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| WORD COUNT | 2933 | TIME SUBMITTED | 30-JUL-2020 12:11PM |
| | | PAPER ID | 61695960 |

# Misconception in fraction for seventh-grade students

# Misconception in fraction for seventh-grade students

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**Abstract**. Fraction is one of the subject that begins to be studied in primary school and often found in daily life. Therefore, students, especially in seventh-grade are familiar with the subject. The purpose of this study is to explore information and describe students' error in solving fraction problem. The research method used is descriptive research. The subject of this study were 30 seventh-grade students at SMP Negeri 1 Piyungan. The research instrument used is the test containing fraction problem. The result showed that students still made mistakes in solving the fraction problem. First, students are wrong in rewriting the known components of the problem. Second, they are wrong to apply the concept of fractional counting operations. Third, they are wrong to convert mixed fractions into ordinary fractions and vice versa. Fourth, they are wrong to change integers to fractions. Fifth, they are less careful in performing a fractional counting operation. Lastly, they are wrong to sort fraction number.

## 1. Introduction

Mathematics is one of the subjects that applied to the learning process and also daily life [1-4]. One of them is a fraction [5]. Fractions are related to daily life such as fair sharing and recipe with fractions [6-9]. In primary school, students are learning a fraction from third grade to sixth grade where the topic mapped according to students level [9]. Fractions deserve an important place in primary school because students often think in term of fraction even when fractions are not explicitly involved and if students understand fractions, they have a good foundation for proportions, decimal numbers and percentage [1]. Understanding fractions also essential for learning algebra, geometry and other aspects of higher mathematics [10, 11]. Therefore, fractions are seemed familiar to students and become important to learn.

But the fact, students have difficulties in learning a fraction [10-13]. Students are still not getting the meaning of fractions [9]. Most of them are considering fraction as a meaningless symbol and assume the numerator and denominator as separate numbers, leaving the denominator unchanged in multiplication problems and misunderstanding mixed numbers [10]. They are wrong in adding two fractions that had a different denominator [1, 12, 14-16]. They didn't use the addition of fraction procedure to solve the problem, like adding a different denominator directly [1]. Most of students still made mistake in learning fraction [17, 18].

Based on curriculum 2013, students should masters the standard competence in learning fractions. First, students could explain and determine how to sort fraction numbers. The fraction numbers consist of ordinary fractions, mixed fraction, decimals, and percentages. Second, students could explain and doing the operation of fractions. There is four operations of fractions that is addition, subtraction, multiplication, and division.

The researcher was interviewing the teacher class. The teacher said that students had difficulties in solving fraction problems. Students need more time to learn the operation of fractions than other standard competences. Most of them had difficulties in addition and subtraction of fractions. To adding and subtracting fractions, they should know how to equalize the denominator. The researcher also interviewing students. They said that they had difficulties in converting decimal numbers into fraction numbers. They could do the operation of fractions but sometimes they confused to interpreting the fraction problems into mathematical form. So, the researcher wants to find out the students difficulties in solving fraction problems, especially in seventh-grade students. The aim of this research is to detect and describes the mistake made by students.

## 2. Method

The method used in this research is descriptive research which describes the misconception of seventh-grade students in solving the fraction problems [19]. The research procedure consists of three phases: the preparation, implementation, and data analysis. In preparation phase, the researcher collects fraction problems from examination tests. There are 10 fraction problems that should be solved by students. The researcher gives instructions to students to answer the questions on the worksheet. Students also not suggested to erased their wrong answer. They just need to cross it out. So, the researcher can find out the way of students thinking. Lastly, the researcher analysis the students' answers to detect and describe the mistake made by students. This research was conducted in SMP Negeri 1 Piyungan, Bantul, Yogyakarta. The research subjects were 30 students of class VII-D consist of 14 male and 16 female students. The subjects were chosen based on the consideration that students had studied fractions at this level.

## 3. Result and Discussion

After analysis of the data test, the researcher find out 6 mistakes made by students in solving fraction problems. All type of mistakes and frequency of student that does this mistake can be seen in Table 1.

**Table 1.** Code for type of mistakes made by students

| Code | Type of Mistakes | Frequency |
|---|---|---|
| A | Rewriting the known components of the problem | 3 |
| B | Apply the concept of a fractional counting operation | 13 |
| C | Convert a fraction | 5 |
| D | Change integers into a fraction | 1 |
| E | Less careful in performing a fractional counting operation | 24 |
| F | Sort fraction numbers | 7 |

In the first mistake namely Code A, there are one mistake with 2 possible reasons that states why the mistake can be done. All type of mistake and the possible reason can be seen in Table 2.

**Table 2.** Mistaken A

| Mistakes Made | Possible reason |
|---|---|
| Error rewriting the count operation and the components of the problem | • Read the question carelessly<br>• Lack of concentration |

Figure 1 shows that students can perform fractional counting operations. Students know the concept of fractions division. Students also covert the mixed fraction into ordinary fraction well. However, students were wrong in rewriting the components of the problem. Students should write $\mathbf{2\frac{1}{2}}$, not $\mathbf{2\frac{1}{4}}$. Because of that, students cannot solve the problem correctly [7, 12, 14, 15]. So, students must concentrate and reading the question carefully.

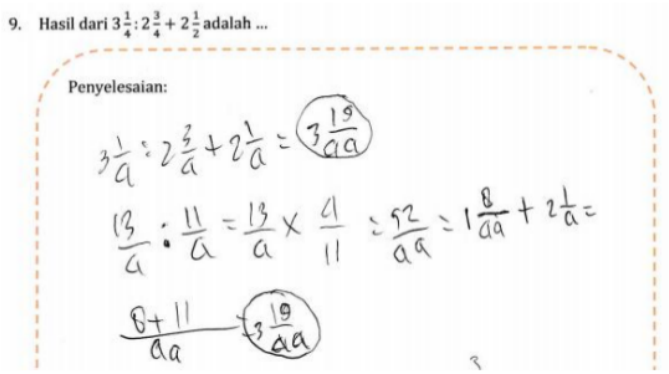


**Figure 1.** Rewriting the component of the problem carelessly

For the second mistake with code B, there are six type mistakes and possible reason why the mistake can be done. All type of mistake can be seen in Table 3.

**Table 3.** Mistaken B

| Mistakes Made | Possible reason |
|---|---|
| Equalizing the denominator in adding a fraction | • Equalizing the denominator carelessly |
| Subtract fractions without equalizing the denominator | • Lack of conceptual understanding about addition of fraction<br>• Counting subtraction operations carelessly |
| Equalizing the denominator in multiplying a fractions | • Lack of conceptual understanding about multiplication of fraction<br>• Equalizing the denominator carelessly |
| Multiplying mixed fractions without convert the mixed fractions into ordinary fractions | • Lack of conceptual understanding about multiplication of fraction |
| Divided a mixed fraction directly without converting the mixed fractions into an ordinary fractions | • Lack of conceptual understanding about division of fraction |
| Error in divided ordinary fractions (equalizing the denominator, inverting the divisor and multiplying the inverted divisor by the dividend and then multiplying each numerator by denominator) | • Lack of conceptual understanding about division of fraction<br>• Reading the question carelessly |

Furthermore, Figure 2 shows that student know the procedure to solve the problem. However, students are wrong in applying the concept of fraction division. Fraction division problems can be solved through inverting the divisor and multiplying the inverted divisor by the dividend [10]. After "invert and multiply", students actually multiplying each numerator by the denominator [20]. Students should be multiplying the numerators to get new numerator and also multiplying the denominators to get new denominator. It happens because students lack conceptual understanding [5, 11]. So, students need to learn more about the concept of fraction division and more practice in solving fraction division problem.

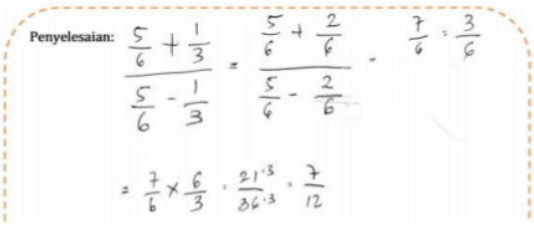


**Figure 2.** The ways of student divided a fraction

The third mistake namely Mistake C consists of one mistake with 2 possible reason. The mistake talks about the error in convert mixed fractions into ordinary fractions and vice versa. For more information can be seen in Table 4.

**Table 4.** Mistaken C

| Mistakes Made | Possible reason |
|---|---|
| Error in convert mixed fractions into ordinary fractions and vice versa | • Converting mixed fractions carelessly<br>• Lack of concentration |

Figure 3 shows that students know how to convert a mixed fraction into an ordinary fraction but students are counting carelessly. Students should write $\left(\frac{93}{4}\right)$ as an ordinary fractions, not $\left(\frac{92}{4}\right)$. So, students need to be concentration and converting fractions carefully [5].

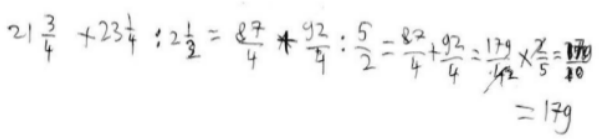

**Figure 3.** Convert a mixed fraction into an ordinary fraction carelessly

Table 5 shows the fourth mistake that can be done for student namely mistaken D. The mistake has one possible reason such as lack of conceptual understanding.

**Table 5.** Mistaken D

| Mistakes Made | Possible reason |
|---|---|
| Wrong converti integer number into a fractions | • Lack of conceptual understanding |

Figure 4 shows that students wrong to convert integers into a fraction. Students should write $\frac{12}{1}$, not $\frac{12}{12}$. It is important to include fractions that are equivalent to a whole number (e.g. $\frac{7}{7}$) so that students understand that whole numbers can be written as a fraction [1].

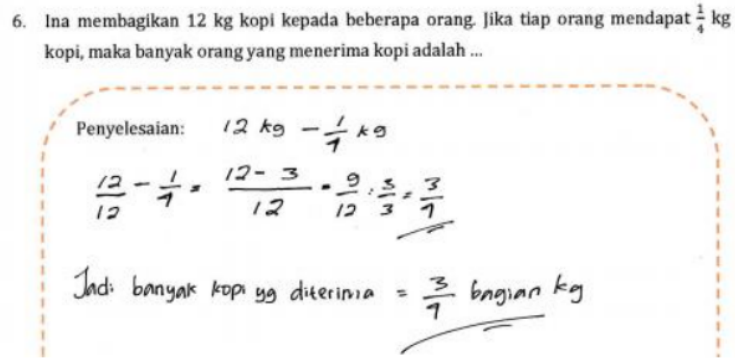


**Figure 4.** Wrong to convert integer number into a fraction

The sixth mistakes make 5 types. Every type consists of 2 or 3 possible reason. All correlation between the type of mistakes and the possible reason can be seen in Table 6.

**Table 6.** Mistaken E

| Mistakes Made | Possible reason |
|---|---|
| Simplifying fractions | • Simplifying fractions carelessly<br>• Lack of concentration<br>• Lack of conceptual understanding about equivalent fractions |
| Error in addition and division operation | • Less careful in counting operations<br>• Read the question carelessly<br>• Error in interpreting the problem into a mathematical form |
| Doing subtraction first then division | • Counting fraction operations carelessly<br>• Do not know the basic rules for counting operations |
| Do not finish in solving a problem | • Read the question carelessly<br>• Lack of knowledge<br>• Cannot interpreting the problem into a mathematical form |
| Answer without explaining the procedure | • Lack of knowledge<br>• Cannot interpreting the problem into a mathematical form<br>• Answering without reading a question |

Students are wrong to interpreting the problem into mathematical form (Figure 5). But, students are understanding the concept of addition and subtraction fractions well. This problem can be interpreted into mathematical form as $2\frac{1}{2} + 22\frac{3}{4} + \frac{1}{4} : \frac{1}{4} =$. Figure 5 shows that students also wrong to interpreting the problem into mathematical form. Students read a question carelessly so that students wrote $12 - \frac{1}{4} =$. The correct mathematical form is $12 : \frac{1}{4} =$. The error already states in several research that discuss about this error [5-7, 12].

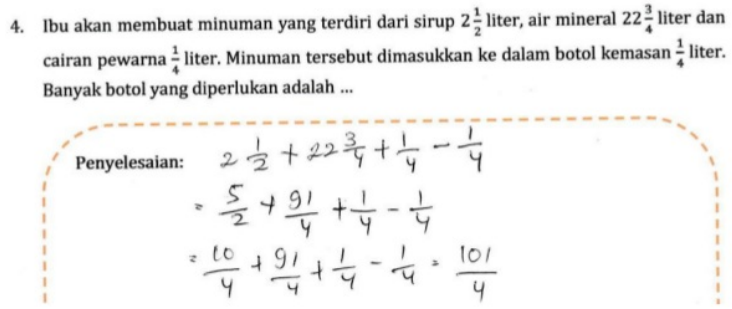


**Figure 5.** Wrong to interpret the problem into a mathematical form

The last mistake consists of 2 types. The first type has two possible reasons and the second type only has one possible reason. For more information, it can be seen in Table 7.

**Table 7.** Mistaken F

| Mistakes Made | Possible reason |
|---|---|
| Error in convert fractions into decimal, sort fractions without equalizing the denominator, answering without giving any reason or explanation | • Lack of conceptual understanding about decimal numbers<br>• Do not know the procedure to solve the problem |
| Sort decimal numbers without considering the number behind the comma | • Lack of conceptual understanding about decimal numbers |

Figure 6 shows that there are two mistakes made by students. First, students are wrong to convert a fraction into a decimal [12, 15, 17]. We can see that students simplifying a fraction. Students view the numerator (3) as (2) then divided the numerator and denominator by 2. Students wrote 1.4 for the result. Second, students sort fractions without equalizing the denominator.

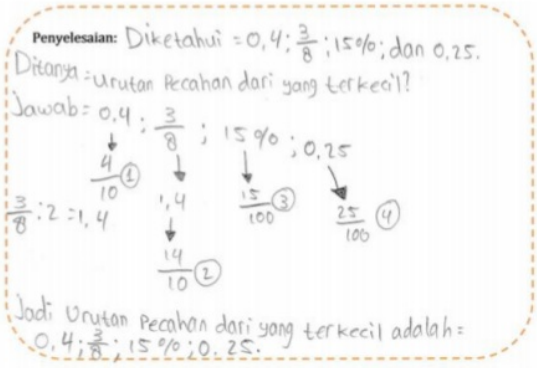


**Figure 6.** Wrong to sort fractions

## 4. Conclusion

There are six misconceptions in solving the fraction problems for seventh-grade students. First, students are wrong in rewriting the known components of the problem. Second, they are wrong to

apply the concept of fractional counting operations. Third, they are wrong to convert mixed fractions into ordinary fractions and vice versa. Fourth, they are wrong to change integers to fractions. Fifth, they are less careful in performing a fractional counting operation. Lastly, they are wrong to sort fraction number. The result would be the foundation or the best reason for researcher to design the learning trajectory on fraction and implement the design in learning process to solve the problems for the future research.

## 5. Acknowledgment

The researcher thanks Universitas Ahmad Dahlan for giving the opportunity and facilities so the researcher can complete this research. Thanks also to the head department of our master program, Dr. Suparman, M.Si., DEA., who teaches and motivates the researcher to learn more about research methodology on especially in mathematics education. Lastly, author thanks to SMP N 1 Piyungan and the teacher who facilitating us with their students as the research subject.

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