Egg Carton Calculations: Facilitator Guide

Grouping is a fundamental concept in mathematics:

- A “number” represents a group containing a specific quantity.
- Groups can be counted.
- Groups can be combined.
- Groups can be removed.
- Groups can be regrouped into sets.

Many young children who struggle with math do so because they have not fully mastered the concept of “group.” Instead, struggling youth often focus on the symbols they write while forgetting about the quantity those symbols represent. For example, the child who writes “26+5 = 211” has not connected the location of the symbol “2” with either “quantity 20” or “2 groups of quantity 10.”

These difficulties grow as youth learn more complex mathematics. By the end of second grade, youth in many communities are expected to work with groups of groups, i.e., multiplication and division. However, many youth conflate multiplication and division with fact families or times tables. For example, the child who aces a timed facts test but cannot solve a multiplication word problem based on those same facts has not connected a memorized shortcut with underlying quantities.

Array models are one way to introduce multiplication and division. Unlike times tables, array models visually represent the quantities involved. For example, the fact “3x5=15” can be represented as 3 rows (groups) of 5 units each. Youth can clearly see that the quantity “3x5” is one row larger than “2x5” and one row smaller than “4x5”. For older youth, “area=lxw” essentially means “solve a 2-D geometry problem by using an array.”

Another benefit of using an array model is that it corresponds to many real-life “packing” or “space-filling” situations. From books on a shelf to baskets of bread rolls to bathroom tiling projects, youth can easily find examples of arrays in their own lives. This particular problem set uses egg cartons to explore up to 5x5=25, but you can adjust the numbers as needed.

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When using these problems with youth, encourage them to engage in a dialogue about methods and processes rather than just check their answers. These prompts can help facilitate deeper conversation about the underlying mathematics:

1. Who solved it using the same method? Did you get the same result? Explain.
2. Who got the same result using a different method? Explain what you did.
3. Who used a completely different method AND got a completely different result? Explain.
4. Will this method always work for problems like this? What would happen if we changed one of the numbers? Both of the numbers?
5. What changes could we make to the problem so that this method stopped working?
6. What are the limitations of this method?
7. What are the benefits of this method?
8. How could we solve this problem using a more efficient method?