Grade 6 / Case Study 2

MATH * SMARTER BALANCED PERFORMANCE TASK

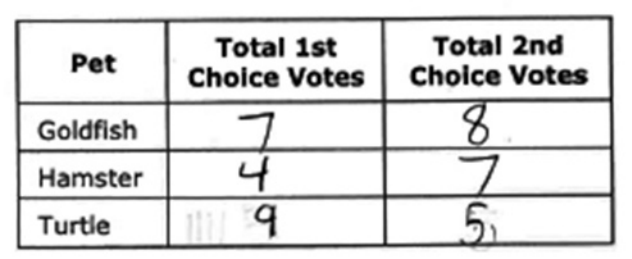
Item 1

Using the class data shown in **Table 1**, complete the following frequency table.

Table 1. Class Pet Votes

Student	1st Choice	2nd Choice	Student	1st Choice	2nd Choice
1	Turtle	Hamster	11	Turtle	Hamster
2	Goldfish	Hamster	12	Turtle	Goldfish
3	Goldfish	Turtle	13	Hamster	Turtle
4	Hamster	Turtle	14	Hamster	Goldfish
5	Goldfish	Turtle	15	Turtle	Goldfish
6	Turtle	Goldfish	16	Goldfish	Turtle
7	Hamster	Goldfish	17	Turtle	Goldfish
8	Turtle	Goldfish	18	Turtle	Goldfish
9	Goldfish	Hamster	19	Turtle	Hamster
10	Goldfish	Hamster	20	Goldfish	Hamster

Student Response to Item 1



Pet	Total 1st Choice Votes	Total 2nd Choice Votes
Goldfish	7	8
Hamster	4	7
Turtle	9	5

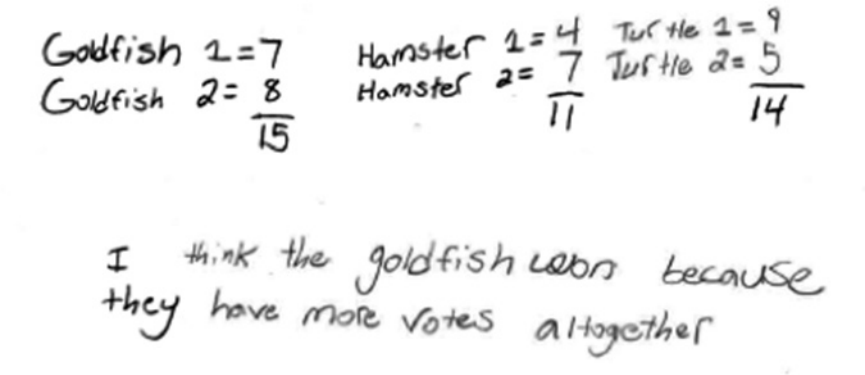
Analysis of Response to Item 1

The response earns full credit, 1 point. The student correctly interpreted the data table and entered all correct values in the frequency table. S/he has demonstrated s/he understands the context and the representation of the data.

Item 2

Create your own method for using the votes to decide a winner. Explain your method using the information from **Table 1** to determine the winning pet.

Student Response to Item 2



Analysis of Response to Item 2

The response earns full credit, 2 points. The student's work shows the method used and explains which pet is the winner based on the method. This student's method was to add the 1st and 2nd choice votes together to determine the winner. This student has clearly communicated an understanding of the task, used the provided data, and created a model to determine and justify the winning pet.

Item 3

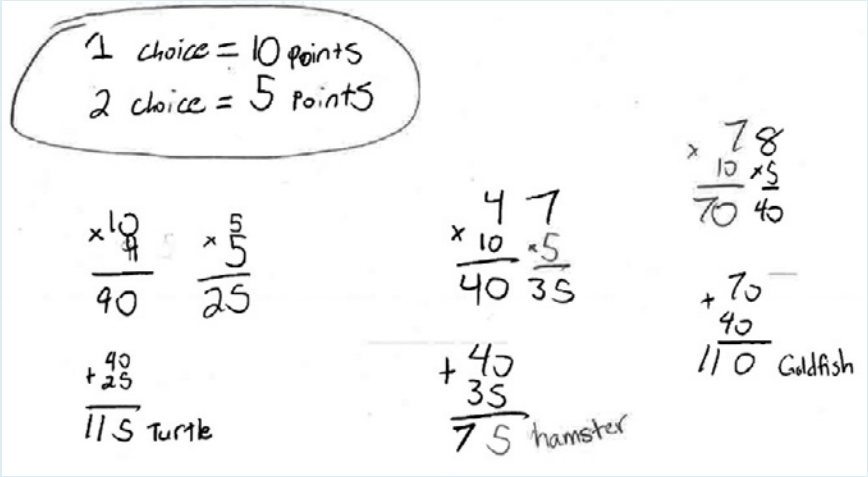
Your teacher wants to use a point system to select the winning pet. She wants each pet to get a certain number of points for each 1st choice vote and a certain number of points for each 2nd choice vote.

Your teacher decides to use these rules for her point system:

- Points need to be positive whole numbers
- Points for a 1st choice vote have to be greater than or equal to the points for a 2nd choice vote.

Determine point values for the 1st and 2nd choice that would result in the **turtle winning**. Use words and numbers to explain how this point system results in the turtle winning.

Student Response to Item 3



Analysis of Response to Item 3

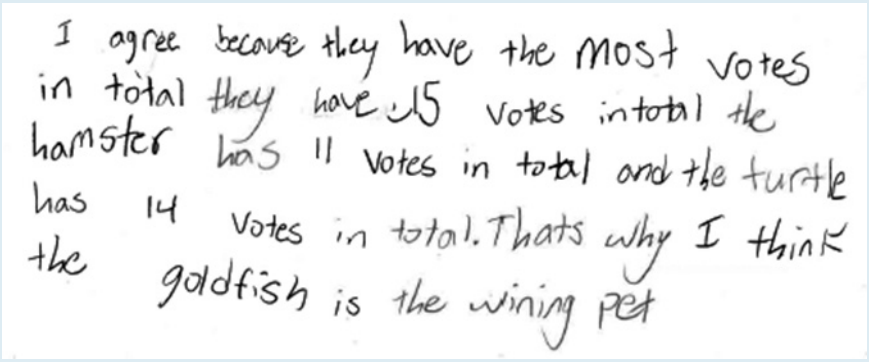
The response earns partial credit, 1 point. The student described a method that meets the two criteria but did not explain how the turtle would win using this method. First choice votes have been assigned a value of 10 points and second choice votes half that value. The student's work includes correct calculations to show how this model would result in the turtle winning, however, the student never explicitly stated the turtle won. This student has partially demonstrated the mathematical content and practices essential to this task.

Item 4

Your classmate claims that there is **no** point system that could result in the goldfish winning. Do you agree or disagree with your classmate?

Use words and numbers to explain your reasoning.

Student Response to Item 4



Analysis of Response to Item 4

This response earns no credit, 0 points. This student agreed with the claim but provided an explanation for why the goldfish would win if each vote was counted as one point. This response does not demonstrate an understanding of the content and practices essential to the task.

Item 5

Your principal surprises you by buying your class a turtle. He brings the turtle to your class along with a sheet from the pet store titled "Turtle Tank Rules."

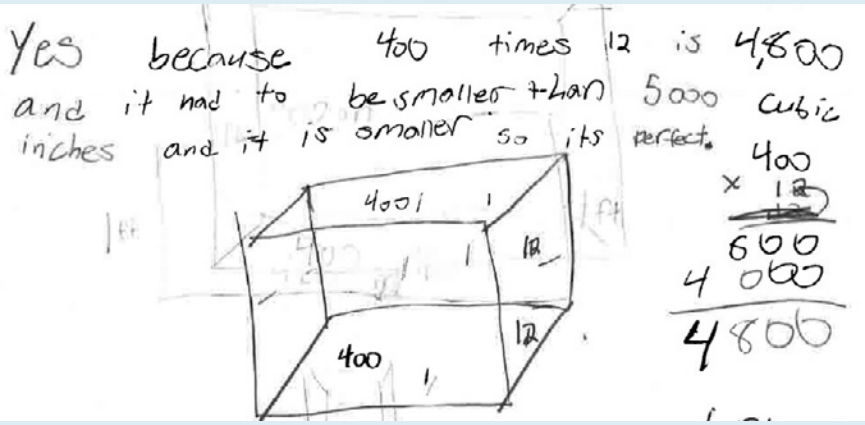
The rules state:

- Tank walls must be at least 1 foot tall so the turtle can't climb out.
- There must be at least 400 square inches of floor space for the turtle to walk around on.

Your teacher says the volume of the tank must be smaller than 5000 cubic inches so it doesn't take up too much room in the classroom.

Give the dimensions of a tank that would work for your new turtle. Use words and numbers to explain how your tank satisfies the "Turtle Tank Rules" and your teacher's requirement.

Student Response to Item 5



Analysis of Response to Item 5

This response earns no credit, 0 points. While the student did provide some explanation as to how the chosen dimensions met the volume constraint, the other requirements were not mentioned. The drawing shows base area of 400, height of 12 and volume of 4800. The response does not provide dimensions of length and width to achieve an area of 400 square inches. Therefore, the dimensions provided satisfy only one of the constraints. This response does not provide sufficient evidence of understanding of the mathematical content and processes essential to this task. It does not demonstrate more than an acquaintance with the topic.

Overview of Student's Performance

This student has demonstrated an understanding of the mathematical concepts and context of this task. The responses show the student's ability to interpret the data, translate it into a frequency table, determine the winning pet, and justify a choice based on the data. This student has demonstrated facility with numbers and the ability to design under constraints. In item 3, a point system that met all requirements was created and applied. In item 5, a rectangular prism was drawn that met all the design constraints.

It is not the mathematical content but the attention to process and detail which prevented the responses from earning full credit for each item. The student did not effectively communicate his/her choices and chains of reasoning in writing. Despite creating and applying a model that was within the design constraints, the student did not explain how that point system would result in the turtle winning in item 3. In item 4, the student may not have attended to all of the words in the sentence and overlooked the bolded word "no"" as his/her response both agreed with the claim but went on to explain why the claim was incorrect. Finally, in item 5, the student drew a rectangular prism that met all the constraints, but his/her response did not specify three dimensions that would make the tank possible, and only attended to the volume requirement in the written explanation.

This student sees the big picture and both enjoys and is adept at solving problems. S/he is easily irritated and frustrated by requirements to write in math class, saying that numbers and labeled work alone are effective communication tools to share reasoning. For these reasons, in regards to item 3, this student would likely argue with me that s/he did use words and numbers to justify or explain how the point system resulted in the turtle winning. S/he would say "choice," "points," and the animal names are words and anyone could look at the calculations and know the turtle won.

Next Steps

This student would benefit from opportunities to engage in Mathematical Practice 6 (Attend to precision) and Mathematical Practice 3 (Construct viable arguments and critique the reasoning of others). Instructional supports should include reading strategies that incorporate identifying all components necessary for a full and complete response, and re-reading the question and comparing it to the response to ensure all components have been addressed.

This student would also benefit from more exposure to sample responses and discussions with partners about how they would score that response with a rubric. I would like to share 'official' scores for the samples, with rationales for the scores, and encourage students to ask questions to deepen their understandings of what constitutes a viable argument and how to communicate mathematical reasoning effectively in writing. This approach is consistent with the UDL principle of Action and Expression in that it affords students opportunities to enhance their capacity to monitor their own progress.