

Writing to Learn in Math – How Students Use Math Reasoning

By Emily Espy

The context and my reflections on this work are as follows:

My school is a turnaround school within Boston Public Schools. I teach 8th grade math, and my students are all students of color from a variety of socioeconomic and cultural backgrounds. Throughout the year, our math department has been focused specifically on building students' verbal reasoning and problem-solving skills. We have developed a rubric for analyzing student reasoning through writing, which is attached in addition to the work samples below.



Students were exposed to this rubric around October of this year, and we have revisited it through peer review and self-assessment workshops. Additionally, I am working to conference with students on their written reasoning after every unit assessment. The work you will see was part of our geometry unit on the volume of cones, cylinders, and spheres: students were asked to use their knowledge of these shapes' volume formulas to answer some real-world questions about comparisons between flower vases (task written by Illustrative Mathematics). To get to this level of reasoning and to see students produce this much writing in math class, we have worked on building up some habits by asking the following questions when completing real-world tasks:

- Did I answer the prompt?
- Did I answer with a complete sentence?
- Is my answer reasonable, and will a reader understand my answer?
- Is my vocabulary and math description accurate?

This list is not exhaustive, but rather serves as a foundation for other questions about producing excellent, reasonable written work in math. I am pleased with the students' work submitted here - I would have pushed them to explain more of their math process or reminded them of that desired quality had this been spread out over multiple days or could I do this again.

The additional two samples represent another problem-solving task on volume for your perusal. I am happy to discuss in more detail some of the things we do in math or to provide additional student samples from these tasks and others if desired. Overall, I believe we use exploratory writing the majority of time in my math class, as we are consistently explaining WHY something

makes sense or is true in math. A student recently remarked, "I used to HATE it when you said, 'answer in a complete sentence'...but it's helping me understand better now." Writing is certainly helping produce stronger mathematicians in Boston!

Thank you again for the opportunity. Please do not hesitate to reach out with further questions!

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Score	Strong Reasoning Indicator
___/1	Organized
___/1	Uses accurate math <u>vocab</u>
___/1	Explains thinking needed to address problem in <u>complete sentences</u>
___/1	Contains the answer, clearly indicated (includes units)
___/1	Uses problem solving strategy (create model, estimate, annotations, etc.)
___/5	Total