

Mathematical Written Responses

Mathematical written responses combine mathematics knowledge with writing skills to communicate computations and provide an analysis of the processes used to solve the problem. These types of responses are often used for open-ended questions that may have one correct answer, multiple answers, or more than one possible method of solution.

Sample Question

Students recorded attendance data for their homeroom over 2 weeks. Then the class calculated the percent of students present. The results are shown in this table. What is the mode of the attendance data? What is the mean of the attendance data? What is the median Show and explain your work.

| Homeroom Attendance Data | | |
|--------------------------|-----------------------------|-----------------------|
| December Dates | Students Present (21 Total) | % of Students Present |
| 5 | 19 | 90% |
| 6 | 21 | 100% |
| 7 | 20 | 95% |
| 8 | 19 | 90% |
| 9 | 18 | 86% |
| 12 | 17 | 81% |
| 13 | 19 | 90% |
| 14 | 16 | 71% |
| 15 | 16 | 76% |
| 16 | 20 | 95% |

Sample Written Response

- The mode of the students present in homeroom over the 2-week period from December 5 to 16 is 90%. Mode is the value that appears most often in the data. 90% appears three times.
- The mean of the attendance data is 87%. Mean is the average of a set of numbers. To find the mean, I found the sum of the attendance percentages and divided by the number of percents.
 $90 + 100 + 95 + 90 + 86 + 81 + 90 + 71 + 76 + 95 = 874$
 $874 \div 10 = 87.4$
 87.4 rounded to nearest whole number is 87.
- The median of the attendance data is 90%. The median is the middle value in a list of statistics ordered from least to greatest. I listed the data from least to greatest. 90 is in the middle.
 71 76 81 86 90 | 90 90 95 95 100

Activity

Identify the student's purpose(s) for writing. Write the purpose(s) and briefly explain your rationale.

Guidelines for Writing Mathematical Responses

1. Carefully read the question.
2. Locate (circle or underline) all the important information and data.
3. Identify the audience or readers of your writing. Questions to ask include the following:
 - Does the reader have the same degree of mathematical knowledge as I do? If not, do they have more or less?
 - Does the reader have the same math vocabulary as me? Do I need to explain some meanings?
 - Has the reader already solved the problem? Is my purpose to show evidence that I can solve it?
 - Is my audience my teacher, peers, younger children, or adults?
 - Is my reader assessing my knowledge? Or am I simply explaining the process to my audience?
4. Break down the question into parts (a, b, c or 1, 2, 3).
5. Answer all parts of the question in an organized and focused manner.
6. Label each part of the question in your response.
7. Make connections between each step.
8. Include a response to each part of the question. Explain the sequence of steps to solve the problem and the strategy used.
9. Provide evidence of computation with correct results.
10. Include graphs, charts, number lines, and diagrams as needed.
11. Explain in complete sentences each step of the process to solve the problem. When possible, explain how you knew to do something (e.g., I used .25 or 25% because they are equal.).
 - Write a minimum of two sentences for each part.
 - Restate the question in the first sentence and include the answer.
 - Explain the process used to answer the question in subsequent sentences.
12. Use mathematics-specific vocabulary throughout the response.
13. Include definitions for vocabulary words to demonstrate understanding.
14. Revise your writing. Questions to ask include the following:
 - Is your answer clear and easy to understand?
 - Does each part of the question have an answer and process steps?
 - Have you used math vocabulary appropriately?
15. Edit the response to ensure your writing uses correct spelling, grammar, and mechanics.

Source: Scallin, S. M. (2006). Written response to mathematical questions: Computation and composition. In S. L. Pasquarelli (Ed.), *Teaching writing genres across the curriculum: Strategies for middle school teachers* (pp. 77–90). Greenwich, CT: Information Age.