

## **Analysis of The Seventh Grade Students' Ability at SMP YPK Merauke in Solving Fraction Problems**

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### **Abstract:**

This study aims to analyze the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems. The research employed a descriptive quantitative approach involving 34 seventh-grade students as research subjects. The instrument used was a written test consisting of four essay-type questions designed to measure students' ability to convert common fractions into mixed numbers, mixed numbers into common fractions, and common fractions into decimal forms. Data were analyzed by calculating the percentage of correct answers for each indicator and categorizing them according to students' ability levels. The results showed that students' ability to convert common fractions into mixed numbers was in the moderate category with a percentage of 44.11%. Students' ability to convert mixed numbers into common fractions was in the good category with a percentage of 67.64%. Meanwhile, students' ability to convert common fractions into decimals was very low, with percentages of 14.70% and 5.88%, respectively. These findings indicate that students tend to perform better on procedural problems than on problems requiring deep conceptual understanding. Therefore, mathematics instruction should emphasize conceptual understanding of fractions through the use of varied learning media and structured practice.

**Keywords:** students' ability, fractions, mathematics learning, junior high school.

### **Introduction**

Mathematics is a subject that plays a crucial role in developing students' logical, systematic, and analytical thinking skills. The aim of mathematics learning at the Junior High School (SMP) level is to equip students with the ability to understand concepts, reason logically, and solve mathematical problems related to daily life (Lestari & Yudhanegara, 2019). Therefore, mastering basic mathematical concepts starting from grade VII is an important foundation for the success of students' learning in subsequent topics. One of the foundational topics studied by seventh-grade students in SMP is fractions. The fraction topic includes common fractions, mixed fractions, and decimal fractions, all of which are interconnected. According to Sari and Putri (2020), understanding the concept of fractions is essential as it forms the basis for



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learning arithmetic operations, ratios, and more advanced mathematics topics. However, several studies show that fractions are often a source of difficulty for junior high school students. This is in line with the findings of Pagiling, Palobo, and Mayasari (2021), who emphasized that pre-service teachers' beliefs about the nature of mathematics and its teaching significantly influence the approaches they adopt in delivering concepts such as fractions to students.

Students' difficulties in the fraction topic are generally seen in their ability to convert between different types of fractions. Research by Nuraini, Rahman, and Fatimah (2019) shows that students often make conceptual errors when converting improper fractions to mixed fractions or vice versa. These errors occur because students have not fully understood the meaning of the numerator and denominator, as well as the relationships between different types of fractions. This finding is supported by the research of Utami and Widodo (2018), which states that most students tend to memorize the steps of solving problems without understanding the underlying concepts. In addition, students' ability to convert fractions into decimal form is still relatively low. Wahyuni and Hidayat (2021) revealed that students' errors in converting fractions to decimals are due to a weak understanding of place value and the relationship between fractional and decimal systems. As a result, students often make calculation errors and fail to solve problems accurately.

The ability to solve mathematical problems is an important indicator of students' mastery of concepts. According to Polya (2016), the ability to solve problems reflects the students' thinking process in understanding the problem, planning the solution, executing strategies, and checking the results obtained. In the context of fractions, this ability can be observed in students' accuracy in converting fractions and solving problems systematically. Analyzing students' ability to solve mathematical problems is important to identify the types of errors students make. Rahmawati and Susanto (2022) stated that through the analysis of students' abilities, teachers can identify conceptual errors and procedural mistakes that frequently occur in mathematics learning. The results of this analysis can serve as a basis for designing more effective teaching strategies that cater to students' needs.

Based on initial observations in grade VII at SMP YPK Merauke, some students are still struggling with fraction problems, particularly in converting improper fractions to mixed fractions, converting mixed fractions to improper fractions, and converting fractions to decimal form. These difficulties are reflected in students' work, which shows conceptual errors and procedural mistakes. This situation is in line with the findings of Lestari and Yudhanegara (2019), who stated that the low performance of students on fraction topics is often caused by teaching that focuses more on procedures rather than emphasizing conceptual understanding. Given this context, there is a need for research that analyzes the ability of grade VII students at SMP YPK Merauke in solving fraction problems. This study aims to provide an overview of students' abilities and the types of mistakes made in solving fraction problems. The

research results are expected to serve as a basis for evaluation for teachers to improve the quality of mathematics teaching, especially in the fraction topic.

### Research Methods

This study uses a descriptive quantitative approach. This approach is chosen because the research aims to describe the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems based on test data. According to Lestari and Yudhanegara (2019), descriptive quantitative research aims to systematically and objectively describe existing phenomena or conditions based on numerical data.

The research was conducted at SMP YPK Merauke during the even semester of the current academic year. The subjects of this study were 34 seventh-grade students. The selection of subjects was done using a total sampling technique, where all seventh-grade students were chosen as the subjects of the study, considering that the number of subjects was still manageable for analysis as a whole.

The instrument used in this study was a fraction problem-solving test designed based on the competency achievement indicators for seventh-grade fraction topics. The test instrument was first validated by a mathematics education lecturer and a mathematics teacher to ensure the appropriateness of the material, clarity of language, and the level of difficulty of the questions. According to Arikunto (2018), the purpose of instrument validation is to ensure that the instrument truly measures the ability being studied.

The data collection technique in this study involved written tests. The test was designed in the form of descriptive questions related to fraction topics. The test consisted of four questions, namely:

1. Converting a common fraction into a mixed fraction,
2. Converting a mixed fraction into a common fraction,
3. Converting a common fraction into decimal form, and
4. Converting a common fraction into decimal form.

These questions were developed based on the competency achievement indicators for seventh-grade fractions and were consulted with the mathematics teacher to ensure alignment with the applicable curriculum. The test results were analyzed using descriptive quantitative analysis with a dichotomous approach. Each student's answer was scored 1 for a correct answer and 0 for an incorrect answer. The analysis was conducted by counting the number of students who answered correctly and incorrectly for each question.

Next, the number of correct answers for each question was calculated as a percentage to reflect the students' ability to solve fraction problems. The percentage was used to interpret the students' ability for each fraction topic indicator.

The formula used to calculate the percentage of correct answers is:

$$P = B/N \times 100\%$$

P= percentage of correct answers

B=number of students who answered correctly

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N = total number of students

The resulting percentage was then categorized into student ability levels with the following criteria:

Percentages	Category
81% - 100%	Very Good
61% - 80%	Good
41% - 60%	Passed
21% - 40%	Bad
0% - 20%	Very bad

### Results and Discussions

The final product results in this development obtained a circle learning module assisted by augmented reality for 8th grade students. Based on the results of teacher interviews and the results of student needs analysis, information was obtained that the school had limited teaching materials and a lack of student interest in learning because they only relied on textbooks. Then, the curriculum used refers to students so that they can develop their own potential, therefore it is necessary to update independent learning media for students.

This study aims to analyze the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems based on the number of correct and incorrect answers for each question. The test instrument consists of four questions, each measuring the students' ability to convert fractions. Based on the test results administered to the students, data on the number of students who answered correctly and incorrectly for each question was obtained, as presented in Table 1.

**Table I.** Percentage of Correct and Incorrect Answers by Students on Each Question

No.	Question Indicator	Correct (Students)	Incorrect (Students)	Percentage Correct	Category
1	Converting simple fractions to mixed fractions	15	19	44.11%	Fair
2	Converting mixed fractions to simple fractions	23	11	67.64%	Good
3	Converting simple fractions to decimal fractions	5	29	14.70%	Very Poor

No.	Question Indicator	Correct (Students)	Incorrect (Students)	Percentage Correct	Category
4	Converting simple fractions to decimal fractions	2	32	5.88%	Very Poor

This study aims to provide a comprehensive overview of the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems. The data for this study were obtained through written tests consisting of four descriptive questions. These four questions were designed to assess the students' ability to convert different forms of fractions, including common fractions, mixed fractions, and decimal fractions. Data analysis was carried out by counting the number of correct and incorrect answers, then converting the results into percentages to determine the students' ability categories for each indicator.

Overall, the research results indicate that students' ability to solve fraction problems is still relatively low and uneven across each indicator. Some students were able to solve problems well on certain indicators, but on others, a significant number of students faced considerable difficulties. This condition shows that students' understanding of fraction concepts is incomplete and tends to depend on the type of problem presented.

On the indicator for converting common fractions into mixed fractions, the results showed that 15 out of 34 students were able to answer correctly, while 19 students made mistakes. The percentage of correct answers was 44.11%, which falls into the "satisfactory" category. This result suggests that nearly half of the students have an initial understanding of how to convert common fractions into mixed fractions, but this understanding is not yet evenly distributed among all students. Common mistakes made by students on this indicator include errors in dividing the numerator by the denominator, mistakes in determining the integer quotient, and inaccuracies in identifying the remainder as the numerator of the fraction.

On the indicator for converting mixed fractions into common fractions, students performed relatively better compared to the other indicators. Out of 34 students, 23 answered correctly and 11 answered incorrectly. The percentage of correct answers was 67.64%, which falls into the "good" category. This result shows that the majority of students were able to follow the correct steps in solving the problem. It indicates that students find it easier to understand problems that are procedural, have clear solution steps, and are frequently practiced in lessons.

In contrast to the previous two indicators, students' ability to convert common fractions into decimal fractions showed very low results. On the third question, only 5 students answered correctly, while 29 students answered incorrectly. The percentage of correct answers was only 14.70%, which falls into the "very poor" category. On the fourth question, the results were even lower, with only 2 students answering correctly

and 32 students answering incorrectly, giving a percentage of correct answers of 5.88%. These results show that nearly all students had difficulty converting fractions into decimal form. The low performance on this indicator indicates that students do not yet understand the conceptual relationship between fractions and decimal numbers. Students tend to have difficulty dividing the numerator by the denominator, determining the result of the division in decimal form, and understanding decimal place value. Additionally, some students appeared unsure about continuing the division process and did not know when to stop the division.

Based on the percentage of students' abilities in solving fraction problems, there is a significant difference between the students' abilities on each indicator. The table shows that the highest percentage is found in the indicator for converting mixed fractions into common fractions, at 67.64%, which falls into the "good" category. This indicates that the majority of students were able to solve problems that are procedural in nature.

Meanwhile, the percentage of students' ability in the indicator for converting common fractions into mixed fractions is at a moderate level, 44.11%, which falls into the "satisfactory" category. This suggests that some students are still struggling to understand the concept of division as the basis for converting fractions. The graph also shows that the percentage of students' ability in the indicator for converting common fractions into decimal form is very low, at 14.70% and 5.88%. The low percentage in this indicator indicates that the topic of converting fractions to decimals is the most challenging for the seventh-grade students at SMP YPK Merauke. The stark difference between this indicator and the others shows that students require special attention and guidance in understanding this topic.

The results of this study indicate that the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems is still dominated by conceptual and procedural errors. Students tend to be more capable of solving routine problems with clear solution steps, but they face difficulties when confronted with problems that require a deeper understanding of concepts. These findings align with the opinion of Lestari and Yudhanegara (2019), who stated that many students are able to solve mathematical problems procedurally, but they do not necessarily understand the underlying concepts.

The students' ability, categorized as satisfactory, in converting common fractions into mixed fractions indicates that their understanding of fractions as a result of division is still not optimal. According to Nuraini, Rahman, and Fatimah (2019), students' mistakes in fraction topics are often caused by a lack of understanding of the meaning of the numerator and denominator, so students tend to rely on memorizing solution steps without understanding the underlying concepts.

The students' ability, categorized as good, in converting mixed fractions into common fractions shows that students find it easier to understand algorithmic material. This is in line with the research of Utami and Widodo (2018), who stated that

students tend to succeed in solving problems with a fixed solution pattern that is frequently practiced. However, this success does not fully reflect a deep understanding of the concepts, as some students still struggle to explain the reasoning behind the solution steps used.

The low ability of students to convert fractions into decimal form is an important finding in this study. According to Wahyuni and Hidayat (2021), students' difficulties in converting fractions to decimals are closely related to weak understanding of place value concepts and division operations. Additionally, Rahmawati and Susanto (2022) emphasize that fraction learning that does not involve visual and contextual representations can cause students to struggle in understanding the relationship between fractions and decimals. Based on the results and discussion, it can be concluded that the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems still needs improvement, especially in the aspect of conceptual understanding. Teachers are expected to use the results of this study as a basis for reflection to design lessons that focus more on conceptual understanding, the use of varied learning media, and the provision of graded and contextual exercises. A focus on contextual problem solving and concept-based instruction has also proven effective in enhancing students' creative thinking skills, as demonstrated by Palobo and Meirista (2018) through the development of a problem-solving-based learning device aimed at increasing students' creative thinking ability and interest in learning mathematics.

### Conclusions and Suggestions

Based on the research findings and discussion outlined, it can be concluded that the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems still varies and tends to be suboptimal across all indicators measured. Students' ability to convert mixed fractions into common fractions is categorized as good, indicating that the majority of students are able to solve procedural problems with clear solution steps. However, students' ability to convert common fractions into mixed fractions remains in the satisfactory category, suggesting that their understanding of division as the basis for converting fractions is not yet fully mastered.

The research results also show that students' ability to convert common fractions into decimal form falls into the very poor category. The majority of students experienced difficulties in understanding the relationship between fractions and decimal numbers, particularly in the division process and understanding decimal place value. This finding indicates that students still make conceptual and procedural errors in fraction topics, especially in converting fractions to decimals.

In general, the ability of seventh-grade students at SMP YPK Merauke in solving fraction problems still needs to be improved, especially in terms of conceptual understanding. Students tend to perform better on routine and algorithmic problems but face difficulties with problems that require a deeper understanding of concepts.

Therefore, the results of this study highlight the need for improvements in the mathematics learning process on the fraction topic, so that students are not only able to solve problems procedurally but also understand the underlying concepts.

Based on the conclusions of the study, several recommendations can be made as follows. First, mathematics teachers are encouraged to place greater emphasis on learning that focuses on understanding the concept of fractions, rather than just mastering the procedures for solving problems. Teachers can use various representations, such as images, concrete models, number lines, and other visual media, to help students understand the relationships between fractions, mixed fractions, and decimal numbers.

Second, it is recommended that teachers provide step-by-step and graded practice problems, starting with simple questions and progressing to more complex ones, while also linking the fraction material to real-life contexts to make learning more meaningful for students. Providing feedback on students' mistakes should also be done consistently to help students understand where they went wrong and how to correct it.

Third, for schools, the results of this study can serve as an evaluation tool to improve the quality of mathematics instruction, particularly in the fraction topic, by providing supporting learning resources and training for teachers in applying innovative teaching strategies.

Fourth, for future researchers, it is recommended to conduct further research involving a larger number of subjects, using qualitative or mixed methods, and to examine in more depth the types of errors students make and the factors that influence learning difficulties in the fraction topic. Future research could also develop and test effective learning models or media to improve students' understanding of fraction concepts.

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