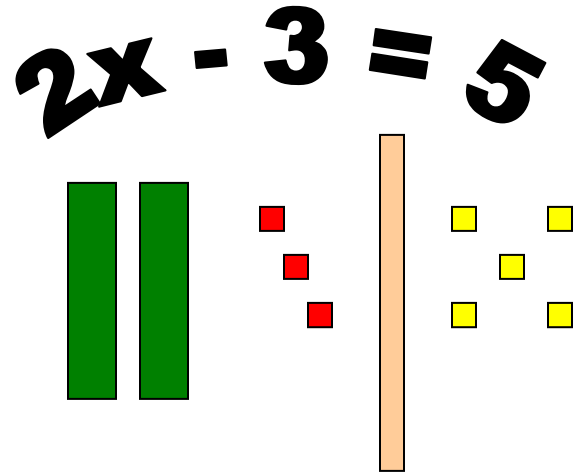**Algebra/Geometry Summer Institute 2008**

Anthony deBlois

Grenada High School

9th-12th Grade

Title: Let Algebra Tiles Solve Equations for You

1.   Teaching
   Objectives: The student will solve multi-step equations.
                           The student will solve multi-step equations using algebra tiles.

2. Instructional
   Activities: (Students will be divided into an equal number of groups so that at
                           least one student with a strong algebra background is in each group. The
                           teacher will put one set of algebra tiles in each group area and will hand
                           out a copy of Attachments B and C for each student to have.)

   I. The teacher will start the lesson by playing a 3 minute movie scene
         for the students on finding the way back home. (See "Homeward
         Bound" ending scene.) The teacher will begin by saying, "When
         someone gets lost, that person wants to find home. When most of you
         look at an algebraic problem, you feel lost and want to find your way
         home by finding out what in the world is 'x', the variable! To find
         your way home, you had to go the way you came in reverse. To solve
         for the variable, you have to do the order of operations in reverse."
         At this point, the teacher will put Attachment A Transparency on the
         overhead. (See Attachment A.) [5 min]

      A. The teacher will first tell the students to copy the notes from the
            overhead (Attachment A Transparency) into their notes section of
            their notebook while the teacher reads aloud what is written on the
            Attachment A transparency.
      B. While making sure the majority of the students have time to copy
            from the overhead, the teacher will use a piece of paper to
            gradually reveal and read what is displayed on the overhead.
      C. The teacher will ask if the class has any questions before moving on
            to the next activity. [5 min]

   II.   Using algebra tiles on the overhead, the teacher will use the model
               on Attachment B to model how to solve the equation that is given.
               (The students will follow the teacher's example and model using
               the algebra tiles at their desk.)

      A. The teacher will tell the students to get out the algebra tiles in their
            group and replicate the model that the teacher models on the
            overhead. (Use Attachment B as a guide to model the example.)

B. As the teacher models the first page of Attachment B with distributive property, the teacher will ask the students, "What does the distributive property imply?"
C. After the student answers correctly, the teacher will tell the class that the distributive property is the act of multiplying each addend separately and then adding the products together.
D. The teacher will take time demonstrating the model on the overhead and require students to draw in their notes section of their notebook the steps to each model being displayed on the overhead. [10 min]

III. The teacher will tell the students to look at worksheet I on their desks and read the directions carefully. (See Attachment C.)

A. By modeling with algebra tiles on the overhead, the teacher will guide the students through problems 1 and 2.
B. Next, the teacher will tell the students to solve problems 3 thru 8 as a group by modeling with algebra tiles.
C. The teacher will tell the students to draw each step of how they modeled with algebra tiles to get their answer. [20 min]
D. The teacher will go over the worksheet with the class and give the class the correct answers.
E. Lastly, the teacher will have one student from each group model with algebra tiles the problems found on Worksheet I. (Have group 1, do number 1, group 2 do number 2, group 3 do number 3, etc….) Also, the teacher will discuss questions 9-12. [15 min]

3A. Materials: Pencil
Attachments A Transparency and Attachment B
Worksheet I (Attachment C)
Overhead
DVD player
Homeward Bound (DVD)
Notebook
Algebra Tiles

3B. Resources: www.math.about.com/odd/algebra/a/distributive.htm. Internet. Last viewed by June 20, 2008.
www.mathbits.com/MathBits/AlgebraTiles/AlgebraTiles.htm. Internet. Last viewed by June 18, 2008.
Price, Rath and Leschensky, William. Pre-Algebra. Mcgraw Hill/Glencoe, June 1999, pp. 151-155.

4. Assessment: The teacher will monitor Activity I to make sure all the students are taking notes. The teacher will observe and correct the groups' work in Activity II. The teacher will have students grade each other's work, and one student from each group will demonstrate with algebra tiles on the overhead each problem from the worksheet in Activity III.

FINDING THE WAY HOME
(ATTACHMENT A TRANSPARENCY)

SOLVING EQUATIONS- USING ORDER OF OPERATIONS IN REVERSE

P		P	BLUE- SAME STREET NAME
E		E	
M,D	REVERSE	A,S	
A,S		M,D	

1. Undo parentheses first, then exponents (sometimes, the same street name is in different locations)
2. Undo addition or subtraction before undoing multiplication or division.

$3(x – 3) = 6$ **DISTRIBUTE BY UNDOING PARENTHESES FIRST**

$3x – 9 = 6$

$\underline{\quad +9 \quad +9}$ **UNDO** [1.] **SUBTRACTION**

$\dfrac{3x}{3} = \dfrac{15}{3}$ **UNDO** [2.] **MULTIPLICATION**

$X = 5$

Attachment B

Using algebra tiles, solve for $3(x - 3) = 6$.

1. Model the distributive property of the left side of the equation.

   A. Model $3(x - 3)$ by saying, "I have three groups of $(x - 3)$."
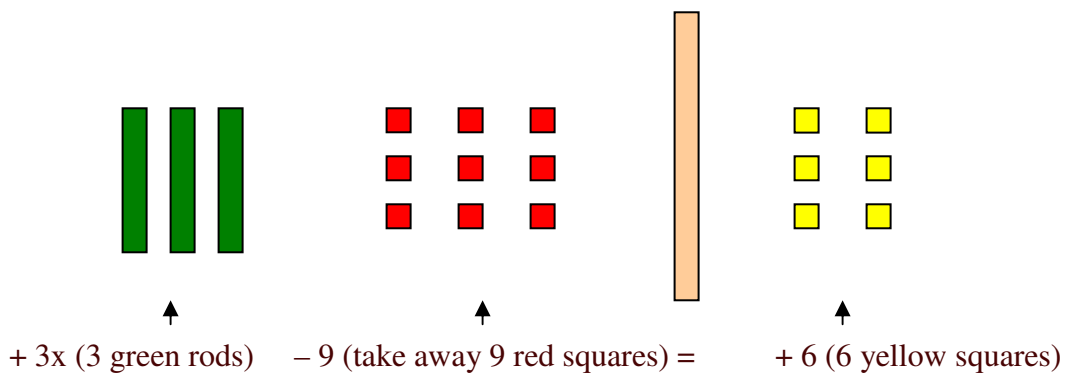
   B. Group the x's and the -3's together.
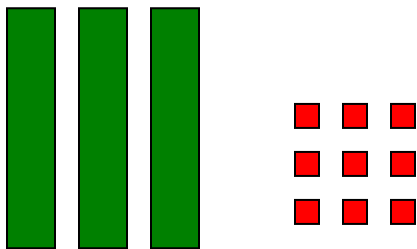
   $(3x - 9)$

   2. Now take the simplified left side of the equation and set it \
      equal to 6. $(3x - 9 = 6)$
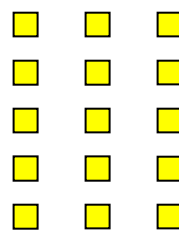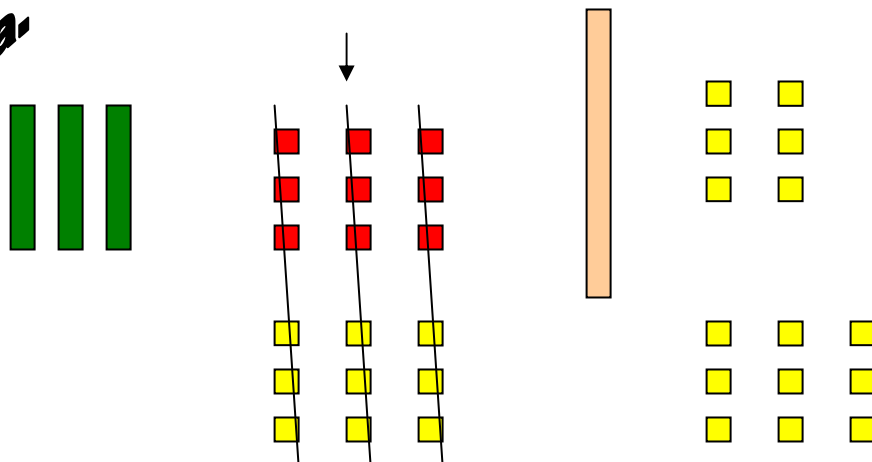
      a. Add the inverse of -9 to each side.
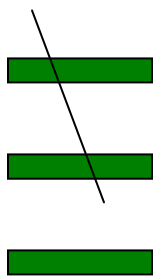   b. Divide each side into equal number of groups.

+ 3x (3 green rods)   − 9 (take away 9 red squares) =   + 6 (6 yellow squares)
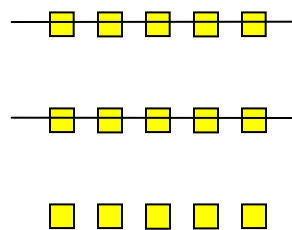
Add +9 to each side.

2a.

2b.

GROUP EQUALLY
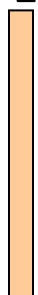
ANSWER
$1X = 5$

Worksheet I
(Attachment C)

Use the algebra tiles to model the following problems. Draw your models on your own paper, and work the problem algebraically as well. Show all work!!!

1. $2x - 4 = 10$

2. $5x - 6 = 3x - 8$

3. $8(m + 5) = 16$

4. $5c - 4 - 2c + 1 = 8c + 2$

5. $-5x + 4 + 2x = 16$

6. $4x + 9 = 2x - 6$

7. $2z - (5z + 1) = 3z + 1$

8. $4y + 3(2y - 4) = y$

9. How many steps are in numbers 7 and 8?

10. Which operation occurs first in numbers 1-8?

11. Which method comes first in numbers 1-8, group or combine?

12. Why is it important to get the variable by itself on one side?