

## CHAPTER I

### INTRODUCTION

#### 1.1 Background

One of the goals of mathematics learning to improve understanding of mathematical concepts, mathematical reasoning and mathematical problem solving. To achieve the objectives of mathematics learning, one of the abilities that must be mastered by students is mathematical communication skills. Where this ability is one of the abilities that are expected to be developed properly, so that students can convey mathematical ideas both in writing and verbally. This is in line with the opinions Baroody (in Ansari, 2016: 5), which states:

There are at least two important reasons why communication in mathematics need it is grown among students. First, the math is not merely tools thinking, tools find patterns, resolve problems or draw conclusions, but mathematics as well as a tool for communicating ideas with clear, precise and meticulous. Second, as a social activity in learning mathematics, as place interactions between students, as a means of communication between students and teachers.

Given the importance of communication ability of mathematics in life, it is expected that the learning process is done effectively and efficiently to develop students' mathematical communication ability. However, during the process of mathematical learning takes place. There are some problems that inhibit the learning process. The problems that occur during the learning process in the class X IPA 1 SMA Negeri 1 Perbaungan, one of which is a learning process that occurs in the classroom is still dominated by the teacher or the learning method used is still a lecture. Lecture method still has many shortcomings. This is in line with the opinions Sanjaya (2009: 145):

The lecture method is done by delivering oral subject matter. The subject matter that is delivered is a ready-made subject matter, such as data or facts, certain concepts that must be memorized so as not to require students to re-think and unable to express the idea by using their own language.

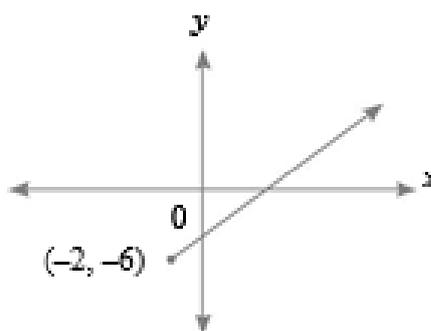
In the opinion above, it can be concluded that the lecture method is less able to improve students' mathematical communication ability because during the

learning process which is dominated by the teacher resulted in the students did not have the opportunity to greet their ideas, ideas or opinions. Thus, it cannot be known the ability of students' mathematical communication in conveying ideas thinking and mathematical ideas in solving math problems.

Furthermore, to determine the students' communication ability then, given initial communication test writing to students of class X IPA 1 SMA Negeri 1 Perbaungan totaling 36 people. Problem is designed so that the solution may show indicators of communication that drawing, writing and mathematical expressions. Here are the questions and the results of the diagnostic test students' mathematical communication ability.

1. Perhatikan grafik berikut

Jelaskan daerah asal dan daerah hasil dari grafik fungsi di bawah



**Figure 1.1: Graph Function**

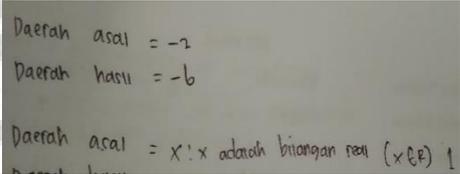
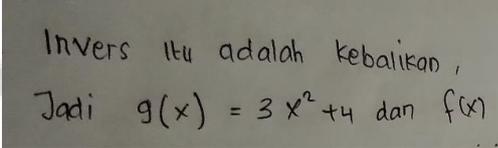
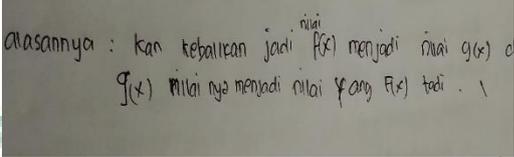
2. Diberikan  $f(x) = 3x^2 + 4$  dan  $g(x) = \sqrt{\frac{x-4}{3}}$

a. Tentukan  $g$  adalah invers dari  $f$

b. Jelaskan alasan  $g$  adalah invers dari  $f$  dalam model matematika

Furthermore, the author presents the results of one of the students work in the following table:

**Table 1.1: Results of Preliminary Tests Answer One Student**

NO	Answer Students	Error analysis
1		<ul style="list-style-type: none"> <li>• Students are not able to interpret the picture correctly, it appears that students are less able to interpret the picture.</li> <li>• Students are less able to present what they know on the picture into the idea of mathematics and mathematical symbols correctly</li> </ul>
2a		Students have not been able to solve mathematical problems and provide solutions to problems correctly and completely
2b		Students have not been able to provide mathematical explanations using mathematical language or mathematical models

From the initial capability test questions were given no learner communication ability are very high and medium category. In the high category, there are 2 students (5.56%), and 34 students (88.89%) in category very low. From the initial communication tests are given by researchers in class X IPA 1 SMA Negeri 1 Perbaungan it is known that the ability of students' mathematical communication ability is still relatively low.

During the process of observation, researchers saw when the teacher finished explaining the material, almost no students were asked about the material. Many students were silent as if already understood by the teacher. Each time the teacher asks the question only a few students who take an active role to answer a teacher's question. Here the researchers noticed that the students in the class of students classified as passive and did not dare argue. Researchers also conducted interviews to students about why they cannot give opinions during learning mathematics progresses, from some students said that they considered that math is a difficult subject and math are also feared.

Some experts also said that the math tends to be seen as a difficult subject, and if it can be avoided. As Aunurrahman opinion (2018: 202) which says that "from various fields of study that are taught in school, math is a field of study that is considered the most difficult by the students either learning disabilities or those who are not learning disabilities". So many students have difficulty learning mathematics as the opinion Saragih (2013: 175) says that "a lot of students who have difficulty learning, especially in math learning". From the description above opinion that mathematics is still considered a difficult subject most students.

The difficulty of learning mathematics causes students to lack interest in mathematics learning. As Fifko's opinion (2017: 216) says that "One of the lessons that can arouse students' interest in learning is to give the impression that mathematics is not difficult. The low interest in learning mathematics because of the existence of a variety of negative stamp has been embedded in the minds of students with regard to mathematics, which may all be raised from the teacher either directly or indirectly, consciously or unconsciously". This is the basis so that the lack of interest in learning mathematics becomes low. In line with the opinion of Silviani, dkk (2017: 151) who said that "In reality there are still many students who are not interested in learning mathematics. The number of students who have an interest in learning mathematics in the medium and low categories indicates that there are still things that must be improved in the learning process of mathematics

in the classroom. Interest in learning mathematics can be influenced by external factors such as the use of learning methods applied by teachers in the classroom”.

Growing interest in learning in mathematics learning aims to improve student learning achievement or student mathematics learning outcomes. As the results of interviews with mathematics teachers at SMA Negeri 1 Perbaungan said that “the average value of student mathematics learning outcomes is still relatively low”. Based on the Trends Survey in the International Mathematics and Science Study (TIMSS) in 2015, which shows that Indonesia is ranked 45th out of 50 countries. The average score of mathematics achievement achieved is 397 with the average standard used by TIMSS is 500. The survey results show that students’ abilities in mathematics learning in Indonesia are at a low level on an international scale (Rahmawati, 2016: 2). The lack of students’ ability in mathematics learning shows that students’ mathematical communication ability are still at a low level.

On the other hand, according to the NCTM (2000: 60-61), “there needs mathematical communication ability in students so that they can: (a) Modeling the situation by verbal, written, images, graphics, and algebra, (b) Reflects and clarification in think about mathematics ideas in a variety of situations, (c) Assess the mathematical ideas through conjecture with convincing reasons”. This is the reason why communication needs to be cultivated among the students.

Lack of communication ability cannot be separated from the learning process. Teachers assume students are the object or target of study, so that the learning process more efforts made by teachers, ranging from the search for, collect, solve and communicate information intended to allow learners to acquire knowledge (Ansari, 2015: 4). So that students have not been able to communicate the work or ideas well to others, both orally and in writing. Students are difficult to express his opinions, even if the idea or ideas already in their minds. This may be because students are afraid of expressing his ideas, especially during the time in learning the students are not accustomed to communicate ideas orally and in writing

Improving students' mathematical communications ability need to be supported with appropriate learning models so that learning objectives can be achieved. An important aspect in planning a study of creativity and innovation relying on a teacher to understand the needs and conditions of the student by using model chosen. This is done in order to help students understand simple knowledge presented by the teacher. According Ranti (2015: 97) communication ability received less attention from teachers so that it appears the assumption that communication ability cannot be built in the learning of mathematics. As a result in mathematics learning day, teachers rarely give an opportunity to students to communicate his ideas so very foreign to them to talk about mathematics.

One effort to overcome the above problem is to make changes to the model applied learning in the classroom teacher. Applied learning models should be able to develop students' ability to illustrate ideas and communicate mathematical problem solving. Based on the exposure of these problems one model of learning that can to improve students' mathematical communication is a model of Problem Based Learning (PBL).

Sudarman (2007: 69) states that the problem based learning is a learning model that uses contextual problems as a context for students to learn and to acquire knowledge and essential concept of the subject matter. In the process of solving these problems, students are trained to interpret ideas into mathematical symbols or illustrations well. In the process, the students do not work individually but the students discuss it with a friend group. After that, one of the groups presented the results of discussions in front of the class and then another group respond. Interactions that occur in the classroom are expected to improve the communication ability of students.

On the other side of the problem based learning according Choridah (2013: 200) is a concept study that focused on the problems of authenticity so that students can prepare his own knowledge, cultivate the thinking ability and inquiry high level, student's independence and increased confidence. In resolving these problems students are trained to pour his ideas into a mathematical model and illustrates

issues in the form of picture properly. Students solve these problems in groups after discussion in groups, the students presented the results of discussions in class and other groups in charge of responding. The process of discussion and presentation is expected able to improve students' mathematical communication.

The problem that serve as the focus of learning can be accomplished students through group work so as to give the experience a learning experience that is diverse to students such as cooperation and interaction within the group, as well as a learning experience related to solving problems like making hypotheses, design experiments, conduct investigations, collect data, interpret the data, make inferences, to present, discuss, and create reports. These circumstances show that the model of Problem Based Learning can improve students' mathematical communication ability.

During this learning model Problem Based Learning already been tested on a few lessons. One is based on research results Dede Tresnawati Choridah (2013) concluded that the learning model Problem Based Learning can improve students' mathematical communication ability. Then, based on Oktaviani Anggi study (2015) concluded that the learning model Problem Based Learning can improve students' mathematical communication ability.

From the description above shows that the learning model Problem Based Learning in addition to optimizing the participation of pupils and students' activeness in working together or work individually also be able to improve students' mathematical communication.

Based on the background that has been presented, the researcher interested in conducting a study entitled **“The Implementation of Problem Based Learning Model to Improve Students' Mathematical Communication Ability at Grade XI”**.

## **1.2 Identification of Problems**

Based on the background of the problems described earlier, we can identify some of the issues as follows:

1. Mathematics is a difficult subject.
2. The value of mathematics learning outcomes is still relatively low.
3. Student learning interest in mathematics learning is still less.
4. The process of learning in class X IPA 1 SMA Perbaungan tend to be passive.
5. Mathematical communication ability in class X IPA 1 SMA Negeri 1 Perbaungan still relatively low.
6. Mathematics learning activities used by teachers in the classroom are still using the lecture method or less involving mathematical communication ability of students.

### **1.3 Limitations**

So that the problems in this study is lower and clearly it is necessary to limit the problem in order to achieve the desired goal. The problem studied in this research are:

1. Mathematical communication ability class X SMA Negeri 1 Perbaungan still low
2. The learning model used by teacher does not involve students' mathematical communication ability.

### **1.4 Problem Formulation**

Based on the above problem definition, the formulation of the problem in this research are:

1. How can problem based learning models improve students' mathematical communication ability on linear programs topic at grade XI SMA Negeri 1 Perbaungan AY 2018/2019?
2. How the improvement of students' mathematical communication ability on linear programs topic at grade XI SMA Negeri 1 Perbaungan AY 2018/2019 by implementing the learning model of Problem Based Learning ?

### 1.5 Research Objective

The purpose of this research is to improve students' mathematical communication ability through implementation Problem Based Learning models in program linear topic at grade XI SMA Negeri 1 Perbaungan AY 2018/2019.

### 1.6 Benefits Research

The results of this study are expected to provide information and to provide the following benefits:

1. For a Students
  - a. Learning enhance the activity of students in the class, both in terms of working same, communication and critical thinking.
  - b. Improve communication ability of students in learning math mathematical which had a positive impact on learning and students' mathematics learning outcomes.
2. For a teachers
  - a. Acquire knowledge to improve communication ability mathematical student by using model Problem Based Learning.
  - b. As a reference to be able to use models that vary learn in accordance with the material being taught.
3. For a researchers
  - a. Will be obtained in the study whether the problem solving learning model problem based learning can improve students' mathematical communication ability.
  - b. As information material as well as handle material for researchers in teaching stints as a candidate in the future the teacher.
  - c. As a reference for future research.
4. For The School

As an input to the management of the school in order to improve the model learning and improve education

### 1.7 Operational Definition

By paying attention to the title of the research, there are some terms that need to be explained in order to avoid disagreements between researchers and readers.

1. The Implementation in this research is the implementation of problem based learning model to improvement students' mathematical communication ability
2. The improvement in this research is there is an increase in students communication ability from cycle 1 to cycle 2 with category medium ( $0,30 \leq g < 0,70$ )
3. Problem Based Learning is a learning model that presents a real-world problem that stimulate students to learn critical thinking and problem solving skills, as well as to acquire knowledge and mathematical concepts. Stages in problem based learning is the orientation of students on issues, organize the students, guiding the investigation of individuals and groups to develop and present the results, and analyzing and evaluating the process and results of problem solving.
4. Mathematical communication is in the process of delivering the ability to communicate that involves written mathematical activity.
5. Mathematical communication ability is the ability of students to express ideas and opinions of mathematical writing. As for the students' mathematical communication ability that will be measured in this study are;  
(1) describe the situation of the problem and stating the problem solution in the form of picture (2) explain ideas, situations and relationships are writing a math problem; (3) interpret the data into a mathematical model.