Summer 2016

UTM Middle School STEM Workshop

**Workshop Facilitator**: Dr. Louis Kolitsch

**Subject/Grade**: Add and/or subtract linear expressions. (Grade 7)

**Estimated time**: 1 hour

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

Grade 7: **7.EE.A.1** Apply properties of operations as strategies to add, subtract, factor, and

 expand linear expressions with rational coefficients.

**Objective**: Use algebra tiles to add and/or subtract linear expressions.

* I can model the sum or difference of linear expressions using algebra tiles.

**Materials and Resources**: Algebra tiles, Worksheet 1, Worksheet 2

**Motivating Students/Anticipatory SET:**

Many real world applications involve solving systems of equations. For example, studying the traffic moving through a set of intersections requires analyzing a system of linear equations whose variables reflect the movement of cars into and out of each intersection. Solving these systems requires combining linear expressions.

**Instructional procedures**:

* Depending on the class size, give each student or each pair of students a set of algebra tiles.
* Work through Example 1, step by step.
* Have the students model each sum on Worksheet 1 and record the answers.
* Work through Example 2, step by step.
* Have the students model each difference on Worksheet 2 and record the answers.

**Questioning/Thinking/Problem Solving:**

1. How would you use your algebra tiles to represent positive numbers and negative numbers?

2. What is a zero pair? How can you use a zero pair to help you?

3. Show me how to model 7 – 4 using your tiles. Show me how to model 7 – (– 4) using your tiles. How will this help you with your problems?

4. (Once the students have completed their work) What pattern(s) do you see? How could you work these problems without algebra tiles?

**Follow-up Activities/Extensions**:

Use your tiles to add and subtract expressions in two variables (x’s and y’s).

**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 addition and subtraction models and their connection to adding and subtracting “like terms.”

**Assessment:**

Give students additional expressions to add and/or subtract. Include expressions that allow students to experience all possible situations that arise with addition and/or subtraction (including getting a sum or difference of 0 when combining x’s).

**Teacher Reflection:**

To be completed once the activity has been conducted.

Example 1

Model (2*x* + 3) + (*x* + 4).

Step 1: To represent 2*x* + 3 we will need 2 *x*-rods and 3 squares.

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Step 2: To represent *x* + 4 we will need 1 *x*-rod and 4 squares.

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Step 3: Combining these representations we have 3 *x*-rods and 7 squares.

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Thus the sum of the two expressions is 3*x* + 7.

Worksheet 1

1. (*x* + 5) + (2*x* + 3) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. (4*x* + 2) + (3*x* + 5) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. (5*x* + 3) + (2*x* – 3) = (5*x* + 3) + (2*x* + (–3)) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Example 2

Model (2*x* + 3) – (*x* + 4).

Step 1: To represent 2*x* + 3 we will need 2 *x*-rods and 3 squares.

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Step 2: To take away *x* + 4 we will need to take away 1 *x*-rod and 4 squares. To be able to do this we will need to include a zero pair of squares in our representation of 2*x* + 3.

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Step 3: We can now remove 1 *x*-rod and 4 squares leaving us with 1 *x*-rod and 1 red square.

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 Thus (2*x* + 3) – (*x* + 4) = *x* + (–1) = x – 1.

Worksheet 2

1. (6*x* + 4) – (2*x* + 3) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. (3*x* + 2) – (4*x* + 1) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. (4*x* + 5) – (3*x* – 2) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_