Lesson: Adding Natural Numbers Using Base-Ten Blocks
Math Academy
Student Notes:

Goal:
- Summarize that in adding two multi-digit Natural numbers where addends differ in number of digits, one adds according to place value

Prerequisite Knowledge:
- Understand base-ten number system

Activities

1. Working with a partner,
   a. Dump out the contents of each bag separately.
   b. Discuss with your partner: What would the physical action of addition look like with the 2 sets of blocks?

   c. What is the total number of blocks?

   d. How would you represent the total with the least number of blocks possible? Draw the answer in the space provided below. Note if any changes were made with blocks.

   e. Write the addition problem using numbers. Then, figure out the result using the standard paper-and-pencil method.

   f. Discussion: What is the relationship between the trade in the base-ten blocks and the carry in the written work above? Be prepared to share your thoughts with the class.

Amber Schreve and Thomas Geil

2. Working with a partner,
   a. Separately from your partner, think of a 3-digit number. Write this number in the space below.

   b. Share your number with your partner. Draw both numbers below using the least number of base-ten blocks.

   c. Use this space to create your own unique addition problem.

Before Trades:

After Trades (if necessary):

   d. Write the unique addition problem that you and your partner created. Then, find the sum using the paper-and-pencil method.

Amber Schreve and Thomas Geil

e. Discussion: Be prepared to share your thoughts with the class.
   i. If trades were present in your problem, then: What is the relationship between the trade in the base-ten blocks and the carry in the written work above?

   ii. If trades were not present in your problem, then: Explain why there were no trades in this particular problem. How does this relate to the paper-and-pencil method?

3. Whole Class Discussion: How does adding multi-digit natural numbers work? Explain the standard algorithm for adding natural numbers.

Lesson: Adding Natural Numbers Using Base-Ten Blocks
Math Academy
Instructor Notes:

Goal:
- Summarize that in adding two multi-digit Natural numbers where addends differ in number of digits, one adds according to place value

Prerequisite Knowledge:
- Understand base-ten number system

Lesson Materials:

- Base-Ten Blocks
- Baggies

Preparation
- Sort and organize base-ten unit blocks into baggies of 9 blocks each
- Sort and organize baggies with 1 base-ten rod and 2 base-ten unit blocks (a total of 12)

Lesson Breakdown:

Activity	Size of Group	Time in Activity Total Time: 55 minutes
Add 12 blocks and 9 blocks by performing trades and composing tens in physical and written form	Groups of 2	15 minutes
Add 2 unique 3-digit numbers by performing trades and composing tens using diagrams and written form	Groups of 2	30 minutes
Discuss the necessity of trades in the algorithm for addition	Whole class	10 minutes

Amber Schreve and Thomas Geil

Activities

4. Working with a partner,
   a. Dump out the contents of each bag separately.
      Give each group a baggie with 12 small cubes and a baggie with 9 small cubes:
   b. Discuss with your partner: What would the physical action of addition look like with the 2 sets of blocks?

      They should be physically pushing the blocks together. Words like total, all together, combined, etc may be used.

   c. What is the total number of blocks?

      21 small cubes. See if any think to trade 10 small cubes for a rod.

   d. How would you represent the total with the least number of blocks possible? Draw the answer in the space provided below. Note if any changes were made with blocks.

      This should lead to a discussion of composing tens and trading 10 cubes for a rod.

   e. Write the addition problem using numbers. Then, figure out the result using the standard paper-and-pencil method.

      $12 + 9 = 21$. Some students might show a carry and some may just add.

   f. Discussion: What is the relationship between the trade in the base-ten blocks and the carry in the written work above? Be prepared to share your thoughts with the class.

      The carry represents the 10 small cubes becoming one rod or a 'Ten'.

Amber Schreve and Thomas Geil

5. Working with a partner,
    a. Separately from your partner, think of a 3-digit number. Write this number in the space below.

    b. Share your number with your partner. Draw both numbers below using the least number of base-ten blocks.

        Walk around and verify the correct unit shape is drawn. In the case of a 3 digit number there are two possible unit shapes to use. The small cube or the rod. Either is correct but the same unit must be used for both numbers.

    c. Use this space to create your own unique addition problem.

    Before Trades:

    After Trades (if necessary):

    d. Write the unique addition problem that you and your partner created. Then, find the sum using the paper-and-pencil method.

e. Discussion: Be prepared to share your thoughts with the class.
    i. If trades were present in your problem, then: What is the relationship between the trade in the base-ten blocks and the carry in the written work above?

    Discuss how the trade involves 10 of one shape or one of the next bigger shape. Compare that to the carry that shows up above the digits in the paper and pencil method. It's not a one but actually 10 or 100.

    Each group will present their unique addition problem on the board. They will present their drawings of the result along with the written work.

    ii. If trades were not present in your problem, then: Explain why there were no trades in this particular problem. How does this relate to the paper-and-pencil method?

    If trades are not applicable, then have students discuss why not. They selected numbers that do not exceed 10 in each place value.

    Each group will present their unique addition problem on the board. They will present their drawings of the result along with the written work.

6. Whole Class Discussion: How does adding multi-digit natural numbers work? Explain the standard algorithm for adding natural numbers.

    This should lead to the discussion and summarization that when adding two multi-digit Natural numbers where addends differ in number of digits, one adds according to place value

Amber Schreve and Thomas Geil

1. Given:

    a.   Write this quantity using numbers.

    b.   Say this number out loud to yourself using appropriate place value names.

2. Given the number 1,204:
    a.   Draw using base-ten blocks.

    b.   Say this number out loud to yourself using appropriate place value names.

3. Given the addition problem: $436 + 243$
    a.   Represent each number using base-ten blocks.

    b.   Use the base-ten blocks to find the result (sum). Highlight any trades if applicable.

    c.   Do the addition problem using the pencil-and-paper (standard) method.

Amber Schreve and Thomas Geil

d. Explain whether trading or carrying is necessary and which trades are applicable. If trading or carrying is not applicable in this situation, explain why not.

4. Given the addition problem: 105 + 297
   a. Represent each number using base-ten blocks.

   b. Use the base-ten blocks to find the result (sum). Highlight any trades if applicable.

   c. Do the addition problem using the pencil-and-paper (standard) method.

   d. Explain whether trading or carrying is necessary and which trades are applicable. If trading or carrying is not applicable in this situation, explain why not.

<u>Homework: SOLUTIONS</u>

1. Given:

    a. Write this quantity using numbers. **Answer:** 378 [Note: 3 flats represent 300, 7 rods represent 70, and 8 units represent 8 ones]

    b. Say this number out loud to yourself using appropriate place value names. **Answer:** Three hundred seventy-eight.

2. Given the number 1,204:
    a. Draw using base-ten blocks.

    b. Say this number out loud to yourself using appropriate place value names. **Answer:** One thousand, two hundred four [Note: We don't use the word "and" when saying this number out loud. The word "and" denotes a decimal place, so saying out loud: "one thousand, two hundred and four" represents the number 1200.4]

3. Given the addition problem: 436 + 243
    a. Represent each number using base-ten blocks. **Answer:**

= 436

= 243

Amber Schreve and Thomas Geil
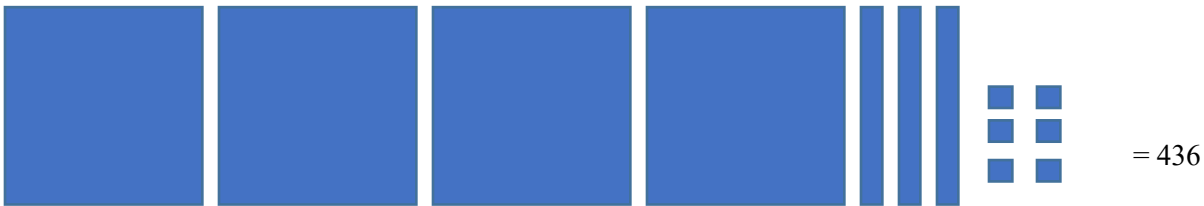
b. Use the base-ten blocks to find the result (sum). Highlight any trades if applicable. **Answer:**
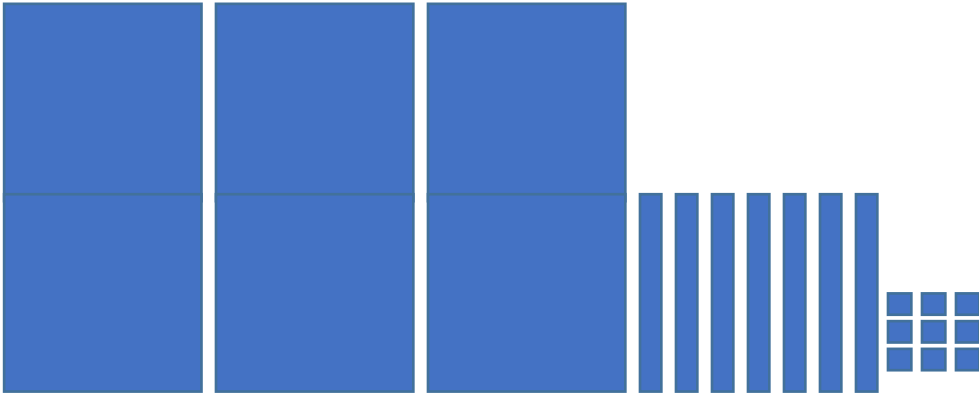
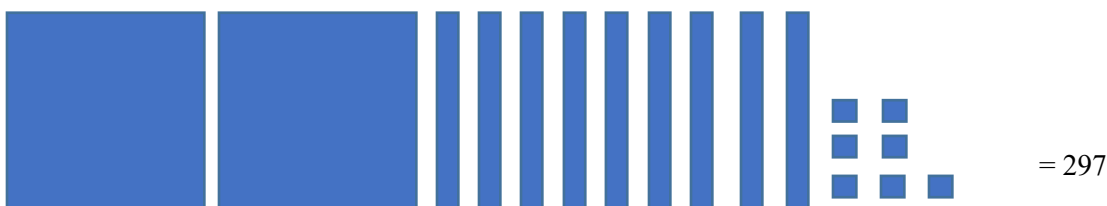c. Do the addition problem using the pencil-and-paper (standard) method. **Answer:**

$$
\begin{array}{r}
436 \\
+\ \ 243 \\
\hline
679
\end{array}
$$

d. Explain whether trading or carrying is necessary and which trades are applicable. If trading or carrying is not applicable in this situation, explain why not. **Answer:**

Trading or carrying was not necessary because the sum in each of the place values was less than 10.

4. Given the addition problem: $105 + 297$
   a. Represent each number using base-ten blocks. **Answer:**

$= 105$

$= 297$

Amber Schreve and Thomas Geil

b. Use the base-ten blocks to find the result (sum). Highlight any trades if applicable.

        i.   Trade 10 blocks for 1 rod
       ii.   Trade 10 rods for 1 flat

c. Do the addition problem using the pencil-and-paper (standard) method.

$$\begin{array}{r} {}^{1\,1} \\ 105 \\ +\ \underline{297} \\ 402 \end{array}$$

d. Explain whether trading or carrying is necessary and which trades are applicable. If trading or carrying is not applicable in this situation, explain why not.

Trading and carrying were necessary because the sum in the ones and tens was 10 or more.

Amber Schreve and Thomas Geil