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Students Mathematical Communication Ability On Transformation Geometry

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ABSTRACT

The purpose of this study was to determine the level of mathematical communication ability of high school students in the subject of transformational geometry. The population in this study were students of class XI at one of the senior high schools in Karawang. The sample selection was carried out by means of purposive sampling. This study uses a qualitative descriptive approach, with analytical techniques: (1) data reduction, (2) data presentation, (3) drawing conclusions. The results of this study are that students' mathematical communication abilities on transformation geometry material in one of the high school schools in the Karawang district are in the sufficient category with an average value of 49%. One indicator of communication skills that should get more attention is the ability of students to connect real events or the application of mathematics to everyday life in the form of mathematical ideas.

INTRODUCTION

Mathematics learning has an important role in everyday life (Meika, 2022). Mathematics is so important that mathematics needs to be studied at all levels of education, from early childhood to higher education. (Purwaningrum, 2021). In learning mathematics, mathematical communication ability is one of the competencies that must be possessed by students (Anderha, 2020) (Siregar, 2018) (Wijayanto, 2018) . This ability can help students understand mathematical concepts, solve mathematical problems, and work together with classmates and teachers. This ability is also important in everyday life, because it helps individuals make wise decisions, solve mathematical problems encountered in everyday life and explain ideas or thoughts in a clear and effective mathematical form.

According to Sumarmo in Wijaya (2018), Mathematical communication includes students' abilities: (1) Connecting real objects, pictures and diagrams into mathematical ideas, (2) Explain ideas, situations and mathematical relationships orally and in writing with real objects, pictures, graphs and algebra, (3) Express events in language or mathematical symbols, (4) listen, discuss and write about mathematics, (5) reading with comprehension of a written mathematical presentation, (6) make conjectures, construct arguments, formulate definitions and generalizations.

Mathematical communication skills measured in this study are: (1) express real events or the application of mathematics with mathematical symbols or ideas presented in writing, (2) connecting real events or the application of mathematics to everyday life in the form of mathematical ideas, (3) explain ideas, situations and mathematical relations as outlined in written form by presenting a mathematical picture or graph.

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However, in reality, students' mathematical communication skills are still low. (Syah, 2021) (Dewi,2022). This was proven when the researcher conducted an interview with a mathematics teacher at a high school in Karawang, the teacher stated that students had relatively low mathematical communication skills, this can be seen when students did not understand the teacher's explanation or had difficulty solving math problems, students were embarrassed to ask to teachers, students have difficulty solving math problems, especially problems related to illustrations and the use of mathematical models or symbols that contain geometry.

Geometry material transformation is important to learn, one of the reasons for the importance of studying geometry material is to hone students' abilities in mathematics (Maulani,2020). By studying geometry, students can connect abstract mathematical concepts with concrete mathematical concepts so that the two are easily integrated and can be a driving force for deep understanding.

Based on the background above, it is necessary to analyze students' mathematical communication abilities in transformation geometry material to determine the level of students' abilities, in this case and provide appropriate solutions to improve students' mathematical communication abilities. The aim of the research was to determine the mathematical communication skills of high school students on transformation geometry material.

METHOD

This research is qualitative research. This study aims to analyze students' mathematical communication skills on transformation geometry material without giving any prior treatment. This research was conducted at one of the high schools in Karawang. The subjects in this study were 28 students, a technique for selecting research subjects was carried out using a purposive sampling technique, namely a sampling technique with certain considerations or objectives (Sugiyono, 2015). Subjects were chosen by asking students what their teachers had taught them in school about transformation geometry. Based on their answers and other factors, 3 subjects were chosen. The instrument used in this study is an instrument of mathematical communication ability test questions. The data used was obtained through test activities, namely by conducting a test consisting of 5 mathematical communication ability questions.

This study uses data analysis techniques according to Miles and Huberman (Sugiyono, 2018), namely: (1) Data reduction, at this stage the researcher selects, groups and summarizes data based on what you want to know into several groups according to the purpose, (2) Data presentation, which is often used in presenting data in qualitative research, namely with narrative text. Therefore, the results of students' mathematical communication abilities as well as the results of the interviews will later be presented in a narrative manner, (3) drawing conclusions, drawing conclusions is to provide conclusions on the final results of the data results that have been obtained. Drawing conclusions in this study aims to answer the formulation of the problem, namely by describing the results of students' mathematical communication abilities in the material of transformation geometry.

RESULT AND DISCUSSION

This study was done in one of Karawang's state high schools in the 11th grade. The results of this study can be seen in how the students answered questions about their mathematical communication skills. There are three indicators of mathematical

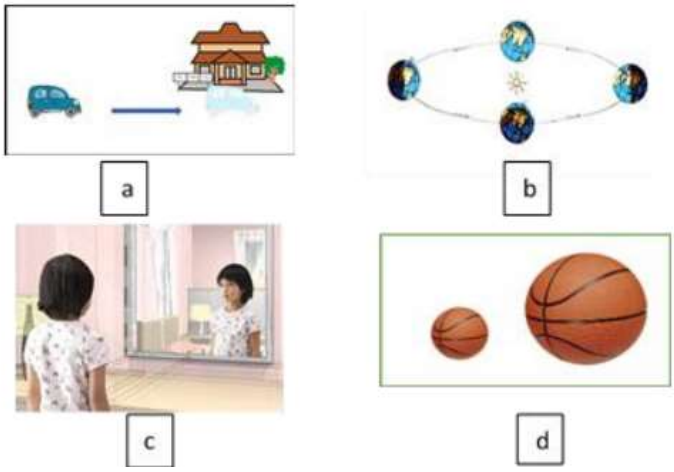
communication skills used in this study. The test results for students' mathematical communication skills based on indicators are as follows:

Tabel 1. Percentage of Mathematical Communication Ability Test Results

No	Indicator	Mean
1	Using mathematical symbols or ideas to express real-world events or the application of mathematics	49%
2	Connecting real-life events or the application of mathematics to everyday life through mathematical concepts	30%
3	Explaining ideas, situations and mathematical relations as outlined in written form by presenting a mathematical picture or graph	48%

Based on Table 1, it can be seen that the average students' mathematical communication ability is in the range of 49%, with the distribution as follows: (1) students' ability to using mathematical symbols or ideas to express real-world events or the application of mathematics is 49%, (2) students' ability to connecting real-world events or the application of mathematics to everyday life through mathematical concepts is 30%, (3) students' ability to explaining ideas, situations and mathematical relations as outlined in written form by presenting a mathematical picture or graph is 48%.

Question No 1



Look at the photo on the question! The picture is a picture of transformation in everyday life. Show the type of each transformation below and describe its characteristics.

Problem item number 1, aims to measure students' ability to using mathematical symbols or ideas to express real-world events or the application of mathematics.

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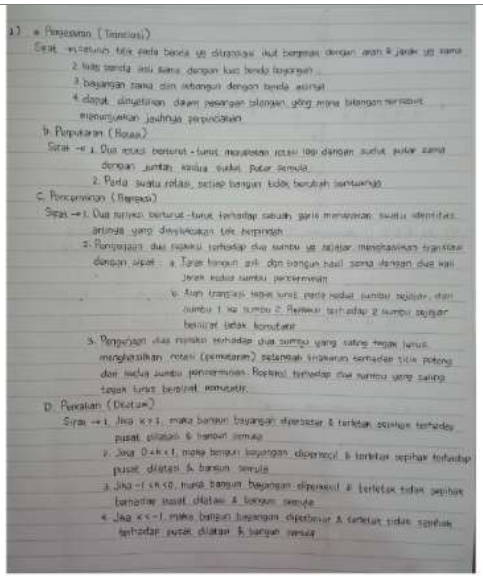
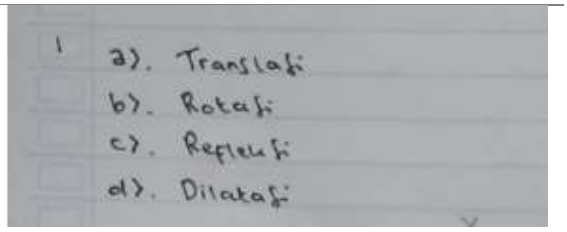


Subyek (a)



Subyek (b)

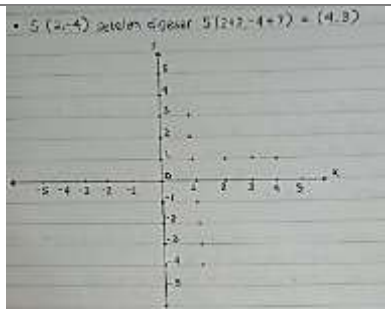
Figure 1. Students answer on indicator 1

In item number 1, students are directed to answer the questions given. Students must respond to the types of transformation contained in the questions based on their application in everyday life and explain the meaning of each type of transformation they are familiar with. On this indicator, the average student scores 59%. Subject (a) answered question number 1 correctly, and subject (a) mentioned the types of transformation and explained them in detail. Thus, subject (a) fulfills the indicators of mathematical communication ability in the transformation material contained in item number 1. As for subject (b), it can be seen in the picture where subject (b) only mentions the types of transformations without explaining the meaning of each type of transformation. Based on the results of the interview with subject b, he stated that it was difficult to be able to memorize all the characteristics of this transformation.

Question No 2

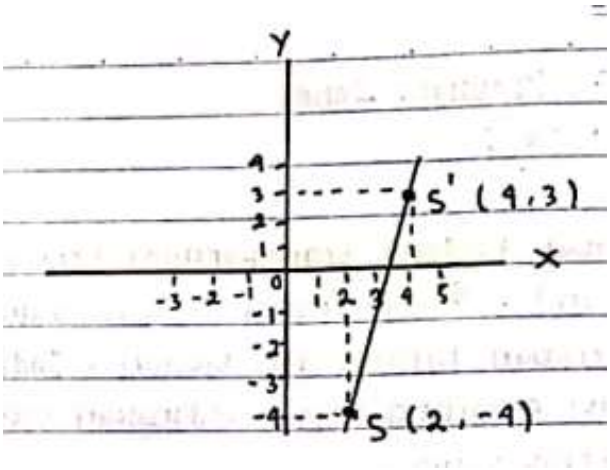
Show the image of the displacement of a car that is at point S(2,-4) when it is shifted 2 units to the right and 7 units up, which is described in Cartesian coordinates. Assume the direction to the right of the positive x-axis and the direction up of the positive y-axis!

Item number 2 aims to measure mathematical communication skills with indicators Connecting real-life events or the application of mathematics to everyday life through mathematical concepts.



Subyek (a)

Subyek (b)



Subyek (c)

Figure 2. Students answer on indicator 2

In item number 2 students are directed to be able to connect real-life events or the application of mathematics to everyday life in the form of mathematical ideas. This indicator can be fulfilled if students are able to choose the right formula and steps, so that from the resulting solutions they are able to draw a transformation graph according to the question, namely placing the shadow point on cartesian coordinates. The formula used in solving this problem is translation, translation is a transformation that results in congruence with the transformed form, including direct isometric transformations (Hada, 2021).

On this indicator, the average student gets a score of 30%. Most students can only draw a transformation graph, but they do not explain the steps for solving it using the correct translation formula. This is evident from the pictures of the students' work in solving problem number 2. The pictures of the work done on subjects a, b, and c show that the students immediately drew only their cartesian coordinates. It can be seen from the picture of the completion of subject a, that subject a has not been able to answer the questions correctly. Students do not provide completion steps for subjects b and c, but the answers are correct, namely the result of the dot shadow is at S'(4, 3). Based on the interview results, these students explained that they forgot to write down the formula along with the steps in solving the translation problem. Thus, subjects a, b, and c have not been able to fully fulfill their ability to connect real-life events or the application of mathematics to everyday life in the form of mathematical ideas.

Question No 3

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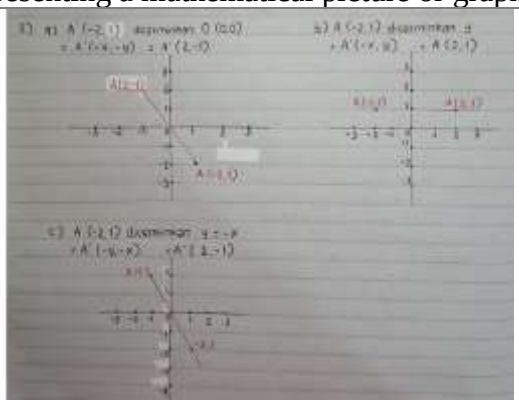
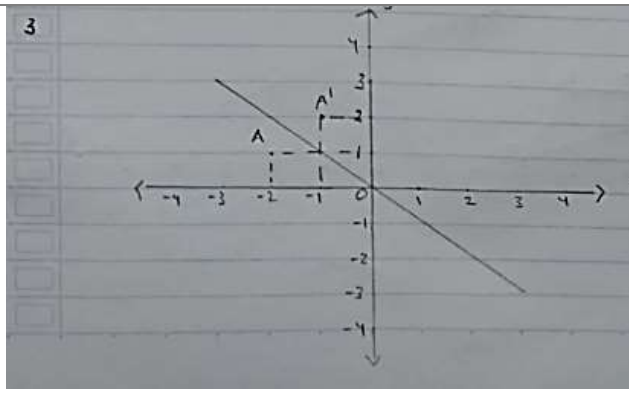
Determine the image of point A(-3,-2) which is rotated 180° and 90° counterclockwise respectively with the same center, namely O(0,0) and apply it to the Cartesian coordinate plane!

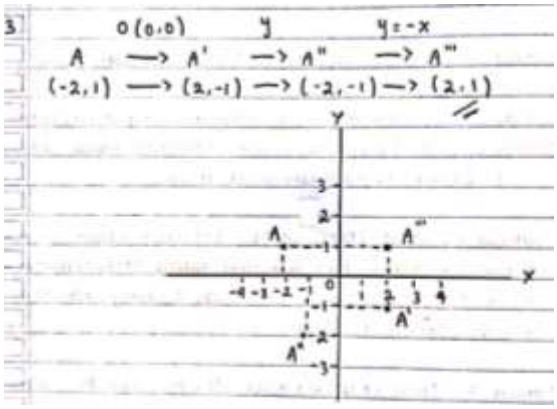
Item number 3 aims to measure mathematical communication skills with indicators Explaining ideas, situations and mathematical relations as outlined in written form by presenting a mathematical picture or graph



Subyek (a)



Subyek (b)



Subyek (c)

Figure 3. Students answer on indicator 3

In item number 3, students are directed to solve rotation problems systematically, namely by completing a rotation of 180° followed by a rotation of 90°, so that from the resulting completion, they are able to draw a transformation graph by placing the shadow point on cartesian coordinates. The formula used to solve this problem is rotation, rotation is a transformation that attaches a point to another set of points by rotating, or in other words, rotation is the event of moving an object through a curved line with a center at a certain point and with a certain rotation angle with the direction clockwise or counterclockwise, which causes the position of the image to change (Hanafi, 2017).

On this indicator, the average student gets a score of 30%. Based on the results of the analysis, subject a answered the question correctly, but subject a did not include the basic information in the question that should have been written on the answer sheet. Subject (a)'s answer has included the correct formula, namely the rotation formula of 180° followed by a 90° rotation. Subject (a) has correctly made conjectures and arranged a systematic solution to problem number 3, so that subject (a) is able to describe the transformation graph

according to the question, namely, correctly placing the shadow point on the cartesian coordinate plane.

As for subject b, based on the results of the analysis of the answers to item number 3, it was stated that they were not correct in answering the questions. This is evident from the results of subject b's answer, where subject b only presents a graph in cartesian coordinates without the formula and steps for solving it. Based on the interview results, the student explained that he still did not understand the rotation formula, especially in its application in the cartesian coordinate plane. Based on the results and discussion of the three indicators of students' mathematical communication abilities, it can be concluded that students' mathematical communication skills are still in the sufficient category, in line with research (astuti, 2015) (Aminah, 2018).

CONCLUCISION

Students' mathematical communication skills on transformation geometry material in a high school in Karawang district are in the sufficient category with an average score of 49%. An indicator of communication skills that must be addressed is students' ability to connect real events or the application of mathematics to everyday life in the form of mathematical ideas. By fixing the deficiencies in these indicators it is hoped that students' communication skills will be able to improve further.

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Analisis Kemampuan Komunikasi Matematis Siswa Pada Materi Geometri Transformasi

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Abstract

Tujuan dilakukan penelitian ini untuk mengetahui tingkat kemampuan komunikasi matematis siswa SMA pada materi geometri transformias. Populasi dalam penelitian ini adalah siswa kelas XI di salah satu SMA Karawang. Pemilihan sampel dilakukan dengan cara purpossive sampling. Penelitian ini menggunakan pendekatan deskriptif kualitatif, dengan teknik analisis yaitu: (1) Reduksi data, (2) Penyajian Data, (3) penarikan kesimpulan. Hasil dari penelitian ini adalah Kemampuan komunikasi matematis siswa pada materi geometri transformasi di salah satu sekolah SMA di kabupaten karawang berada pada kategori cukup dengan kisan rata – rata nilai sebesar 49%. Salah satu indikator kemampuan komunikasi yang harus mendapatkan perhatian lebih adalah kemampuan siswa dalam mengkoneksikan kejadian nyata ataupun penerapan matematika pada kehidupan sehari-hari ke dalam bentuk ide-ide matematika.

Kata Kunci: Kemampuan Komunikasi Matematis; Geometri Transformasi

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