linear equation using Algebra Tiles.

Using your "grab" hand, remove the same pieces from each side of the = sign, until only the tile representing "x" remains on the left.

1.2 1.3 1.4 1.5 ▸ RAD AUTO REAL ctrl

Diagram illustrating the geometric approach using algebra tiles. A large square labeled 'x' is shown on the left side of an equals sign. Below it are two smaller squares labeled '1'. On the right side of the equals sign, there are three squares: two large squares and one small square. A dashed line is drawn below the diagram with the instruction: "Drag removed pieces below this line:"

1.3 1.4 1.5 1.6 ▸ RAD AUTO REAL

3. Graphical approach

This last approach will graph each side of the equation on the coordinate axes, and find the intersection of the two lines. The "x" coordinate of the intersection point will be the solution to the linear equation.

1.4 1.5 1.6 1.7 RAD AUTO REAL

Graph $y = x + 2$ and $y = 3$.

The graph shows two lines on a coordinate plane. The x-axis ranges from -20 to 20, and the y-axis ranges from -20 to 20. The line $f1(x) = x + 2$ is a straight line with a positive slope. The line $f2(x) = 3$ is a horizontal line. The intersection point is labeled $(1, 3)$. The y-axis has a tick mark at 7.15, and the x-axis has a tick mark at 2.

Examining Linear Equations

Name _____

Directions: Read carefully as to how you are to verify your solutions to these equations. Be ready to demonstrate your methods to the class.

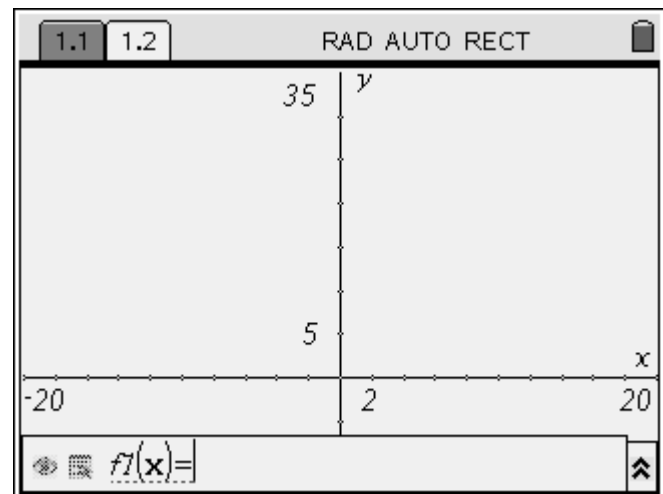


1. Solve for x : $2x + 4 = 10$. Using the “nSolve” command, verify your solution.

2. Solve for x : $4x - 8 = 12$. Using the “sto” method, verify your solution.

3. Solve for x : $x + 4 = 6$. Using Algebra tiles, draw a diagram illustrating this equation and its solution.

4. Solve for x : $3x + 5 = 4x - 3$. Using the graphical approach, verify your solution. Sketch the graph.



5. Solve for x : $4x + 1 = 2x + 6$. Choose a method (not Algebra tiles) to verify your solution.