

## **ANALYSIS OF HIGH SCHOOL STUDENTS MATHEMATICAL LITERACY SKILLS IN THE CAMBRIDGE CURRICULUM**

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### **ABSTRACT**

*Mathematical literacy skills are one of the competencies needed in the 21st century. The aim of this study is to describe the mathematical literacy skills of high school students on the Cambridge curriculum angle material. This study was conducted in class X-A MAS Istiqlal Jakarta with 27 research subjects. The research method used a qualitative approach with a descriptive method. The data collection technique used a validated mathematical literacy test consisting of 5 essay questions with three indicators: formulate, employ, and interpret. The results showed that mathematical literacy skills were in the high category of 11%, the medium category was 70%, and the low category was 19%. The majority of students missed the formulate and interpret stages and made process errors at the employ stage.*

**Keywords:** *Mathematical Literacy Skills, Cambridge Curriculum*

### **ABSTRAK**

Kemampuan literasi matematis menjadi salah satu kompetensi yang dibutuhkan di Abad 21. Tujuan penelitian ini adalah untuk mendeskripsikan kemampuan literasi matematis siswa tingkat SMA pada materi sudut kurikulum cambridge. Penelitian ini dilakukan di kelas X-A MAS Istiqlal Jakarta dengan subjek penelitian sebanyak 27 siswa. Metode penelitian yang digunakan menggunakan pendekatan kualitatif dengan metode deskriptif. Teknik pengumpulan data menggunakan instrumen tes kemampuan literasi matematis yang sudah divalidasi sebanyak 5 soal esai dengan tiga indikator yaitu *formulate*, *employ*, dan *interpret*. Hasil penelitian menunjukkan kemampuan literasi matematis dengan kategori tinggi sebesar 11%, kategori sedang sebesar 70%, dan kategori rendah sebesar 19%. Mayoritas siswa melewatkhan tahapan *formulate* dan *interpret* dan melakukan kesalahan proses pada tahap *employ*.

**Kata Kunci:** Kemampuan Literasi Matematis, Kurikulum Cambridge

#### **A. Introduction**

Mathematics education plays a crucial role in fostering structured and systematic thinking (Thanheiser

2023). One way to foster structured and systematic thinking is by improving students' mathematical literacy skills (Lestari and Effendi

2022; Nurgabyl, Satkulov, and Kagazbayeva 2023). Mathematical literacy is an individual's skills to formulate, employ, and interpret mathematics in various contexts (Stacey and Turner 2015). Mathematical literacy builds conceptual understanding, critical thinking skills, and trains reasoning skills that can be utilized in everyday life (Kappassova et al. 2025; Nurul, Zubainur, and Elizar 2025). Mathematical literacy places problem-solving at the core of literacy activities because students will use their classroom knowledge to solve real-world problems mathematically (Khotimah 2021; Rusmana 2019). However, based on the results of the 2022 PISA, Indonesia still ranks 63rd out of 81 countries, a decrease from the 2018 PISA graph (PISA 2023). Learning evaluation needs to be carried out massively starting from the development of teaching materials, teacher pedagogical skills, and the implementation of the curriculum in Indonesia (Angriani et al. 2024; Wijaya et al. 2024).

Mathematics education in Indonesia is not limited to the national curriculum; several schools have implemented international curricula

such as Pearson, IB, and Cambridge. In this article, researchers will focus on the Cambridge curriculum because it is one of the most widely adopted international curricula in Indonesia (Islam and Fajaria 2022). The Cambridge curriculum is a constructivist-based curriculum that encourages students to build knowledge through active inquiry and higher-order thinking, from elementary to advanced levels, emphasizing 21st-century skills such as problem-solving and global collaboration (Magfiroh et al. 2025).

Based on the previously explained explanation, the researcher is interested in conducting a study analyzing mathematical literacy skills in the topic of angles using the Cambridge curriculum at the high school level. The analysis was conducted to obtain detailed information about students' mathematical literacy skills in the topic of angles so that it can be used by students, teachers, school policymakers, and researchers.

## **B. Methods**

This study uses a qualitative approach and descriptive methods to describe high school students'

mathematical literacy skills in the topic of angles. Qualitative descriptive methods are research approaches that aim to describe phenomena in depth and holistically based on non-numerical data such as observations, interviews, and documents.

This research was conducted at MAS Istiqlal Jakarta. The subjects of this research were 25 students of class X-A. The topic of the material used was angles. The instrument used in this research was a mathematical literacy skills test instrument consisting of 5 essay questions that had been validated by 2 experts. After being answered by the students, the researcher will score them according to the guidelines that have been developed. The researcher will perform simple calculations to determine the category of the students' mathematical literacy skills level. The category will be determined based on the calculation of the average value of the standard deviation.

**Table 1. Categorization of Mathematical Literacy Skills Levels**

Category	Value Limit
High	$X < (\bar{X} + SD)$
Medium	$(\bar{X} - SD) < X \leq (\bar{X} + SD)$
Low	$(\bar{X} - SD) \leq X$

### **C. Result and Discussion**

This research was conducted in class X-A with a total of 25 students involved. The results of this study were obtained from the mathematical literacy test scores on the topic of angles. The following is a presentation of the results of the students' mathematical literacy test.

#### **Question 1**

In the first mathematical literacy test, the context is determining the direction of the Qibla based on a person's standing position. Students are asked to determine how many degrees the person should turn and whether turning clockwise or counterclockwise is more effective.

1. Rayyan wants to do prayers at the hotel, but there is no Qibla direction marker in his room. If the Qibla direction in Indonesia is at 295 degrees and Rayyan is currently facing east, how many degrees should Rayyan turn his body, and should he turn clockwise or counterclockwise? Show which one is more effective between turn clockwise and turn counterclockwise?



**Figure 1. Question 1 Mathematical Literacy Skills**

Answer:  
 ↗ Counterclockwise. cause is ~~shorter~~ then clockwise  
 $360 - 295 = 65^\circ$   
 $90 + 65$   
 $= 155^\circ$   
 He must turn  $155^\circ$

**Figure 2. High Category Students' Answers to Question 1 Mathematical Literacy Skills**

Based on the student's answers in Figure 2, it can be seen that the student was able to write down the steps to find a solution to the given problem. This indicates that the student was able to carry out the employ stage of mathematical literacy skills correctly. In addition, the student also wrote a conclusion from the findings he had written. The conclusion written by the student can be categorized as the student has been able to carry out the interpret stage correctly. However, the student still missed one important stage in mathematical literacy skills, namely formulating. The student has not written the formulating stage in the answer even though the student actually understands the mathematical form of the given problem. Based on the student's answers in Figure 2, it can be concluded that students in the high category have met two indicators of mathematical literacy skills and one other indicator of mathematical literacy skills, although not yet perfect.

Answer:
counter clockwise sum 205 angle

**Figure 3. Students' Answers in the Medium Category on Question 1 Mathematical Literacy Skills**

Unlike students with high mathematical literacy skills, the student in Figure 3 wrote a conclusion (interpret stage) well and correctly without writing down the previous stages, namely the formulate and employ stages. The student in Figure 3 is included in the category of moderate mathematical literacy skills.

Answer:
177 degrees clockwise

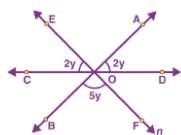
**Figure 4. Low Category Students' Answers to Question 1 Mathematical Literacy Skills**

In Figure 4, we can see that the student has written a conclusion, meaning they have completed the interpret stage. However, their answer is still not entirely correct, so their score is not perfect. They also haven't written the formulate and employ stages. The student in Figure 4 is at the low mathematical literacy stage.

## **Question 2**

In the second mathematical literacy test, the context is six flag-raising team members forming a formation for a performance. Students are asked to determine the size of the angle formed by the flag-raising team formation.

2. Six students A, B, C, D, E, and F are practicing marching for the flag-raising competition. The students make a formation by gathering in the middle at point O then spreading out to six different points as shown in the picture. Students A and B, C and D, E and F form a straight line. Calculate the angle between student A, point O, and student E.



**Figure 5. Skills Question 2 Mathematical Literacy Skills**

Answer:

$$2y + 8y + 2y = 90$$

$$\frac{360}{9y} = 40$$

**Figure 6. Students' Answers in the Medium Category on Question 2 Mathematical Literacy Skills**

Students with moderate literacy skills are able to formulate the problem in the question (formulate stage) and process the problem into the correct answer (employ stage). However, they have not yet reached a final conclusion (interpret stage).

Answer:

97° degrees

**Figure 7. Low Category Students' Answers to Question 2 Mathematical Literacy Skills**

### Question 3

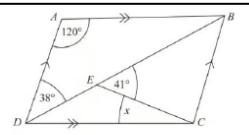
In the third mathematical literacy test question, the context concerns the relationship between angles. Students are asked to find the value of one angle from several known angles in a figure.

3. ABCD is a parallelogram. E is on DB. The measure of angle ADB = 38°

The measure of angle BEC = 41°

The measure of angle DAB = 120°

Calculate the measure of angle x and explain how to find the measure.



**Figure 8. Question 3 Mathematical Literacy Skills**

Answer:

$$\text{Diket: } \angle DAB = 120^\circ \quad \angle ADB = 38^\circ \quad \angle BEC = 41^\circ$$

$$\angle BEC = 41^\circ \quad \therefore \angle BDC = 149^\circ$$

**Figure 9. High Category Students' Answers to Question 3 Mathematical Literacy Skills**

In Figure 9, students in the high category have written down information on the given problem (formulate stage) and written down the steps to solve it properly and correctly (employ stage). However, they have not yet written down the final step, the interpret stage.

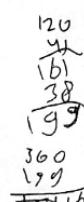
Answer:

$$180 - 120 - 38 = 22$$

$$80 - 38 - 22 = 101$$

$$120 - 101 = 19$$

$$x = 19$$



**Figure 10. Skills Students' Answers in the Medium Category on Question 3 Mathematical Literacy Skills**

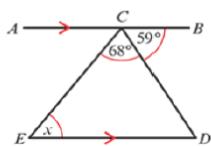
In Figure 10, students in the moderate literacy category were able to answer well and correctly by writing down the steps involved in finding the value of x. This indicates that they were able to write down the employ steps well. However, they skipped the

formulate and interpret steps at the end of their answer. Students in the low literacy category did not write down their answer at all because they did not understand and skipped question 3.

#### **Question 4**

In the fourth mathematical literacy test question, the context is the relationship between angles. Students are asked to find the value of one angle from the known value of another angle in the image. Students need to understand the relationship between angles when two parallel lines are intersected by a transversal.

4. Calculate the measure of angle marked with  $x$  in these figures? Show the step and give reasons



**Figure 11. Question 4 Mathematical Literacy Skills**

Answer:

$$180 - 68 - 59 = 53$$

$$x = 53$$

**Figure 12. Skills High Category Students' Answers to Question 4 Mathematical Literacy Skills**

In Figure 12, a student in the high category can provide the steps for the problem correctly. As seen in the image, the student understands the magnitude of opposite angles.

However, the student skipped the formulating step and provided an interpretation of the results. The answers of students with moderate abilities varied, including those who only wrote the formula stages, wrote the employ stages but with calculation errors, and wrote the formula and employ stages incorrectly.

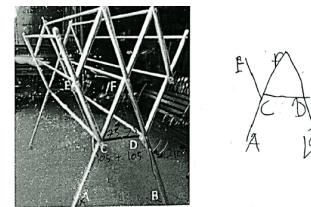
#### **Question 5**

In the fifth mathematical literacy test question, the context is the size of an angle formed by an object that applies mathematical principles. Given one angle, students are asked to find the size of the other angle.

5. With a certain angle shape, the clothesline can stand in balance without the help of other supports. If the  $\angle CFD$  is  $30^\circ$  and the CFD triangle is an isosceles triangle, then the angle formed by pole B with the ground is...



**Figure 13. Question 5 Mathematical Literacy Skills**



Answer:

$$180 - 30 = 150$$

$$\frac{150}{2} = 75^\circ$$

$$2x = 200 - 10$$

$$2x = 190$$

$$x = 95$$

$$x = 75^\circ$$

**Figure 14. Skills High Category Students' Answers to Question 5 Mathematical Literacy Skills**

In Figure 14, students in the high category can provide the steps for the task correctly and effectively. They understand the problem well and can re-describe it for clarity. However, they still miss the formulate and interpret stages.

Answer:	$180 - 30 = \frac{150}{2} = 75$ $360 - 270 = 150$
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**Figure 14. Students' Answers in the Medium Category on Question 5 Mathematical Literacy Skills**

Students in the moderate category answered correctly, but the concept they applied was incorrect, resulting in suboptimal scores in the employ stage. They skipped the formulate and interpret stages. The presentation above shows some of the results of students' work with high, moderate, and low mathematical literacy skills. The results for the entire class are presented in the following table.

**Table 2. Statistical Results of Students' Mathematical Literacy Abilities**

	N	Min.	Max.	Mean	Std.			
						Score	Score	Deviation
<b>Mathematical Literacy Skills Score</b>	15	0	45	18,19	15			

**Table 3. Categorization of Mathematical Literacy Skills Levels.**

Category	Value Limit	Number of Students	Percentage (%)
<b>High</b>	$30 < X \leq 45$	3	11%
<b>Medium</b>	$15 < X \leq 30$	19	70%
<b>Low</b>	$0 < X \leq 15$	5	19%
<b>Total</b>		27	100%

The results of the mathematical literacy percentage showed that out of 27 students, 5 students were in the low category (19%), 19 students in the medium category (70%), and 3 students in the high category (11%). The majority of students still had medium and low literacy skills.

Students with good mathematical literacy skills were able to meet the indicators of mathematical literacy skills (Kusuma et al. 2022). However, most students struggled at the formulation and interpretation stages. Someone who is able to complete the initial stages of understanding a given problem will find it easier to express ideas in the problem-solving process (Baiduri, Rizky, and Alfani 2020). One reason for this is that students are not yet able to communicate answers in writing and often rush through the problems (Ridzkiyah and Effendi 2021). Furthermore, a lack of mastery of

prerequisite material is a factor in students' difficulties in solving the given problems (Fazzilah et al. 2020).

Mathematics learning strategies need to be transformed into active learning to improve understanding of the PISA context through step-by-step practice problems (Kamaruddin, Zakaria, and Basri 2023). Teachers can add tangible learning media such as teaching aids, images, tables, or use AI technology to help students understand and represent the problems presented (Angriani et al. 2024; Tussita, Yunisah, and Sopiyah 2024). Teachers can also use several other methods to increase student engagement in learning, such as active group discussions, providing rewards/punishments, and repeated practice (Manjani et al. 2025).

#### **D. Conclusion**

Based on the results of research conducted in MAS Istiqlal Jakarta class X-A, the results obtained mathematical literacy abilities are dominated by the medium category of 70%, followed by the low category of 19% and the high category of 11%. Of the three categories, the majority of students did not write the formulate and interpret stages well, some of

them experienced difficulties in the employ stage. The results of this study are expected to provide insight and knowledge for teachers and researchers in solving educational problems in Indonesia, especially in mathematics subjects that use the Cambridge curriculum.

#### **BIBLIOGRAPHY**

Angriani, Andi Dian, Kiky Nakesya A. S, Nurul Azizah Amrillah, Rezki Teguh Imansyah, and Muh Ikhsan Maulana. 2024. "Analisis Kesulitan Siswa Dalam Menyelesaikan Soal Literasi Matematika PISA Berdasarkan Self-Efficacy." (36):517–26.

Baiduri, Baiduri, Octavina Rizky, and Ikrimatul Alfani. 2020. "Mathematical Connection Process of Students with High Mathematics Ability in Solving PISA Problems ." *Başlık* volume-9-2020(volume-9-issue-4-october-2020):1527–37. doi: 10.12973/eu-jer.9.4.1527.

Fazzilah, Evi, Kiki Nia, Sania Effendi, and Rina Marlina. 2020. "ANALISIS KESALAHAN SISWA DALAM MENYELESAIKAN SOAL." 04(02):1034–43.

Islam, Zahra Nabilla, and Nurul Hasanah Fajaria. 2022. "Cambridge Curriculum Implementation at SMP Madina Islamic School." (2):101–12.

Kamaruddin, Zakaria, and Hasan Basri. 2023. "Upaya Guru Dalam

Mengatasi Kesulitan Belajar Matematika Siswa Kelas V SDN 52 Carebbu Kabupaten Bone.” 3(1):15–25.

Kappassova, Sandugash, Alma Abylkassymova, Ummugul Bulut, Zaure Zhumagulova, Nuri Balta, and Symbat Zykrina. 2025. “Mathematical Literacy and Its Influencing Factors : A Decade of Research Findings.” 21(7).

Khotimah, Husnul. 2021. “Perkembangan Literasi Matematika Di Indonesia.” *Prosiding Seminar Nasional Pendidikan Matematika Universitas Mulawarman* 1:1–10.

Kusuma, Dani, Y. L. Sukestiyarno, Wardono Wardono, and Adi Nur Cahyono. 2022. “Analisis Kemampuan Literasi Matematika Pada Siswa Peserta Olimpiade.” 232–38.

Lestari, Risna Dwi, and Kiki Nia Sania Effendi. 2022. “Analisis Kemampuan Literasi Matematis Siswa SMP Pada Materi Bangun Datar.” *Biomatika : Jurnal Ilmiah Fakultas Keguruan Dan Ilmu Pendidikan* 8(1):63–73. doi: 10.35569/biomatika.v8i1.1221.

Magfiroh, Vera Siti, Siti Qamariah, Salsabila Salsabila, and N. Desti Ramadani. 2025. “Implementasi Kurikulum Cambridge Di Al-Irsyad Satya Islamic School.”

Manjani, Nurhudayah, Mardiyah Kharismayanda, Sela Maranata, and Sartika Putri. 2025. “Strategi Guru Dalam Mengatasi Kesulitan Belajar Matematika Pada Siswa SD Berdasarkan Teori Behavioristik.” 3(2023):139–47.

Nurgabyl, Duisebek, Bakiyar Satkulov, and Aspet Kagazbayeva. 2023. “Formation and Development of Mathematical Literacy in the Context of Evaluative – Study Tasks of PISA.” 14(4):701–22.

Nurul, A., Cut Morina Zubainur, and Elizar Elizar. 2025. “The Relationship between Mathematical Literacy and the Realistic Mathematics Education Approach : A Systematic Literature Review.” 18(1):49–66. doi: 10.20414/betajtm.v18i1.696.

PISA. 2023. “PISA 2022 Results Factsheets Indonesia.” *The Language of Science Education* 1:1–9.

Ridzkiyah, Nur, and Kiki Nia Sania Effendi. 2021. “Analisis Kemampuan Literasi Matematis Siswa Sma Dalam Menyelesaikan Soal Program for International Student Assessment (PISA).” 6:1–13.

Rusmana, Indra Martha. 2019. “Literasi Matematika Sebagai Solusi Pemecahan Masalah Dalam Kehidupan.” 0812(80):475–84.

Stacey, Kaye, and Ross Turner. 2015. “Assessing Mathematical Literacy : The PISA Experience.”

Thanheiser, Eva. 2023. “What Is the Mathematics in Mathematics Education ?” *Journal of Mathematical Behavior* 70(January):101033. doi: 10.1016/j.jmathb.2023.101033.

Tussita, Zahra, Suci Rahma Yunisah, and Khotna Sopiyah. 2024. “Strategi Pembelajaran

Mengatasi Kesulitan Anak SD  
Dalam Mengerjakan Soal Cerita  
Matematika." 4(1):10–17.

Wijaya, Tommy Tanu, Wahyu Hidayat,  
Neni Hermita, Jesi Alexander  
Alim, and Corrienna Abdul Talib.  
2024. "Exploring Contributing  
Factors to Pisa 2022  
Mathematics Achievement:  
Insights from Indonesian  
Teachers." 13(1):139–56.