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Mathematical Communication Skills of Senior High School Student in Solving Mathematical Problem Based On Adversity Quotient

Hasbiansyah Cahyadi[1*], Susanah[2]

[1,2]Mathematics Education, State University Of Surabaya, Surabaya, Indonesia

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***Corresponding author:**
hasbiansyah.19022@mhs.unesa.ac.id

Abstract: Mathematical communication skills are useful for students to understand mathematical language. This research aims to describe student's mathematical communication skills with type AQ climber, camper, and quitter in solving mathematical problems. This research is a descriptive study. Data collection techniques include questionnaires, assignments, and interviews. Data analysis techniques include data reduction, data display, and conclusions. The results of this study show that: a) At the stage of understanding the problem, climber and camper students wrote of all the necessary mathematical information, while quitter students wrote of some the necessary mathematical information. Climber and quitter students use mathematical language in the form of precise numbers and symbols, while camper students don't use precise mathematical symbols. b) At the stage of devising a plan three of them make mathematical models and write down calculation operations that correspond to the question. Climber and camper students present and explain their ideas with clear reasons, while quitter students give less clear reasons. c) At the stage of carrying out the plan climber and camper students use mathematical language in the form of numbers, variables, symbols and logical connections appropriately, while quitter students uses a symbol that is not properly used. d) At the stage of looking back climber and camper students use mathematical language in the form of appropriate numbers and symbols, while quitter students don't use mathematical language.

INTRODUCTION

Mathematical communication skills are useful for students to understand mathematical language in mathematics learning. According to NCTM (2000), process standards in mathematics learning include problem solving, reasoning, communication, connections, and representation. Based on Chasanah et al. (2020) mathematical communication skills can encourage students to be able to express and convey their ideas about mathematics. Asfanudin et al. (2024) states mathematical communication can help students to easily understand mathematical concepts. Good mathematical communication skills can improve mathematics learning outcomes, logical thinking skills, and correct communication methods (Uyen et al., 2021). Therefore if students have good mathematical communication, they can increase their confidence in conveying mathematical ideas.

Lomibao et al. (2016) states mathematical communication is students' skill to express their ideas and discuss mathematical concepts coherently and clearly. Skill is an individual's potential to carry out a task or job (Sekartini, 2016). Fazriansyah (2023) states mathematical

communication skills can be defined as students skills to express mathematical ideas or concepts effectively to other using written or oral methods, which aim to ensure comprehensive understanding of the recipient. According to Pagesty et al. (2021) mathematical communication skills are students' skills to convert what they know in the form of real objects, picture, tables, etc. into mathematical form using their own language and using appropriate mathematical symbols. Based on that definition, it can be interpreted that mathematical communication skills are students' potential in write and explain about their ideas using their own language and also using correct mathematical language for presenting it.

The results of previous research by Oktavianingsih & Warmi (2021), students who are classified as having low mathematical communication skills are 50%. This shows that there are still many high school students who are weak in mathematical communication. According to Kemendikbudristek (2022) that the aim of mathematics subjects in senior high school is to communicate ideas using symbols, tables, diagrams, or other media to clarify situations or problems, as well as presenting a situation in symbols or mathematical models. From this statement, senior high school students must have good mathematical communication skills.

One of the activities to be able to see mathematical communication skills is solving mathematical problems. In solving mathematical problems, it's not only about the calculations, but also about how we convince other people to accept our ideas in solving mathematical problems. Based on Maulyda (2020) the relationship between mathematical communication and problem solving in mathematics learning can be seen from the aim of mathematical communication in mathematics learning, namely helping students understand problems in the form of story problems and communicating the results. Polya (2004) explains that problem solving is an attempt to find a way out of a goal that cannot be achieved immediately. Problem solving consists of 4 stages, namely the stage of understanding the problem, devising a plan, carrying out the plan, and looking back (Polya, 2004).

Based on Saputra et al. (2022) adversity quotient (AQ) has a positive effect on mathematical communication skills. According to Khoirunnisa et al. (2021) adversity quotient is a human being's ability to think, direct and control his actions and his resilience to challenges and difficulties to keep fighting. According to Stoltz (2020) there are 3 types of adversity quotient, namely climber, camper, and quitter. Climber welcome challenges, and they live with the understanding that things are urgent and must be dealt with immediately; Camper can do work that requires creativity and take calculated risk, but they usually take the safe route; Quitter work just to live, they have little ambition and low enthusiasm (Stoltz, 2020). This research aims to describe the mathematical communication skills of senior high school students with type AQ climber, camper, and quitter in solving mathematical problems.

METHOD

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This research use a descriptive method with a qualitative approach. The aim is to describe the mathematical communication skills of senior high school students in solving mathematical problems based on adversity quotient. Based on Losi et al. (2021) mathematical communication skills of female students are higher than male students. Hence the subject of this research were 3 students (climber, camper, and quitter) in class X senior high school with the criteria of being the same gender and having good and equal mathematics skills as indicated by the same interval of math test scores. The students math test scores and math test score intervals below were obtained from the class X mathematics teacher at the senior high school.

Table 1. Math Test Score Interval

KKM	Predicate			
	Less	**Enough**	**Good**	**Very Good**
76	Score < 76	76 ≤ Score < 84	84 ≤ Score < 92	Score ≥ 92

Data collection techniques in this research include giving questionnaires, giving assignments, and interviews. The instrument in this research include the Adversity Response Profile (ARP) questionnaire, mathematics problem assignments, and interview guidelines. The Adversity Response Profile (ARP) questionnaire is used to determine students' AQ type. The questionnaire was adapted from Stoltz (2020) and consulted with the supervisor, consisting of 20 incidents with 2 questions for each incident. The mathematics problem assignments are used to describe students' written mathematical communication skills. The assignment is in the form of an essay question based on a story problem in order to understand the student's process in solving problem and modelling it mathematically. The interview guidelines are used to describe students' verbal mathematical communication skills.

The results of the questionnaire were analyzed based on the adversity quotient type grouping adapted from Handayani & Ramadhani (2020) which can be seen in the following table.

Table 2. Adversity Quotient Type

ARP Questionnaire Score	Adversity Quotient Type
135-200	Climber
95-134	Camper
0-94	Quitter

The results of student assignments were analyzed based on indicators of mathematical communication skills adapted from Uyen et al. (2021) and Sari & Yuberta (2022) which can be seen in the following table.

Table 3. Indicators of Mathematical Communication Skills

Polya Problem Solving Stages	Indicator Mathematical Communication Skills
Understanding the problem	Take note all necessary mathematical information presented in mathematical writing or orally

Polya Problem Solving Stages	Indicator Mathematical Communication Skills
	Use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas
Devising a plan	Make mathematical models and write calculation operations that are appropriate to the question in problems
	Present, express ideas in writing or orally accompanied by clear reasons
	Use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas
Carrying out a plan	Present, express solutions in writing or orally accompanied by clear reasons
	Use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas
Locking Back	Use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas

After the students have done the assignment, the students are then interviewed. The interview results were analyzed based on 3 activities according to Miles and Huberman (1994) namely (1) data reduction, (2) data display, and (3) conclusion drawing and verification.

RESULT AND DISCUSSION

Result

Data collection in this research was carried out at SMAN 1 Bangkalan, starting with giving a questionnaire in class XE-1 which consisted of 36 students. The subjects chosen by 3 students (1 climber, 1 camper, and 1 quitter) with the same gender and have good and equal mathematics skills as indicated by the same interval of math test scores. Based on the data, the following 3 students were obtained.

Table 4. Research Subject

No.	Name	Type of Adversity Quotient	Gender	Math Test Score	Code
1.	JAZ	Climber	Female	89	ST
2.	SAW	Camper	Female	88	SS
3.	SSA	Quitter	Female	86	SR

The results of the analysis of the mathematical communication skills of subjects with the AQ climber type, AQ camper type, and AQ quitter type in solving mathematical problem based on the stages of problem solving are presented as follows.

1. **Analysis of Mathematical Communication Skills of Subjects (ST) with The AQ Climber Type**
   a) **Understanding The Problem**

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The following picture shows the solutions by ST at the understanding the problem stage.

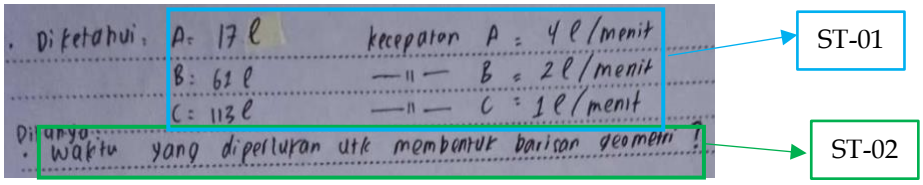

Figure 1. ST's Way of Mathematical Communication in Understanding Problem

Below is an interview conducted by researchers with ST regarding the solution above.

P-01 : Why do you write the known information like this?
ST-01 : Because from the problem says that container A contains 17 liters of water, container B contains 61 liters of water, container A contains 113 liters of water. Likewise, the speed of the water is also written in the question, namely speed A=4 liters per minute, speed B=2 liters per minute, speed A=1 liters per minute.
P-02 : Then why do you write the asked information like this?
ST-02 : Because from the problem, determine the time needed for this to happen, namely when the volumes of containers A, B, and C form a geometric sequence.

Based on the results of student answers and interviews above, at the stage of understanding problem ST write down all the known information including the volume of water and the speed of the water in each container. She wrote down the volume of container A is equal to 17 liters, the volume of container B is equal to 61 liters, and the volume of container C is equal to 113 liters. She also wrote down the speed of the water of container A is equal to 4 liters per minutes, the water of container B is equal to 2 liters per minutes, the water of container C is equal to 1 liters per minutes. It shows that ST performs indicators of mathematical communication skills, namely take note all necessary mathematical information presented in mathematical writing or orally. ST also uses numbers, symbol "=" in her writing. It shows that ST performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

b) Devising A Plan

The following picture shows the solutions by ST at the devising a plan stage.

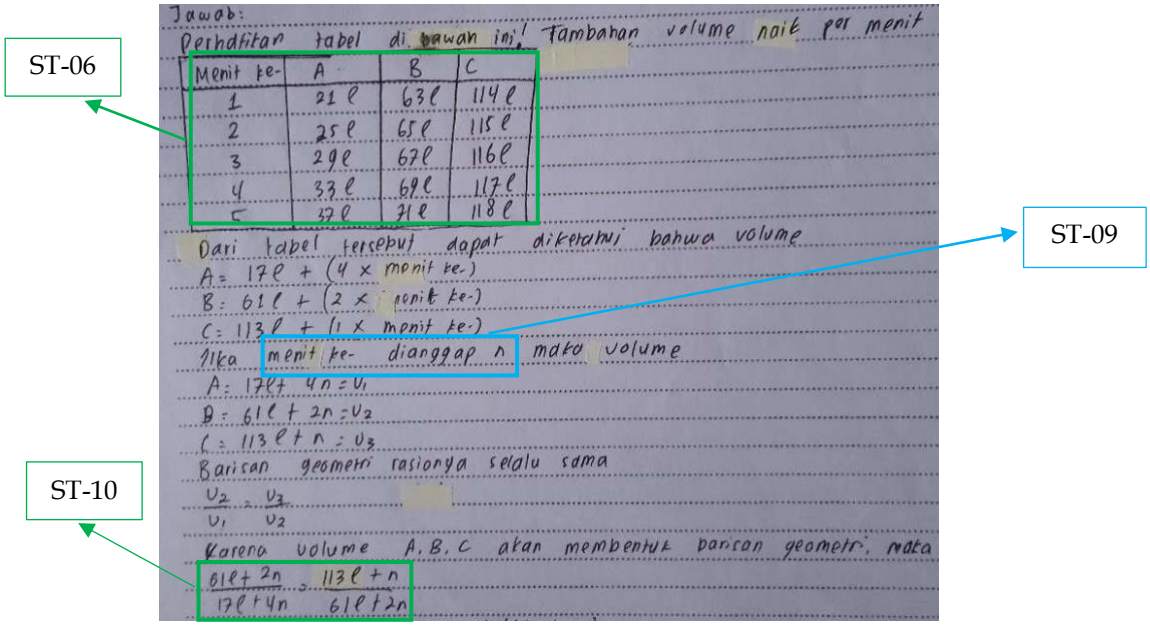

Figure 2. ST's Way of Mathematical Communication in Devising A Plan

Below is an interview conducted by researchers with ST regarding the solution above.

P-03 : What ideas do you have in mind to solve this problem?
ST-03 : I want to refer here to the ratio formula for geometric sequences.
P-04 : Why did you choose that idea?
ST-04 : Because I think this must be related with the ratio formula for geometric sequences.
P-05 : So how do you go about completing your idea?
ST-05 : Here, at first I did an experiment, and I found the pattern.
P-06 : Why did you make a table like this?
ST-06 : Because we know that the volume of water increases per minute. Where the volume of A increases by 4 liters per minute, the volume of B increases by 2 liters per minute, and the volume of C increases by 1 liters per minute.
P-07 : How do you know this?
ST-07 : From its speed.
P-08 : You said before that you found the pattern. What's the pattern?
ST-08 : So the pattern is the volume is added by the speed times the minutes.
P-09 : Here you let the time be n. Why do you use the n symbol?
ST-09 : Because it just makes it easier to calculate the time.
P-10 : Why did you get this equation model?
ST-10 : Because it forms a geometric sequences so $\frac{u_2}{u_1} = \frac{u_3}{u_2}$. *And then substitute the value of* u_1, u_2, *and* u_3.

Based on the results of student answers and interviews above, at the stage of devising a plan ST make a model mathematics, namely $\frac{61l+2n}{17l+4n} = \frac{113l+n}{61l+2n}$. ST also write the operation +, ×, / correctly. It shows that ST performs indicators of mathematical communication skills, namely make mathematical models and write calculation operations that are appropriate to the question in problems. ST can write down ideas and explain them by giving clear reason in writing or orally. It shows that ST performs indicators of mathematical communication skills, namely present, express ideas in writing or orally accompanied by clear reasons. ST uses table which contains information on the volume of water and the speed of water in containers A, B, and C in the first 5 minutes. ST also let the time using the variable n. It shows that ST performs

indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

c) Carrying Out The Plan

The following picture shows the solutions by ST at the carrying out the plan stage.

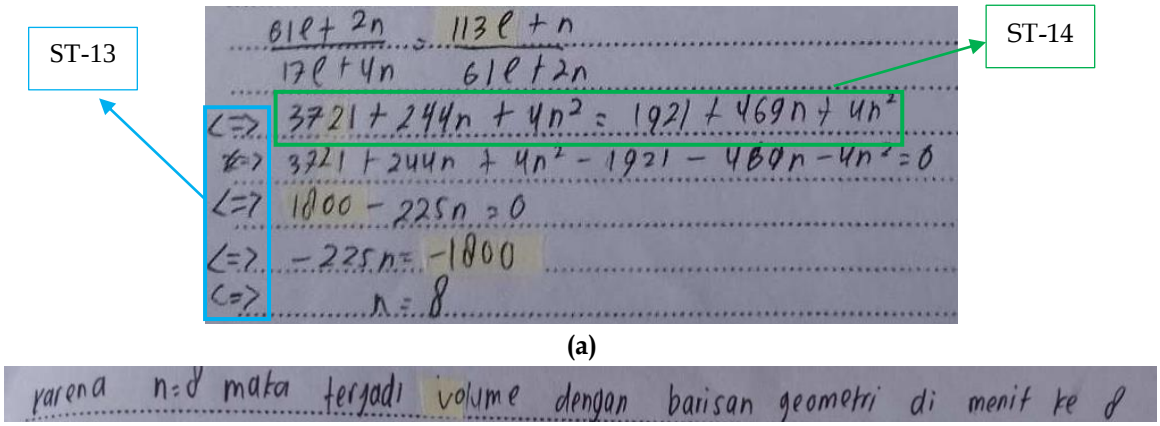

Figure 3. ST's Way of Mathematical Communication in Carrying Out The Plan (a) Process and (b) Results

Below is an interview conducted by researchers with ST regarding the solution above.

P-11 : So what do you do with this equation?
ST-11 : I cross multiplied.
P-12 : Why do you cross multiply?
ST-12 : Because as far as I know, if we get a form like this we must cross multiply it and I have difficulty if I don't cross multiply it.
P-13 : Here you write the symbol "↔". Why do you use that symbol?
ST-13 : Because from this equation, I get the next equation.
P-14 : In this equation, why is the "l" missing?
ST-14 : Actually, l in here is liter just units. So it can be removed.

Based on the results of student answers and interviews above, at the stage of carrying out the plan ST is able to do calculations correctly, has no errors in writing and explains the solution confidently when interviewed. It shows that ST performs indicators of mathematical communication skills, namely present, express solutions in writing or orally accompanied by clear reasons. ST writes numbers, the variables n, the logical connection "↔" from an equation to the next equation. It shows that ST performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

d) Looking Back

The following picture shows the solutions by ST at the looking back.

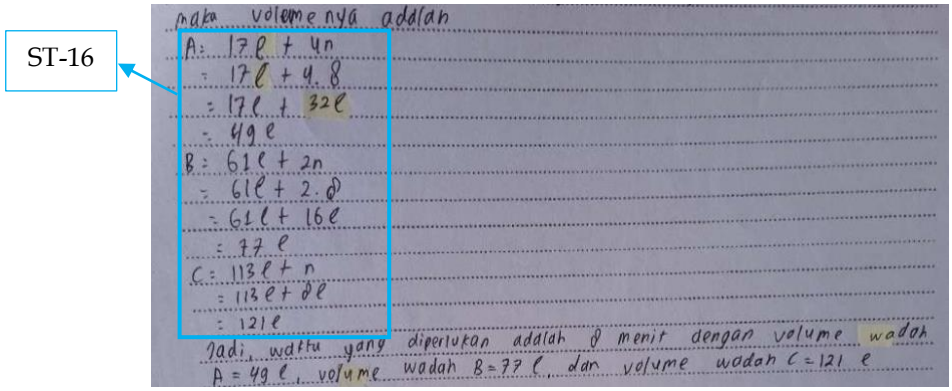

Figure 4. ST's Way of Mathematical Communication in Looking Back

Below is an interview conducted by researchers with ST regarding the solution above.

P-15 : Here you get the time is 8 minutes. Why are you sure that your answer is correct?
ST-15 : I'm sure because I checked it and the answer is 8.
P-16 : How do you check it?
ST-16 : I changed the n to 8. I got volume A=49 liters, volume B=77 liters, and volume C=121 liters. And I checked the ratio is the same.
P-17 : What is the ratio?
ST-17 : I didn't write this. The ratio is $\frac{77}{49}$ *or equal to* $\frac{11}{7}$.

Based on the results of student answers and interviews above, at the stage of looking back ST checks the answer by calculating the volume of water in the three containers in the 8th minute which must form a geometric sequence. In this case, ST wrote it on the answer sheet. It shows that ST performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

2. Analysis of Mathematical Communication Skills of Subjects (SS) with The AQ Camper Type

a) Understanding The Problem

The following picture shows the solutions by SS at the understanding the problem stage.

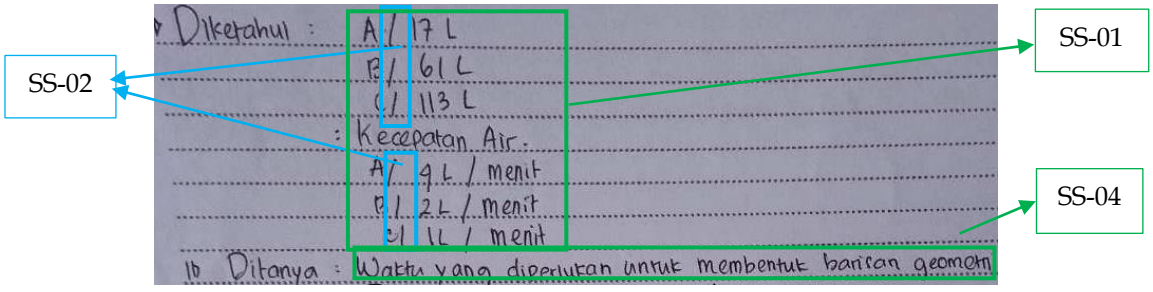

Figure 5. SS's Way of Mathematical Communication in Understanding Problem

Below is an interview conducted by researchers with SS regarding the solution above.

P-01 : Why do you write the known information like this?
SS-01 : Because based on the problem I know that container A contains 17 liters, B contains 61 liters, and so on. And then also know the speed of the water in each container.

P-02 : Here why do you use the symbol "/"?
SS-02 : Because it's just to separate.
P-03 : Why don't you use equal symbol?
SS-03 : No way.
P-04 : So why do you write the asked information like this?
SS-04 : According to the problem asked, the time needed for this to happen is to form a geometric sequence.
P-05 : What form a geometric sequence?
SS-05 : Containers A, B, C.
P-06 : The speed?
SS-06 : The water volume.

Based on the results of student answers and interviews above, at the stage of understanding problem SS write down all the known information including the volume of water and the speed of the water in each container. She wrote down the volume of container A is equal to 17 liters, the volume of container B is equal to 61 liters, and the volume of container C is equal to 113 liters. She also wrote down the speed of the water of container A is equal to 4 liters per minutes, the water of container B is equal to 2 liters per minutes, the water of container C is equal to 1 liters per minutes. It shows that SS performs indicators of mathematical communication skills, namely take note all necessary mathematical information presented in mathematical writing or orally. But in this case SS uses numbers, symbol " / " in her writing which is wrong symbol. It shows that SS performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas, but was not precise.

b) Devising A Plan

The following picture shows the solutions by SS at the devising a plan stage.

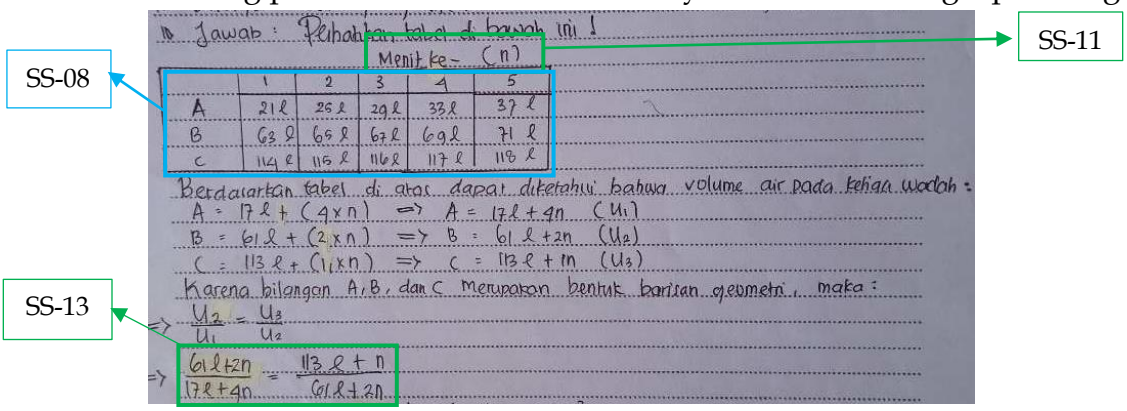

Figure 6. SS's Way of Mathematical Communication in Devising A Plan

Below is an interview conducted by researchers with SS regarding the solution above.

P-07 : What ideas do you have in mind to solve this problem?
SS-07 : I want to find time using the ratio of geometric sequences.
P-08 : So how do you go about completing your idea?
SS-08 : I made a table like this.
P-09 : Why did you make a table like that?
SS-09 : Because we know that the volume of water increases per minute. Where the volume of A increases by 4 liters to 21 liters, the volume of B increases by 2 liters to 63 liters, and the volume of C increases by 1 liters to 114 liters. And so on.
P-10 : Why is it increasing and not decreasing?
SS-10 : Because it's filled with water at a different speed for each container.

P-11 : Then you get the volume of water $A = 17l + 4n$ *and so on. Why is there an n symbol?*
SS-11 : Here, I denote the number of minutes as n.
P-12 : Why did you choose the n symbol?
SS-12 : Because I want to get the formula for the n term from each of these containers.
P-13 : Why did you get a model like this?
SS-13 : I changed the value of u_1, u_2, *and* u_3.

Based on the results of student answers and interviews above, at the stage of devising a plan SS make a model mathematics, namely $\frac{61l+2n}{17l+4n} = \frac{113l+n}{61l+2n}$. SS also write the operation +, ×, / correctly. It shows that SS performs indicators of mathematical communication skills, namely make mathematical models and write calculation operations that are appropriate to the question in problems. SS can write down ideas and explain them by giving clear reason in writing or orally. It shows that SS performs indicators of mathematical communication skills, namely present, express ideas in writing or orally accompanied by clear reasons. SS uses table which contains information on the volume of water and the speed of water in containers A, B, and C in the first 5 minutes. SS also let the time using the variable n. It shows that SS performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

c) Carrying Out The Plan

The following picture shows the solutions by SS at the carrying out the plan stage.

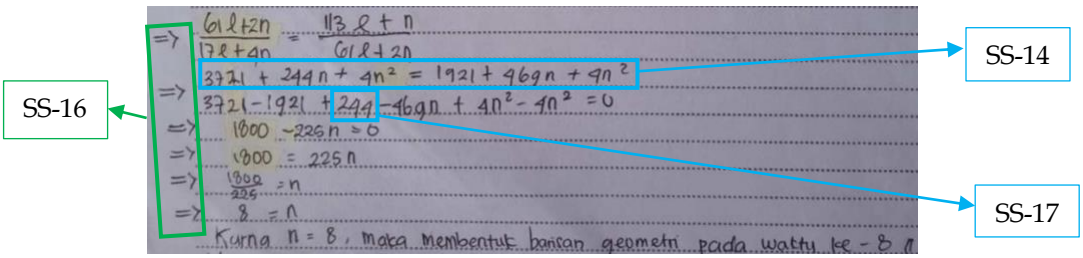

Figure 7. SS's Way of Mathematical Communication in Carrying Out The Plan

Below is an interview conducted by researchers with SS regarding the solution above.

P-14 : To get this equation, what do you do?
SS-14 : I cross multiplied.
P-15 : Why do you cross multiply?
SS-15 : Because moving sides. Division if we move sides become multiplication.
P-16 : Why do you use symbol "→"?
SS-16 : Continuation of the above equation.
P-17 : This is from where?
SS-17 : (SS laughed a little) Oh yeah not enough, It should be $244n$.

Based on the results of student answers and interviews above, at the stage of carrying out the plan SS is able to do calculations correctly, but has errors in writing and explains the solution confidently when interviewed. It shows that SS performs indicators of mathematical communication skills, namely present, express solutions in writing or orally accompanied by clear reasons, even though there were errors in the

writing. SS writes numbers, the variables n, the logical connection "→" from an equation to the next equation. It shows that SS performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

d) Looking Back

The following picture shows the solutions by SS at the looking back.

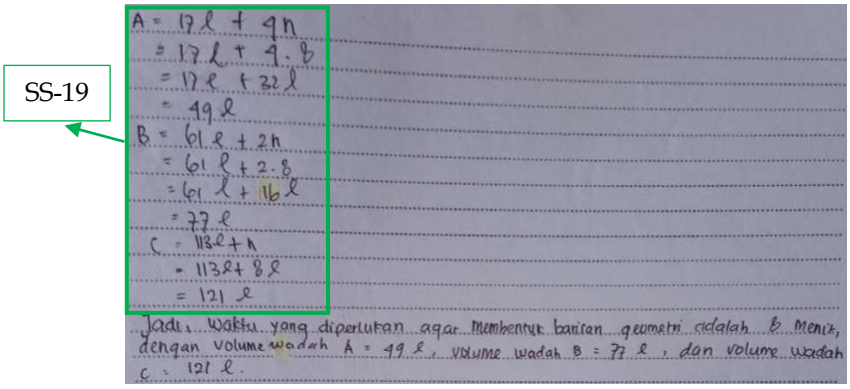

Figure 8. SS's Way of Mathematical Communication in Looking Back

Below is an interview conducted by researchers with SS regarding the solution above.

P-18 : Are you sure with your answer?
SS-18 : Yes I'm.
P-19 : Why are you sure?
SS-19 : Because it has been calculated correctly.
P-20 : Has it been checked correctly or not?
SS-20 : Already. The ratio is the same.
P-21 : What is the ratio?
SS-21 : $\frac{11}{7}$.

Based on the results of student answers and interviews above, at the stage of looking back SS checks the answer by calculating the volume of water in the three containers in the 8th minute which must form a geometric sequence. In this case, SS wrote it on the answer sheet. It shows that SS performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

3. Analysis of Mathematical Communication Skills of Subjects (SR) with The AQ Quitter Type

a) Understanding The Problem

The following picture shows the solutions by SR at the understanding the problem stage.

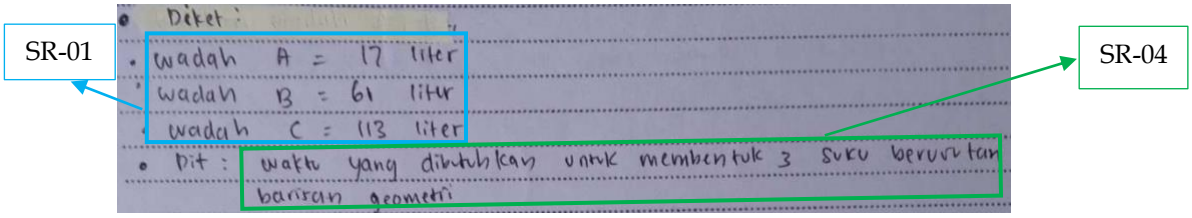

Figure 9. SR's Way of Mathematical Communication in Understanding Problem

Below is an interview conducted by researchers with SR regarding the solution above.

P-01 : Why do you write the known information like this?
SR-01 : Because it makes it easier to calculate. So first write down what volumes A, B, and C.
P-02 : Is that all that is known?
SR-02 : No way. There is when the volume of A increases.
P-03 : Why don't you write?
SR-03 : Because I forgot (while laughing).
P-04 : And then, why do you write the asked like this?
SR-04 : Because that's what we're looking for in the question.

Based on the results of student answers and interviews above, at the stage of understanding problem SR write down some the known information including the volume of water, but she forget to write down the speed of the water in each container. She wrote down the volume of container A is equal to 17 liters, the volume of container B is equal to 61 liters, and the volume of container C is equal to 113 liters. It shows that SR not performs indicators of mathematical communication skills, namely take note all necessary mathematical information presented in mathematical writing or orally. SR also uses numbers, symbol "=" in her writing. It shows that SR performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

b) Devising A Plan

The following picture shows the solutions by SR at the devising a plan stage.

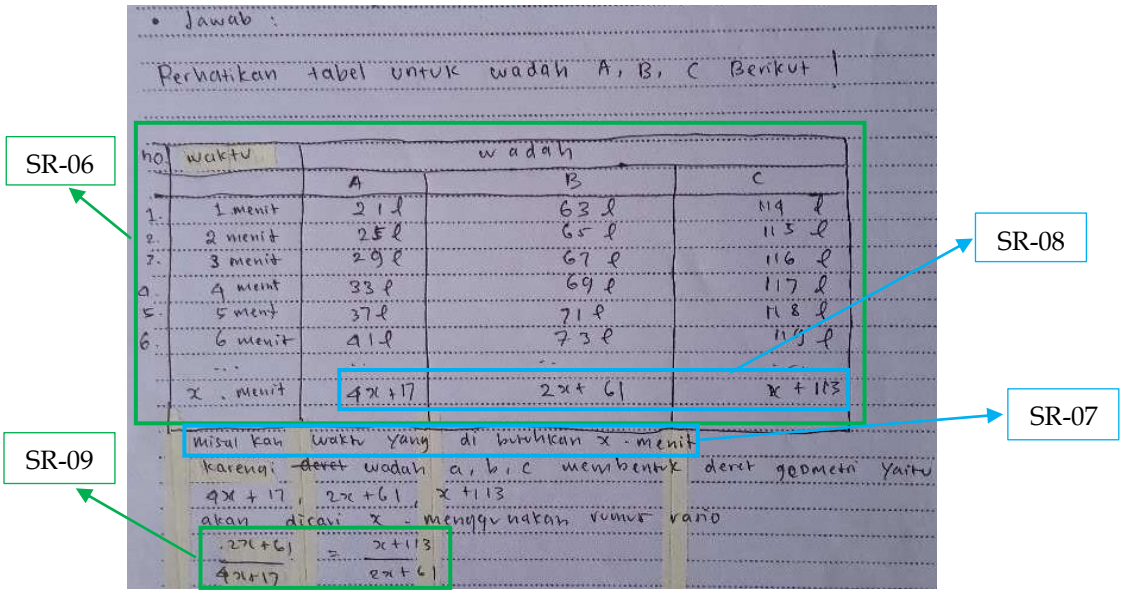

Figure 10. SR's Way of Mathematical Communication in Devising A Plan

Below is an interview conducted by researchers with SR regarding the solution above.

P-05 : What ideas do you have in mind to solve this problem?
SR-05 : I use the ratio formula because geometric sequence.
P-06 : Here you write the table. Why did you write the table like that?
SR-06 : Because it makes it easier to see.
P-07 : Here you let the time be x. Why did you use the x symbol?
SR-07 : Because to find the ratio. Because it's not yet known. So I use the x symbol.
P-08 : Why does it have to be added here?

SR-08 : Because the time increases (SR doubtful).
P-09 : Why do you get this equation?
SR-09 : Because the known sequence is a geometric sequence.

Based on the results of student answers and interviews above, at the stage of devising a plan SR make a model mathematics, namely $\frac{2x+61}{4x+17} = \frac{x+113}{2x+61}$. SR also write the operation +, ×, / correctly. It shows that SR performs indicators of mathematical communication skills, namely make mathematical models and write calculation operations that are appropriate to the question in problems. SR can write down ideas, but she can't explain them by giving clear reason in orally. It shows that SR not performs indicators of mathematical communication skills, namely present, express ideas in writing or orally accompanied by clear reasons. SR uses table which contains information on the volume of water and the speed of water in containers A, B, and C in the first 6 minutes. SR also let the time using the variable x. It shows that SR performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

c) Carrying Out The Plan

The following picture shows the solutions by SR at the carrying out the plan stage.

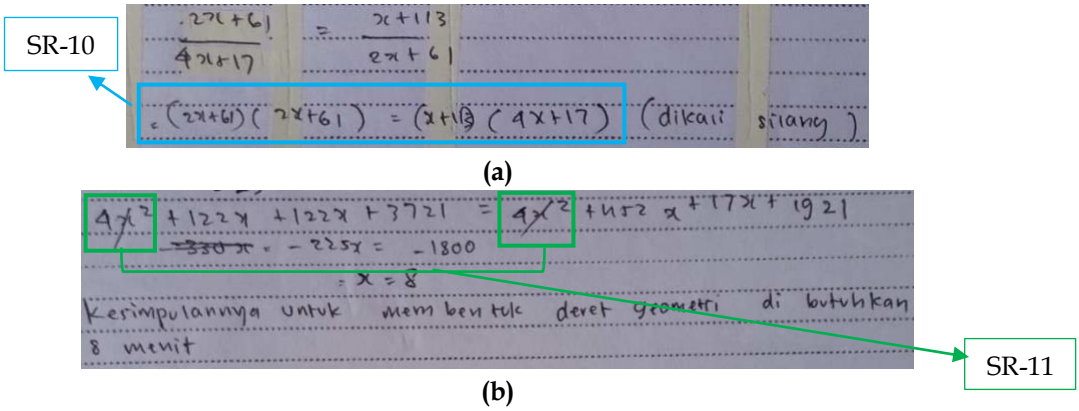

Figure 11. SR's Way of Mathematical Communication in Carrying Out The Plan (a) Process and (b) Results

Below is an interview conducted by researchers with SR regarding the solution above.

P-10 : Why do you cross multiply?
SR-10 : Because division changes ssides to multiplication.
P-11 : Why is this $4x^2$ *crossed out?*
SR-11 : Because it's exhausted. Moved the section so it's exhausted.

Based on the results of student answers and interviews above, at the stage of carrying out the plan SR is able to do calculations correctly, has no errors in writing and explains the solution confidently when interviewed. It shows that SR performs indicators of mathematical communication skills, namely present, express solutions in writing or orally accompanied by clear reasons. SR writes numbers, the variables x, but in this case SR use the symbol "=" from an equation to the next equation which is wrong symbol. It shows that SR performs indicators of mathematical communication

skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas, but was not precise.

d) Looking Back

Below is an interview conducted by researchers with SR regarding the solution above.

P-12 : Why are you sure about your answer?
SR-12 : Because it has been calculated.

Based on the results of student answers and interviews above, at the stage of looking back SR not checks the answer and don't wrote it on the answer sheet. It shows that SR not performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas.

Discussion

Based on results of students' mathematical communication skills in solving mathematical problems. The following is a discussion related to the mathematical communication skills of each subject at each stage of problem solving.

1. Mathematical Communication Skills of Adversity Quotient Climber High School Students in Solving Math Problems

At the stage of understanding the problem, the climber student performs the mathematical communication ability indicator i.e. take noted all the necessary mathematical information presented in mathematical writing or orally. This can be caused by the high motivation of climber students. This is as stated by Chadha (2021) that climbers live to get maximum results and have high motivation and enthusiasm. In addition, it is also in line with the results of research from Widyarti (2020) that climber students in understanding problems are able to write down the information contained in the problem and are able to understand what is asked. The climber student is also performs indicators of mathematical communication skills i.e. use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas. This is like what Lomibao et al. (2016) said that students need to learn to communicate using mathematical language to show their understanding of the concepts learned. So that in the stage of understanding the problem it can be said that the climber student performs all the indicators of mathematical communication ability. Like what Chadha (2021) said that climbers always try to get maximum results.

At the stage of devising a plan, the climber student performs the indicators of mathematical communication ability i.e. make mathematical models and write calculation operations that are appropriate to the question in problems. This is in accordance with what Prayogo et al. (2023) conveyed that climber students are able to form mathematical models in the form of pictures, tables, diagrams, graphs, algebraic expressions. Climber students also performs indicators of mathematical communication skills that use mathematical

language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas. This is in accordance with research from Widyarti (2020) climber students are able to write down the information obtained into mathematical symbols clearly and precisely. So that in the stage of devising a plan, it can be said that the climber student performs all indicators of mathematical communication skills. This is also like what Chadha (2021) said that climbers always try to get maximum results.

At the stage of carrying out the plan, the climber students performs the indicators of mathematical communication skills, namely present, express solutions in writing or orally accompanied by clear reasons. In accordance with what was conveyed by Saputra et al. (2022), climber students are not confused when dealing with questions containing mathematical variables. Climber students performs indicators of mathematical communication skills, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas. This is in accordance with Prayogo et al. (2023) climber students can make arguments, and make conjectures.

At the stage of looking back, climber students meet mathematical communication skills indicators, namely use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas. This is according to the results of research by Saputra et al. (2022) which shows that climber students are quite good at compiling evidence, drawing conclusions, providing evidence of the truth of the solution.

2. Mathematical Communication Skills of High School Students Adversity Quotient Camper Type in Solving Math Problems

At the stage of understanding the problem, the camper students performs the indicators of mathematical communication ability i.e. take noted all the necessary mathematical information presented in mathematical writing or orally. Camper students also use mathematical language (numbers, letters/variables, symbols) combined with general language when solving and evaluating mathematical ideas because camper students write using numbers and symbols "/". It can be said that camper students in understanding problems use mathematical language (symbols) that are not quite right. This is in accordance with Chadha (2021) campers are people who are satisfied with what they consider good enough. Where in this case camper students are satisfied with using symbols that they think are good enough, even though in reality they are wrong.

At the stage of devising a plan, camper students make mathematical models and write calculation operations that are appropriate to the question in problems. Camper students also present their ideas by presenting tables. He also expounded his writings in his own language, and also expressed his ideas orally by giving reasons for his ideas. This means that camper students have carried out indicators of mathematical communication skills, namely presenting, expressing ideas in writing or orally with clear reasons. As stated by Saputra et al. (2022), camper students are quite good at expressing ideas and showing

relationships with models even though they look confused and unsure of their own explanations. Camper students also use mathematical language (numbers, letters/variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas because camper students write down numbers, variables n, using tables to represent, using mathematical symbols, as well as using logical connections i.e. "→" combined with an explanation that uses general language. As stated by Stoltz (2020) that campers still show a number of efforts, a little enthusiasm and some effort.

At the stage of carrying out the plan, camper students present, express solutions in writing or orally with clear reasons. Where this can be known during the interview, the camper student provides an explanation related to what is done. But in there are still writing errors in the work he does. As stated by Stoltz (2020) that most campers will not deliberately take risks related to their work. Camper students also use mathematical language (numbers, letters/variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas because camper students write down numbers, mathematical symbols, variables, logical connections "→". As stated by Chadha (2021) that campers are people who are satisfied with what they consider good enough.

At the stage of looking back, camper students use mathematical language (numbers, letters or variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas because in calculations camper students write down numbers, variables, symbols accompanied by explanations using everyday language. According to the results of research by Saputra et al. (2022) which shows that camper students are the same as climbers, which are quite good at compiling evidence, making conclusions, providing evidence of the truth of the solution.

3. Mathematical Communication Skills of High School Students Adversity Quotient Quitter Type in Solving Math Problems

At the stage of understanding the problem, the quitter student don't performs the indicators of mathematical communication skills, namely take note all the necessary mathematical information presented in mathematical writing or orally. This can happen because quitters are people who have little drive and little ambition (Chadha, 2021). Because of such little encouragement and little ambition, quitter students often forget information important to them. Quitter students also use mathematical language (numbers, letters/variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas because quitter students use numbers and symbols "=" in writing down the information. This is like what Lomibao et al. (2016) said that students need to learn to communicate using mathematical language to show their understanding of the concepts learned.

At the stage of devising a plan, quitter students make mathematical models and write calculation operations that correspond to the question in question. This is shown by quitter students who write mathematical models and by writing the proper addition and multiplication operations when obtaining volumes A, B, C and using division and addition operations. Quitter students also present, express ideas in writing or orally with clear

reasons. However, quitter students give inappropriate reasons at the time of the interview and in writing it. This is in accordance with Saputra et al. (2022) conveyed when quitter students were asked to explain the solution they wrote, they could not explain it. In addition, quitter students use mathematical language (numbers, letters/variables, symbols, tables) combined with general language when solving and evaluating mathematical ideas. This is in accordance with Lomibao et al. (2016) students need to learn to communicate using mathematical language to show their understanding of the concepts learned.

At the stage of carrying out the plan, quitter students present, express solutions in writing or orally with clear reasons. Where this can be known during the interview, the quitter student provides an explanation of what is done. Quitter students also use mathematical language (numbers, letters/variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas because quitter students write down numbers, mathematical symbols, variables. However, quitter students use incorrect logical connections. Where in this case the quitter student uses "=" to start writing an equation derived from the previous equation. This is according to what Stoltz (2020) said that quitters have little ability to deal with difficulties.

At the stage of looking back, quitter students don't use mathematical language (numbers, letters/variables, symbols, tables, logical connections) combined with general language when solving and evaluating mathematical ideas because quitter students only give reasons that do not contain mathematical language in them. According to the results of research by Saputra et al. (2022) which shows that quitter students have not been able to collect evidence, provide reasons or proof of the truth of the solution. They assume that when the calculation has been obtained, the process of answering the questions has been completed (Saputra et al., 2022)

CONCLUSION AND SUGGESTIONS

Based on the data analysis and discussion above, it can be concluded that climber students at the stage of understanding the problem take note all the necessary mathematical information about the known information, namely the volume of water and also its speed in each container and also about the information asked in the problem which is then presented in mathematical writing or orally. Climber students also use mathematical language in the form of numbers and symbols "=" combined with general language. At the stage of devising a plan, climber students make mathematical models, namely $\frac{61l+2n}{17l+4n} = \frac{114l+n}{61l+2n}$ and write down calculation operations, namely addition, multiplication, and division operations according to the question in question and use mathematical language in the form of numbers, symbols, tables, and variables n in presenting his ideas with clear reasons. At the stage of carrying out the plan, the climber student explains the solution appropriately and uses very precise logical connections, namely "↔". At the stage of looking back climber students use the right mathematical language including numbers, symbols, and variables and write them on the answer sheet.

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Camper students at the stage of understanding the problem take note all the necessary mathematical information about the known information namely the volume of water and also its speed in each container and also about the information asked on the problem which is then presented in mathematical writing or orally. The climber student also uses the mathematical language of numbers, but he uses the imprecise symbol "/". At the stage of devising a plan, climber students make mathematical models, namely $\frac{61l+2n}{17l+4n} = \frac{114l+n}{61l+2n}$ and write down calculation operations, namely addition, multiplication, and division operations according to the question in question and use mathematical language in the form of numbers, symbols, tables, and variables n in presenting his ideas with clear reasons. At the stage of carrying out the plan, the climber student explained the solution correctly, but there were still typos in his work where he should have written "$244n$", but he wrote only "244". He uses the right logical connections that are "→". At the stage of looking back climber students use the proper mathematical language of numbers, symbols, and variables and write them on the answer sheet.

Quitter student at the stage of understanding the problem take note some of the necessary mathematical information about the known information, namely the volume of water in each container and also about the information asked in the problem, but he does not write down information related to the speed of water in each container which is then presented in mathematical writing or orally. Quitter students also use mathematical language in the form of numbers and symbols "=" combined with general language. At the stage of devising a plan, quitter students make mathematical models, namely $\frac{2x+61}{4x+17} = \frac{x+114}{2x+61}$ and write down calculation operations, namely addition, multiplication, and division operations according to the question in question and use mathematical language in the form of numbers, symbols, tables, and variables x in presenting his ideas but giving unclear reasons during interviews. At the stage of carrying out the plan, the quitter student explains the solution appropriately, but she uses a symbol that is not properly used, namely "=" to connect two different equations. At the stage of looking back quitter student did not use proper mathematical language and did not write it down on the answer sheet.

In this research, it has been described related to the mathematical communication skills of high school students in solving problems where there are still students who are still wrong in using symbols, conveying reasons, and others. Therefore, it is expected for teachers to familiarize their students with mathematical communication properly and correctly during learning and when solving mathematical problems. In this research, the mathematical problem used is a problem designed to be solved using table illustrations. It is expected for other researchers to be able to develop it by using mathematical problems involving illustrations, pictures or graphs, etc., or by using other types of problems.

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