Designing of problems to measure mathematization ability

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Abstract. This study uses a study design research with the aim to explain the mathematical thinking to measure the mathematization aspects of the material object pattern in row configuration with the chosen subject is junior high school grade 8 students who were 3 students. This research process consists of five stages: preliminary design, focus group discussions, testing and interviews, as well as a retrospective analysis.The data analysis technique is qualitative techniques. In Question 1, all students answered correctly, students 1 shows the appearance of geometrization and optimization, students 2 shows the appearance of geometrization, connecting, formalization, and optimization, students 3 shows the appearance of geometrization, connecting, and optimization.

Keywords: designing mathematical problems, mathematization ability

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1. Introduction

One eighth grade math material is pattern Numbers. In the 2013 revision of the curriculum attachment KD 3.1 [1] stated that the students of class VIII should be able to make generalizations from patterns on the sequence of numbers and rows of configuration objects. In the learning patterns will be presented a number of mathematical problems in the form of sequence of numbers, then the students were asked to determine the pattern or some subsequent numbers [2]. To search for a pattern of numbers of learners can with images, tables, and algebraic calculation [3]. This is consistent with mathematical thinking is the thinking process displaying mathematical ideas with images, graphics, and others as well as indicators that mathematical formalization, connecting, geometrization, and optimization.In fact, learners are still many difficult, in solving problems of pattern number. According to. [4] [5] Reviews These Difficulties Because there are no students who can write the formula of the n, whereas the formula of the n is the beginning of the learning patterns of numbers, students Also have difficulty in making generalizations general abstract of the material pattern of numbers [6]. One contributing factor Because student learning is still memorize concepts and formulas pattern [7]. [8] when students work on the problem that is the problem is whether students master the material.

In mathematics, the purpose of teaching mathematics the most basic one is that learners can think mathematically and using mathematical thinking in solving problems [9]. [10] states that mathematical thinking is a process that involves at least one activity. Such activity is abstraction, reasoning, evidence, representation, symbolization, and mathematical modeling. Here researchers haya researching mathematical aspects of mathematical thinking. Mathematical is a process of translating a real problem in the form of symbolic mathematics [11]. Indicators are mathematical formalization, connecting, geometrization, and optimization. Mathematical thinking is a process for making a real problem into a mathematical model. With the formalization indicators, connecting, geometrization, and optimization.mathematical mathematical aspects most often done geometrization, connecting,

optimization while indicators are pretty much done is geometrization, connecting, and formalization. This is because the command or instruction questions on the editorial matter is less clear and detailed to measure the ability Optimization. So that students are not required to use optimization way in solving the problems [12]. So the type of mathematical mathematical thinking needs to be applied to the learning approach that supports the process of mathematical thinking metematisasi type.

When solving mathematical problems students have different cognitive styles -beda because it has a different cognitive style differences when solving problems, so that this difference refers to the difference of mathematical processes (Thinking Mathematically) because, according to [13] In mathematical process to solve mathematical problems high tenacity needed in choosing the concepts, principles, and the proper way to obtain the right solution

Learning curriculum in 2013, students are expected to have the skills and mathematical accordance with the four core competencies listed on content standards in mathematics [14] .It is in line with [15] that the purpose of mathematics is the mathematical communication, mathematical reasoning, problem solving, mathematical connection and the mathematical representation. This indicates that the learning of mathematics mathematical thinking is very important.

[16] suggested that mathematics originated from things that are concrete to the abstract. According to [17] PMRI learning model is in accordance with the curriculum in 2013 and PMRI emphasize the problems of everyday life. The use of context in learning mathematics is useful for students to build an explicit relationship between context and mathematical ideas to support students' development of mathematical thinking [18]. This is consistent with previous studies ever conducted by [19]; [20] that with the application PMRI in mathematics, uan understand the problems, plan solutions, and solve problems is a good category. According to [21], in PMRI students are given the opportunity to rediscover the mathematical concepts and understanding of students with the help of teachers,

So the researchers will conduct research with the title "Designing the Problem To Measure mathematical ability Junior High School Students.

2. Method

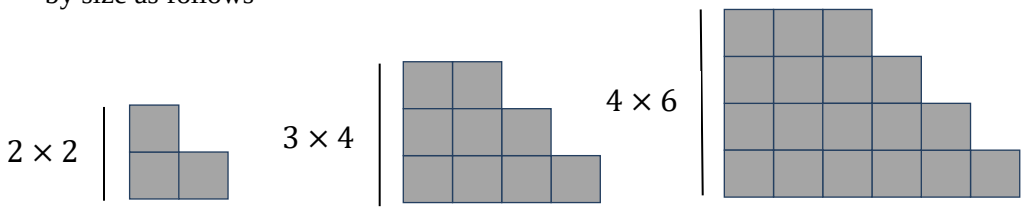
This study uses a method of design research with the aim to describe the results of designing the problem to measure the ability to think mathematically mathematical aspects of junior high school students on a material number pattern. The research location is Indralaya, at SMP Negeri 1 Indralaya. In this study, there are 5 steps done, namely: Preliminary Design, focuss Group Discussion, Trial, Interview and Retrospective Analysis. While the instruments used in this study is about the tests to measure the mathematical aspects of the mathematical thinking process of students. The study focuses on the mathematical aspects of the students are geomterization, connecting, formalization and optimization. Subjects of this study consisted of three students in grade 8 with mathematical abilities were medium and high.

3. Result and Discussion

3.1. *Preliminary Design*

At this stage the researchers to study literature related to the focus in this research is to think mathematically mathematical aspect that is geomterization, connecting, formalization and optimization .According to some references, there are several issues that can be used to measure the mathematical aspects of students' mathematical thinking SMP.

Table 1. The draft question

No. Question	Question
1	Mr. Didit plans to make the stairs beside his swimming pool using concrete bricks by size as follows  the stairs to - 1 the stairs to - 2 the stairs to - 3 If Mr. Didit will make a ladder up the stairs to - 6. Decide how many bricks brick and size required by Mr. Didit?

3.2. *Focus Group Discussion*

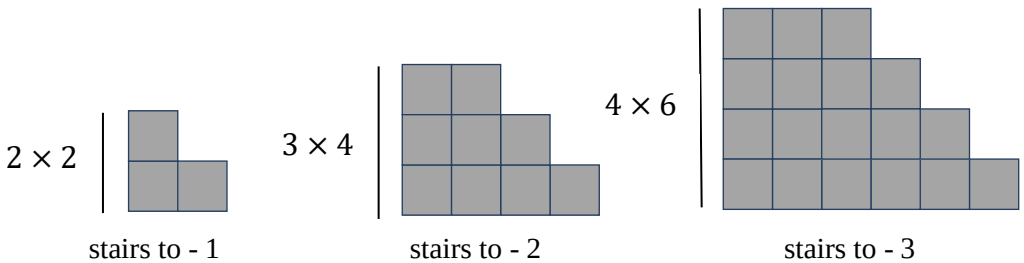
Two questions that have been carefully discussed with 2 Lecturer Mathematics Education, Mrs. Novita Sari, S. Pd, M. Pd and Mrs. Ruth Helen Simarmata, S.Pd, M.PMat, M.Pd. The following table is a summary of the results of discussions with both lecturers.

Table 2. Discussion results

Lecturer	Comments and Suggestions
Mrs. Ruth Helen Simarmata, S.Pd, M.PMat, M.Pd	Fix a written language in accordance with the EYD, Fix the question is less clear
Mrs. Novita Sari, S. Pd, M. Pd	Language questions still exist that give rise to a double interpretation,

Based on the discussions that have been conducted by two instructors, improvements were made to the draft questions that have been prepared, as for some of the improvements made are literature and language in question in accordance EYD.

Table 3. The draft question

No. Question	Question
1	Mr. Didit plans to make the stairs beside his swimming pool using concrete bricks by size as follows  stairs to - 1 stairs to - 2 stairs to - 3

If Mr. Didi will make a ladder up the stairs to - 6. Determine the size of the stairs an what concrete bricks required by Mr. Didit?

In question number one focus being asked is If Mr Didit will make a ladder up the stairs to - 6. Determine the size of the household and how many bricks of concrete required by Mr. Didit. The reason the subject answered using geometrization as to make it easier to find the next pattern that is how the size of the stairs and a lot of concrete bricks. The reason the subject answered using connecting because it used to work on the problems directly operate numbers in Question 3 on the use of this operation is multiplication, division, and summation. The reason the subject using the formalization of seeing the size of the stairs and a lot of concrete bricks by operating number then students will look for a pattern to-n so that students will find the formula Un.

3.3. *Trials*

At this stage, one question that is designed and tested to discuss with faculty 3 research subjects. The subject of research work on the problems that have investigators designed for 1 hour. The results of this trial show that the questions that have been designed researchers to see the mathematical aspects of mathematical thinking through four indicators:*geometrization*, *connecting*, *formalization*, and optimization of research subjects.

3.4. *Interview*

At this stage the researchers conducted interviews related to answer the research subjects while testing the matter. The interview was conducted with the aim of clarifying the mathematical aspects of the mathematical thinking process research subjects.

3.5. *Retrospective Analysis*

3.5.1. Analisis soal nomor 1

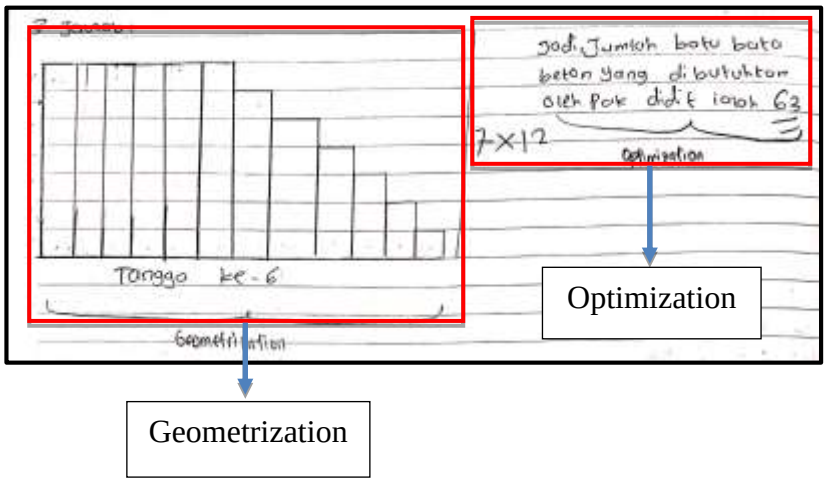


Figure 1. The students' answers 1 number 1

Figure 1. The students' answers 1 number 1. On that subject there is the emergence of student 1 geometrization indicators and optimization. Geometrization indicator appears as the subject of the next ladder students 1 illustrates the first to find out the size of the stone stairs and a lot of concrete. Optimization indicator appears as the subject of the students first get the final result being asked on the matter is set size and how the stone stairs of concrete required.

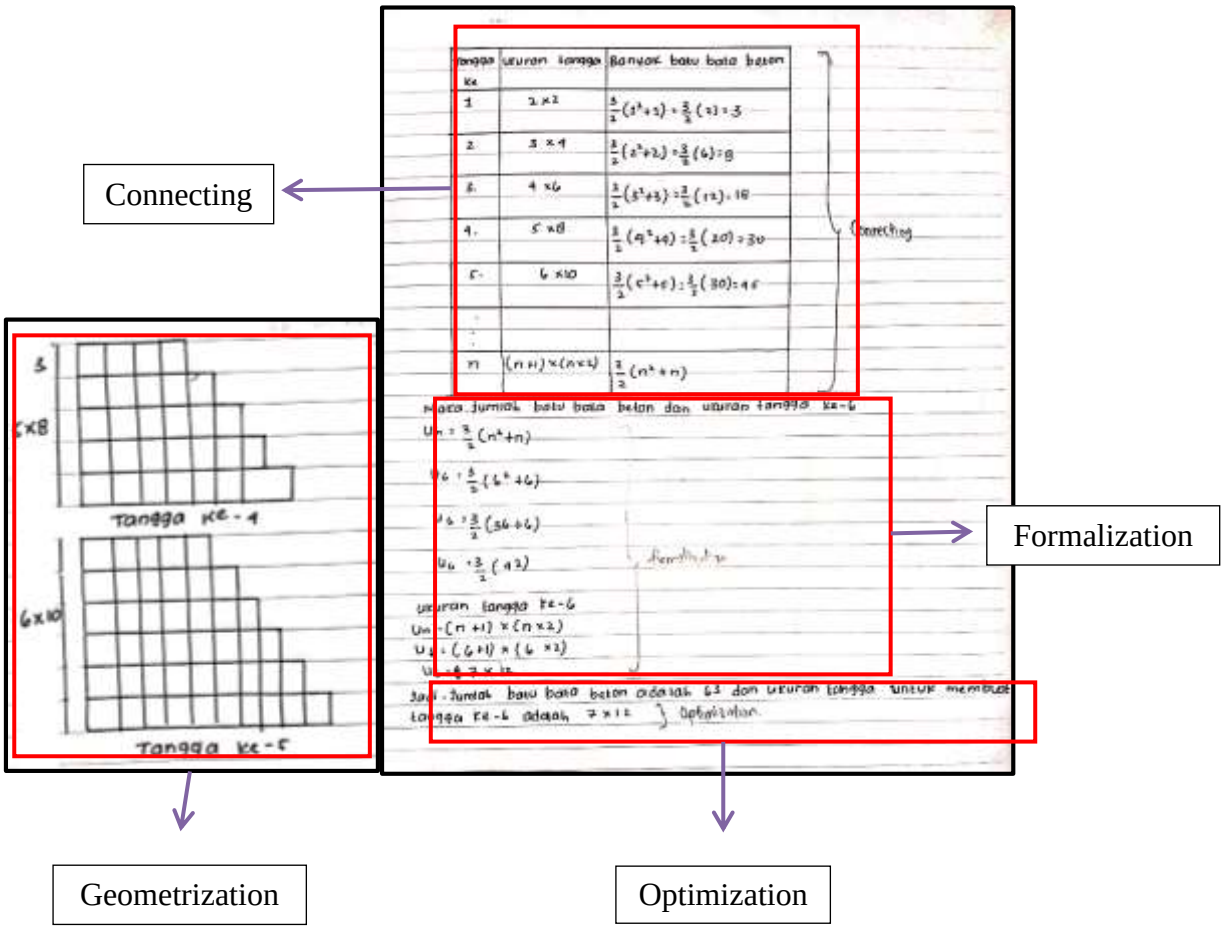


Figure 2. The students' answers 2 number 1

Figure 2. The students' answers 2 number 1. On the subject of student 2 are the emergence of geometrization indicators, connecting, formalization and optimization. Geometrization indicator appears as the subject of student 2 illustrates the steps to the 4 and 5 steps to the first to find out the size of the stone stairs and a lot of concrete. Connecting indicator appears is indicated by the subject students two create a table to determine the size of the stone stairs and a lot of concrete on the composition of the n-th to find his number patterns using multiplication, division and summation. Formalization indicator appears as the subject of two students using mathematical symbols based on the properties that exist with the symbol n. Optimzation indicator appears as the subject of two students get the final result being asked on the matter is set size and how the stone stairs of concrete required.

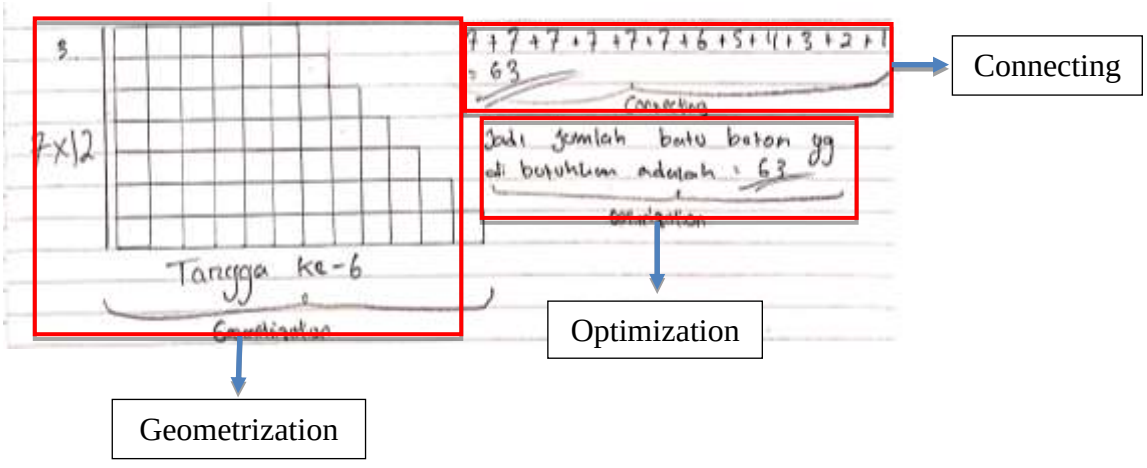


Figure 3. The students' answers 3 number 1.

Figure 3. The students' answers 3 number 1. On the subject of three students are the emergence of geometrization indicator, connecting, connecting and optimization. Geometrization indicator appears as the subject of student 3 depicts the ladder to 6 to determine the size of the stone stairs and a lot of concrete. Connecting indicator appears is indicated by the subject students 3 calculate many concrete bricks of images that have students 3 images and determine the size of the stairs using addition and multiplication operations. Optimzation indicator appears as the subject of 3 students get the final result being asked on the matter is set size and how the stone stairs of concrete required.

4. Conclusion

Based on data analysis that has been done above, it can be concluded that the first questions that have been designed to be used to measure the mathematical aspects of the process of mathematical thinking junior high school students

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