Title: Cups and Counters

Learning Objectives:

Students will:

- solve equations using the subtraction and addition properties of equality

Materials:

- cups
- boxes
- counters (positive and negative)

Instructional Plan:

The teacher will review with the students the concept of solving equations using the Subtraction and Addition Properties of Equality and tell them that today they will be competing in a race solving equations using cups and counters. They will have to remember the different rules they learned yesterday and solve the problems in a quick, accurate manner in order to win the game. The teacher will review with the students a few algebraic equations and how to solve them. The teacher will tell the students that they must break into groups of 3. Each group member will have a different job and they will have to rotate jobs for each equation.

Runner: Gets the cup and box from the teacher

Solver: Solve the problem using the manipulatives

Checker: Checks the problem using pencil and paper. Then brings the final answer to the teacher and gets the next box and cup.

Then the teacher will demonstrate the activity.

The teacher will tell the students that the runner of each group is going to come up to the teacher and get a cup with counters in it and a little box with counters in it as well. The cup represents the x, the unknown variable that the students need to solve for. The counters in the cup represent the number that is added or subtracted to the x. In the little box will be another set of counters. These counters represent what the cup and counters are equal to. For example, if a student gets a cup with 4 positive red counters in it and gets a little box with 8 positive red counters, it represents the equation $x+4=8$. The goal is for the students to "solve for x" or in this case, get the cup to be empty. For this particular example, the teacher will recognize that there are 4 positive red counters in the cup, which means she needs to do the inverse operation to get rid of them. The teacher will remind the students that whatever you do to one side you have to do to the other. If you take 4 counters out of the cup, you MUST take four counters out of the box. After the "solver" has solved the problem, the checker will check the work with paper and pencil to

make sure the solver is correct. If they are, the checker will become the runner and run to the teacher to get the next problem. If they are not correct, the checker will tell the solver to try again.

Each group will get a basket full of positive and negative counters in case they need more for their problem.

The group with the most correctly solved problems at the end of the class period will be the winners.

Assessment:

- observations

Standards:

NCTM

Algebra

Use mathematical models to represent and understand quantitative relationships

- model and solve contextualized problems using various representations, such as graphs, tables, and equations

Common Core

Expressions and Equations 7.EE

- Solve real-life and mathematical problems using numerical and algebraic expressions and equations

    3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate.
    4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning the quantities

Worksheet

Before getting started:

1. Break into groups of 3
2. Assign each member one job, either the runner, the solver, or the checker (everyone will get to do each job)

JOBS:

Runner: Gets the cup and box from the teacher

Solver: Solve the problem using the manipulatives

Checker: Checks the problem using pencil and paper. Then brings the final answer to the teacher and gets the next box and cup.

How to play: The runner will go up to the teacher and get a cup and a little box both containing counters. The cup represents the unknown variable, or x, that the students are going to have to solve for. The counters in the cup represent the number being added or subtracted to the X. In the little box will be another set of counters. These counters represent what the cup and counters are equal to.

EXAMPLE:

If a student grabs a cup with 4 counters and a little box with 8 counters, that represents the equation

X+4=8

Goal: The goal is for you to "solve for x" or in this case, get the cups empty! Remember, you can only get the cups empty by using inverse properties of addition and subtraction. AND REMEMBER!!! WHAT YOU DO TO ONE SIDE YOU HAVE TO DO TO THE OTHER! After the solver has solved the problem using the manipulatives, the check will check his/her work using pencil and paper. When they are correct, the checker now becomes the runner and the roles rotate.

The group with the most correctly solved problems at the end of the class period will be the winners.