Fruity Math

Lesson Plan

Cube Fellow: Matthew Wells **Teacher Mentor: Kimberly Halsey**

Goal: The main goal of this lesson is to understand conceptually how to solve one-step equations in an early high school Algebra I course. A secondary goal will be in getting the students to see the similarity between algebraic manipulation of variables and algebraic manipulation of numbers. At the same time, though, the students will be able to distinguish between variables and numbers, and be able to apply these ideas in future mathematical content.

Grade and Course: Ninth-Tenth grade Algebra I course

KY Standards: MA-HS-5.2.1 : Students will apply order of operations, real number properties (identity, inverse, commutative, associative, distributive, closure) and rules of exponents (integer) to simplify algebraic expressions.

Objectives: The students will be able to:

1) **Solve one-step algebraic equations involving multiplication and division, such as $2x=10$ or $\frac{1}{2} x = -3$.**
2) **Distinguish between variables and real numbers in an algebraic equation**
3) **Understand how to keep equations balanced when simplifying**
4) **Isolate a variable**
5) **Use these ideas to help in the solving multiple step equations in the future**
6) **Connect the arithmetic of real numbers with that in manipulating variables**

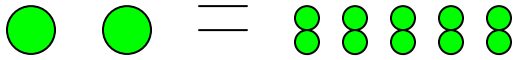
Resources/materials needed: A bag of red apples and a bag of green apples, butter knife, towels

Description of Plan: At the beginning of the lesson, the instructor will remind the class of solving one-step equations involving additions (such as $x+2 = 10$). On the marker board (or chalkboard), the instructor should write the letter "x", and then draw two green dots, and equate this picture to 10 green dots. Then the instructor will demonstrate the act of "taking away" two green dots from both sides. This will motivate the lesson ideas. Then the instructor will ask the students how we might represent the variable x (our unknown), with the ultimate idea of representing "x" with an apple. A discussion should be made concerning negative numbers versus positive numbers (and variables). Here, we use green to represent positive numbers (dots) or variables (apples), and use red for their negative counterparts. A group

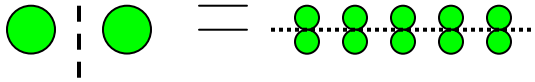
discussion will then be made discussing how to solve one-step equations involving multiplication and division. Here are a few examples:

Example 1: Solve 2x = 10.

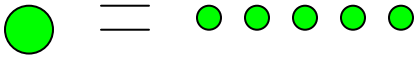
Step 1: Use two green apples to represent 2x and 10 green dots



Step 2: Divide each side into two equal groups



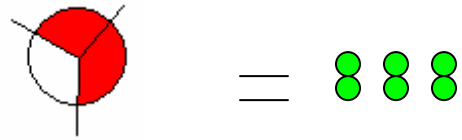
Step 3: Equate one apple to one group of dots



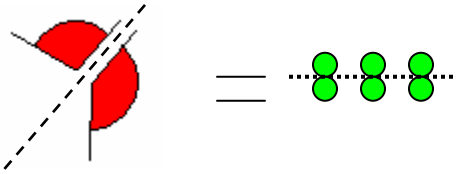
Note: For this example, the numbers are nice, meaning we do not have to slice a dot or apple to create 2 equal groups. Examples with this slicing action should be shown so that other ideas are addressed.

Example 2: Solve -(2/3)x = 6.

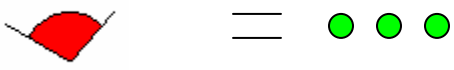
Step 1: Use 6 green dots for 6. Use 2/3 of a red apple for –(2/3)x



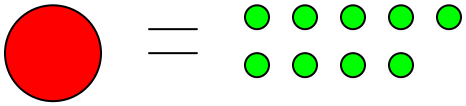
Step 2: Divide each side into 2 equal groups.



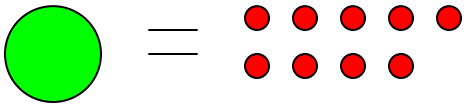
Step 3: Observe that 1/3 of the red apple equals 3 dots.



Step 4: Find the worth of a whole red apple by multiplying by three.

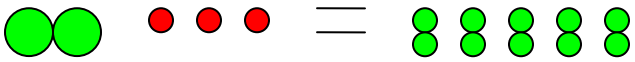


Step 5: Negate both sides ; i.e. change red to green and green to red. As long as we do it to both sides, the equation remains the same. Thus x=-9.



The instructor is encouraged to cut the apples into thirds, as this gives a great visual representation of what is going on. Of course, one should not limit themselves to fractions which are less than 1 and greater than 0. The bonus to cutting the apple(s) is to demonstrate the cutting abilities of the instructor, and grab the attention of the students. The instructor should also think of relating this discussion of apples with money problems. If two apples cost ten dollars, how much will one apple cost? The concept of negating both sides is seen easily in this demonstration, as well as distinguishing between variables and numbers in an equation. The concepts of division and multiplication are also re-enforced, and the students should see the connection between dividing real numbers and dividing "x" into equal piles. This lesson is also a good lead-in to two-step equations. Here is an example:

Example 3: Solve 2x + (-3) = 10.



The concepts are essentially the same, except we must first add three to both sides. Discussion should be had as to what happens when two similar (one red and one green) combine. Here, of course, red and green are opposite, so when put together would make zero.

Lesson Source: **Cube fellow and his affixation with apples**

Instructional Mode: **Interactive lecture**

Date Given: **November 9, 2006** **Estimated Time**: **One 45-minute class period**

Date Submitted to Algebra^3: **November 27, 2006**