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Numeracy Skills Of Junior High School Students In Doing AKM (Minimum Competency Assessment) Type Problems

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Abstract: In an effort to improve numeracy skills, the Ministry of Education and Culture has established the National Assessment as a form of education evaluation in Indonesia. The implementation of the National Assessment evaluation is measured through the Minimum Competency Assessment (AKM). The Pythagorean Theorem is one of the chapters that includes geometry and measurement materials, and algebra which requires the ability to analyze and solve problems. Understanding and practice questions using the AKM type of questions are needed so that students can easily interpret mathematical problems that arise in everyday life. The purpose of this study was to describe the numeracy skills of junior high school students in solving AKM type questions on the Pythagorean Theorem material. The subjects of this study were 12 students of Class VIII of SMP Brawijayasakta I Surabaya. This study used a qualitative descriptive method. Data collection techniques in this study were written tests and unstructured interviews. The data analysis technique used by the researcher was triangulation techniques which aimed to ensure the relationship between test results and interview answers. The results of this study indicate that Students in the high numeracy ability category are sufficient to fulfill indicator 1, and can fulfill indicators 2 and 3 well. For students in the low numeracy ability category, it is enough to meet indicator 1, to meet indicator 2 well and not to meet indicator 3. For students in the low numeracy ability category, it is enough to meet indicator 1 and not meet indicators 2 and 3.

Keywords: minimum competency assessment; numeracy skills; pythagoras' theorem.

INTRODUCTION

Maths is something that cannot be separated from everyday life. This proves that mathematics is a subject that plays an important role both in education and in everyday life. Maths skills are not only about counting skills, but also reasoning skills. Mathematical skills that refer to everyday life can be referred to as numeracy skills. Numeracy skills contain a mathematical ability that refers to the ability to apply social arithmetic operations in everyday life. Although numeracy skills have an important role, in fact numeracy skills in Indonesian students are still relatively low. This is supported by the results obtained by Indonesia in the PISA test from year to year showing that Indonesia's numeracy skills can be said to be low compared to other countries. According to (OECD, 2019) in numeracy skills Indonesia obtained an average of 379 with an OECD average score of 487, with these results Indonesia is ranked 75th out of 81 countries. In the PISA 2022 results, Indonesia experienced a decline in numeracy skills, which obtained an average of 366 with an average OECD score of 487 (OECD, 2024).

According to (Sudirman et al., 2020) n his research shows the results if the mathematical literacy of junior high school students is still low. This is concluded based on this, indicated by the percentage of students who obtained high, medium, low, and consecutive mathematical literacy scores of 34,04%; 14,89%; and 51,06%. Therefore, to facilitate students' mathematical ability, teachers must apply innovative learning approaches and models. In a study conducted by (Holis et al., 2016) in junior high schools in Konawe district, it was found that the average mathematical literacy ability of public junior high school students in Konawe district scored less than 60% for each level of PISA-type

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mathematical literacy questions, the average mathematical literacy ability of public junior high school students in Konawe district was only 7,7 on a scale of 100..

In an effort to improve the numeracy skills of Indonesian students, the Minister of Education, Culture, Research and Technology stipulates the Regulation on National Assessment that National Assessment (AN) is one form of evaluation of the education system by the Ministry at the primary and secondary education levels. AN learning outcomes are measured through the Minimum Competency Assessment (AKM) which maps 2 minimum competencies, namely literacy skills and numeracy skills. In AKM type questions, students are not only expected to measure specific topics or content but can measure a variety of content, various contexts and at several levels of cognitive processes. The cognitive level indicates the thinking process that is required or necessary to be able to solve the problem or problem. The cognitive process in numeracy can be divided into three levels. In numeracy, the three levels are understanding, application and reasoning (Kemendikbud, 2021).

Menu According to (Kementrian Pendidikan dan Kebudayaan, 2020) the content on numeracy skills can be divided into four groups, namely Numbers, Measurement and Geometry, Data and Uncertainty, and Algebra. The Pythagorean Theorem is one of the chapters that covers geometry and measurement, and algebra that requires the ability to analyse and problem solve. In the Pythagorean Theorem material, students are required to prove theorems, mathematics, convert problems into mathematical form with the right formula, determine the length of the sides of a triangle, compare the sides of a triangle, determine the distance between the two points in cartesian coordinates, and apply the pythagorean theorem in solving problems in everyday life.

In fact, in everyday life there are many calculation problems where these problems can be calculated using the Pythagorean Theorem, for example, problems related to distance, measurement, architecture and construction, and many more. Therefore, it is necessary to understand and practice problems using AKM problem types so that students can easily interpret mathematical problems that arise in everyday life.

Research on analysing students' numeracy skills has been widely researched by previous researchers. The results of research from (Nurhaliza Ali & Ni'mah, 2023) entitled "Analysis of Learners' Ability to Solve Geometry Questions on the Minimum Numeracy Competency Assessment" show the results that students' ability to solve AKM type problems on geometry material is low. The cause of the low ability can be influenced by internal factors and external factors. The methods used by teachers in the teaching-learning process can also affect students' numeracy skills.

Previous research from (Setianingsih et al., 2022) entitled "Analysis of Numeracy Skills of Junior High School Students in Solving Question Type Minimum Competency Assessment (AKM)" provides results that students' numeracy skills are still classified as low or basic level. Students have not fully mastered all numeracy indicators such as, not being able to use various kinds of numbers and mathematical symbols, not being able to analyse information presented in various forms (graphs, tables, charts, diagrams, and so on).

Based on some of the research described above, the research focused on some specific material, thus making researchers aim to analyse the numeracy skills of junior high school students with AKM (Minimum Competency Assessment) type questions with the aim of describing the numeracy skills of students in solving Pythagorean Theorem questions on AKM type questions so that it can be used as a teacher reference to prepare students in solving AKM questions.

METHODS

This research uses a qualitative approach with a descriptive research type. According to (Sukmadinata, 2011), research with descriptive methods has the aim of describing phenomena as they are. Based on the topic in this study, namely the numeracy ability of students in solving AKM type problems on Pythagorean Theorem material for class VIII students of SMP Brawijayasakta I Surabaya, the researcher will describe the data obtained by the researcher as a result of his research. The subjects of this study were VIII grade students of SMP Brawijayasakta I Surabaya, totalling 13 students. Data collection was conducted using written tests and unstructured interviews.

The written test given contains questions about Pythagorean Theorem material using AKM type questions in the form of descriptions of 2 questions that have been validated by experts. Giving this written test aims to determine students' numeracy skills in solving Pythagorean Theorem problems in solving AKM type problems. The test instrument used by researchers includes existing numeracy indicators. Here are 3 numeracy indicators according to (Han et al., 2017): (1) able to use various kinds of numbers or symbols related to basic mathematics in solving daily life problems, (2) able to analyse information displayed in various forms (graphs, tables, charts, diagrams and so on), (3) interpret the results of the analysis to predict and make decisions.

After students completed the test, the researcher checked the students' test results using the following scoring rubric (Han et al., 2017):

Table 1. Assessment rubric

Numeracy Ability Indicator	Score	Description
Use a variety of numbers and symbols related to basic mathematics to solve problems in a variety of daily life contexts.	0	No proficiency with numbers and mathematical symbols
	1	Fairly proficient with numbers and mathematical symbols.
	2	Has skills related to numbers and mathematical symbols.
Analyse information presented in various forms (graphs, tables, charts, diagrams, etc.).	0	Did not analyse the problem/no attempt to analyse the problem.
	1	Does not understand the problem thoroughly, resulting in inappropriate solution planning.
	2	Does not understand most of the problems. So the solution is correct, but mostly wrong.
	3	Has not understood a small part of the problem. So that the solution is correct, but there are still errors.
	4	Understand the problem but there are few mistakes in the solution.
	5	Understand the problem but there are still errors in the solution.
	6	Understand the problem and solve with the right solution procedure.

Numeracy Ability Indicator	Score	Description
Interpret the results of these analyses to make predictions and decisions.	0	Unable to interpret the analysis results to draw conclusions.
	1	Can interpret the results of the analysis but the computation is wrong or the answer is wrong as a result of improper solution.
	2	Can interpret the analysis results correctly.

The test results are checked and the researcher will group the test results into 3 groups of categories, namely high, medium and low. The grouping of the three categories above refers to the opinion of (Khoirudin et al., 2017).

Table 2. Category of numeracy skills

Category	Value Range
High	71-100
Medium	41-70
Low	≤ 40

Furthermore, researchers will take 1 student in each numeracy ability category (high, medium, and low) and will be interviewed regarding the questions given. This interview is used to explore broader and more open information about the steps used by students in working on the written test given. In analysing the data, researchers used triangulation techniques. The use of this technique aims to ensure the relationship between test results and interview answers. Then, the researcher will draw a conclusion and will describe how students' numeracy skills in solving AKM-type problems on Pythagorean Theorem material.

RESULTS AND DISCUSSION

The research instruments used were written tests and unstructured interviews. The written test was used to measure students' numeracy skills on Pythagorean Theorem material in working on AKM problems. Unstructured interviews were used to explore more extensive and open information related to the steps used by students in working on the written test given. The validation of the written test was carried out by Mr DS as a lecturer in Mathematics Education and Mrs TE as the 8th grade mathematics teacher at SMP Brawijaya Sakta I Surabaya. The validation results from lecturers and teachers obtained the results that the numeracy AKM questions were declared feasible to use for research.

Data collection was carried out by giving written tests totalling 2 questions to 8th grade students of SMP Brawijayasakta I Surabaya. The results of the test will be checked based on the assessment rubric. Of the 13 students in class VIII who took the test, only 10 students. The test results will be categorised into 3 categories, namely high, medium, and low. The data is presented in the following table 3.

Table 3. Numeracy Test Results

Name	Score	Category
ADB	10	Low
AZA	10	
MVR	30	
MF	40	
ASPS	60	Medium
MRA	60	
IFS	60	
NNS	70	
JNA	80	High
MAR	90	

The results showed that the numeracy skills of class VIII students totalling 10 students, there were 4 students in the low category, 4 students in the medium category, and 2 students in the high category. The next step is to interview 1 student in each numeracy ability category (low, medium, and high) to find out how the steps used by students in doing the test. In selecting the subject, the researcher held a discussion with the subject teacher. The following are the names of the students selected for the interview:

Table 4. List of resource persons

Student Codes	Score	Category
R	10	Low
S	60	Medium
T	80	High

Test and interview results of low numeracy ability students question number 1 and number 2 that,

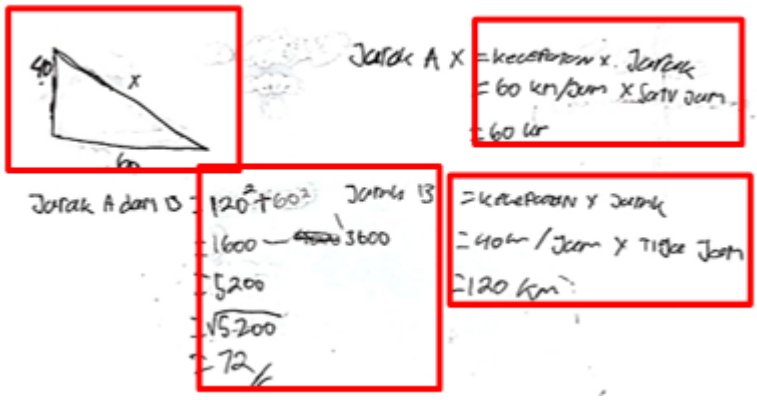


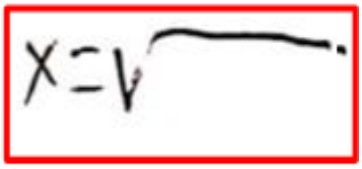
Figure 1. Answers to Question Number 1 by Low Numeracy Students

To obtain the steps of solving Question number 1 and clarify students' answers, researchers conducted interviews with students. The following is the result of the interview:

6P : Explain the information you get from the Question!

R : Question number 1 has speed, time, and finding distance.
P : How did you work on the Question
R : I read it over and over again to understand the Question, it took me a long time to understand. Then I remember the formula to find the answer, and after that I calculate it.
P : What steps did you take in working on the Question?
R : Rewrite what is known in the Question, like the distance from A to B.
P : Why did you draw a triangle? Why not another flat shape?
R : Because it is about the Pythagorean Theorem miss
P : How did you know that what you were looking for was the hypotenuse?
R : I just guessed, I don't really understand it.
P : What were your obstacles in doing the Question?
R : Understanding the reading and the formula
P : Where did you find the formula?
R : Trying to remember
P : Did you find it difficult to understand the mathematical symbols?
R : It's difficult, I haven't mastered it yet
P : What arithmetic operations did you use in doing the Question? Have you mastered them?
R : There are addition, subtraction, multiplication and finding the root value. But I haven't mastered it yet, there are still mistakes I make when writing and counting.
P : Are you sure about your answer?
R : Not sure miss

Based on the test results and interview answers above, it can be seen that students know what arithmetic operations they have used in working on the Question, but students have not mastered the process so that the final answer produced is still not correct. Therefore, it can be concluded that the student has sufficient skills related to numbers and mathematical symbols.



Picture 2. Answers to Question Number 2 by Low Numeracy Students

To obtain the steps of solving sol number 2 and clarify students' answers, researchers conducted interviews with students. The following are the results of the interview:

P : Explain the information you got from Question number 2!
R : About the ship
P : Why didn't you finish it?
R : I was confused miss, I was also too focused on finding the answer to number 1. So when I wanted to work on Question number 2, my energy had run out miss.
P : Explain what was an obstacle when working on number 2!
R : Reading number 2 is more, and there are pictures too. So I was confused about what to do with it
P : Did you find it difficult to analyse the information presented in the form of

pictures?

R : Yes, sis

P : Then why did you only write the root symbol?

R : I'm not sure miss, just so it's not empty.

Based on the test results and interview answers, it can be concluded that the student did not analyse the question and could not interpret the analysis results to draw conclusions. Therefore, it can be concluded that the student did not analyse the Question/there was no attempt to analyse the Question and could not interpret the results of the analysis to draw conclusions.

Test and interview results of students with medium numeracy ability question number 1 and number 2 that:

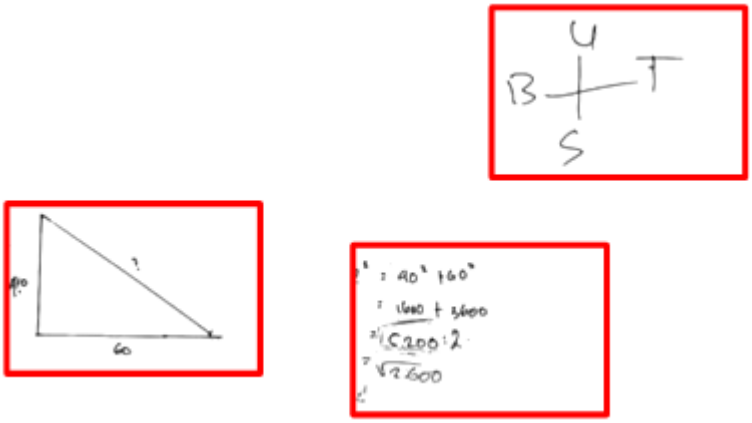


Figure 3. Answers To Question Number 1 By Medium Numeracy Students

To obtain the steps of solving Question number 1 and clarify students' answers, researchers conducted interviews with students. The following is the result of the interview:

P : Can you understand the problem in the Question?

S : Yes, finding the distance

P : What steps do you take in working on the Question?

S : Observing the Question first and then working on it

P : Why did you draw the cardinal directions?

S : I drew the cardinal directions to help me draw the triangles.

P : Why did you draw a triangle? Why not other flat shapes?

S : Because based on the cardinal directions, a triangle is formed.

P : How did you know that what you were looking for was the hypotenuse?

S : From the reading and the help of the cardinal directions

P : What are your obstacles in doing the Question?

S : I was still confused in the mathematical operations, especially finding the root value.

P : Do you have any other problems with arithmetic operations or understanding mathematical symbols?

S : There is sis, I often get confused in understanding and using symbols. Because there are many mathematical symbols, so I often flip back and forth when using them. I also often miss writing symbols.

P : Are you sure about your answer?
S : Not sure sis
P : Why?
S : Because I can't complete the root calculation

Based on the test results and interview answers above, it can be seen that students can know the steps to work on the Question, but students do not understand the Question and have not mastered the process so that there are errors in counting and the final answer produced is still not correct. Therefore, it can be concluded that students have sufficient skills related to numbers and mathematical symbols.

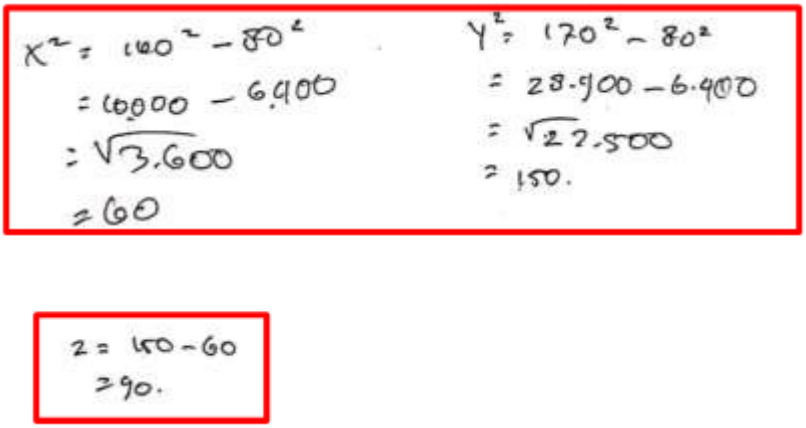


Figure 4. Answers To Question No 2 By Medium Numeracy Students

To obtain the steps of solving Question number 2 and clarify students' answers, researchers conducted interviews with students. The following is the result of the interview:

P : What information did you get from the Question?
S : Find the distance of 2 ships
P : What steps did you take in working on the Question?
S : Same as number 1, I observed the Question first and then worked on it.
P : Why didn't you draw another triangle to help with the calculation?
S : Because the Question has presented a clear enough picture, so I felt no need to draw a triangle for counting.
P : What are your obstacles in working on the Question?
S : For Question number 2, there are no obstacles, I can do it smoothly.
P : Why didn't you give the distance unit in each of your answers when the Question already stated the distance unit?
S : Because I was confused, I felt that km was too far and m was too close. So I didn't write the distance unit
P : Why don't you draw a conclusion in the final result of your answer?
S : Because I am not used to drawing conclusions in story Question, I am used to working like a normal Question.

Based on the test results and interview answers, it shows that students are able to analyse the Question and solve the Question well so as to obtain the correct results, but students do not write conclusions in the final answer because they are not used to it. Therefore, it can be concluded that the student can understand the Question but there are still errors in the solution and cannot interpret the analysis results to draw conclusions.

Test and interview results of high numeracy ability students question number 1 and number 2 that,

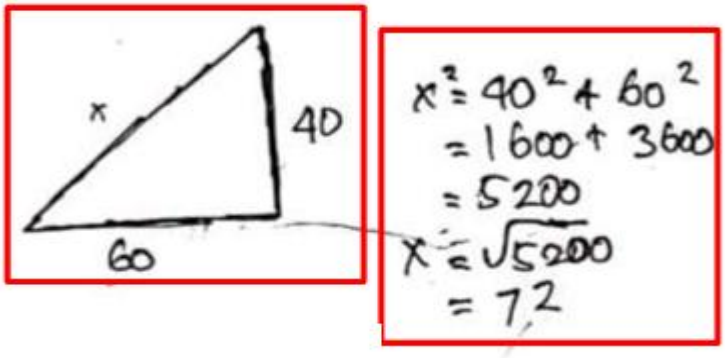


Figure 5. Answers To Question No 1 By High Numeracy Students

To obtain the steps of solving Question number 1 and clarify students' answers, researchers conducted interviews with students. The following is the result of the interview:

P : Do you know what type of question it is?
T : AKM miss
P : Does that mean you have previously received Question AKM during the lesson?
T : Yes, I have.
P : Do you think it is more difficult which is a regular Question or an AKM Question?
T : Question AKM miss
P : Why?
T : Because there is a lot of reading, so we have to read until the end before we can find the question.
P : Can you understand the information presented?
T : I can miss
P : What information do you get from Question number 1?
T : About the distance of 2 motorbikes
P : How did you do the Question?
T : I read it repeatedly, then I also circled the important information on the Question sheet, after that I remembered the formula and calculated it.
P : Do you think Question number 1 is easy or difficult? Explain!
T : It was difficult miss, because I was confused about calculating the roots and number 1 also didn't have a sketch so it was more difficult.
P : What were your obstacles while working on the Question?
T : Calculating miss, I was confused about the roots
P : Does that mean you haven't really mastered basic calculations?
T : I can add, subtract, multiply, divide, but I'm still confused about the roots.

Based on the test results and interview answers above, it can be seen that students have their own way of working on the Question, but students do not understand the Question and have not mastered the process so that there are errors in counting and the final answer produced is still not correct. Therefore, it can be concluded that the student has sufficient skills related to numbers and mathematical symbols.

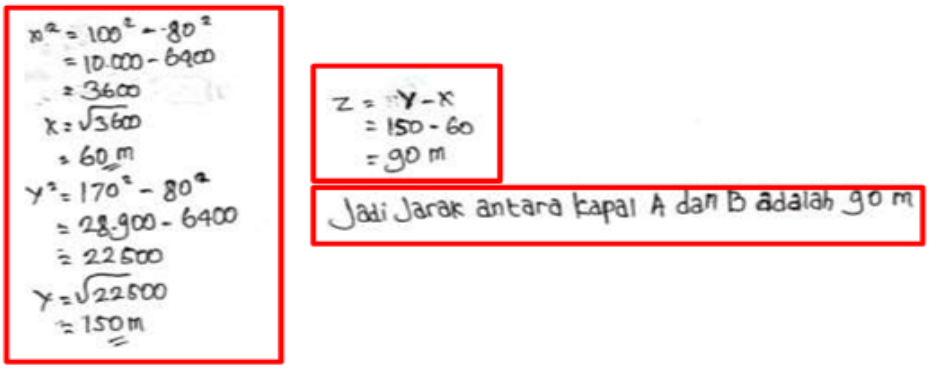


Figure 6. Answers To Question No 2 By High Numeracy Students

To obtain the steps of solving Question number 2 and clarify students' answers, researchers conducted interviews with students. The following is the result of the interview

P : What information did you get from the Question?
T : About the distance of 2 ships miss
P : What steps did you take in working on the Question?
T : Same as number 1 miss, I read the Question repeatedly miss, I observed the picture, then I also circled the important information on the Question sheet, after that I remembered the formula and calculated it.
P : Did you have trouble understanding Question number 2?
T : No, number 2 was easier because of the sketch, so I didn't need to draw the triangle again.
P : What were your obstacles in working on the Question?
T : It took me quite a long time to understand the Question because Question number 2 is longer than number 2, the rest I could do it smoothly.
P : Are you sure with your answer?
T : Sure miss, this time I can calculate the root

Based on the test results and interview answers, it shows that students are able to analyse the Question and solve the Question well so as to obtain the correct results, students can also write conclusions in the final answer. Therefore, it can be concluded that students can understand the Question and solve with the right solution procedure and can interpret the analysis results correctly to draw conclusions. Based on the results of the analysis of student answers and student interviews in solving AKM type questions on Pythagorean Theorem material can be seen in the following table:

Table 5. Numeracy Test Results

Numeracy Skill Indicator	No Question	Research Subject R	S	T
Use a variety of numbers and symbols related to basic mathematics to solve problems in a variety of daily life contexts.	1	Enough	Enough	Enough
Analyse information displayed in various forms (graphs, tables, charts, diagrams, etc.).	2	Less	Good	Good
Interpret the results of these analyses to make predictions and decisions.	2	Less	Less	Good

Students who have low category abilities only fulfil one of the indicators, this is in line with the results of research by Sari in (Pulungan, 2022) which shows that students with low numeracy skills will tend to have difficulty when drawing conclusions. The same research results were also obtained by (Sari et al., 2021; Kustini, 2023) Students in the medium category did not meet the third indicator, this is in line with research by (Fauzanah, 2022; Istifadah, Nuryadi, & Saadah, 2023) which shows that students with medium numeracy abilities are less able to determine the results of analysis in decision making.

Third indicator was only mastered by high ability students, the same research results were also obtained by (Nurhayati et al., 2022). he results of the same study by also show the same results, that high ability students meet all numeracy indicators, these results are in line with research by (Maulidina, 2019; Hidayatullah et al., 2024) which shows that students with high numeracy abilities are able and correct in using various kinds of numbers or symbols related to basic mathematics to solve problems in various contexts of daily life, able to analyse information displayed in various forms (graphs, tables, charts, diagrams and so on), and able to interpret the results of these analyses to predict and make good decisions.

CONCLUSION

The results of the numeracy test assessment as a whole and the categorisation of high, medium, and low groups obtained 2 students in the high category with an average score of 85; 4 students in the medium category with an average of 62.5; 4 students in the low category with an average of 22.5. Students with high numeracy ability category sufficiently fulfil indicator 1, and can fulfil indicators 2 and 3 well. In the low numeracy ability category, students fulfil indicator 1, fulfil indicator 2 well and do not fulfil indicator 3. It can be concluded that the numeracy ability of the majority of students in class VIII of SMP Brawijaya Sakta I Surabaya in solving AKM type questions on Pythagorean Teroma material has low and medium categories. Therefore, in the KBM process, it is recommended to provide numeracy exercises using AKM-type questions in each material. Thus, students are accustomed to solving question type AKM.

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