

## Analysis of Mathematics Problem-Solving Ability at Class V Students of SDN 7 Wadaga

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**Abstract.** The importance of problem-solving skills is that students gain experience to find a way out of a problem. However, in fact the fourth-grade students of SDN 7 Wadaga's problem-solving abilities have not shown maximum results and students tend to be faster in solving direct calculation questions than story questions. The purpose of this study was to determine the problem-solving ability of students in understanding the problem, devising a plan, carrying out the plan, and looking back. This type of research uses descriptive qualitative research. The subjects of this study were the fifth-grade students of SDN 7 Wadaga with a total of 13 students. Data collection techniques in this study are tests, interviews, and document studies. The data analysis techniques used are credibility, transferability, dependability, and confirmability. The conclusion in this study is the problem-solving ability of students in understanding the problem of 81.4%, in devising a plan 94.86%, carrying out plans of 82.9%, and looking back 67%. This means that students can understand the problem, devising a plan, carry out the plans in the test well. Meanwhile, in looking back the answers and processes, it is quite low.

Keywords: problem solving ability, mathematics

### 1 Introduction

Human Resources are required to have higher order thinking skills (HOTS). In Bloom's taxonomy C4 (analyze), C5 (evaluate), and C6 (create) are HOTS abilities where the cognitive level and indicators C4 to C5 are critical thinking processes while C6 is part of creative thinking skills, where critical and creative thinking skills are part in creating solutions in making and making decisions or solving problems (Saraswati & Agustika, 2020: 259). Where is one of the important aspects in learning mathematics is problem solving ability. Problem solving ability is a very important part of the mathematics curriculum in which students are guided in the learning process to gain experience using the knowledge and skills they already have to find solutions to non-routine problems (Roebyanto & Harmini, 2017: 15). Meanwhile, according to Maghfiroh et al., (2021: 73) problem solving ability is an effort to find problem solving in achieving the desired goals based on the cognitive structure of students. Meanwhile, mathematical problem solving ability is a complex cognitive activity, where the process of problem solving and problem solving requires a strategy (Syam et al., 2021: 31). According to Polya in Rostika & Junita (2017: 39), the stages that can be measured in mathematical problem solving abilities are understanding the problem, devising a plan, carrying out the plan, and looking back. Driana & Ernawati (2019: 110) state that solving problems requires critical and creative thinking because the rapid development of knowledge and technology in the 21st century results in more complex challenges and problems that humans will face.

Students who are in the concrete operational stage which are generally aged 7 to 12 years or at the age of elementary school level will experience learning difficulties in understanding mathematics learning because mathematics learning itself is abstract and deductive. Abstract means that mathematics is developed through the mind and imagination while deductive means that every conclusion is always

generally accepted in mathematics (Priatna & Yuliardi, 2019: 2). In addition, teachers often emphasize the delivery of subject matter and direct calculations to solve a problem not by giving non-routine problems that stimulate students to use the knowledge they already have in solving the problem which will make students not easily forget and be able to understand a problem clearly. deep.

Based on the results of direct observation and participation in the learning process in class IV at SDN 7 Wadaga through the Class 1 Teaching Campus activities carried out from April to June 2021, it was concluded that one of the mathematical skills, namely the problem-solving ability of students, has not shown maximum results. Students do not understand the problem so that the problem cannot be solved. Meanwhile, in planning and carrying out problem solving strategies students only do what is known but cannot give the right conclusions on the problems or questions given. In addition, in the learning process students tend to be faster and more precise in solving direct calculation problems compared to using story questions that use solving steps that can make students trained to interpret solutions to problems in building material.

Given that students' abilities are different from one another, it is necessary to know the extent of students' abilities in solving mathematical problems. Listening to the description above, researchers are encouraged to conduct research with the same students but at different grade levels, namely in class V and with different problem-solving abilities when they were in class IV and with different learning material difficulties.

Mathematics learning in class V SDN 7 Wadaga is taught a lot of material, one of which is the material of building space. According to (Suharjana, 2008: 5), spatial structure is a part of space that is limited by the set of points found on all sides or surfaces of the wake. In the material of spatial construction, many aspects are taught including the volume of the building, the properties of the spatial structure, as well as the spatial network. Given the many mathematical aspects that are needed in real life in solving problems related to the volume of the building, the properties of the spatial structure, and the nets of the spatial structure, the material for the spatial structure is important to master. Therefore, researchers are encouraged to conduct a study entitled "Analysis of Mathematical Problem Solving Ability at class V of SDN 7 Wadaga".

## **2 Research Methods**

The type of research used is descriptive qualitative research, which means a research method to describe existing phenomena both currently and in the past (Fitrah & Luthfiyah, 2017: 36). This study uses descriptive qualitative research which aims to describe or describe students' mathematical problem solving abilities in spatial material by collecting information or data both verbally and in writing that are systematically arranged, explained, and analyzed. The students studied were students of class V SD Negeri 7 Wadaga, totaling 13 students consisting of 5 boys and 8 girls. There are 3 research subjects selected to be discussed. Data collection techniques in this study are tests, interviews, and document studies. The data analysis techniques used are credibility, transferability, dependability, and confirmability.

## **3 Research Result**

The problem-solving ability of students with the highest percentage is the subject of S-13 with a percentage of 95.83%, the problem-solving ability of students with the percentage is in the middle value, namely the subject of S-3 with a percentage of 83.33%, and the problem-solving ability of students with a low percentage is subject S-6 with a percentage of 58.33%. Based on the data above, the subjects of S-13, S-3, and S-6 were used as research subjects representing the problem-solving abilities of class students. The test chosen for analysis is test number 1 to provide an overview of the other 5 test questions.

### *3.1 Indicator Understanding Problem*

Subject S-13

Problem analysis 1:

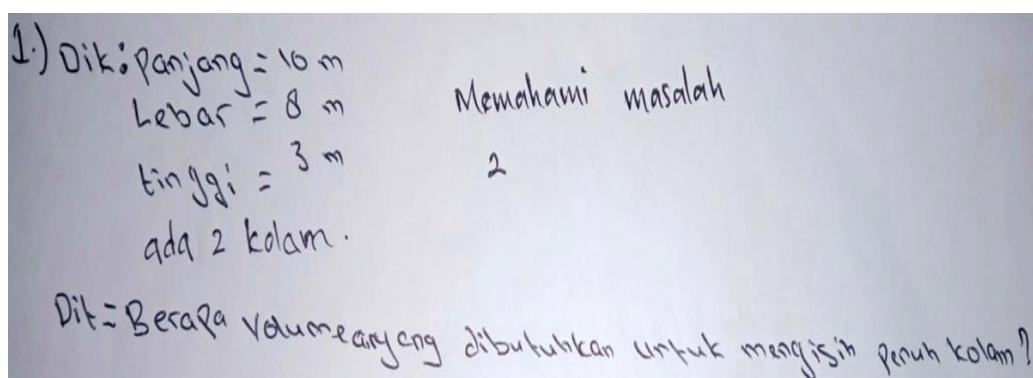


Figure 1. The answer sheet for the problem-solving ability test subject S-13

Based on the picture above, the test results show that the subject of S-13 is able to understand the problem correctly and as expected. This means that S-13 is able to write down what information is known and asked in the test using their own sentences. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

- Q : So what do you understand or what do you know from the question?  
 S-13 : There are 2 pools, 10 m long, 8 m wide, and 3 m high.  
 Q : How did you determine the question or what to ask from that question?  
 S-13 : (Points to question) Here, there is a question word.

Based on the results of the interview above, the subject of S-13 can re-explain what is understood in solving the given problem. Students are able to reiterate what is known and asked using their own sentences.

Subject S-3

Problem Analysis 1:

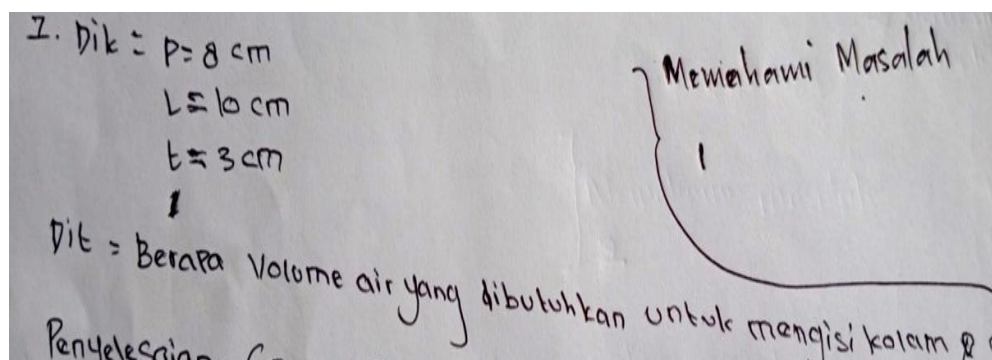


Figure 2. The answer sheet for the S-3 subject problem solving ability test

Based on the picture above, the test results show that the S-3 subject is still not quite right in understanding the problem. This means that the subject of S-3 is able to write down what is known to be inaccurate where the subject does not write down all the information. In addition, the subject also made an error in writing the unit of length. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

- Q : What do you know about this question?  
 S-3 : It is known that the length of the water pool is 8 m, the width is 10 m, and the height is 3 m.  
 P : Take a look at your answer, is it the same as what you just answered with what is written on your answer paper?  
 S-3 : (looked at the answer paper) Not the same.  
 Q : How did you determine the question or what to ask from that question?  
 S-3 : There is the last part of the question.

Based on the interview transcript above, it shows that the subject of S-3 is still not quite right in understanding the problem. Where when the researcher asked the S-3 subject to recount what was known and asked from the question S-3 had not been able to state the information correctly.

Subject S-6  
Problem Analysis 1

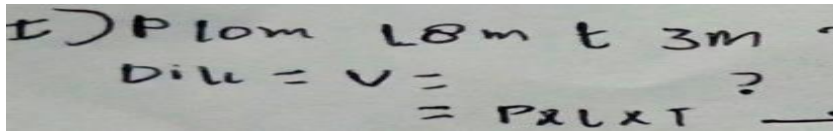


Figure 3. The answer sheet for the S-6 subject problem solving ability test

The analysis of the written test results of the S-6 subjects showed that they were less precise in understanding the problem. Where the subject of S-6 does not write down all the information from what is known in the test. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

P : Try to read question number 1, what do you know about the problem?

S-6 : The length of the pool, the width of the pool, the new height of the pool.

Q : Then how do you determine the question or what to ask from that question?

S-6 : I'm looking for one with a question mark.

Based on the interview transcript above, it shows that the subject of S-6 is less precise in understanding the problem because it does not write down all the information in the known part.

### 3.2 Indicator Devising a Plan

Subject S-13  
Problem Analysis 1:

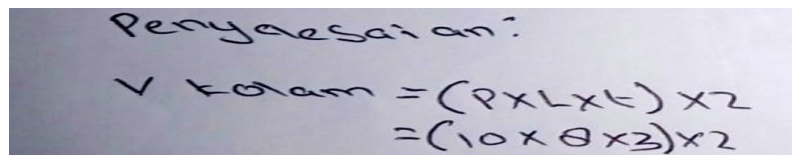


Figure 4. Answer sheet for the S-13 subject problem solving ability test

Based on the picture above, the test results show that the subject of S-13 is able to plan a solution, meaning that the subject is able to formulate a strategy or completion step that leads to the right answer. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

P : Then, what are the steps you take in determining the mathematical method, meaning how do you determine the formula?

S-13: Length x width x height x 2 because there are 2 pools.

Q : Do you think this method is correct?

S-13: Yes.

Based on the results of the interview above, the subject of S-13 can mention a problem-solving plan by being able to make strategies in solving problems.

Subject S-3  
Problem Analysis 1:

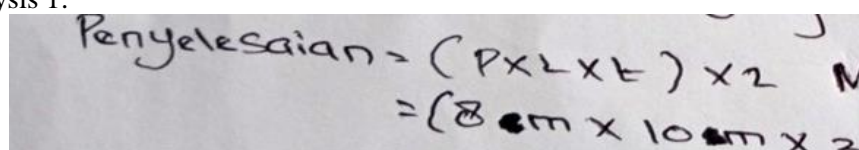


Figure 5. The answer sheet for the S-3 subject problem solving ability test

Based on the picture above, the test results show that the subject of S-3 can carry out the plan, meaning that the subject is able to formulate a strategy or completion step that leads to the right answer. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

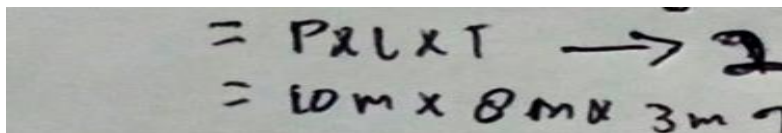
Q : Then, what are the steps you take in determining the mathematical method or formula for the problem?

S-3 : The trick is to find the volume of my new pool times 2.

Based on the interview transcript above, it shows that the S-3 subject can plan a solution with the S-3 subject being able to mention the strategy in solving the problem.

Subject S-6

Problem Analysis 1:



$$= P \times L \times T \rightarrow 2$$

$$= 10 \text{ m} \times 8 \text{ m} \times 3 \text{ m} \times 2$$

Figure 6. The answer sheet for the S-6 subject problem solving ability test

Analysis of the results of the written test shows that the subject of S-6 can write a settlement plan but the strategy or completion steps have not led to the correct answer. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

Q : Then, what are the steps you take in determining the mathematical method or formula for the problem?

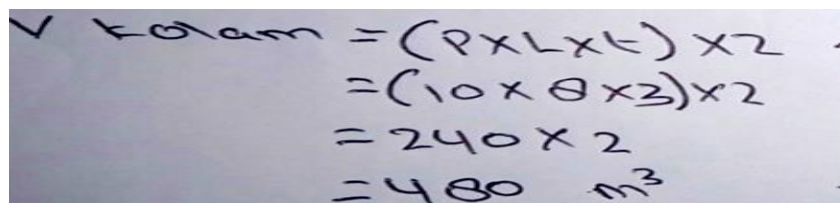
S-6 : The formula is length x width x height.

Based on the interview transcript above, it shows that the subject of S-6 is less precise in formulating a mathematical model that can lead to the right answer.

### 3.3 Indicator Carrying Out the Plan

Subject S-13

Problem Analysis 1:



$$\checkmark \text{ Volume} = (P \times L \times T) \times 2$$

$$= (10 \times 8 \times 3) \times 2$$

$$= 240 \times 2$$

$$= 480 \text{ m}^3$$

Figure 7. The answer sheet for the S-13 subject problem solving ability test

Based on the picture above, the test results show that the subject of S-13 is able to carry out the plan well. This means that S-13 is able to substitute the information correctly and perform calculations correctly according to a predetermined formula. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

Q : What method do you use to solve math?

S-13: I'll give you the formula  $(10 \times 8 \times 3) \times 2$ , the answer is 480 m<sup>3</sup>.

Based on the results of the interview above, the subject of S-13 can re-explain the stages in carrying out the settlement plan by applying a settlement strategy and calculations based on a predetermined formula.

Subject S-3

Problem Analysis 1:



Handwritten calculation for S-3 subject:

$$= (P \times L \times t) \times 2 \text{ Merencanakan}$$

$$= (8 \text{ m} \times 10 \text{ m} \times 3 \text{ m}) \times 2$$

$$= 480 \text{ cm}^3$$

Figure 8. The answer sheet for the S-3 subject problem solving ability test

Based on the picture above, the test results show that the S-3 subject can carry out the plan by correctly substituting the information into a predetermined formula so as to produce the right answer. Next, the researchers conducted interviews with the subject of S-3 related to the ability to solve problems, are as follows.

P : Take a look at your answers on your worksheet, how do you solve math problems?

S-3 : How to calculate the volume of a block of  $8 \times 10 \times 3$  the answer is 240 and then the answer is 480 m<sup>3</sup> multiplied by two.

Based on the interview transcript above, it shows that the S-3 subject is able to perform calculations according to the designed mathematical model.

Subject S-6

Problem Analysis 1:

Handwritten calculation for S-6 subject:

$$= P \times L \times T \rightarrow$$

$$= 10 \text{ m} \times 8 \text{ m} \times 3 \text{ m}$$

$$= 280 \text{ cm}^3$$

Figure 9. The answer sheet for the S-6 subject problem solving ability test

The analysis of the written test results showed that the S-6 subject in carrying out the S-6 plan was in accordance with the planned strategy and the calculation results also led to the right answer. However, because the formula applied did not match the needs of the test questions, the answers given were incorrect. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, are as follows.

P : Take a look at your answers on your worksheet, what method do you use in solving math?

S-6 : The volume of the pool is  $10 \times 8 \times 3 = 280 \text{ cm}^3$ .

Based on the interview transcript above, it shows that the subject of S-6 in carrying out the S-6 plan is in accordance with the strategy made but the results of the calculation do not lead to the right answer because the formula applied is not right.

### 3.4 Indicator Looking Back

Subject S-13

Problem Analysis 1:

Handwritten calculation and conclusion for S-13 subject:

$$= 240 \times 2$$

$$= 480 \text{ m}^3$$

jadi volume ~~240~~ volume air yang di butuhkan adalah  $480 \text{ m}^3$   
Menerikan kembali ?

Figure 10. The answer sheet for the S-13 subject problem solving ability test

Based on the picture above, the test results show that the S-13 subject is able to re-examine the correctness of the answer by being able to interpret or provide conclusions on the answers he has obtained. Next, the researchers conducted interviews with the subject of S-13 related to the ability to solve problems, namely as follows.

Q : How do you know the answer you get is correct?

S-13: I am recalculated.

Q : What conclusion did you get after getting the answer from the calculation?

S-13: The volume of water required is 480 m<sup>3</sup>.

Based on the results of the interview above, the subject of S-13 shows checking the answers repeatedly so as to produce conclusions that are in accordance with the expected answers.

Subject S-3

Problem Analysis 1:

$$= (8 \text{ cm} \times 10 \text{ cm} \times 3 \text{ cm}) \times 2$$

$$= 480 \text{ cm}^3$$
 Melaksanakan 3  
 Jadi Volume air yang dibutuhkan = 480 cm<sup>3</sup>

Figure 11. The answer sheet for the S-3 subject problem solving ability test

Based on the picture above, the test results show the S-3 subject can re-examine by writing conclusions based on the problems given. Next, the researchers conducted interviews with the subject of S-3 related to the ability to solve problems, are as follows.

Q : How do you know the answer you got?

S-3 : I am calculate it again.

Q : What conclusion did you get after getting the answer from the calculation?

S-3 : In conclusion, the volume of water needed is 480 m<sup>3</sup>.

Based on the interview transcript above, it shows that the S-3 subject re-examines the correctness of his answer by giving a conclusion to the answers he gets, but in checking the process, the S-3 subject does not write down all the information contained in the test questions.

Subject S-6

Problem Analysis 1:

$$= 10 \text{ m} \times 8 \text{ m} \times 3 \text{ m}$$

$$= 240 \text{ cm}^3$$
 Melaksanakan rencana 1  
 Jadi = Volume air yang dibutuhkan untuk mengisi kolam 280 cm

Figure 11. The answer sheet for the S-6 subject problem solving ability test

The analysis of the results of the written test showed that the subject of S-6 was able to re-examine the answers by writing conclusions about the answers obtained, but in checking the process, the subject of S-6 did not write down all the information obtained from the test and the calculations carried out could not prove the correctness of the correct answer. Next, the researchers conducted interviews with the subject of S-6 related to the ability to solve problems, are as follows.

Q : How do you know the answer you got?

S-6 : I'm checking it again.

Q : What conclusion did you get after getting the answer from the calculation?

S-6 : The volume of the pool is 280 cm<sup>3</sup>.

Based on the interview transcript above, it shows that the subject of S-6 rechecked the answers obtained but the calculations that were carried out again could not prove the correctness of the desired answer.

#### **4. Discussion**

##### *4.1 Indicator Understanding the Problem*

On the subject of S-13, based on the analysis of test results and the results of interviews that have been carried out, the subject of S-13 is able to understand the problem by being able to write down and mention all the information on the test, both what is known and asked in the test correctly using his own sentence or language. on all tests of the 6 test questions given.

As for the subject of S-3, based on the analysis of test results and the results of interviews that have been carried out, they were able to understand the problems very well on tests 3, 4, and 6 by being able to write and state fluently what information was known and asked in the test. However, in tests number 1, 2, and 5, they have not maximally carried out the stages of understanding the problem because S-3 is not able to write down all the information that is known or asked in the test or makes mistakes in understanding the problem.

While on the subject of S-6, based on the analysis of test results and the results of interviews that have been carried out in understanding the problem, they are only able to understand very well on test number 6 but on tests number 1, 3, 4 and 5 they have not been able to carry out the stages of understanding the problem because S- 3 has not been able to write down all the information that is known or asked in the test or makes mistakes in understanding the problem even on test number 2 does not write down what is known and asked in the test.

##### *4.2 Indicator Devising a Plan*

On the subject of S-13, based on the analysis of test results and the results of interviews that have been carried out, in planning the problem well, namely being able to formulate or compile a mathematical model according to the data or information that is known correctly. So that the resulting answer leads to the right answer.

On the subject of S-3, based on the analysis of the test results and the results of interviews that have been carried out, in planning the problem well, it is the same as the S-13 subject, namely being able to formulate or compile a mathematical model according to the data or information that is known correctly. So that the resulting answer leads to the right answer.

In the subject of S-6, based on the analysis of test results and the results of interviews that have been carried out, they are quite capable in planning problem solving, namely being able to plan problems on tests number 3, 4, 5, and 6 well but on test number 1 they are able to write strategies but not complete or incorrect answers, while in test number 2 students did not write a problem-solving plan.

##### *4.3 Indicator Carrying Out the Plan*

On the subject of S-13, based on the analysis of the test results and the results of interviews that have been carried out, are able to carry out the completion plan according to the formula or mathematical model that has been designed and perform calculations based on the formula that has been prepared or in other words S-13 is able to apply problem-solving strategies well designed. So that the answer obtained is correct and as expected.

In the S-3 subject, based on the analysis of the test results and the results of the interviews that have been carried out, they have not been able to carry out the completion plan properly, which in tests number 2, 5, and 6, the S-3 subject uses the correct procedure but the calculation is incorrect/incomplete. However, in tests number 1, 3, and 4, they were able to apply a well-designed problem-solving strategy.

On the subject of S-6, based on the analysis of test results and the results of interviews that have been carried out, they are only able to carry out the plan well on test number 3, meaning that the procedures used are correct and perform the right calculations. While the test questions number 4, 5, and 6 only use the correct procedure but the calculation is wrong/incomplete. As for test number 1, the



subject of S-6 completion procedures and calculations were carried out incorrectly, while test number 2 did not write down the problem solving procedure at all.

#### 4.4 Indicator Looking Back

On the subject of S-13, based on the analysis of the test results and the results of interviews that have been carried out at the stage of re-examining the subject of S-13, they are quite capable of writing conclusions and re-checking the process correctly or quite capable of explaining or interpreting based on the problem. However, S-13 on test question number 2 did not write a conclusion on the results obtained where based on the results of the interview S-13 did not write a conclusion because the time allotted had run out but S-13 stated that before collecting the answer sheets, he had checked again many times so that S-13 immediately collects the answer paper.

On the subject of S-3, based on the analysis of test results and interview results that have been carried out at the re-examination stage, they are able to write conclusions and re-check the process appropriately. Where in re-checking the S-3 subject did well on tests number 1, 3, and 4 but on tests number 2, 5, and 6 they did not carry out the check properly, namely the S-3 subject wrote conclusions and checked the process and answers poorly. so that the answers given cannot prove the truth of the desired answer.

On the subject of S-6, based on the analysis of test results and interview results that have been carried out in the re-examination stage, they have not been able to write conclusions and re-check the process correctly. Where in re-checking the subject S-6 did well on test number 3 but on tests number 1, 4, 5, and 6 did not carry out the check properly, namely the subject S-6 wrote conclusions and checked the process and answers incorrectly so that the answers given cannot prove the correctness of the desired answer. While in test number 2, the subject of S-6 did not write conclusions or did not check the answers.

## 5 Conclusion

Based on the results of the research that has been carried out regarding the mathematical problem solving abilities of fifth graders at SDN 7 Wadaga in the 2021/2022 academic year, the researchers conclude that:

1. The percentage of students' problem-solving abilities in understanding the problem is 81.4%. This high percentage shows that students can understand the problems in the test well, which means students can write down what information is known and asked in the test well.
2. The percentage of students' problem-solving abilities in planning solutions is 94.86%. This shows that students can plan a solution well, which means students can write formulas or mathematical models of the given problem.
3. The percentage of students' problem solving ability in implementing the plan is 82.9%. This shows students can carry out the plan well, which means students are able to perform calculations according to the procedures or formulas that have been designed.
4. The percentage of students' problem solving ability in re-examining is 67.3%. This shows that students are quite low in re-examining because students do not write conclusions and check the process incorrectly.

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