

Algebra/Geometry Institute Summer 2004



Lesson Plan 1

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School: Eastwood Cleveland, MS
Grade Level: 8th

1 Teaching objective(s)

The students will model the commutative and associative properties of real numbers.

2 Instructional Activities

Have addition and multiplication problems on the board plus order of operations problems with parenthesis

$$2 + 3 \qquad 7 \cdot 4 \qquad 6 + 8 \qquad 5 \cdot 9 \qquad (6 \div 3) + 8 - 7$$

$$8(1 + 2) - 6 \qquad 9 + (4 - 1) \qquad 52 - 4(5 - 3)$$

The teacher will go over the boardwork and start the discussion of how numbers can be arranged in different orders to produce the same sum or product.

Students will be in groups of four for each activity.

Activity 1

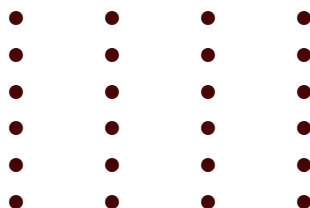
Commutative Property

The teacher will pass out a certain number of double color counters to each group. The teacher will ask students to place the counters in as many arrangements as possible using addition and multiplication. Two or three groups will use addition while the other two or three groups will use multiplication.

The students will arrange the counters (all the same color) into as many arrangements as possible. Once they have arranged the counters into different ways, they will write out the process of how they arranged the counters.

After the students have had time to play with the counters, the teacher will ask the students to explain the way they arranged their counters. As the students are explaining their arrangement, the teacher will write on the whiteboard all the ways the students arranged the counters.

Example: For multiplication: One student might explain that they placed four counters in a row then placed five counters under each of the four.



The next students might arrange their counters in six rows with four going down.

For addition of the 24, students might arrange 6 counters + 8 counters + 10 counters in one group. Another group arranged the counters in 8 counters + 10 counters + 6 counters.

Once each group has explained how they arranged their counters, the teacher will ask the students what is the same about each arrangement. As the students realize that the same numbers in a different order give the same sum or product, the teacher explains that the property they have experienced is the commutative property. She shows them from the whiteboard how two groups with the same number of counters arranged them in different ways.

$$4 \times 6 = 6 \times 4$$
$$6 + 8 + 10 = 8 + 10 + 6$$

The teacher will give out different numbers of counters for the students to arrange using the commutative property. The students will write on their paper the ways they arranged the counters.

Example of number of counters 30 15 9 12

After the students have a better understanding of commutative property, the next activity uses the counters to define associative property.

Activity 2

Associative Property

Using the same counters the students will use their information from their commutative property papers to develop their understanding of the associative property. Associative property will be defined before the activity begins.

They will take numbers and group them together to add or multiply to get the same sum or product they got in the commutative property activity. The teacher will use the overhead projector to show the examples to the groups.

Example For addition: They will place their counters in 6 counters + 8 counters + 10 counters on their table. They will group together the 6 counters and the 8 counters then add. Then they add the other 10 counters to the grouped counters. $(6 + 8) + 10$

Next the students will rearrange the counters into 8 counters + 10 counters + 6 counters. They will group together the 8 counters and the 10 counters to get a sum. Then they will add the other 6 counters to the grouped counters. $6 + (8 + 10)$

For multiplication: They will place three counters in a row with four counters under each counter. Then they will do the same

row/column set up again. They will find the product of the first row/column set up then multiply by two. $(3 \times 5) \times 2$

Next the students will rearrange the counters into a row of two with four counters under each of the two counters. They will do this row/column set up three times. They will find the product of a 5 by 2 set then multiply it by 3. $3 \times (5 \times 2)$

After they have seen how the process works they will be given a number of counters to make different set ups by grouping. The teacher will write the examples on the whiteboard to show how the associative property should be written.

Example of number of counters 30 12 8 15

The students will write on their paper the ways they arranged the counters, making sure they show how they grouped the counters.

To make sure they understand the activity, I would ask questions like:
What is special about the commutative property?
What operations can you use commutative property with?
The activity where you grouped the counters was for what property?
Which property was harder to show?

3 Materials and Resources

Whiteboard
Dry erase markers
Overhead projector
Pencils
Paper
Counters

References: Resource Book – Algebra Hands On. Hands On, Inc., 1990. Pages 95 & 97. Kindergarten through Grade Nine.

4 Assessment

Students will be assessed by the teacher giving each student a certain number of counters. The students will be asked to arrange the counters so they can write a commutative property set up and then rearrange the counters to write an associative property set up.

On the student paper there should be one commutative property sentence and one associative property sentence. The paper could or could not be graded. I would probably use the papers to see what I need to go over more for better understanding.