

Development of Algebra Test Problems Based on Minimum Competency Assessment (MCA) for Junior High School

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Abstract. *The Minimum Competency Assessment (MCA) is one of the components of the National Assessment (NA) in Indonesia, which aims to measure students' cognitive abilities, including numeracy skills. Students with low numeracy skills can be affected by not being used to working on MCA-type problems. This study aims to develop MCA items on algebra that meet valid, practical, and effective criteria using the Tessmer model, including preliminary, self-evaluation, expert reviews, one-to-one, small group, and field test stages. The subjects in this study were 36 Year 7 students of one junior high school in Banda Aceh, Indonesia. The instruments used were validation sheets, practicality sheets, and student response problemnaires. The findings indicated that 15 MCA problems on algebra have met the validity, practicality, and effectiveness criteria. It shows teachers can use MCA items to train students' numeracy skills. Future researchers are expected to develop multiple problems within a single stimulus with more varied content and context; they will need to consider the novelty of the stimulus in real conditions in the field.*

Keywords: *algebra, minimum competency assessment (MCA), validation*

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Introduction

The Ministry of Education and Culture of the Indonesian government has established the National Assessment (NA) as a program for evaluating the quality of primary and secondary education starting in 2021. The NA consists of three parts: the Character Survey, the Learning Environment Survey, and the Minimum Competency Assessment (MCA) (Dewi & Ekawati, 2022). The MCA is one of the NAs implemented as a substitute for the National Examination in Indonesian. The change aims to improve student learning outcomes by improving the evaluation system and student learning experiences (Perdana, 2021). This aligns with the aim of NA to monitor and evaluate the primary and secondary school education system (Kemendikbud, 2020).

Moreover, implementing MCA was also motivated by the low results of Indonesian students' numeracy skills at the Program for International Student Assessment (PISA) level. Indonesia was ranked 72nd out of 79 PISA participating countries with a low average mathematics literacy score (OECD, 2019). The government's strategy to overcome this problem is

implementing MCA, which will be officially implemented in 2021 (Fanani, Hanindita, Rosidah, & Susiloningsih, 2022).

One of the abilities measured in MCA is numeracy (Nahadi, Siswaningsih, Purnawarman, Lestari, Febriani, & Rohmawati, 2022). Numeracy is the ability to solve practical problems in everyday life by using concepts, procedures, facts, and mathematical tools in various types of relevant (Lechner, Gauly, Miyamoto, & Wicht, 2021; Wijaya, Maryanti, Wulandary, & Irawan, 2022). The use of context in MCA Numeracy aims to recognize the role of mathematics in everyday life (Jain & Rogers, 2019; Xiao, Barnard-Brak, Lan, & Burley, 2019). In addition, MCA presents problems using various contexts, which are expected to be completed by students using their literacy and numeracy competencies (Hwang, 2020; Klarita & Syafi'ah, 2022). According to Wahyudistya, Ekawati, and Hidayat (2023), students have a good level of numeracy literacy if they can analyze, reason, and communicate their mathematical knowledge and skills effectively and efficiently to solve and interpret the given mathematical problems.

The context used in MCA is adapted from the PISA content domain, which is divided into four materials, one of which is algebra. Algebra is a crucial component of mathematics (Star, Foegen, Larson, McCallum, Porath, Zbiek, Caronongan, Furgeson, Keating, & Lyskawa, 2015; Veith, Beste, Kindervater, Krause, Straulino, Greinert, & Bitzenbauer., 2023). The application of algebra in everyday life covers various fields such as technology and finance. (Mulungye, O'Connor, & Ndeithu, 2016). A practical example of algebra in everyday life is determining selling prices in trading activities. The application of algebra in trading is used to calculate the size of possible profits and losses and the amount of capital needed to buy and sell an item. Another example of applying algebra in financial management is making a budget for food, transportation, boarding house rentals for students studying abroad.

Furthermore, algebra is also effective for developing logical thinking skills, which can train students' numeracy skills (Astuti & Supiat, 2023). This shows the importance of students' understanding of algebra material in learning mathematics. Nasir, Hashim, Zabidi, Jusoh, and Zaihidee (2013) argued that if students cannot solve algebra problems, they will most likely experience difficulty in solving other mathematics problems. Therefore, this study chose algebra content because algebra is very close to everyday life. The MCA test problems on algebra material have not been developed much by previous researchers, so the MCA test problems on algebra material available on the internet are limited.

Based on the data analysis that has been carried out, researchers found that the availability of MCA test problems on algebra content that includes personal and sociocultural contexts is limited. This is inversely proportional to the relatively high percentage distribution of MCA problems for personal and sociocultural contexts, which is 40% for each context (Pusmenjar,

2020). Researchers chose personal and sociocultural contexts because they are important and need to be trained so that students can solve problems in their personal lives and the surrounding environment.

Furthermore, teachers have an important role in customizing MCA to students. However, teachers' understanding of MCA remains relatively low due to the lack of socialization about the MCA complex. The availability of MCA items is also limited; therefore, teachers have difficulty implementing MCA problems (Fauziah, Sobari, & Robandi, 2021). Based on the 2022 report card on public education related to the achievement of students' numeracy skills, the NA results in 2021 from three levels of education, elementary, junior, and senior high school, are below the minimum competency limit. No more than 50% of students reached the minimum competency for numeracy literacy. This can be caused by inadequate examples of MCA problems, leading students not to be used to solving problems containing various content and contexts. Referring to this problem, it is necessary to develop MCA items to help teachers familiarize students with solving MCA problems, especially in algebra.

Based on the explanation above, research is necessary to develop MCA problems, especially algebra. Therefore, the research problem is, what are the characteristics of Minimum Competency Assessment (MCA) items on algebra for junior high school students that meet the criteria of being valid, practical, and effective?

Methods

The method used in this research is research and development. According to Creswell (2014), research and development is a type of research that aims to obtain and produce products which are then tested for validity so that they can be accounted for. The trials were conducted in Year 7 at one junior high school in Banda Aceh, Indonesia. The one-to-one trial involved 3 students, the small group trial involved 6 students, and the field trial involved 27 students. The development model in this study refers to the Tessmer model, which consists of several stages, including preliminary, self-evaluation, expert reviews, one-to-one, small group, and field tests (Tessmer, 1993). Figure 1 presents a chart of the Tessmer development model.

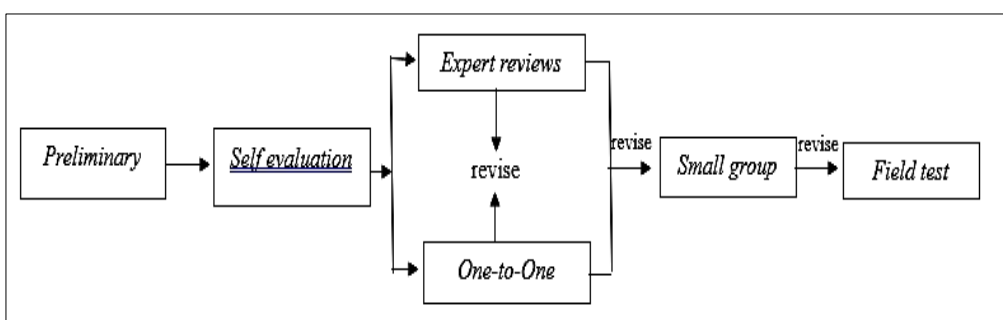


Figure 1. Tessmer development model

Several reference sources related to the research were reviewed in the preliminary stage. After collecting related information and theories, the research location and subject for the trial was determined. Next, in the self-evaluation stage, the activities carried out included analyzing the need for problem development, consisting of analyzing the provisions for preparing numeracy problems and determining the required materials and competencies. Furthermore, designing problem grids, numeracy problem products, answer keys, scoring guidelines, and validation instruments are also carried out at this stage. The result of this stage is called prototype I.

The expert reviews stage is a stage to get input or suggestions from validators for improving the test problems developed. The validators in this study consisted of two lecturers of mathematics education and one mathematics teacher who then assessed by analyzing the content, construct, and language aspects to determine the validity of the test problems developed. The validity of the problems is determined by assessing these three aspects until the problems fulfill good criteria as defined by the validator's judgment. Along with the expert reviews stage, the one-to-one trial was conducted by asking three students to work on the test designed. After solving the problems, the students were asked to comment on the problems.

The results of the revision of the expert reviews stage and the one-to-one trial were tested again in a small group of 6 Year 7 students from one junior high school in Banda Aceh. In addition, in the small group trial, the practicality test of the problems was also carried out by administer response problemnaires to students after they worked on the test. If the results obtained are more than 60%, the product can be said to be practical (Luppy, Anwar, Linuhung, Agustina, & Rahmawati, 2020). The problem practicality category can be seen in Table 1.

Table 1. Criteria for the practicality of the MCA problems

Score Interval (%)	Criteria
$80 < P \leq 100$	Highly Practical
$60 < P \leq 80$	Practical
$40 < P \leq 60$	Fairly Practical
$20 < P \leq 40$	Poorly Practical
$0 < P \leq 20$	Not practical

(Riduwan & Akdon, 2013)

The last stage is the field trial on 27 students of Year 7 from other classes in Banda Aceh. The trial results were carried out to see the effectiveness of the problems on students' numeracy skills. The effectiveness of the problems can be seen based on the field trial test results. According to Trianto (2011), determining the effectiveness of the problems can be done by giving a test where the test results can be used to evaluate various aspects of the learning process. The problem is effective if the average student's test results are in the fair category in the $50 \leq \text{score} < 75$. The student score criteria can be seen in Table 2 (Ajizah, Karim, & Suryaningsih, 2023).

Table 2. Student's score criteria

Score	Criteria
Score = 100	Excellent
$75 \leq \text{Score} < 100$	Good
$50 \leq \text{Score} < 75$	Fair
$0 \leq \text{Score} < 50$	Poor

Results and Discussion

This research has produced a packet of MCA problems on algebra for junior high school students that have met the valid, practical, and effective criteria which have been tested through the stages of the Tessmer development model, including preliminary, self-evaluation, expert review, one-to-one, small group, and field testing. In the preliminary stage, researchers conducted a literature study, a need analysis related to the problems discussed. Researchers conducted need analysis, context analysis, content, and cognitive level of MCA, as well as analysis of MCA competencies used in developing MCA test items on algebra. The needs analysis in this study was conducted through an interview with one of the mathematics teachers at Banda Aceh. The analysis aims to obtain information about the availability of MCA test problems at school. The interview results can be seen in Table 3.

Table 3. Teacher interview results

No	Problem	Interview Results
1	Have learners been previously introduced to the MCA problem?	Already, even students have participated in the MCA test with computers.
2	Have learners previously received MCA training?	Learners have not been fully trained on MCA due to the limited MCA problems available. Teachers more often give routine problems and occasionally give HOTS problems to train students' numeracy.
3	Have students previously been given lessons that discuss MCA problems?	Problems given to students during the learning process have not discussed MCA problems and are still based on mathematics textbooks.
4	Does the school have a MCA problem bank?	No, the school does not have an MCA problem bank.
5	Does the school need MCA problems?	It is very much needed because the problems can be used as a reference to train students' numeracy so that they have experience answering a wide variety of MCA problems.
6	How many times has MCA been conducted at school?	MCA has been conducted 4 times at the school.

The results of teacher interviews showed that the mathematics learning process still rarely discusses MCA problems and only uses mathematics textbooks. Moreover, MCA problems are still not available in schools. Teachers also have not fully trained students on MCA issues.

Researchers have analyzed personal and sociocultural contexts and algebra content to determine the availability of MCA problems for algebra contexts. Based on the results of the analysis that has been carried out, researchers found that the availability of MCA problems that cover personal and sociocultural contexts is still limited. This is inversely proportional to the

percentage distribution of MCA problems for personal and sociocultural contexts, which is relatively high, with 40% for each context. Personal and sociocultural are contexts that are close to everyday life. Therefore, the personal and sociocultural context and the algebra contained in MCA need to be developed because they are still very limited. The previous research also stated that the MCA test problem is still limited so that students are familiar with implementing MCA activities later.

The next stage is self-evaluation, which is designing MCA problems on algebra. The results are problem devices in the form of a lattice of MCA problems on algebra for the junior high school level. The problem sets that have been developed are then consulted with the supervisor. The purpose of this stage is to evaluate the problems in terms of language so that the instructions and information of the problem are clear and the steps to solve the problem can be understood properly. The data obtained at this stage is called prototype I.

The problems developed are 15 MCA problems on algebra content consisting of 5 stimuli, including Cinema XXI, discounted price, birthday party, Toyota Hi Ace, and layer cake. The types of problems developed follow the design of the development of MCA problems set by the Pusmenjar (2020), which consists of multiple choice, complex multiple choice, matching, short answer, and long answer problems. Overall, the researcher has independently evaluated the MCA problems on algebra content to fulfill the valid criteria in the researcher's view. The MCA problems on algebra content were validated by validators to achieve theoretical validity that fulfills content validity and construct validity (Taofek & Agustini, 2020).

Then, at the expert reviews stage, the developed problems (prototype I) were given to 3 validators for assessment. The assessment carried out by the validators aims to provide comments and suggestions regarding the feasibility of the MCA problems on the problem devices that have been developed. The validation was done by providing validators with grids and MCA problems on algebra content. Furthermore, the validator examines the grids and MCA problems given. The following is the process and results of the validation of several MCA problems developed on the "Birthday Party" stimulus, as presented in Figure 2. Validators' suggestions and comments on problems 7, 8, and 9 can be seen in Table 4 and Table 5.

Table 4. Validator comments on problems 7 and 8

Validator 1	Validator 2	Validator 3
The problem instructions should be written using a different font style. Revise "fabric" to "clothes."	Re-survey the real price in the field. Then, correct the sentences used to make them easier to understand and not cause multiple interpretations.	It would be better if Anita's parents were the ones who gave the clothes, not Anita because the context is a birthday event. Fix the price of the shirt in the stimulus.

Table 5. Validator comments on Problem 9

Validator 1	Validator 2	Validator 3
Adjust the price writing with EYD.	The problem has fulfilled the content, construct, and language components.	The problem has fulfilled the content, construct, and language components.

Birthday Party

Anita will be holding a birthday party in August. She wanted her friends to take part in celebrating her happy day. As a form of celebration, Anita distributed fabric to her 12 friends, consisting of 5 men and 7 women. She will buy two types of fabric: Toyobo cotton fabric for men and Wolfis fabric for women.



Kain Toyobo



Kain Wolfis

7. If the price of one piece of Toyoba cotton and one piece of Wolfis fabric is Rp500.000 and the total price is Rp3.150.000, which fabric is cheaper?
8. Anita's friends planned to sew the cloth distributed to the same tailor. They went to Bu Ida's house to ask about the clothes to be sewn. It turned out that Mrs. Ida could sew 5 shirts in 15 days. Then, how much time does Bu Ida need if she has to finish 12 clothes from Anita's friends?
9. In addition to her 12 best friends, Anita's extended family of 10 adults also attended the birthday celebration. The birthday celebration was held at a place that provides birthday packages. Each attending child will receive a food package, a birthday hat, and a snack bag. Meanwhile, the parents will only get a food package. Here is the price list of the birthday package:

No	Name of Item	Unit Price
1.	Food Pack	Rp25.000
2.	Hat	Rp5.000
3.	Snack Bag	Rp17.000

If the guests consist of 30 children and 14 parents, determine the "True" or "False" of the following statements!

Statement	True	False
The cost of food packages for all family, friends, and guests who attend is more than IDR 1.500.000		
The cost of procuring snack bags is no more than IDR 700.000		
The cost of the birthday package given to each child is more than IDR 50.000		

Figure 2. MCA problems

Based on these comments, the researcher revised the problems and consulted again with the validator. The validation result can be seen in Figure 3.

Birthday Party

Anita will be holding a birthday event in August. She wanted her friends to take part in celebrating her happy day. As a form of celebration, Anita's parents distributed clothes to her 12 friends, consisting of 5 boys and 7 girls. Two types of clothes are to be purchased: Toyobo cotton for men and Wolfis fabric for women.



Kain Toyobo



Kain Wolfis

7. If the price of 1 package of Toyobo cotton cloth and 1 package of Wolfis cloth is Rp75.000, while the total purchase price of the cloth to be distributed is Rp435.000, which cloth is cheaper? Explain!
8. Anita's friends planned to sew the clothes distributed to the same tailor. They went to Bu Ida's house to ask about the clothes to be sewn. It turns out that Mrs. Ida can sew 5 shirts in 15 days. Then, how much time does Bu Ida need if she has to finish 12 clothes from Anita's friends?

9. Besides her 12 best friends, Anita's extended family of 10 adults also attended the birthday celebration. The birthday celebration was held at a place that provides birthday packages. Each attending child will receive a food package, a birthday hat, and a snack bag. Meanwhile, the parents will only get a food package. Here is the price list of the birthday package:

No	Name of Item	Unit Price
1.	Food Pack	Rp25.000,00
2.	Hat	Rp5.000,00
3.	Snack Bag	Rp17.000,00

If the guests consist of 30 children and 14 parents, determine the "True" or "False" of the following statements!

Statement	True	False
The cost of food packages for all family, friends, and guests in attendance is more than IDR 1.500.000,00		
The cost of procuring snack bags is not more than IDR 700.000,00		
The cost of the birthday package given to each child is more than IDR 50.000,00		

Figure 3. Revised MCA problem

After all the validations were completed, the MCA algebra problems were obtained, fulfilling the validity of content, construct, and language. The valid problems consist of 4 comprehension problems, 7 application problems, and 4 reasoning problems. The following is a recapitulation of the researchers' revisions to each problem component.

The MCA problems on the algebra material developed have gone through several stages of revision. Five problems required major revision, five required moderate revision, and five only needed minor revision. Problems requiring major revision are 2, 3, 7, 10, and 13. Problems that required moderate revision are 1, 4, 5, 6, and 12. Problems requiring minor revision are 8, 9, 11, 14, and 15.

Table 6. Recapitulation of problem revision

No.	Revised		
	Content	Language	Solution
1	√	√	-
2	√	√	√
3	√	√	√
4	-	-	√
5	-	√	√
6	-	√	√
7	√	√	√
8	-	√	-
9	-	√	-
10	√	√	√
11	-	√	-
12	√	√	-
13	√	√	-
14	-	√	-
15	√	√	√

Furthermore, the one-to-one trial was conducted to determine students' readability of the problems. The problems were tested on three randomly selected learners. The three learners are students of class VIII-2 who were given the initials student A, student B, and student C. The three students were asked to solve fifteen problems about the Minimum Competency Assessment of Algebra content developed by the researchers. The three students were not only asked to solve the problems but also to provide suggestions and comments on the problems given. Here are some of the students' answers in one-to-one trial.

Problem 1: all three students solved the problem well and correctly. Student A and student B solved with the completion of pattern 4, -1. Student C solved with the completion of the number pattern level 2 difference +3. Based on the answers, the researcher concluded that the students had understood the meaning of the problem, so the researcher did not revise problem 1. The following are the answer sheets of the three students.

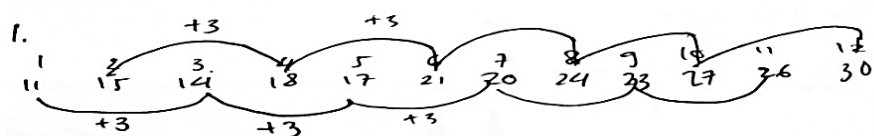


Figure 4. Student A's answer to problem 1

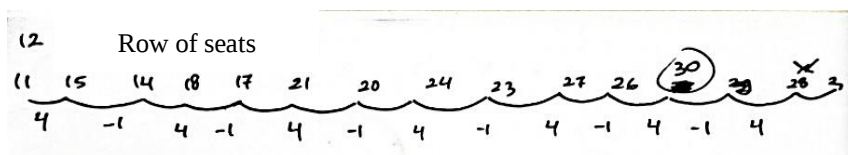


Figure 5. Student B's answer to problems 1

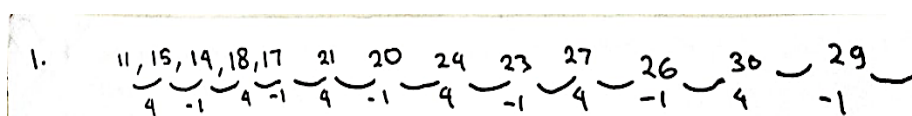


Figure 6. Student C's answer to problem 1

In problem 2, the three students solved the problem well and correctly. The three students solved the problems systematically and by the answers expected by the researcher. Based on the answers, the researcher concluded that the students had understood the meaning of the problem, so the researcher did not revise problem 2. The following are the answer sheets of the three students.

2. $\frac{3}{7} \cdot 14 = 6$ kursi (baris 3) $\frac{5}{6} \cdot 18 = 15$ (baris 4) kursi kosong : $14 - 6 = 8$ kursi kosong : $18 - 15 = 3$ Jumlah kursi terisi : $15 + 6 = 21$ Jawab: Salah, Benar, Salah	$\frac{3}{7} \cdot 14 = 6$ seats (Line 3) $\frac{5}{6} \cdot 18 = 15$ (Line 4) Empty seat = $14 - 6 = 8$ Empty seat = $18 - 15 = 3$ The number of seats filled is $15 + 6 = 21$ Answer: False, True, False.
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Figure 7. Student A's answer to problem 2

No. 2) Jika $\frac{5}{6}$ terisi penonton maka $1 - \frac{5}{6} = \frac{1}{6} \times 18 = 3$ kursi // (Salah)

Jika $\frac{3}{7}$ terisi penonton maka $1 - \frac{3}{7} = \frac{4}{7} \times 14 = 8$ kursi // (Benar)

Jika 3 baris ke tiga $\frac{3}{7} \times 14 = 6$ kursi = $15 + 6 = 21$ kursi //

baris ke 4 $\frac{5}{6} \times 18 = 15$ kursi (Salah)

If $5/6$ seats are filled with spectators, then $1 - 5/6 = 1/6 \times 18$ (4th seat) = 3 seats (False)

If $3/7$ seats are filled with spectators, then $1 - 3/7 = 4/7 \times 14$ (3rd seat) = 8 seats (True)

The 3rd line $3/7 \times 14 = 6$ seats

The 4th line $5/6 \times 18 = 15$ seats = $15 + 6 = 21$ seats (True)

Figure 8. Student B's answer to problem 2

2. $\left(\frac{3}{7} \times 14 = 6 \right)$ $\therefore \frac{3}{7} \times 14 = 6$ kursi terisi, berarti $14 - 6 = 8$ kosong

$\left(\frac{5}{6} \times 18 = 15 \right)$ $\therefore \frac{5}{6} \times 18 = 15$ kursi terisi, berarti $18 - 15 = 3$ kosong

$6 + 15 = 21$

(False)

$\therefore 3/7 \times 14 = 6$ seats are filled, then $14 - 6 = 8$ are empty

$\therefore 5/6 \times 18 = 15$ seats are filled, then $18 - 15 = 3$ are empty

Figure 9. Student C's answer to problem 2

Then, problem 3 was solved well and correctly by student A and student C. Student B solved the problem with the expected solution, but student B did not add up all the costs that must be prepared in problem 3. The following are the answer sheets of the three students.

3- $U_7 = 35.000 + (7-1) 3.000$ $= 35.000 + 18.000$ $= 53.000$ (tarif baris 7) biaya Rani dan Ali: $53.000 \cdot 2$ $= 106.000$ biaya Topih, Bima dan Fahri: $65.000 \cdot 3$ $= 195.000$	$U_{11} = 35.000 + (11-1) 3.000$ $= 35.000 + 30.000$ $= 65.000$ (tarif baris 11) * Biaya seluruhnya: $106k + 195k$ $= 301.000$
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$U_7 = 36.000 + (7-1) 3.000$ $= 35.000 + 16.000$ $= 53.000$ (the price of the 7th line) Rani and Ali's fees = 53.000×2 $= 106.000$ Topih, Bima, and Fahri's fees = 65.000×3 $= 195.000$	$U_{11} = 35.000 + (11-1) 3.000$ $= 35.000 + 30.000$ $= 65.000$ (the price of the 11th line) *The total costs = $105.000 + 195.000$ $= 301.000$
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Figure 10. Student A's answer to problem 3

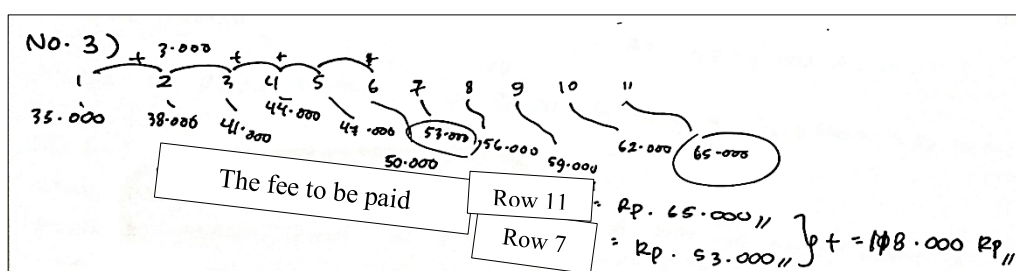


Figure 11. Student B's answer to problem 3

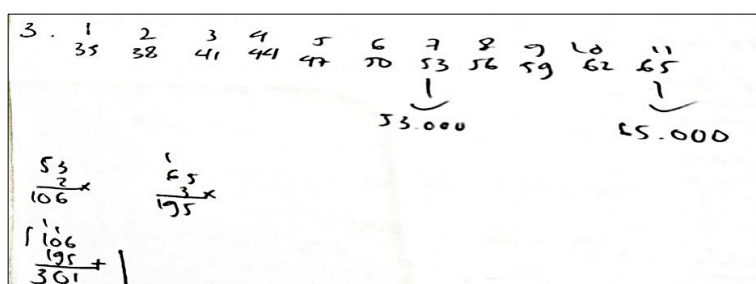


Figure 12. Student C's answer to problem 3

During the process of solving the MCA problems given, it was seen that students could understand the purpose and language of the problems well. The students could answer the problems given, although some of their answers were not completely correct. After analyzing the learners' answers, the researcher asked some problems and asked the learners to give their comments after working on the problems. Comments/suggestions were given in writing. The following are some of the problems that res

earchers asked learners.

Based on the answers given by students, the researcher concluded that the problems developed could be understood well by students. However, some problems were difficult, and the language was still complicated. So, the researcher decided to revise the language of the problems that were considered complicated by students. The one-to-one trial resulted in prototype II.

Table 7. Results of student comments

No	Problem	Student A's Comments	Student B's Comments	Student C's Comments
1	Were you able to understand the meaning of the problems given?	I can understand the meaning of the problems given.	I could understand some of the problems quite well. However, I think some problems are too difficult. Some problems were difficult to digest because the language of the problems was a bit convoluted. However, overall, the problems were good and easy to understand.	I understand the problems given, but there are also some problems that I don't understand.
2	Did you experience any other obstacles or problems during the process?	I had difficulty using previously studied material and problems with material not studied at school. As a result, I had to read them several times to understand how to solve the problem.	Some problems were hard to answer. Not because the problems were difficult but because I couldn't do them.	Yes, I had a little trouble with the problem.
3	Do you feel that MCA has benefits for you?	I feel that MCA is quite beneficial for me because it can hone my logical thinking speed, numeracy skills, calculation speed, and confidence when answering problems.	MCA certainly has benefits for me. I got new experiences and gained new knowledge. With MCA activities, we can have a mindset on how we understand the problem; this shows that every problem must be read carefully and thoroughly.	Yes, because MCA can make me study hard and improve my focus.

Furthermore, prototype II was tested in a small group trial. The small group trial was conducted on 6 Year 8 students at a junior high school in Banda Aceh, Indonesia. Students were asked to answer problems, provide suggestions or comments on the problems they worked on, and fill out student response sheets to test the problems' practicality. The results of the practicality of the problems can be seen in Table 8.

Table 8. Practicality data of small group student response problemnaire

Statement (S)	Practicality (%)	Criteria
S(1)	96,7%	Very Practical
S(2)	93,3%	Very Practical
S(3)	86,7%	Very Practical
S(4)	93,3%	Very Practical
S(5)	90%	Very Practical
S(6)	90%	Very Practical
S(7)	86,7%	Very Practical
S(8)	83,3%	Very Practical
S(9)	83,3%	Very Practical
S(10)	93,3%	Very Practical
Average	89,7%	Very Practical

The results of the students' response problemnaire were used to test the practicality of the MCA problems on algebra content for junior high school students. It showed that the MCA problems are very practical, with an average result of the practicality of the problems of 89.7%. The problems that can be said to be practical are also known from the problems that students can solve. Practicality can be illustrated by students who can work on problems well at the small group trial (Purwitaningrum & Prahmana, 2021). The results of the small group trial are called Prototype III. However, there are no revisions to the problems in prototype II.

Moreover, the problems were tested on class VIII-1 students consisting of 27 students from one junior high school in Banda Aceh for the field trial. This field trial was carried out to analyze the potential effects of the problems developed. The following are the students' field trial test results, as seen in Table 9.

Table 9. Field test results

Score	Many Students	Percentage	Criteria
100	0	0%	Very good
$75 \leq \text{score} < 100$	7	25,9%	Good
$50 \leq \text{score} < 75$	20	74,1%	Good enough
$0 \leq \text{score} < 50$	0	0%	not good

Based on the data in the table above, 27 students took the test; 20 were in the good enough category, and 7 were in the good category. Meanwhile, there were no students who achieved scores in the excellent category. The average student's score in this trial was 69.11, which was in the good enough category. So, it can be said that the developed MCA problems are effective on students' numeracy skills.

The development of MCA problems on algebra material has fulfilled the characteristics of problems with the criteria of being valid, practical, and potentially impacting junior high school level based on Tessmer's (1993). The developed problems consist of 15 MCA problems on algebra content that have met the criteria of content, construct, and language validity. The validity of problems can be seen based on theoretical validity that fulfills content and construct validity (Arikunto, 2009). The results of the expert reviews in this study are in line with research conducted by Harnita, Johar, Hasbi, and Sulastri (2021), which stated that items that are valid and feasible to use are items that cover content aspects and construct aspects carried out by validators. Furthermore, based on the results of students' answers and comments at the one-to-one trial, the students could understand the MCA problems on the developed algebra content. Thus, the problems can be read and understood well by students.

The MCA problems on algebra material that have been designed required various revisions. In revising the problems, researchers made improvements to problems that did not meet the characteristics of numeracy MCA problems. Santy and Mutaqin (2023) also revised problems that did not fulfill the characteristics of MCA. The problems did not display real problems, and the

context presented in the problem is less applicable and routine. Context is defined as circumstances, phenomena, or natural events related to the mathematical concepts being studied (Syaifuddin, Rahmah, Sah, & Fauza, 2022).

Researchers also changed problems that were considered less realistic. Susanto, Susanta, and Irsal (2022) also revised the numbers on the problems considered unrealistic. This can be seen in the numbers in the problem before being revised, which do not use real prices in the field. Problems related to real life can bring students to the reasoning stage. Hence, the realism of the numbers in the problem is very important so that students will feel closer to the problems, which certainly can attract students' attention. This type of problem can train students to use mathematical concepts that they already have so that they can solve everyday problems (Sulistiyowati, Kuncoro, Setiana, & Purwoko, 2019). This is in line with one of the objectives of MCA, which is that the students are expected to be able to identify and apply the role of mathematics in everyday life. This experience informs the design of new approaches to teaching and numeracy assessment (Pettigrew, Stunden, & McGlynn, 2020). Further research must be done to determine the appropriate learning to improve students' numeracy skills. Students need to be socialized with the MCA and given special assistance to do various MCA exercises so that they are prepared for the MCA evaluation that will be carried out (Susanto, Fransiska, & Susanta, 2023).

Conclusion

Based on the research and discussion stated previously, it can be concluded that the development of MCA problems on algebra content has fulfilled the valid, practical, and effective criteria. The result of this research and development is a product of 15 MCA problems with algebra content for the junior high school level. The problems consist of 5 stimuli with personal and sociocultural contexts. In contrast, in 1 stimulus, there are 3 problems, each with a different form, namely multiple choice, complex multiple choice, matching, short form, and description. The valid problems are also evenly distributed from all algebraic competencies in MCA. The developed problems consist of 4 problems at the understanding level, 7 at the application level, and 4 at the reasoning level. The problems fulfill the characteristics of valid problems after being reviewed based on the validators' assessment. The practicality of the problems was obtained from the practicality test with an average value of 89.7%, which stated that the problems developed were very practical. The effectiveness of the problems was obtained based on the results of the field test, which resulted in an average student score of 69.11 in the good enough category. Teachers can use these MCA problems to train students' numeracy skills. Future researchers are expected

to develop more than three problems in one stimulus with more varied content and context and have to pay attention to the novelty of the stimulus by real conditions in the field.

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