PRACTICE TASK: Base Ten Multiplication

(Inspired by Catherine Twomey Fosnot's, *Young Mathematicians at Work, Constructing Multiplication and Division*)

STANDARDS FOR MATHEMATICAL CONTENT

MCC.3.OA.1. Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

When students begin multiplication they are just getting used to counting. Before multiplication, 6 equaled a group of six objects. They also know that 4 equals a group of four objects. However, to think of 4 X 6 they have to think of the group of six as one unit because they need to make four sixes. The four is now used to count groups not objects. This is a hard concept to grasp for students just learning about numbers. Students have to reorganize their thinking (Frans van Galen and Catherine Twomey Fosnot, 2007, Contexts for Learning Mathematics).

The following task will give students practice in reorganizing numbers and developing strategies that allow them to make sense of the mathematics.

ESSENTIAL QUESTIONS

- What are the strategies for learning multiplication?
- How can we practice multiplication facts in a meaningful way that will help us remember them?
- How is the commutative property of multiplication evident in an array model?

MATERIALS

- Base Ten Blocks, up to 51 cubes and 60 longs per pair (base 10 template has been provided as well)
- Spinner, numbered 1-9
- Packs of 3" X 5" index cards, from 1 to 9 cards per pack, 1 pack per pair
- Overhead Base Ten Blocks (optional)
- Math journal

GROUPING

Partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task students determine the factors of 100 by creating addition and/or multiplication models by placing equal number of Base Ten Blocks of a kind on index cards according to the spin of a spinner. Students then record the number sentences that their model represents.

Part I:

Ask two volunteers to hold out their hands, palms up.

Count out 2 units into each hand. Ask children how they can find the number of units in the four hands. Lead children to count the units by twos. Write this on the chalkboard as the addition sentence 2 + 2 + 2 + 2 = 8. Elicit that 2 units in each of 4 hands means that there is a total of 8 units. Point out that because the same number, 2, is added 4 times, another way of recording this is with multiplication. Write the multiplication sentence 4 X 2 = 8 on the board. Read it aloud as "Four groups of two equal eight." Have students to suggest ways to record 2 cubes in each of 4 hands.

Part II:

Students will work with a partner to determine how many different ways to cover each card from a pack (prearranged according to the students needs) with equal numbers of Base Ten Blocks.

Distribute the prearranged packs of index cards to the students. Instruct the students to determine how many cards are in their packs. They will spread out the cards, then spin a spinner. The number that was spun will determine the number of unit blocks on each card.

- *How many cards?*
- *How many* units *on each?*

The students will determine the product and record the number sentence in their math journal.

Next students will clear off their cards and put an equal number of longs in their place.

- *How many cards?*
- *How many* longs *on each?*

Students will determine the product of the longs and record their number sentence in the math journal. Students will be asked to compare the values they found for the units and for the same number of longs. What did they notice? Repeat the activity several times. (If you spin the same number as before, just spin again!)

FORMATIVE ASSESSMENT QUESTIONS

- What pattern are you noticing?
- What is the relationship between the units and the longs?
- How did you determine your product?
- Could you have determined your product another way?

DIFFERENTIATION

Extension

- Use larger numbers with students that are ready for the challenge

Intervention

- Use smaller numbers and allow students to work in a small group under teacher direction.