Summer 2016

UTM Middle School STEM Workshop

**Workshop Facilitator**: Dr. Louis Kolitsch

**Subject/Grade**: Solve linear equations. (Grades 7 and 8)

**Estimated time**: 1 hour

**Standard(s)**: TN Mathematics Standards

Grade 7: **7.EE.B.4** Use variables to represent quantities in a real-world or mathematical

 problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

 **a.** Solve contextual problems leading to equations of the form *px* + *q* = *r* and

 *p*(*x* + *q*) = *r*, where *p*, *q*, and *r* are specific rational numbers. Solve

 equations of these forms fluently. Compare an algebraic solution to an

 arithmetic solution, identifying the sequence of the operations used in each

 approach. *For example, the perimeter of a rectangle is 54 cm. Its length is*

 *6 cm. What is its width?*

Grade 8: **8.EE.C.7** Solve linear equations in one variable.

**Objective**: Use manipulatives to solve linear equations.

* I can model the solution of a linear equation using algebra tiles.

**Materials and Resources**: Algebra tiles, Work Mat, Worksheet 1

**Motivating Students/Anticipatory SET:**

Linear equations for real-world problems often require solving for the value of x. For example, to convert Fahrenheit to Celsius temperature (or vice versa), you would use a linear equation in a single variable. This activity is designed to introduce students to the idea of solving a linear equation.

**Instructional procedures**:

* Depending on the class size, give each student or each pair of students a set of algebra tiles.
* Work through Examples 1 and 2, step by step.
* Have the students model how to solve each equation on Worksheet 1 and record the solution.

**Questioning/Thinking/Problem Solving:**

Throughout this activity, the goal is to isolate x on one side of the work mat.

1. What do you need to do to isolate x?

2. What do you need to do if you have isolated –x? How can you adjust your tiles?

**Follow-up Activities/Extensions**:

All of the problems on the worksheet can be modeled so that a single x is isolated. As a follow-up, demonstrate some examples where the coefficient of x is not 1, thus requiring the incorporation of the division model. Since you are using whole tiles, carefully choose the numbers in your examples to exclude remainders or fractional solutions.

**Accommodations/Adaptations:**

Specify the color used for positive values and the color used for negative values so that everyone is using the same color for the same representation.

Give additional examples prior to letting students work on their own.

**Closure:**

Emphasize the connection between the model and the steps in solving the equation.

**Assessment:**

Give students additional problems to solve.

**Teacher Reflection:**

To be completed once the activity has been conducted.

Example 1

Model the solution of *x* + 4 = 3.

Step 1: Represent each side of the equation on the respective sides of your work mat. Use the yellow side of the squares to represent your constants.

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Step 2: Add 4 red squares to both sides of the work mat.

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Step 3: Remove zero pairs from both sides of the work mat leaving you with the following.

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From this we can see that the solution to the equation, *x* + 4 = 3, is *x* = –1.

Worksheet 1

Use algebra tiles to model the solution of each of the following equations on your work mat.

1. *x* + 7 = 9

2. *x* – 5 = 3

3. 2*x* + 5 = *x* + 3

4. 3*x* – 2 = 4*x* – 3

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