Mathematics Instructional Plan – Algebra I

Solving Linear Equations Using Functions

**Strand:** Functions

**Topic:** Solving multistep linear equations by finding the zeros of a related function.

**Primary SOL:** A.7 The student will investigate and analyze linear and quadratic function families and their characteristics both algebraically and graphically, including

1. zeros;
2. intercepts;

**Related SOL:** A.4a, A.6c

# Materials

* Computers with internet access
* Solving Linear Equations Graphically activity sheet (attached)
* Graphing calculators

# Vocabulary

expression, function, intercepts, linear equation, slope, solution, zero

# Student/Teacher Actions: What should students be doing? What should teachers be doing?

Note: *Before using this activity, the teacher will need to use the link provided below to visit Desmos, set up an account, familiarize himself/herself with the activity, and create a class code. This class code will allow the teacher to see each student’s progress from a desktop computer as they work through the activity.*

(<https://teacher.desmos.com/activitybuilder/custom/59d677b6c95c18350b897a0b>)

1. Students should each have a computer with internet access on the day this activity is used.
2. Teachers will distribute the Solving Linear Equations Graphically activity sheet and have students visit the website <https://student.desmos.com/>, where they will enter the class code shared by the teacher.
3. The students will progress through the eight slides provided. *(Note: As a teacher, you can monitor their progress on a desktop, or laptop, computer and see who might need your help.)*
4. Students should be recording all work that is requested on the activity sheet.
5. The final practice problem has no solution, so the students will witness that the related function, a horizontal line, has no *x*-intercept.

# Assessment

## Questions

* + - Solve 7*x* + 19 = −2*x* + 55 algebraically. Then, solve the equation graphically to check your solution. Were your results the same? Why, or why not?
		- Consider the following algebraic solution. Look at the graph of a related function to verify that this solution is incorrect. Find and correct any error.

−4(3 − *n*) = 8(4*n* − 3)

−12 − *n* = 32*n* − 3

−9 = 33*n*

 = *n*

 = *n*

## Journal/Writing Prompts

* + - Your teacher gave you the equation $3x+1=4x-3$ and asked you to solve by looking at the graph of a related function. Explain what she means by a “related function” and how that graph can help you solve the given linear equation.
		- In the Desmos activity, we discovered that an equation with no solution has a related function whose graph is a horizontal line that never touches the *x*-axis. How would the graph of a function related to an equation whose solution set is the set of all real numbers look? Explain your reasoning.

## Other

* + - Have students work with partners. One student should solve a given equation algebraically while the other solves graphically. Then, compare solutions and change roles.

# Extensions and Connections (for all students)

* Follow this activity with instruction aimed at using a graphing calculator to determine the zero of a related function.
* Have students apply a similar strategy to solving quadratic equations graphically.

# Strategies for Differentiation

* Project the activity using a demonstration tool (e.g., document camera, digital display) to allow for a more guided learning environment.
* Provide an abbreviated format of the Desmos activity.
* Print the slides of the Desmos activity for students.
* Read questions aloud on each slide.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

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**Solving Linear Equations Graphically**

**Name Date**

As you work through this activity in Desmos, please show any work requested on this sheet.

|  |
| --- |
| Screen 1: Interpreting Solutions |
| $$3x-12=0$$ |
| Screen 4: Try It Out |
| $$5x+1=3x+7$$ |
| Screen 5: On Your Own …  |
| 1. $-3x-5=2x+5$ b.)
 |

|  |
| --- |
| Screen 7: Practice |
| 1.1. $3x+7=-2$ b.)

2.1. $-x=4x-5$ b.)

3.1. $9x-1=7x+3$ b.)

4.1. $5x+3=3\left(x-2\right)+7$ b.)

5.1. $2\left(x+1\right)+x=3x+4$ b.)
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