Analysis of mathematical problem solving ability students of junior high school to Polya model

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Abstract. This research aims to analyze the mathematical problem solving ability of students on the subject of the triangle. This research used descriptive qualitative method and involved 35 students in grade 8 at a junior high school. The instrument is a written test consisting of three items of problem solving. Analysis was conducted according to Polya model. This study showed that the problem solving ability of students still in a weak category. It is seen from the weak ability of students to understand the problem, devise a plan to solve problems, execute plans problem solving, and verification. Besides plant the lack of mathematical problem solving ability of students can be seen from the test results of students who received an average score that is well below the average problem-solving abilities.

1. Introduction
The importance of mathematics is expected that students are able to have good mathematical skills. A student is can be said to having a good mathematical skills if they able to solve the problems that associated with mathematics. The problem is a condition where in obtaining several objectives must find a way to solve it, but do not know what to do and how to solve it [1]. Based on the purposes of learning mathematics that problem solving of mathematics is a very important to be mastered by students to establish and support other mathematical skills. Problem-solving skills are essential for each individual in problems that related to everyday life or issues dealing with the subject matter. This is in accordance with National Council Of Teachers Of Mathematics [2] who noted that there are at least five capabilities that can be grown by students as they learn math, that solving (problem solving), reasoning and evidence, communication, the connection and the representation. With the skills students are expected to be able to use mathematics as a paradigm in everyday life.

The importance of ownership the problem solving by students in mathematics are (1) the ability to problem-solving is a general purpose mathematical, (2) the settlement of the problem include methods, procedures, and strategies are main processes and major in mathematics curriculum, (3) the settlement of the problem is the ability of basic learning mathematics [3]. In line with these opinion, through problem solving students can analyze the problems, produces a rich solution that allows, alternative answers to systematic before selecting and using it [4].

These are two kinds of the problems: (1) find (number, painting, etc.) and (2) prove. To solve both the problem-solving strategies are same in general [5]. But solving strategies in particular can be different, it depends on the type or the substance of the problem. To solve the problem of 'finding' as it opens sometimes, it needs to have problem solving that creativity through the alternatively exercises
development. There are four steps of solving the problem as follows: 1) understand the problem, 2) developing a plan to solve the problem, 3) implement the plan, 4) a retest or verification [6].

The weakness of problem-solving skills towards the students were encountered in some research. In this study the investigators analyzed the mathematical ability of students that is based on indicators Polya model of problem-solving ability. Thus, indicators was used to look at mathematics skill of students in this research is to understand the problem, devise a plan to solve the problem, implement the plan, and retesting or verification.

2. Experimental method
This research is a descriptive qualitative research to describe students’ difficulties and lack in mathematical problem solving. Subjects of this research are 35 students on 8th grade at one of junior high school. All the students taken have studied the triangle subject. Data from mathematical problem solving ability were collected by essay tests. Furthermore, the data in the analysis with descriptive.

3. Results and discussion

3.1. Analysis problem 1 (indicator 1)
Analysis of problem 1 for the indicator based on the ability to understand problem solving of problems as known triangle in the upper area of 60 cm² and the length of AB = 15 cm. Point D on AB with 3AD = 2BD. Calculate the broad and spacious ΔACD ΔBDC.

From 35 students, only two students were able to answer correctly. 33 students answered incorrectly by a variety of errors. One of the students’ answers indicated by figure 1.

Figure 1 shows that students do not understand how to problems on the given problem. This is evident from the inability of students to identify elements that are known so that students are not able to resolve the existing problems.

![Figure 1. Photograph of students answer of problem 1.](image_url)

3.2. Analysis problem 1 (indicator 1)
Analysis problem solving 2 for indicators based on problem-solving abilities to plan on a matter such as given an isosceles triangle ABC with AC = BC and \( \angle ACB = 36^0 \). AD is a line for\( \angle A \). Investigate the type ΔADC and review of large angular ΔABD.

From 35 students no one was able to answer correctly, it is clear that students have not been able to prepare plans to solve the problem-solving questions. One of the students’ answers indicated by figure 2.

![Figure 2. Photograph of students answer of problem 1.](image_url)
Figure 2. Photograph of students answer of problem 2.

4. Conclusion
Conclusion based on the test results and discussion as described in the previous section, we concluded that the weak students' mistakes in understanding the problems and identifying and arranging the plan problem solving. Therefore, teachers in the learning process should plan learning approaches that can minimize errors and optimize students' ability in problem solving mathematical.

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