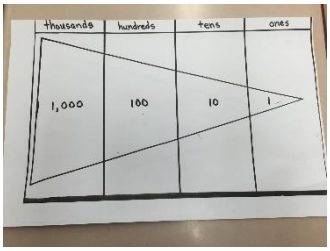
Lesson Title: Triangle Take Away
Grade: 4

Math enduring understandings:

1. Students understand how to make sense of the relationship among place value positions in a base-ten number system.
2. Students understand the difference between the digits, the place, the standard number, the value when subtraction.

Content Standard(s) – Grade 4
NBT.B4 Use place value understanding and properties of operations to perform multi-digit arithmetic.

Materials: Two-sided counters, foam dice with dots 1-6, a set of 3 different colored dice with digits 5 – 9, a game board, writing tool.



Shared experience:

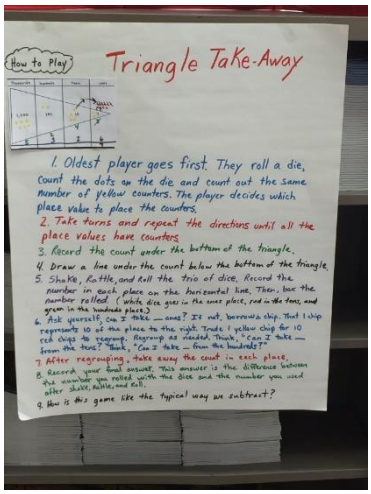
Object: To deepen an understanding or place value and number sense when subtracting by using concrete materials and gradually transition from a game format to a standard algorithm.

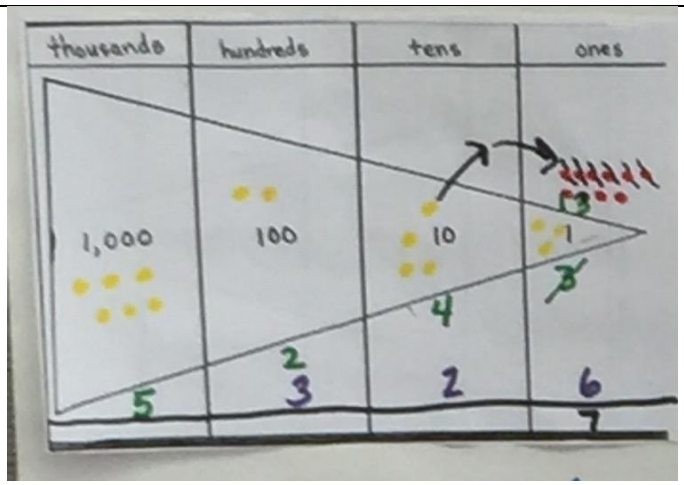
Play: The player rolls a die and count the dots on the die. The count on the die is represented by the counting out the same number of yellow counters. The player decided which place value to place the counters on the game board. The players continues to repeat the process of rolling the die and counting out the counter until all the places have counters.

The player records the count and uses digits as a symbol to represent the total counters in each place order at the bottom of the triangle.

The player draws a line under the triangle.

The player shakes, rattles, and rolls the set of dice that is green, red, and white. The white die digit is placed in the ones place below the line drawn, the red die digit is place in the tens place below the line, the green die digit is placed in the hundreds place below the line.



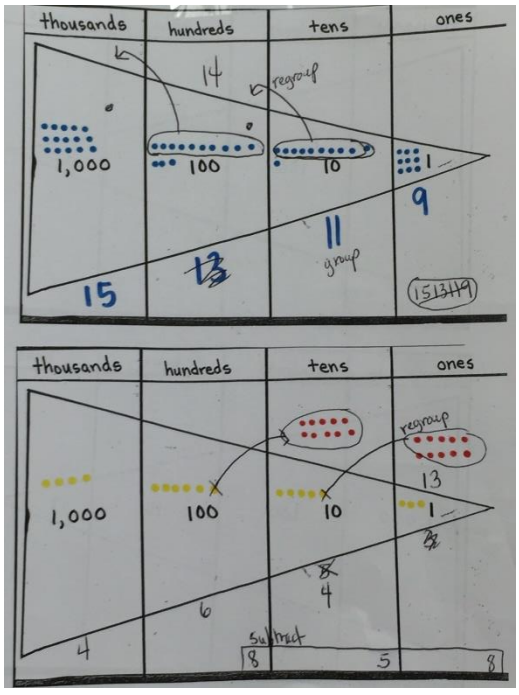


Example of students thinking: The student asks themselves, “Can I take 6 counter away in the ones place when I only have 3 counters there?” The student’s problem solve what to do. Since students have previously subtracted, they are likely to borrow. The key concept is in the understanding of regrouping. One yellow counter can be traded in for ten red counters when the one borrowed counter is moved to the place value to the right. The two-sided counter is important because it helps students use concepts of combinations of ten when taking away. The students record the count of the regrouped counters at the top of the triangle on the game board. After regrouping, the students take away the total counters represented by the white die on the ones place. The students repeat the process until they find the difference between the foam dice standard number and the green, red, and white standard number.

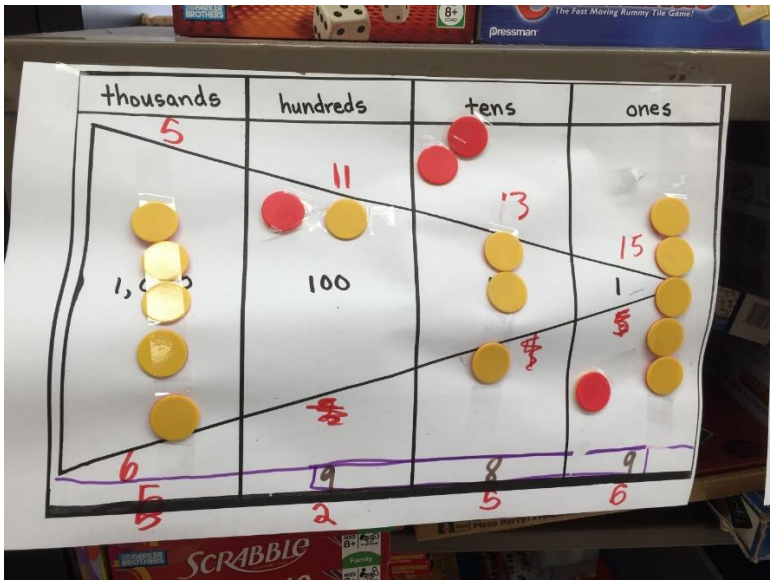
How to win: The player with the highest difference wins a point. The player with the highest points at the end of the game wins.

Example of the regrouping process on paper

The top picture shows addition and
the bottom shows subtraction on paper.



Sample of the game board after the regrouping process

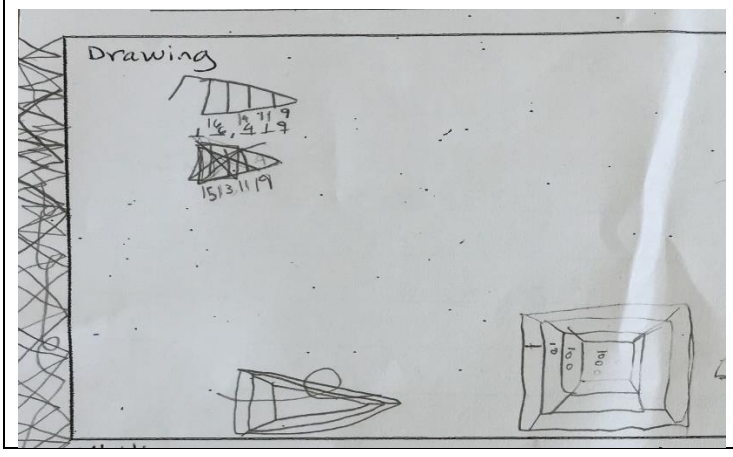


When the student saw they could not take 9 counters away in the ones place because there were only 5 yellow counters. The student removed one counter from the 4 counters in the tens place and wrote a 3 on top to show how many counters were left in the tens place. The student traded in the 1 yellow ten for 10 red ones in the ones place and recorded the count of 15 above the triangle in the ones place. Then the students could take away 10 – 9 and get 1 red counter and think 1 red + 5 yellow is a total of 6 counters in the ones place. Then, the student was to remove 8 yellow counters from the tens place, but only 3 counters were available to remove. Then, the students takes one yellow counter from the hundreds place and trades it on for 10 red counters to represent 10 tens in the tens place + the 3 yellow counters = 13 counters. The count of 13 is written above the triangle in the tens place. Then, the student can see that they have 13 counters because 10 red + 3 yellow = 13 total counters. Now, 8 counters can be removed. If the student thinks 10 – 8 = 2 and 2 + 3 = 5. This same process continues until the total difference is found. 6,245 – 989 = 5,256

Picture or model

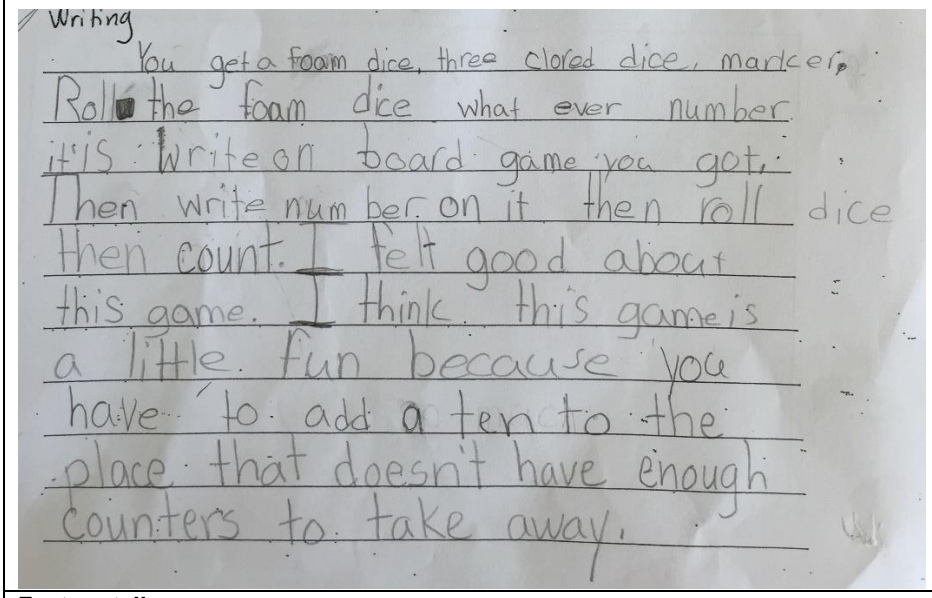
Students will be asked to draw a representation of the game board and the record positions of the counters of each player on their team after each toss in their journals or on the recording sheet.

Example of picture. The student connected this game to a previously played game called Place Value Toss by drawing the squares and the triangle from Triangle Target Toss.



People talk
Students discuss or write what they learned from their own perspective.

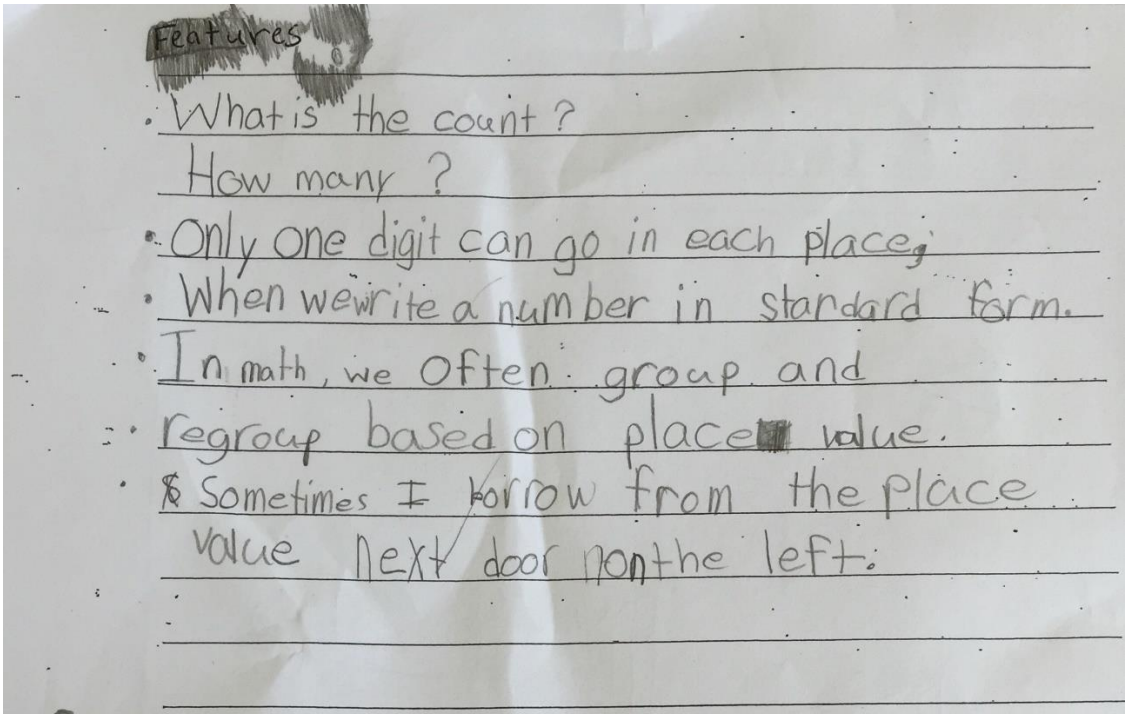
Example of Picture and People Talk on the next page:


Writing

You get a foam dice, three clored dice, marker, Roll the foam dice what ever number it is write on board game you got. Then write number on it then roll dice then count. I felt good about this game. I think this game is a little fun because you have to add a ten to the place that doesn't have enough counters to take away.

Feature talk
Students make conjectures about math related to the game played.

Example of student feature talk:

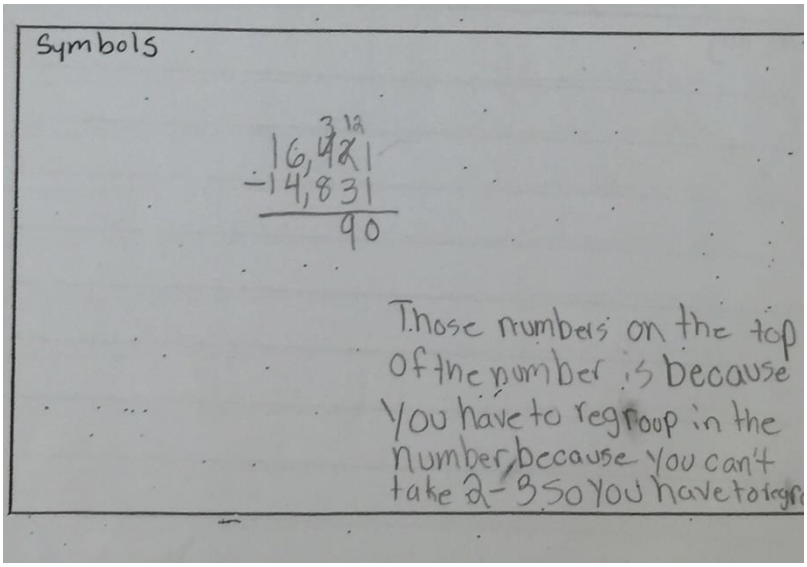

Features

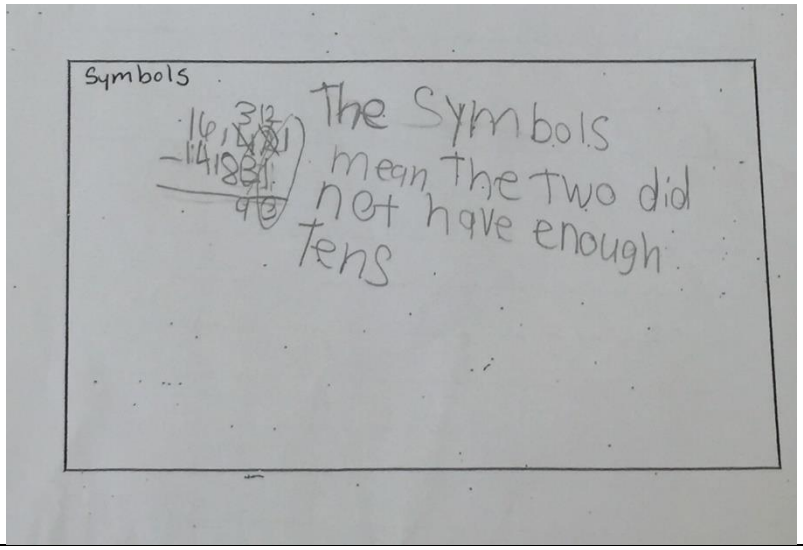
- What is the count?
  How many?
- Only one digit can go in each place.
- When we write a number in standard form.
- In math, we often group and regroup based on place value.
- Sometimes I borrow from the place value next door on the left.

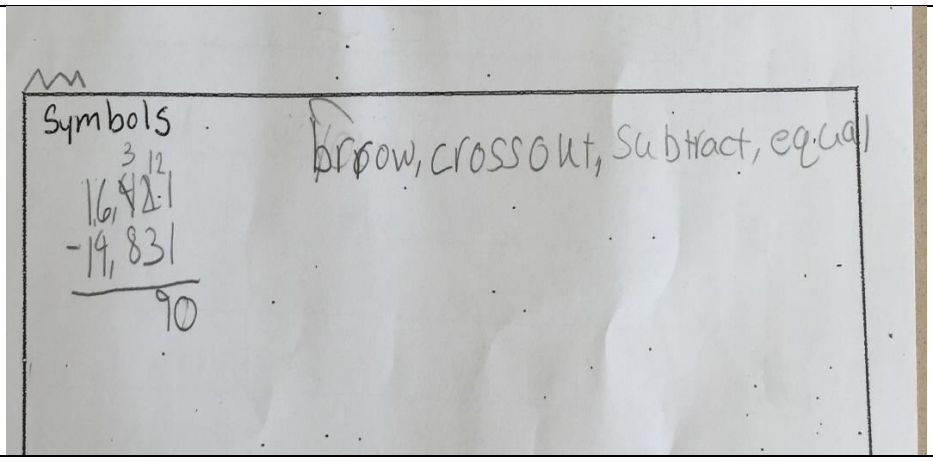
Symbolic representation

Students were given a partially complete multi-digit subtraction problem and asked to make sense of the symbols and explaining the "why?" behind the math.

Three samples of student work:







Extensions/Reteaching/What To Do Next:

After playing this game several times, students are able to transition to lessons such as

GoMath. (2015). *Teacher Edition Chapter 1 Lesson 1.7 Grades 4.* Houghton Mifflin Publishing Company: Orlando Florida. The problem of 16,421 – 19,831 was taken from the unlock the problem in the sited chapter of GoMath.

Teacher reflection:

Students need to understand how to play the game before playing to earn points or playing to win.
Students who struggle with the concept of regrouping and taking away have been successful playing the game and using a white board to show the total count, the regroup, and the take away.

Lesson Written by: Carol Houseworth

The work samples were taken after co-teaching with Jennifer Plaisted and Carol Houseworth. These picture samples are authentic work completed by the students during the 5-step process of this lesson in the Mansfield City School District in the fall of 2015.