PRIME2 Integers Workshop
December 2012

1:00- 1:10	Teachers work on Temperature Changes worksheet as they come in from lunch. Discuss some of the difficulties of the questions. Particularly notice subtraction as a DIFFERENCE between two numbers. When are we talking about DIFFERENCE and when are we talking about CHANGE.
1:10-1:20	Pair:Share: Make list of situations in which negative numbers are used. Write on ELMO. *(Temperature, sea level, owing money, debt, basement, charges on batteries, loss, decrease, withdrawal, down, east/west, north/south)*
1:20-1:40	Think about the Temperature Change worksheet. Thermometers are a type of vertical number lines. Signed numbers are called <u>*Directed Numbers*</u> because they show both magnitude and direction. Give teachers the elevator problem. Have them work on it in partners at their groups. Have volunteers share their work at the ELMO to the whole group. How does an elevator function as a number line? *(you are always adding either positive or negative numbers to the existing level)*
1:40-2:00	What does it look like to subtract a number on a number line? Show a number line. Notice it's symmetry. Do a problem like **10 - 8 = 2.** Subtraction has a direction. Now try subtraction of a negative number like **10 – -8 = 16.** The negative sign is telling you to go in the opposite direction. This is a tricky use of number lines and we need to attend to precision both to symbols and to language. Show teacher the Above or Below Sea Level game. Play a round or two to demonstrate how to play this game. Have partners play. Observe how teachers are playing this game. End with a brief discussion of the benefits and challenges of number lines as a tool to work with negative numbers.
2:00-2:10	**Break**
2:10-2:40	The Chef's Amazing Soup. Read the story out loud and show it on ELMO. Use two colored chips to demonstrate the +4 + –10 and +3 – –2. Have the teachers work at a table to solve the problems on the back of the sheet using the two colored chips. Share strategies for using the model of two colored chips to solve problems with bigger numbers. Notice the partial difference relationship for problem 2.d. -9++3 is the same as -3 + -6 + 3 = -6. Use drawings to help solve the problem.
2:40-2:55	Talk about the "Canceling Model" of negative numbers. Every number has an opposite that when combined, create zero. The idea of negative and positive numbers as opposites is important in algebra. These opposites create a symmetry on the number lines so that if you folding a line over zero, you will find the the opposites align with each other. Introduce the Close to Zero game to be played with dice and chips. Be sure to use the chips to show each move you make. Keep a running record of your results.
2:55-3:00	Where do Negative Numbers fit in the upper elementary curriculum? Show the lesson from EM with neg. numbers. Show current California Content Standards. Finally, show the Common Core and notice that negative numbers have moved to 6th grade as part of a larger investigation of the "Number System".

1:00 - 2:00
Integers on a number line
• Glenn introduces topic of integers.
• Group makes list of situations in which negative numbers are used.
• Group works on Elevator problem with the goal of sharing some solutions on ELMO
• Talk about the number line representation of integers. *(Directed numbers show direction and magnitude)*.
• Talk how to use the number line concept to think of the elevator problem.
• Introduce the Sea Level Game. Play with one person up front, then have partners play together.
• How does this game use the number line concept represent integers?
• What does it look like on a number line to *"subtract a negative number"*?

2:00 - 2:10
Break

2:10 - 3:00
Integers as canceling out
• Introduce another model for negative numbers: two colored chips. Talk about negative numbers as the OPPOSITE of positive numbers (and vice versa). This is a very important idea in mathematics the has repercussions in algebra and beyond.
• Practice using chip mats to "show" random different numbers. Talk about the "creating zero" with two chips of different colors. Zero principal is important in algebra.
• Groups work on IMP hot and cold cubes problem: The Chef's Amazing Soup using the "canceling out" method on boards. Talk about how participants found the solutions. Relate it to "partial difference" algorithm ($-4 + 10$ is the same as $-4 + 4 + 6$).
• Groups play "Connect 3 Integers Game" or "Close to Zero" game with chip mats.
• How does the "canceling out" model compare to the "number line method"?
• **Show where integers fall in the Common Core Standards.**
• CCSS.Math.Content.6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
• CCSS.Math.Content.6.NS.C.6a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.