SCAFFOLDING TASK:  Base Ten Pictures Revisited

In this task the students will create pictures using base ten blocks for numbers between 200 and 1000.

STANDARDS OF MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
   Students will make connections between their base ten pictures (quantity) and the numerical form.
4. Model with mathematics.
   Students use base ten blocks to create and interpret pictures.
6. Attend to precision.

BACKGROUND KNOWLEDGE

Students need to build on their flexible strategies for adding to fluently add and subtract within 100, add up to four two-digit numbers, and find sums and differences less than or equal to 1000 using numbers 0 to 1000 and analyze problems before solving them. Initially, students apply base-ten concepts and use direct modeling with physical objects or drawings to find different ways to solve problems. They move to inventing strategies that do not involve physical materials or counting by ones to solve problems. Student-invented strategies likely will be based on place-
value concepts, the commutative and associative properties, and the relationship between addition and subtraction.

These strategies should be done both mentally and with a written record for support. **It is vital that student-invented strategies be shared, explored, recorded and tried by others.** Recording the expressions and equations in the strategies horizontally encourages students to think about the numbers and the quantities they represent instead of the digits. **Not every student will invent strategies, but all students can and will try strategies they have seen that make sense to them.** Different students will prefer different strategies. Students will decompose and compose tens and hundreds when they develop their own strategies for solving problems where regrouping is necessary. They might use the make-ten strategy (37 + 8 = 40 + 5 = 45, add 3 to 37 then 5) or (62 - 9 = 60 - 7 = 53, take off 2 to get 60, then 7 more) because no ones are exchanged for a ten or a ten for ones. This task presents an opportunity for students to create a picture using base ten blocks (using tens and hundreds only) and then figure out how they want to decompose that amount into different numbers to add together to figure out the total for their picture.

**ESSENTIAL QUESTIONS**

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?

**MATERIALS**

- Centimeter graph paper or base-10 patterns

**GROUPING**

Large Group, Individual

**TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

**Part I**

This task provides an interesting way for students to work with groups of hundreds, tens, and ones.

1. Provide students with centimeter graph paper. Have students trace the hundreds blocks and tens strips on the graph paper first to be sure they are marking the correct amount of squares. Encourage the children to label each part with its value. Have them cut out the pieces so they can use them to make the animal picture below.

2. Display the animal picture below on the overhead. Have the students recreate it with their pieces and then determine the number of hundreds, tens, and ones used to make the picture. Next, have them come up with a total for the “value” of the animal (how much it
is worth). Allow students to work with a partner if necessary. Make sure to discuss the different strategies students use to determine the total value of the animal.

3. When students are sharing their thinking, have them come up and circle the parts they are adding together to show their classmates how they are organizing the numbers in order to reach a total. Ask if any other students had the same total, and if so, have them stand and share their picture at the same time so you can compare/contrast the work.

4. Once the students are comfortable with how to determine the value of a picture, have them take the pieces they made and reorganize/combine them to create their own picture. **Tell them that the value of their picture must be greater than 200 but less than 1,000!** Take time to allow students to share their pictures. Encourage them to be creative!

5. Collect the pictures at the end of the lesson to use for Part II

**Part II**
Hand each student a picture (not their own) from yesterday and have them determine what the total amount should be for the picture. You could post a number line on the wall or board between 200 and 900, and have students attach the picture where it would appear between two hundreds. You could also have students organize them by value, least to greatest or greatest to least. Save the pictures for work mentioned in Part III.

**Part III**
Choose a random picture from the pile of students’ pictures and project it so all can see. Use the Addition and Subtraction Instruction cards from previous activity (Shake Rattle and Roll) and draw out one card (-10, +1-, -100, +100) Have students mentally calculate the new total.

**FORMATIVE ASSESSMENT QUESTIONS**
- What strategy did you use for figuring out how much a picture was worth?
- Could you have created other combinations of numbers to come up with the same total?
- Was it easier to mentally add or subtract? Why?

**DIFFERENTIATION**

**Extension**
- Have the students attribute money amounts to the pieces and then they can determine how much their picture costs.

**Intervention**
- Provide sample pictures that the student can recreate with real base ten blocks. The picture can then be labeled with the correct values and created with centimeter paper.
Base-Ten Picture Recording Sheet

I made a __________________________________________.
(name animal)

My design was built with ______________ base ten blocks.
(write number)

I used ____ flats, ____ rods/longs, and ____ units.

My number has ________ digits.

Here is my number in expanded form.

_____________________________________________________
(hundreds + tens + ones)

I can represent and show numbers using different models, pictures, or number sentences.

My work shows I understand the value of each digit in my number.

What is the difference between place and value?

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