EDUC 170 – Interview Assignment Template (Sprint 2023)

(Type directly into this template or copy the headings into another document. Please <u>*delete the prompts*</u>*, but keep the headings (e.g. , keep "Identify the Problem(s)")*

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Describe the Interviewee & Setting

To conduct the interview, I met with a fourth grade student attending Lowell Elementary named Alexis. Though this was my first time meeting Alexis, they explained that they liked writing and reading over math, but they still felt like they had a good understanding of math. When we began, Alexis was quick to answer the first two questions but as I asked questions about their thinking, Alexis would take a second to reflect on their answer. Throughout the interview, Alexis felt willing to share their thinking and give a pretty in-depth explanation of what concepts or strategies they used. I noticed that the mental math problems I proposed took a little more thinking since Alexis tried to explain their thinking without seeing it written down. However, for the most part Alexis was ready to give a try to the problems I gave them and explain their process. For this interview, I met with Alexis in-person, at their school at a separate table out in the hallway. Alexis' teacher provided us with base-ten blocks and I brought some writing supplies so that they could solve the math problem in various ways that worked for them.

## Report on Problem or Problem Set #1

A.   Identify the Problem(s)

I asked Alexis to solve the following word problem: "Mr. Arrowsmith has 51 markers. He wants to put them into bags, with 10 markers in each bag. How many bags will he fill? How many markers will be left over?"

I read this problem out loud. Alexis used the paper and pencil to write down the elements of the story problem.

B.   Present Interviewee's Written Work, Your Reproduction of What they Wrote, or Your Raw Notes

The first image is directly from Alexis' work. The work related to this problem is outlined in dark blue. The second image is my rewritten version of their work so that it could be presented a little more clearly in linear steps. I also added the "A," "B," and "C," in blue to use as reference in the next section.
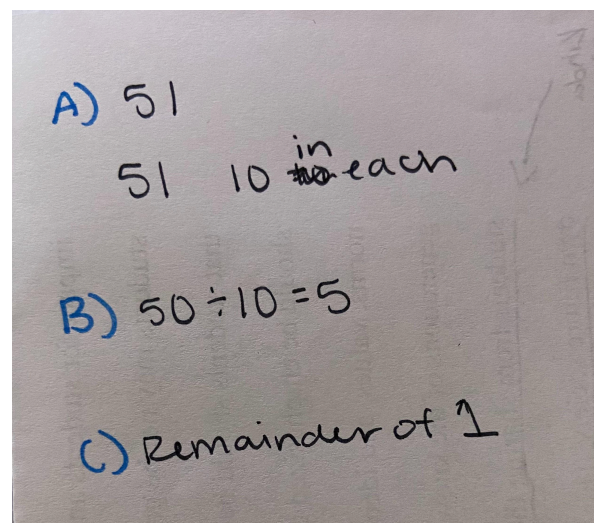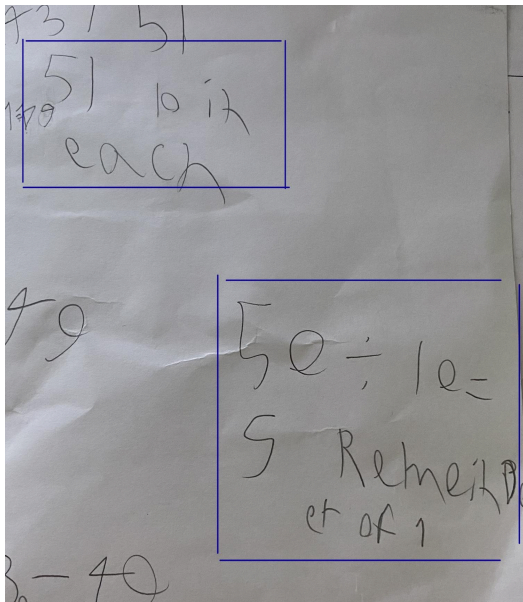
C. Describe the Interviewee's Thinking (*1 short paragraph*)

As I read the story problem out loud, Alexis wrote down the facts of the story as seen in part A with the "51" markers into "10" bags. Alexis promptly began to solve the problem and solved it correctly. Once they finished, they said, "it would be 5 bags and 1 remainder." I then began asking Alexis about their thinking, beginning with the question, "How did you solve that?"

Alexis replied that they knew it was a "simple division problem" so they could just go straight to division as seen in part B. In part B, Alexis wrote $50 \div 10 = 5$ to find the answer to the first question. Then, in part C they knew that there would be 1 remainder because they knew $51 - 50 = 1$, that is how they found the answer to the second question. From this, I asked "Why did you divide 50 by 10 instead of 51 by 10?" And they explained, "I know 5 times 10 is 50 and I also know that division is the inverse of multiplication so I knew that 50 divided by 10 is 5." I finally asked if they could think of another way of solving this problem and they said, "I could do long division but I already know that 50 divided by 10 is 5."

D. Analyze the Interviewee's Thinking (*1 short paragraph*)

To solve this problem, Alexis uses an invented strategy of number/friendly facts. In order to find out what $51 \div 10$ is, they first subtracted $51 - 1$ to use the friendly number of 50. This suggests that they are comfortable with removing a certain value to get a friendly number such as numbers that are even ten numbers. From here, Alexis used another friendly fact that $5 \times 10 = 50$. This friendly fact is something that Alexis said they already knew. Although this does not show up directly in their writing, Alexis explained that because they knew that 5 multiplied by 10 gave them 50, they could use that same fact to divide $50 \div 10$ to equal 5. This suggests that in this problem, Alexis is making connections between the operations of multiplication and division. Since they subtracted 1 from the beginning, Alexis knew that 1 would be the remainder since it did not fit into one whole group. The labeling of the 1 as a "remainder" suggests that Alexis understood the story problem that suggested there would be leftover markers. Additionally, it could suggest that Alexis recognizes that the answer of "5" is a different unit than the remainder of "1".

Throughout this problem, Alexis was willing to explain their thinking even if they didn't write it down. For example, $51 - 50 = 1$ and $5 \times 10 = 50$ are both equations that Alexis knew. This explanation leads me to say that Alexis uses a number/friendly fact strategy for this story problem. I found it interesting that Alexis thought of multiplication and division of inverses of each other, but I did not dig deeper into that part of their thinking. Overall, for this story problem Alexis made some connection back to the story and used a number/friendly fact to solve the problem.

Report on Problem or Problem Set #2

A. Identify the Problem(s)

For this mental math problem, I first encouraged Alexis to try solving it in their head first but also clarified that the paper and pencil were available if they wanted to write it out. I read the subtraction problem out loud: "What is 278 minus 99?."

Alexis thought about the problem in their head and then asked to use the paper.

B. Present Interviewee's Written Work, Your Reproduction of What they Wrote, or Your Raw Notes

After some time, Alexis wanted to write it out so I wrote the equation in blue and the pencil is Alexis' work. This can be seen in the image. I also marked Alexis' steps in pink that are numbered "1," "2," "3," and "4" to refer to in the next section.

C. Describe the Interviewee's Thinking

Alexis first took a couple minutes to solve this subtraction problem in their head. As they were thinking in their head, I heard quiet mumbles from them that sounded something like, "100 minus 9," "16," "117, no 116." Though I could not make out clearly what they were saying, Alexis seemed confused so they asked if they could use the paper.

In blue, I wrote the problem "278 - 99." For a few seconds Alexis looked at it and then wrote the number "178" as seen in Part 1. Even though they had an answer, Alexis did not seem confident in it. They noted that they knew their answer was "one number off" and seemed stumped on what to do next. So then I asked them, "well how did you get to 178? Can you run me through your thinking?" That's when Alexis wrote out Part 2 and explained to me their thinking.

In Part 2, Alexis wrote the equation "278 - 99" but because they knew that 99 was only 1 away from 100, they added the "+ 1" to the original problem which modified the equation to "278 - 99 + 1". They said that because they added the 1 to 99, they could subtract 100 from 278 which brought them to "178." Again, they were unsure of 178 being the final answer so Alexis was still rethinking their work.

I then asked, "Is there a way you can check your answer?" which then prompted Alexis to write out part 3. In part 3, Alexis stated "well I can use the standard algorithm to check my answer." Once they solved the problem through the standard algorithm they said, "hm, I'm getting a different answer...I'm not sure which is correct."

I noticed Alexis was comparing their work in both strategies and after a few seconds it seemed that it clicked for Alexis. In part 4, Alexis adds on to the work that was done in Part 2 by adding "+ 1" to "178" which gives them the full equation of "178 + 1 = 179." They noted that they forgot to add 1 to the other side and said their final answer was 179.

D. Analyze the Interviewee's Thinking

To solve this subtraction problem, Alexis used an invented strategy that included friendly facts. Additionally, they used the strategy of the standard algorithm to help facilitate their problem-solving. The first invented strategy used was seen in part 2. Although they did not write it down, Alexis' explanation clarified that they used "100" as the friendly number to subtract from "278". Alexis used the fact that 99 + 1 = 100 to solve "278 - 100." This could suggest that Alexis feels

comfortable finding a friendly number to subtract between large numbers. When Alexis used the standard algorithm to check their work, Alexis was confused that they were arriving at two different answers ("178" from the friendly fact and "189" from the standard algorithm). This suggests that Alexis knew of different approaches to solve this subtraction problem and that Alexis may be comfortable with different strategies but is also actively comparing how the answers should match.

Although Alexis made an error in the standard algorithm, we did not look deeper into why they arrived at a different answer. Instead, Alexis directed their attention to their work in part 2. Once they realized that they needed to add "+ 1" to 178 since they added an extra value from "278 - 100," it made me think about relational calculations/structure. Though this problem was not set up to analyze an understanding of the equal sign, it made me reflect and begin to think that Alexis used a relational-structural approach. Alexis explained briefly that they realized they need to add 1 to the left side in order to find the answer of "179". Because I did not ask Alexis further questions about why they needed to add 1, it is difficult to suggest clearly what they were thinking.

Working through this problem with Alexis was incredibly interesting because they were using different strategies to show their thinking. Alexis was also willing to continue to solve this problem despite their confusion. It made me think about how math is like a puzzle so I was just as interested in finding the right answer. Anyway, if I was able to ask Alexis more questions I would ask a question related to how they solved using the standard algorithm. Additionally, I would ask deeper questions about why they ended up adding 1 to the 178 and which strategy they felt comfortable with the most. Alexis was using a variety of strategies to solve this problem and was willing to work through their confusion.

Reflect

Reflect on your experience preparing and conducting this interview and analyzing your interviewee's thinking. What did you learn? What was most interesting? What was most challenging? What questions did it raise?

When I was preparing for the interview, I found myself having a little trouble choosing what problems to prepare. I grew up in Central Washington and with some tutoring experience I've gained in Seattle, I've noticed that the pace of the math curriculum varies by districts. This understanding led me to choose between different types of problems and to have a variety of numbers ready to ask based on the students comfort. As I was conducting the interview I made sure to clarify the resources available to the student so that they could solve the problem through a method that worked for them. Additionally, I made sure to both write and speak out loud the problems depending on what the student needed to understand what they needed to solve. During the interview, I was surprised to see Alexis' willingness to share and explain their thinking process. Because of the student's clarity, it allowed me to make connections between their work, thinking, and mathematical concepts I've learned about.

As I took notes of the student's explanation and what they told me, I could already begin connecting class concepts to their work. However, as I reviewed the work and took a deeper analysis it led me to think more deeply about their thinking. I had more questions as I looked at the work for a second time. It was most interesting to see the student work through their confusion and how they decided to approach the problem with different strategies. This made me pay closer attention to how they used each strategy and how it produced an incorrect answer. Similarly, I found it the most challenging to not suggest how they could solve the problem but rather just to understand their thinking. As a tutor, it felt a little difficult to not nudge them to the solution but I tried my best to ask questions to both understand their thinking and to have them walk through what they were doing. Overall, it was a very useful experience to be able to connect the concepts we've learned in class with the real thinking of current students.