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ANALYSIS OF THE REASONING SKILLS OF JUNIOR HIGH SCHOOL STUDENTS IN SOLVING GEOMETRY PROBLEMS IN BUILDING SPACE

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Abstract

This research aims to find out how much the level of reasoning ability of female students in solving problems on the material of geometry build space, because reasoning is one of the standards that are needed in learning mathematics and become one of the objectives of learning mathematics and is needed for problem solving in everyday life. This type of research is a descriptive qualitative approach. The sample of this research is 30 students of class VIII A SMPs METHODIST 1 RANTAUPRAPAT with the research method is a written test. From this study shows that the level of reasoning ability of high students is only 27%, while students who have a moderate level of reasoning ability by 53% and students who have a low level of reasoning ability by 20%.

Keywords: reasoning ability; geometry build space

Abstrak

Penelitian ini bertujuan untuk mengetahui berapa besar tingkat kemampuan penalaran siswa siswi dalam memecahkan permasalahan soal pada materi geometri bangun ruang, karena penalaran merupakan salah satu standar yang sangat dibutuhkan dalam pembelajaran matematika dan menjadi salah satu tujuan dari pembelajaran matematika serta sangat dibutuhkan untuk pemecahan masalah dalam kehidupan sehari-hari. Jenis penelitian ini adalah pendekatan kualitatif deskriptif. Sampel penelitian ini 30 siswa/i kelas VIII A SMPs METHODIST 1 RANTAUPRAPAT dengan metode penelitian adalah tes tertulis. Dari penelitian ini menunjukkan bahwasanya tingkat kemampuan penalaran siswa yang tinggi hanya berupa 27% saja, sedangkan siswa yang memiliki tingkat kemampuan penalaran sedang sebesar 53% dan siswa/i yang memiliki tingkat kemampuan penalaran rendah sebesar 20%.

Kata Kunci: kemampuan penalaran; geometri bangun ruang

INTRODUCTION

Mathematics studies one of them about the geometry of building space. Where the definition of a building is a building that is limited by the set of points contained on the entire surface of the building and has sides, ribs, points, angles and volume. The side is a plane in the building space that limits the space between the building space with the surrounding room. Ribs are the meeting of two sides in the form of lines in the wake of space. The corner point is the point of the meeting of three or more ribs. Building space



also has various forms, but in this study, researchers only want to focus on building blocks, cubes and tubes. Understanding the basic concepts of building space is very important in mathematics because many other mathematical concepts depend on understanding the concept of building space and also this material is very useful for our daily lives, such as calculating the volume of water in a bathtub, calculating the length and width of a building, and also in architectural science. One of the goals of learning mathematics is to improve the mathematical reasoning of each student (NCTM, 2000). Reasoning is the process of thinking about several statements to make a conclusion or develop new statements (Shadiq, 2014). The importance of students' mathematical reasoning skills is also stated in the learning objectives of mathematics in the Regulation of the Minister of National Education No. 22 of 2006 dated 23 May 2006 concerning Content standards, namely "using pattern and trait reasoning, performing mathematical manipulation in making generalizations, compiling evidence, or explaining mathematical ideas and statements." (Hariyanti and Khotimah, 2022).

According to (Sumartini, 2015) mathematical reasoning ability is a brain habit that must be developed consistently using a variety of contexts, recognizing reasoning and proof are fundamental aspects in mathematics (Ariyanti and Setiawan, 2019). With mathematical reasoning skills, students can develop their mindset, develop their creativity, and develop foresight in learning (Kusumawardani et al., 2018). This is in line with Sumarmo's opinion (Ario, 2016) which states that mathematical reasoning skills are very important in exploring ideas, estimating solutions, and applying mathematical expressions in relevant mathematical contexts, and understanding that mathematics is meaningful (Rohmah, Septian and Inayah, 2020).

Reasoning has also been embedded since children are 11 or 12 to adulthood.² Referring to Government Regulation Number 32 article 19 paragraph (1) of 2013 that the learning process in educational units is organized interactively, creatively, inspiring, fun, challenging, motivating students to actively participate, and providing sufficient space for initiative, creativity, and independence in accordance with the talents, interests, and development and psychological of students (Najilah, 2022). Based on the previous explanation, it can be seen that reasoning ability is one of the competencies that must be possessed by students. That is because reasoning is one of the standards that is needed in learning mathematics and is one of the objectives of learning mathematics and is needed for problem solving in everyday life (Ekawati, Agustina and Noor, 2019). Students' low mathematical reasoning ability will affect the quality of student learning which will have an impact on the low achievement of student learning outcomes. Students' mathematical reasoning skills must be honed so that students can use logical reasoning in solving a mathematical problem. Mathematical problems will always be faced by students



because one of the goals of learning mathematics is for students to be skilled at solving problems Abdullah & Suratno (2015). If students are given a lot of practice on reasoning problems, it is hoped that later students can improve their learning (Williana and Nasution, 2022).

Learner errors in solving problems can be one of the clues to determine the extent to which students master the material. Therefore, it is necessary to identify the errors made by students and find the factors that influence them and then find a solution. Thus, information about errors in solving problems can be used to improve the quality of teaching and learning activities and can improve student achievement.

Therefore, the researcher is interested in analyzing or knowing how much the ability of students in understanding the geometry of building space material, so the author took a title "Analysis of Reasoning Ability of Students in class VII in Solving Problem Problems on Geometry Building Space Material at SMPs METHODIST 1 RANTAUPRAPAT".

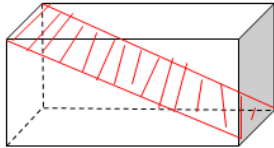
METHODS

This type of research is a descriptive qualitative approach. Qualitative research is a type of research whose results are obtained without going through a quantification process, statistical calculations, or other forms that use numerical measures. The research location was conducted at SMPs METHODIST 1 RANTAUPRAPAT which is located at Jl. Jend. Ahmad Yani No 78 Rantauprapat, Kartini, North Rantau District, Labuhan Batu Regency, North Sumatra.

Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics set by researchers to study and then draw conclusions. The population in this study were students of METHODIST 1 RANTAUPRAPAT SMPs CLASS VIII. The sample is part of the number and characteristics possessed by the population. The sample in this research was 30 students of class VIII A. These subjects were selected based on the level of high, medium, and low mathematical ability informed by the relevant subject teacher. The sampling technique was carried out using the cluster random sampling method. Cluster random sampling method is used to take a class that will be used as a research sample and all students who are members of the class that is used as a research sample are research subjects.

This test method aims to produce data that will be analyzed to obtain answers and to test the proposed hypothesis. The measurement scale used is a nominal scale. The instrument used to collect data in this study is a written test question sheet. If you can solve the problem perfectly according to the

indicator then get a score of 20. And if it is less perfect then get a score of 10, and if the answer is not correct the answer given will get a score of 0.

variabel	Indicator	Question
Mathematical reasoning skills	1. Conjecture	2. Explain what is meant by building space and give examples around your neighborhood! 3. The shaded area (red) in the image below is..  4. Cube a has side length = s , while cube b has side length 4 times that of cube a. What is the volume ratio between cube a and cube b?
	2. Perform calculations based on certain rules or formulas. 3. Checking the validity of an argument	1. Suppose a cube has a side length of 16 cm. Calculate the surface area of the cube and its volume. 2. Find a cube that has a volume of 13824 cm^3 . Find the side length of the cube and its surface area. 3. Find a block that is 24 cm long, 10 cm high and 14 cm wide. Find the volume of the block! 4. A block has a surface area of 94 cm^2 . If it is known that the beam has a length of 5 cm and a height of 3 cm. What is the volume of the beam? 5. Mr. Umar received an order for ceramics to cover the inside of a cube-shaped water reservoir with a depth of 1 m. The ceramics made by Mr. Umar are square with a length of 10 cm. Find the number of tiles that Mr. Umar needs to make so that he can cover the entire inside of the water reservoir! 6. A piece of cardboard is cut into the shape of a cube net with an area of 254 cm^2 . Then the cardboard is folded to form a cube, determine the volume of the cube! 7. A cube has a side length of 24 cm. Calculate the volume of the cube!

Analyze the results of students' mathematical reasoning ability tests using the answer keys that have been made by researchers and assess students' mathematical reasoning ability tests. The steps to analyze the results of the mathematical reasoning ability test are correcting the results of the mathematical reasoning ability test using the answer key that has been made by the researcher. The lattice of questions is made by first determining indicators of mathematical reasoning ability and determining scoring guidelines.

RESULTS AND DISCUSSION

a. Results

To start the research, it began with giving a test of space building problems in the form of cubes and blocks to students of Methodist 1 Junior High School in Rantauprapat. A summary of the test results is stated in table 2. If presented in the form of a line diagram, the percentage obtained is depicted in Figure 1.

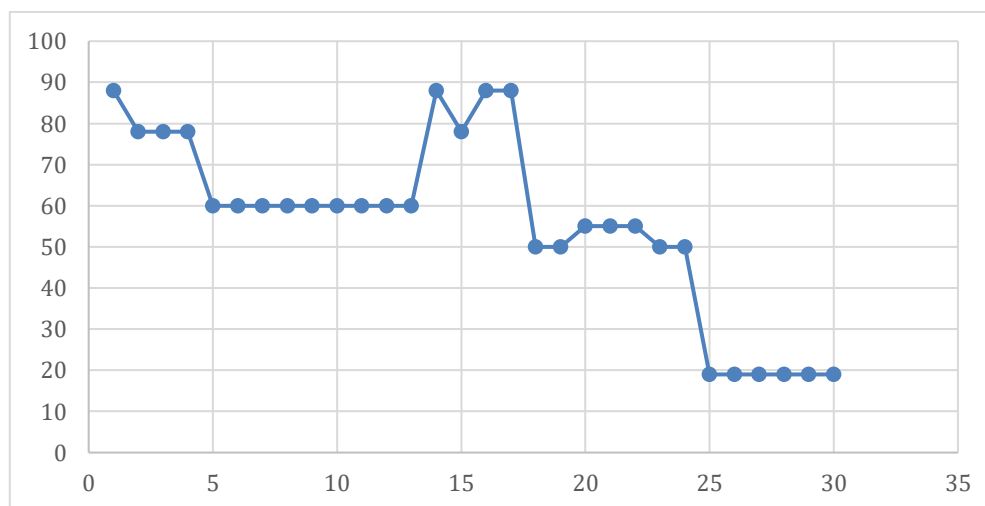
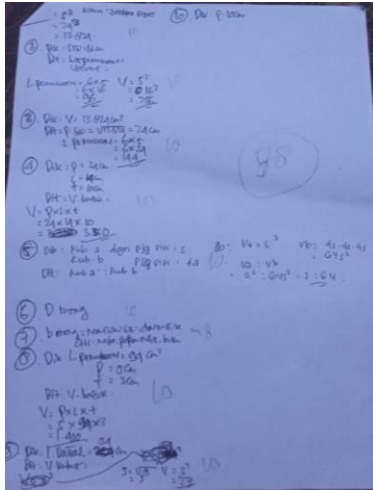


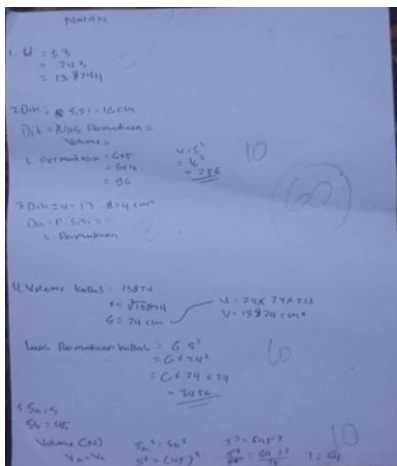
Figure 1. the percentage of test result

Based on table 2 and figure 1, it can be concluded that the high level of students' reasoning ability is only 27%, while students who have a moderate level of reasoning ability are 53% and students who have a low level of reasoning ability are 20%.

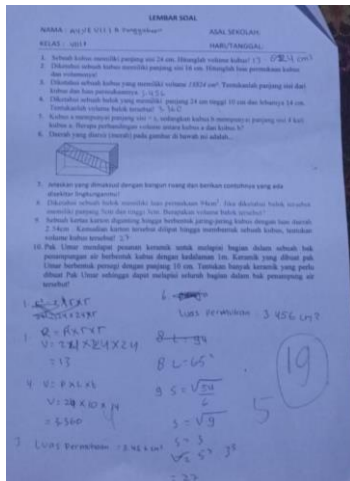
a. Discussion



From the picture above, it shows that the sheet is the test results of students who have a high level of reasoning ability. This can be seen from the accuracy in answering questions and the systematic way of answering. The student has been able to make conjectures well, and has been able to perform calculations based on certain rules or formulas very well and has also been able to check the validity of the argument.



From the picture above, it shows that the sheet is the test results of students who have a moderate level of student reasoning. This can be seen from the lack of accuracy in answering the questions given and the lack of a systematic way of answering because there are still some questions that are answered not in a systematic way or in other words not using known, asked but the student can already do calculations based on rules or formulas well.



From the picture above, it shows that the sheet is the test results of students who have a low level of student reasoning. This can be seen from the inaccuracy in answering the questions given and the inaccurate systematic way of answering because all the questions answered are not in a systematic way or in other words do not use known, asked and also the student cannot do calculations based on rules or formulas properly.

CONCLUSION

Based on the results of research on students in class VIII SMPs Methodist 1 Rantauprapat, it can be concluded that the reasoning ability of students in solving problems of building space problems only reaches a moderate level. There are still many students who cannot answer in a systematic way and lack of understanding of the material of building space. And there are still many students who are less careful in answering the questions given and take a long time to answer the questions so that they cannot answer all the questions that have been given. But there are about 27% of students who have been able to analyze the questions well, answer the questions correctly and systematically and understand the material of building space but still also need a long time to answer the questions.

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