The commutative property of multiplication

Purpose: To introduce the commutative property in such a way that students will discover it themselves, thus giving them a solid foundation for more advanced concepts.

Prerequisites: Concept of multiplication

Number of students: 1-5

Materials:

- decanomial bead bar box (these will serve as the multiplicand)
- small white number cards 0-9 (these will serve as the multiplier)
- small white cards with the multiplication symbol (x)
- an envelope for the cards
- graph paper
- colored pencils, in the same colors as the bead bars
- small chalkboard and chalk, whiteboard and dry erase marker, or pen and paper

Presentation:

1. Place the bead bar box, the envelope with the number cards and multiplication symbols, and the chalkboard/whiteboard/paper with writing utensil on the table.
2. Invite one to five children to the table for the presentation.
3. Take out a 4 bead bar and the 7 number card.
4. Say: **Let's say we have this** (lift up the 4 bar) **and we want to take it 7 times** (lift up the 7 number card).
5. Make the equation: vertical 4 bar (multiplicand), small white card with x, 7 card (multiplier).
6. Say: **This symbol** (point to the card with the x) **tells us that we will take this number** (point to the 4 bar) **this number of times** (point to the 7 card). **Let's do that.**
7. Take out 7 four bars. Place them together, horizontally, below the vertical four bar.
8. Say: **How many is it?** (Allow the students to answer.) **Yes, 4, 8, 12, 16, 20, 24, 28. The product is 28. Let's make it with the least possible number of bead bars.**
9. Take out two 10 bars and an 8 bar, and place together, vertically, below the horizontal four bars.
10. Say: **Now it's easy to see that 4 taken 7 times is 28. Let's write that down.**
11. Write the equation with the product on the chalkboard/whiteboard/paper.
12. Leave the equation you've already done, and begin it's pair. Take out a 7 bar and the 4 number card.
13. Say: **Now let's say we have this** (lift up the 7 bar) **and we're going to take it this number of times** (point to or lift up the 4 card).
14. Make the equation with the 7 bar, the multiplication symbol, and the multiplier card (4), as before.
15. Say: **How many is it?**
16. Take out four 7 bars, and place them horizontally below the vertical 7 bar.
17. Say: **Yes, it's 7, 14, 21, 28. Let's make the product with the least number of bead bars again.**
18. Take out two 10 bars and an 8 bar, and place them vertically underneath the horizontal bars.
19. Say: **Now it's easy to see that 7 taken 4 times is 28. Let's write that down.**
20. Write the equation on the chalkboard/whiteboard/paper, below the first equation.
21. Say: **Let's do a few more. What multiplicand would you like to start with? Which multiplier?**
22. From here, repeat the process with a few more pairs of equations, until the students tire or until the presentation ends; it should not last more than fifteen minutes.
23. **Follow-up work:** The children make more pairs of equations on their own, using the materials.

When the children have had the opportunity to use the materials on their own and do a few examples, you can show them how to do this work on graph paper, instead of using the bead bars and the number cards. This could be the next day, or later.

24. Take graph paper and colored pencils to the table. Invite one to five children for this short presentation.
25. Say: **Instead of using the bead bars for this work, we can do it on graph paper. We just need the graph paper and the colored pencils. If we want to take 3 six times, we can draw the six 3 bars like this.**
26. Put a pink circle in each of three squares in a row to represent the first 3 bar, and do this five more times below the first one.
27. Say**: I can write the equation underneath my drawing.** (Write 3 x 6.) **And I see that 3 six times is 3, 6, 9, 12, 15, 18. I can write that, too.** (Add = 18 to the equation.)
28. Say: **Then I can interchange the multiplicand and the multiplier. This time I will take 6 three times. So I will draw three 6 bars.**
29. Draw the three 6 bars with purple, to the right of the six 3 bars you drew before, and in the same way that you drew the three bars.
30. Say: **I see that 6 taken 3 times is 6, 12, 18. I can write this equation below the bars I've drawn.**
31. Write the equation 6 x 3 = 18 under the six bars you drew.
32. Say: **Now it's your turn. You can choose more multiplicands and multipliers to use in pairs of equations, and you can draw your work instead of using the materials.**
33. **Follow-up work:** The children continue making their own pair of equations and solving them, now on paper.

When the children have practiced quite a bit, and once they have begun to express to you their discovery that the product of each pair of equations is the same, they are ready for the last presentation of this lesson. In this last, short presentation, we will give them the nomenclature that goes with their discovery: the commutative property of multiplication.

34. Bring a notebook and a pen to the table for the presentation. Invite one to five students (all of whom have already discovered how the commutative property works, just without knowing what it's called) to this short presentation. Students should bring their math notebooks and a writing utensil.
35. Say: **I see that you have discovered that when we mutliply two numbers, we can interchange the multiplicand and the multiplier, and end up with the same product. We call this the commutative property of multiplication. Let's write that down in our notebooks, along with a description and a couple of examples, so we don't forget what it's called.**
36. Write "The Commutative Property of Multiplication" in your notebook as an example. The students should do the same. Then encourage them to write a description of the property in their own words. They should NOT copy what you or other students write. They should also come up with their own examples. A description could say something such as, "I can interchange the multiplicand and the multiplier in a multiplication equation, and the product will remain the same." And some examples could 4 x 7 = 28 and 7 x 4 = 28, 6 x 3 = 18 y 3 x 6 = 18.

I hope this presentation is helpful for you and for your students!

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