LESSON

• Lesson on Concept of Multiplication

We will focus on the important things for students to understand about multiplication – those that they will use, not only as they progress in school, but in their lives:

i. Multiplication is finding the total amount in some number of equal clumps.
ii. For a whole number of equal quantities, multiplication can be thought of, and computed by, repeated addition.
iii. Learning one-digit multiplication facts is simply a way to avoid the drudgery of doing repeated addition.
iv. We indicate multiplication by using the word "times" and the symbol x.
v. The unique roles of 0 and 1 in multiplication must be understood in a conceptual way.
vi. The terms "commutativity" and "associativity" are not appropriate for this grade level but the conceptual understanding of these properties for multiplication is very important and should be carefully developed.

In this program, students will be expected to answer questions that require multiplication – whether or not they have "mastered the facts." If a student has not memorized that 6 x 8 is 48, then he will have to add 8 six times, or add 6 eight times. Perhaps such a student will get so tired of this tedious process, that he will be motivated to remember that the product is 48. It's time for us to admit that for many students, the incessant drill over several grade-levels, is not working. We must back off, teach important mathematics, and let students find out for themselves that they need to memorize the "facts." The bottom line is that they will be held accountable for finding answers to questions which involve products, whether they learn the facts or not!

Example 1:

In Mrs. Miller's classroom, the desks are arranged in 5 rows with 6 desks in each row.

We can write and talk about the total number of desks in many different ways. All of these sentences represent this same situation:

Addition Sentence

6 desks	+	6 desks	+	6 desks	+	6 desks	+	6 desks	=	30 desks
Row 1		Row 2		Row 3		Row 4		Row 5		Total desks

Multiplication Sentences

5 rows times 6 desks in each row = 30 desks

5 rows multiplied by 6 desks per row = 30 desks

5 rows x 6 desks in each row = 30 desks

6 desks per row times 5 rows = 30 desks

6 desks in each row multiplied by 5 rows = 30 desks

6 desks per row x 5 rows = 30 desks

Reading these sentences orally is crucial to students' understanding.

Give special attention to these things during the discussion:

- The symbol, x, is read as times or multiplied by.
- The word per means "in each," or "for each," or "for every," or "out of every."
- All of the numbers in an addition or subtraction sentence must have a common name or label. But each of the three numbers in a multiplication sentence have a different label – one tells how many equal sets; one tells how much stuff per set; and one tells the total stuff.
- 5 rows x 6 desks per row says exactly the same thing as 6 desks per row x 5 rows .

Example 2:

Tennis balls are packed 3 to a can. Mike bought 7 cans. How many tennis balls did he get?

Addition sentence gives us the answer:

3 balls	+	3 balls	+	3 balls	+	3 balls	+	3 balls	+	3 balls	+	3 balls	=	21 balls
Can 1		Can 2		Can 3		Can 4		Can 5		Can 6		Can 7		Total

Short way to write it as multiplication sentence:

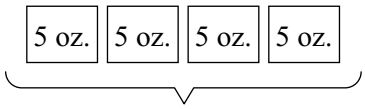
7 cans x 3 balls per can = 21 balls

or

3 balls per can x 7 cans = 21 balls

Example 3:

Serena bought 4 packs of pecans with 5 ounces of nuts in each.



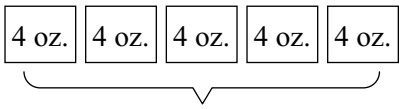
Total 20 oz.

5 oz. + 5 oz. + 5 oz. + 5 oz. = 20 oz.

4 packs x 5 oz. per pack = 20 oz.

5 oz. per pack times 4 packs = 20 oz.

Venus bought 5 packs of pecans with 4 ounces of nuts in each.



Total 20 oz.

4 oz. + 4 oz. + 4 oz. + 4 oz. + 4 oz. = 20 oz.

5 packs times 4 oz. per pack = 20 oz.

4 oz. in each pack x 5 packs = 20 oz.

Emphasize that there are two different situations described in this example. There are several ways to represent each situation: Picture; addition equation; multiplication equations. The picture and equations which represent Serena's packs of pecans are different from those which represent Venus' pecans. This isn't surprising because having 4 bags with 5 oz. in each bag is not the same thing as having 5 bags with 4 oz. in each.

What is the same about the situations, the pictures, and all the equations, is that all of them represent a total of 20 oz. of pecans.

During the elementary grades, children must be comfortable with describing multiplication situations in all these ways. They should learn that these two expressions mean exactly the same thing, and that they are both correct:

2 cookies per student x 23 students

or

23 students times 2 cookies per student

Also, elementary students ought to be using mathematics to answer questions in real, familiar contexts. They should not be doing isolated computation. Things like 6 x 8 with no explanatory labels—should never be encountered. In later grades, and for the rest of their lives, the important thing for them to know is that 6 x 8 and 8 x 6 are the same number—regardless of what those products represent.