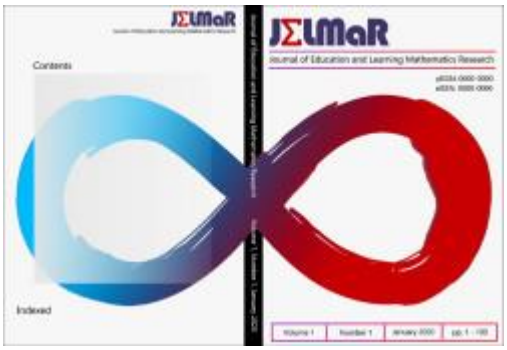

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Implementation of Problem Based Learning Model at Class VII9 of SMP Negeri 21 Pekanbaru

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***Abstract**: The proposes of this research are to improve the learning process and to increase mathematics achievement from the students with applied problem based learning model. Class action research is carried out in two cycles. First cycles has three meetings and one daily tests, second cycles has three meetings and one daily tests. The research subject is the students of class VII_9 SMP Negeri 21 Pekanbaru in academic year 2019/2020, which total of participants are 39 students, consists of 22 female students and 17 male students with heterogeneous ability. The qualitative descriptive showed an improvement of learning process prior to the action on the first and second cycle. The data of the student's evaluation test showed the number of students who reached KKM on the basic score, daily tests (cycle I), daily tests (cycle II) were 15 people (38,46%), 26 people (66,6%), and 30 people (76,9%). The percentage of KKM achievement shows an increase from before the action to after the action so that it can be said that the learning out comes of students also in crease.The results of this study indicate that the Problem Based Learning model can improve the learning process and improve the mathematics learning out comes of students of VII_9 SMP Negeri 21 Pekanbaru in the even semester of the 2019/2020 academic year on material social arithmetic.*

Keyword: Mathematics Achievement, Problem Based Learning, Class Action Research

INTRODUCTION

In the world of education, mathematics is one of the subjects that has an important role. Learning mathematics in the implementation of education is given to all levels of education ranging from elementary, junior high, high school to university level. Mathematics is also a subject that emphasizes the importance of the ability to think logically, critically, analytically, and systematically, and the ability to cooperate. These abilities can be seen in the purpose of learning mathematics.

The purpose of learning mathematics according to Permendikbud Number 58 of 2014 is that students have the ability: (1) to understand mathematical concepts, namely competence in explaining the interrelationships between concepts and applying concepts and algorithms flexibly, accurately, efficiently, and precisely in problem solving ; (2) using patterns as conjectures in problem solving and being able to make generalizations based on phenomena or existing data ; (3) using reasoning on the nature, doing mathematical manipulation which includes the ability to understand problems, build mathematical models, solve models and interpret the solutions obtained and solve problems in daily life ; (4) communicating ideas, reasoning, and being able to compile mathematical proofs ; (5) has an attitude of appreciating the usefulness of mathematics in life ; (6) has attitudes and behaviors that are consistent with values in mathematics and learning ; (7) carrying out motor activities that use mathematical knowledge ; and (8) using simple teaching aids or technology products to carry out mathematical activities.

The achievement of the objectives of mathematics learning can be seen from the completeness of mathematics learning outcomes obtained by students after participating in

the mathematics learning process. The completeness criteria of learning outcomes determined by the education unit is called the Minimum Mastery Criteria hereinafter referred to as KKM (Permendikbud Number 23 of 2016). In this case, the facts obtained in VII_9 grade students of SMP Negeri 21 Pekanbaru, the number of students who reach KKM on daily tests of material numbers, sets, algebraic forms, as well as linear equations and inequality of one variable are 15, 17, 19 , and 18 students out of 39 students. Percentage of KKM achievement successively 38 , 4 %; 43.5%; 48.7%; and 46.1%. So there is a gap between the expected mathematics learning outcomes and the mathematics learning outcomes achieved by students.

Researcher tried to find the cause of the low learning outcomes by conducting interviews with three students with low, medium and high abilities. Interviews were conducted to find out the obstacles experienced by students during the mathematics learning process. Based on interviews with students, information was obtained that: (1) students said they did not like mathematics because they thought mathematics was a difficult subject; (2) students found it difficult to understand the material presented by the teacher; (3) students felt lazy to ask questions when they didn't understand because they feel embarrassed and afraid of being scolded by the teacher; (4) students say that they cannot solve problems in the form of stories because of the lack of students' knowledge in solving problems and understanding the form of the problem; (5) the way of teaching a teacher does not vary, students never learn in groups; and (6) class atmosphere is not conducive.

In addition to conducting interviews with students, researchers conducted interviews with mathematics teachers in class VII_9 of SMP Negeri 21 Pekanbaru. Based on interviews obtained information that: (1) teachers didn't use learning models ; (2) most students didn't actively participate in the learning process and pay less attention when the teacher explains ; (3) most students found it difficult to understand the concept correctly in every material delivered by the teacher so that when given a problem students only copy the answers from their friends ; and (4) students are not able to understand and process the information they have just obtained from the problems which results in some students not being able to solve the problems properly; and (5) the giving of problem solving problems is not always given at every meeting, resulting in students having difficulty in solving problem solving problems.

From the description of the learning process in class VII_9 of SMP Negeri 21 Pekanbaru, it showed that the learning activities that were going on were going well enough, although there were still shortages. The learning process was not yet fully in line with learning activities that were in accordance with the Learning Implementation Plan (RPP) of Permendikbud number 22 of 2016 , students still tent to be passive and less enthusiastic in following the learning process. The teacher also rarely gave problems related to daily life or problem solving problems so students were not familiar with problem solving problems and had not been able to solve a problem to build their own knowledge.

To overcome the above problems , it is necessary to improve the learning process that can facilitate students actively involved to build their knowledge. Muhibbin Syah (2010) states that the learning model or method used during the learning process greatly affects the level of student success in learning.

One way that teachers can do to improve the learning process is to apply a learning model that can make learning centered on students and provide opportunities for students to develop independently build knowledge through discovery in the process of thinking . The learning model that can be applied is the *Problem Based Learning (* PBL) model .

The PBL model is one of the learning models suggested in the 2013 Curriculum (Permendikbud No. 103 of 2014). PBL model is a learning model that uses authentic problems as a source of learning so students are trained to think at a high level and develop personalities through problems in daily life (Hamzah and Nurdin, 2012).

Trianto (2014) states that the advantages of the PBL model include: (1) students better understand the concepts being taught, because they themselves fulfill these concepts; (2) involve students actively solving problems and demanding students' higher thinking skills; (3) embedded knowledge based on schemata owned by students so that learning is more meaningful . Therefore, the existence of PBL is expected to provide broad opportunities for students to think and develop ideas in a group or individual way so that problem solving abilities can be possessed by students .

Researchers chose the PBL model because it was supported from the results of Isoka Amanah Kurnnia's research (2017) which stated that the application of the PBL model could improve the learning process and improve the mathematics learning outcomes of Grade $VIII_5$ students of SMP Negeri 16 Pekanbaru on the subject matter of relations and functions . Paloloang (201 4) also states that the application of the PBL model can improve student learning outcomes in the material of the length of the tangent of the two circles of fellowship in class VIII of SMP Negeri 19 Palu.

Based ur aian above, the researchers have conducted research by applying the model PBL to improve the learning process and improve learning outcomes math class VII_9 of SMP Negeri 21 Pekanbaru school year 2019 /2020 on the matter of social arithmetic.

METHOD

The form of research was Classroom Action Research (PTK). Supardi (in Suharsimi Arikunto, et al, 2016) stated that PTK is a study that uses a cycle or cycle of continuous action , then the cycle or cycle is at least twice. Each round through four stages, namely planning (*planning*), action *(action*), observation (*observation*), and reflection (*reflevtion*) . The implementation in class VII $_9$ of SMP Negeri 21 Pekanbaru was carried out in two cycles and each cycle ended with the implementation of the Daily test (UH) . The subjects of the study were VII grade $_9$ students of SMP Negeri 21 Pekanbaru, amounting to 39 students consisting of 17 men and 22 women with erogenous abilities . Research instruments were learning tools and data collection instruments. The learning kit consists of a Syllabus, 6 Learning Implementation Plans (RPP) and 6 Student Activity Sheets (LAS) . Data collection instruments consisted of observation sheets (teacher and student activities) and mathematics learning achievement test kits. Observation sheets were used to obtain data regarding teacher and student activities during the learning process. The learning achievement test kit consists of a grid of daily test questions, daily test questions, and alternative daily test answers used to collect student learning outcomes data. Data collection techniques are observation techniques and test engineering. Analysis of the data in this study was the analysis of teacher and student activity data and analysis of student mathematics learning outcome data.

Analysis of Teacher and Student Activity Data

Data analysis of teacher and student activities was carried out to answer the problem formulation of the improvement of the learning process obtained through observation sheets. After making observations in cycle 1, observers and researchers discussed the results of observations in cycle 1 and analyzed it by looking at the appropriateness of the actions carried out with the steps of applying the PBL model so that the shortcomings of the researchers carried out in cycle 1. If there were still weaknesses or actions which is not in accordance with the steps of the PBL model , new actions are planned as an effort to improve the implementation of further learning. The action was said to be in accordance

with the plan if the implementation of the action during the learning process takes place in accordance with the steps in applying the PBL model .

Analysis of Student Mathematics Learning Outcomes Data

Data analysis was performed by looking at student mathematics learning outcomes individually. Student mathematics learning outcomes data were analyzed based on KKM achievement and KKM achievement indicators.

Data analysis of KKM achievement on knowledge and skills competencies was done by comparing the percentage of students reaching KKM on the basic score and the percentage of students who achieved KKM on the learning outcomes score ie the UH I and UH II scores. Students are said to be complete when reaching a minimum grade of 71.

According to Purwanto (2014) that the percentage of the number of students who reach the KKM can be calculated in the following way :

$$P = \frac{a}{b} \times 100\%$$

Information :
P = percentage of students who reach the KKM
a = number of students who reached KKM
b = number of all students

Learning outcomes were said to increase if the percentage of students who achieve KKM at UH I and UH II was higher than the percentage of students who reach KKM on the base score. Data analysis of the attainment of indicators of knowledge and skills was carried out to determine the percentage of achievement of each indicator by each student. This achievement can be seen from the individual student mathematics learning outcomes obtained from UH I and UH II. Students were said to reach the KKM indicator if they get a minimum grade of 71 . Student achievement for each indicator is calculated using the following formula:

$$N = \frac{SP}{SM} \times 100\%$$

Information :
N = value
SP = score obtained by students
SM = maximum score

Analysis of the Success of Actions

Wina Sanjaya (2011) stated that PTK is said to be successful where as the problems being studied are increasingly conical or through action each cycle of the problem is increasingly solved, whereas viewed from the aspect of learning outcomes obtained by students the greater the meaning, the learning outcomes from cycle to cycle increases. Success criteria for action in this study are based on the occurrence of improvement in the learning process and an increase in student mathematics learning outcomes. Improvement of the learning process was done by comparing the learning process in cycles I and II obtained through observation sheets of teacher and student activities. Improvements learning process occured when the activity of teachers and students increasingly mem b aik and weakness of the less. In addition, improvements in the learning process also occur if the learning process has been carried out optimally in accordance with the application of the PBL model.

Improved student mathematics learning outcomes can be seen from the analysis of KKM achievement data and KKM achievement analysis indicators. An increase in

student learning outcomes if the percentage of the number of students who reach the KKM increases from the basic score to the daily tests I and from daily tests I to daily tests II. If there is one analysis that does not show an increase in learning outcomes, it is necessary to see which analysis shows a better increase in learning outcomes.

RESULT AND DISCUSSION

The data analyzed are observations of teacher and student activity data as well as student mathematics learning outcome data. From the observations , at the first meeting of cycle I, students payed less attention to the teacher when providing motivation. The second meeting until the end of the second cycle some students have noticed the motivation given by the teacher. At the beginning of the first cycle when the formation of class groups became noisy because students were still busy joking with their friends so it was enough to spend time, but along with the implementation of the cycle I to cycle II students were more orderly.

In the phase of student orientation to the problem of the first cycle, early in the implementation of the first cycle of action students tend to be passive in responding and not understanding the given problem. This is in line with the results of Marlina's research (2018) which states that in cycle I, not all students are active in the learning process. In cycle II, almost all students can understand the given problem, students can understand the problem and have active discussions in groups.

In the phase of organizing student learning in the first cycle, the initial implementation of student actions is still difficult in identifying things that are known and asked about the problem. At the end of the implementation of the first cycle of action the students have started writing the known and asked questions well, although there are still some students who only copy their friends' answers. In cycle II, students independently identify and write down the problem given and students have been able to write what is known and asked of the problems that exist in the LAS independently.

In the guiding phase of individual and group investigations, in the first meeting of cycle I the teacher forgets to give students the opportunity to look for information related to the material from other sources. Some students still work individually in groups and see answers from other groups. Over the first cycle of work each group is getting better from the previous meeting. In cycle II the cooperation between each group gets better until the end of cycle II. Students are active in expressing their opinions in groups. The teacher provides assistance if there are students or groups that are experiencing difficulties. This is in accordance with the opinion of the Archipelago and Syafi'i (2013) which states that a teacher has an obligation in overcoming difficulties experienced by students in the learning process by making efforts to provide assistance to a minimum or better known as *scaffolding* .

In the phase of developing and presenting the work, from cycle I to cycle II there is always a group that wants to present the results of the group. But at the time of presentation students only read the results of the discussion. This happened because students were still shy and lacked confidence in presenting the results of the discussion in front of the class. In line with the implementation of the first cycle of action , students are better at presenting and explaining the results of their group discussions.

In the phase of analyzing and evaluating the problem solving process at the beginning of the first cycle, only one student responded to the results of the group discussion and tended to hesitate in correcting the answers of other groups. The teacher tries to lure students to respond by justifying the answers of other groups or vice versa. In line with the implementation of the first cycle of action, some students began to comment on their friends' answers. At the end of the implementation of the first cycle of action, students who responded to the results of the discussion of other groups presented

began to increase. at the beginning of the implementation of the first cycle of action only two students who want to be together with the teacher to reflect on the learning activities that have been learned. In line with the implementation of the first cycle of actions, some students began to want to participate in activities that reflect learning activities that have been learned. At the end of the action cycle I, students who responded to the reflection of learning activities began to increase. In cycle II, all students together with the teacher reflect enthusiastically on learning activities.

In the closing activities of the second cycle of the second meeting, there was one student who dared to express his opinion even though he was a little hesitant. The third meeting until the end of the second cycle, each meeting the number of students who raise their hands willing to conclude more lessons. The activities of researchers and students in the closing activities of the first cycle increasingly improved until the end of the second cycle. Researchers as teachers always provide formative tests, feedback, homework, and provide information about the subject matter that students will learn at the next meeting.

Based on the activity steps outlined in the implementation of the cycle I and cycle II actions, the application of the PBL model conducted by the researcher had a positive impact on the implementation of the learning process that is seen an increase in teacher and student activities for the better during the learning process , the number of students actively involved in the learning process and bold in pouring out the contents of the thinking in the discussion and eager in every step of solving the problem in the learning process before the action, cycle I and cycle II respectively are 8, 12, and 20 from 39 students with the percentage respectively which are 20 %; 30.7% and 51.2% . Students are also trained to build their own knowledge so that learning becomes more meaningful and more embedded in students' memories. This is in line with research by Novia Angriani (2019) which states that student participation is increasingly active in every step of problem solving.

Mathematics learning outcomes of students analyzed with the achievement of KKM and analysis of the achievement of KKM indi k ator . Students are said to achieve KKM if they get more than or equal to the KKM set by the school, which is 71 . To find out an increase in student learning outcomes before and after the action, can be seen in the following Table 2 .

Table 1 . Percentage of Student KKM Achievement on Basic Score, UH I, and UH II

	Base Score	UH I	UH II
Number of students who reach KKM	15	26	30
Percentage (%)	38,46%	66,6%	76,9% %

Sumber: data from researchers, 2020

Based on Tabel 1 can show that the number of students of class VII $_9$ SMP 21 Pekanbaru reached KKM of prior actions (basic score) to the first cycle (score UH I) and the second cycle (score UH II) have increased .

The researcher analyzed the competency scores of students' knowledge and skills based on the KKM achievement indicators. The completeness of mathematics learning outcomes was analyzed individually for each question indicator which can be seen from the percentage of students who reach the KKM for each question indicator. Students are said to reach the KKM indicator if they score more or equal to 71.

The percentage of KKM achievement of knowledge indicators at UH I can be seen in Table 2 .

Table 2 . Percentage of Student KKM Achievement in UH Knowledge Indicator I

No	Indicators of Competence Achievement	Number of Students Reaching KKM	Percentage (%)
1	Determine the selling price and purchase price of an item	36	92,3%
2	Determine the amount of profit or loss from the sale of an item	32	82%
3	Determine the percentage of profit or loss from the sale of an item	34	84,6%

Sumber: data from researchers, 2020

Table 2 shows that not all students achieved the completeness of each indicator. The percentage of achievement of K K M indicator obtained is still below 100%. Researchers check the errors of student work results in solving UH I questions . The following questions are given for indicator 2 : A chicken farmer buys a chicken at a price of Rp. 45,000, then he resells the chicken at a price of Rp. 50,000 The big profits from the breeder !

Based on the results of UH I, it was concluded that some students were able to solve the questions. However, there are still students who make mistakes in solving problems, namely as shown in Figure 1.

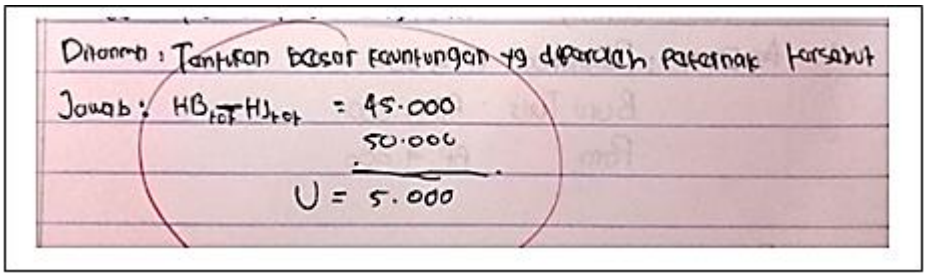

Figure 1. Example of Student Error in UH I

Figure 1 shows that the student made a mistake in writing the formula so that the student continued the operation by subtracting 45000 with 50000. The profit gained by the student was correct. But in the operation there is a mistake because the correct result of the reduction by 50000 is the possibility of this happening due to student carelessness or lack of accuracy. The error in Figure 4.1 is included in the concept error

Furthermore, the percentage of KKM achievement of knowledge indicators in UH II can be seen in Table 3.

Table 3. Percentage of Student KKM Achievement in Knowledge Indicators at UH-II

No	Indicators of Competence Achievement	Number of Students Reaching KKM	Percentage (%)
1	Determine the gross, tare and net size	36	92,3%
2	Determine the amount of discount and percent discount for an item	32	82%
3	Determine the single interest	35	89,7%

Sumber: data from researchers, 2020

It can be seen that the percentage of achievement of KKM indicator is the lowest at 82 % in indicator 2. Percentage of achievement of KKM highest indicator is 92 , 3 % in

indicator number 1. There is no percentage of achievement of KKM indicator 100% in UH II which indicates there are still errors in the answers of students in working on UH II questions. That is because there are still students who are wrong in performing arithmetic operations. The following questions are given for indicator 2 : The price of a bag is Rp.200,000 and there is a discount so the price becomes Rp.160,000. How much is the discount and discount percent of the bag?

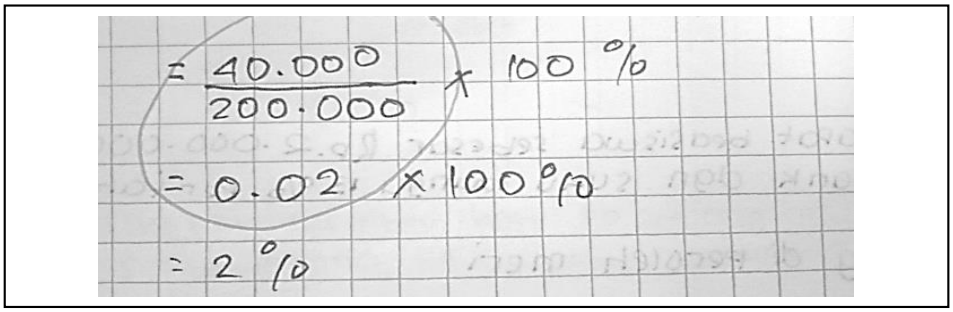

Figure 2. Example of Student Error

Figure 2 shows the student's mistake in carrying out the division operation $\frac{40000}{200000}$. Students wrote the results of the distribution is 0,02 what should be 0,2. This is likely due to a lack of student accuracy . The error in Figure 2 is included in the operation error. Furthermore, the percentage of KKM achievement of UH I skill indicators can be seen in Table 4 .

Table 4 . Percentage of KKM Achievement in Cycle I Skill Indicators

No	Indicator of Achievement	Number of Students Reaching KKM	Percentage (%)	Average value
1	Resolve issues related to sales and purchases	28	71,7%	82,4
2	Resolve issues related to profit or loss	25	64,1%	79,9
3	Resolve issues related to percentage of profit or loss	22	56,4%	64,4

Based on Table 4 can see that not all students mencapa i completeness of each indi k ator . P ersentase achievement of KKM lowest indicator is 56.4% with an average value obtained by the students was 64.4 on the indicator m enyelesaikan issues related to the percentage of profits or losses. That is because students were incomplete and less systematic in writing completion and there are still students who only write what is known and what is asked. The following questions are given for indicator 3: Pak Aji bought a used TV for Rp.600,000. For repairs, Pak Aji had to pay Rp.200,000. After a few months, Mr. Aji decided to sell the TV because he needed money at a price of Rp. 700,000. Determine the percentage of profit or loss from the sale . Figure 3 below is an example of student error in indicator 3.

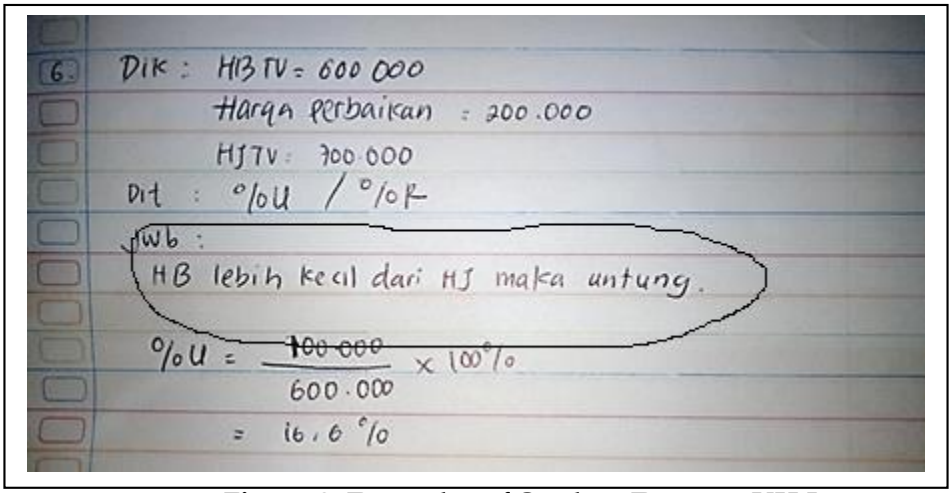

Figure 3. Examples of Student Errors at UH I

Figure 3 shows the students' mistakes when determining whether Pak Aji experienced a loss or gain. Students stated that the purchase price is smaller than the selling price. It is likely that this happened because students did not add the purchase price of the TV to the price of the TV repair first. So that the problem solving that students do is wrong. Furthermore, the percentage of KKM achievement of UH II skills indicators can be seen in Table 5 .

Table 5. Percentage of KKM Achievement in Cycle Skill Indicators II

No	Indicator of Achievement	Number of Students Reaching KKM	Percentage (%)	Average value
1	Resolving problems related to gross, tare and net	33	84,6%	80,7
2	Resolving social arithmetic issues related to discounts	25	64,1%	77,3
3	Resolving social arithmetic problems related to the concept of single interest	27	69,2%	73,6

Based on Table 5 percentage achieved KKM lowest indicators ie 64 , 1 % with an average value of 77.3 students in the indicator solved social arithmetic problems relating to the discount. That is because there are still students who do not understand the concept of discounts and are incomplete in answering questions . The questions given for indicator 2 are : Mr. Karim wants to buy clothes and pants for his son's birthday gift. He bought at a store that was giving massive discounts. He bought clothes at a price of Rp.300,000 and got a 70% discount and pants at a price of Rp.500,000 and got a 50% discount. Determine the total harg a which must be paid Pak Karim . The following are examples of student errors in indicator 2.

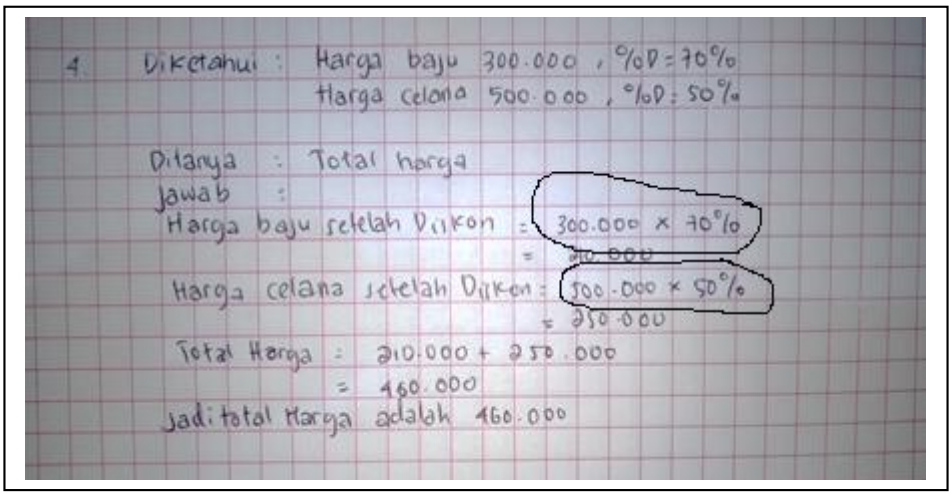

Figure 4. Example of Student Error

Figure 4 shows the student's mistake when determining the price of clothes after the discount, students multiply the initial price of clothes and pants by the percentage of discount. It is likely that this happened because students thought that the discounted price was the same as the price after the discount. Because of these errors, the students' answers are not correct until the end of problem solving.

Based on the description above , it can be said that there was an improvement in the learning process and improved student learning outcomes in mathematics, this is in line with the results of Pratiwi's research (2014) which states that the application of the PBL model can improve the learning process and improve mathematics learning outcomes of $VIII_2$ grade students of SMP Negeri 4 Pekanbaru and the results of research by Moh Fikri Bungel (2014) which stated that the application of the PBL model could improve the learning outcomes of Class VIII students of SMP Negeri 4 Palu on prism material.

The analysis of the results of the study supports the proposed action hypothesis that, if PBL models are applied in the process of learning mathematics, it can improve the learning process and improve the mathematics learning outcomes of VII_9 grade students of SMP Negeri 21 Pekanbaru in the even semester of 2019/2020 academic year on arithmetic material social. This is in line with what was stated by Wina Sanjaya (2011) that PTK is said to be successful where when the problem being studied is increasingly conical or through action each cycle of the problem is increasingly solved, whereas viewed from the aspect of learning outcomes obtained by students the greater the meaning, the learning outcomes from cycle to cycle increasing .

CONCLUSION

Based on the results of research and discussion can be concluded that the application of the model of Problem Based Learning (PBL) can improve the learning process and improve learning outcomes eighth grade mathematics VII9 grade students of SMP Negeri 21 Pekanbaru in the second semester of the school year 2019/2020 on Arithmetic Social.

Based on the discussion and conclusions in this study, the researchers submit recommendations relating to the application of the Problem Based Learning (PBL) model in mathematics learning, among others as follows: (1) The application of the PBL model can be used as an alternative learning model that can be applied to improve the learning process and improve student learning outcomes in mathematics; (2) In this learning model, students are required to be able to solve contextual

problems provided, make students independent to learn and increase student confidence, therefore teachers or researchers who want to apply the PBL model should make it clear to students to discuss with their group friends first before ask the teacher and give help as needed.

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