Writing For A Math Website

In this task, students will write equations with various solution types and provide step-by-step solutions with justifications.

STANDARDS FOR MATHEMATICAL CONTENT:

Work with radicals and integer exponents.

MGSE8.EE.7 Solve linear equations in one variable.

MGSE8.EE.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

MGSE8.EE.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

STANDARDS FOR MATHEMATICAL PRACTICE:

This task uses all of the practices with emphasis on:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tolls strategically.
6. Attend to precision.

BACKGROUND KNOWLEDGE:

In order for students to be successful, the following skills and concepts need to be maintained:

- **MGSE7.EE.3**, **MGSE7.EE.4**

COMMON MISCONCEPTIONS:

- *Students will continue have trouble using inverse operations to solve equations.*

ESSENTIAL QUESTIONS:

- What strategies can I use to create and solve linear equations with one solution, infinitely many solutions, or no solutions?

MATERIALS:

- Copy of the task for each student

GROUPING:

- Partner/Small Group

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION:

Students become designers of mathematics problems that meet the specs of the standards. They design 6 equations and provide step-by-step solutions with justifications as part of a community service project for the school. Students should follow the directions in the task, working with a partner or small group.

Teachers should end the lesson by using discussion questions like those that follow in order to help students make the mathematics more explicit.

Teacher Questions for Facilitating Student Discussion

- *Which categories of problems were the easiest to create?*

- *What strategy did you use to create the problems with infinitely many solutions?*

- *What challenges did your group encounter while completing this task?*

- *Did you notice any patterns? If so, describe the pattern(s).*

- *Would you like to be a writer for a website or textbook company to write math problems? Why or why not?*

DIFFERENTIATION:

Extension:

- Create three word problems that can be solved by writing linear equations. One problem must have one solution, one problem must have no solution, and one problem must have infinitely many solutions. Each problem must also meet one of the specs of the standard as listed below. You may not use a spec more than once.

- linear equation in one variable
- include rational number coefficients
- require use of the distributive property
- variables on both sides of the equation
- require collecting like terms

Write your word problems then solve them showing your solutions step-by-step.

Intervention/Scaffolding:

- Have students try working backwards. Create an example (meeting the specs of the standard) with the class, complete with justification for each step.

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As a community service project your school has partnered with a national web based company to help develop a website that will provide math support to 8th graders with the Common Core Georgia Performance Standards. Your middle school has been assigned the standards below.

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MGSE8.EE.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

MGSE8.EE.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Your help has been requested writing the problems and providing the solutions. The new program will be interactive. It must tell the students if the answer is correct or incorrect and show the problems completely worked out along with justification for each step.

1. Create 6 equations that can be sorted into the categories in the table below (2 per category) and provide solutions to the problem. The solutions must show all steps along with written justifications for each step. Each problem created must meet the specs of the standard as listed below:

   - linear equation in one variable
   - include rational number coefficients
   - require use of the distributive property
   - variables on both sides of the equation
   - require collecting like terms

One Solution	No Solution	Infinitely Many Solutions

2. Provide a written explanation to help other 8th graders understand the meaning of having one solution, no solution, or infinitely many solutions.

Performance Task: Plausible Student Response(s)

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Performance Task: Plausible Student Response(s)

ONE SOLUTION	NO SOLUTION	INFINITELY MANY SOLUTIONS
Equations have one solution when the variables do not cancel out.	*Equations having no solution have variables that will cancel out and constants that are not equal. This means that there is not a value that can be substituted for x that will make the sides equal.*	*An equation with infinitely many solutions occurs when both sides of the equation are the same. Any value of x will produce a valid equation.*
$\frac{1}{4}(8y+4)-17=-4(\frac{1}{2}y-8)$ $y=12$	$-(\frac{3}{4}x+7-\frac{1}{4}x)=19-\frac{1}{2}x$ $-7 \neq 19$	$-6(\frac{1}{2}a+3)+6=\frac{3}{4}(-16-4a)$ $-3a-12=-12-3a$

2. Provide a written explanation to help other 8th graders understand the meaning of having one solution, no solution, or infinitely many solutions.

Comment

Accept a variety of answers.

Teacher Questions for Discussion

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