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Gender analysis: A review of mathematical problem-solving skills among madrasah tsanawiyah students

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Abstract
Mathematics problem-solving instruction should promote gender equality in schools. This study examined how gender relates to students' mathematical problem-solving processes in the context of the perimeter and area of plane figures. A descriptive qualitative design was employed to explore how students interpreted problems, selected strategies, and validated their solutions. Seventh-grade students from MTsN 2 Banda Aceh were purposively selected from Class VII-1 based on the results of an initial screening test. The participants consisted of two male and two female students representing high and low levels of problem-solving ability. Data were collected through an open-ended problem-solving test and semi-structured interviews. The data were analyzed using Miles and Huberman's interactive model, and the credibility of the findings was enhanced through time triangulation by administering comparable tasks on different occasions. The findings showed that female students tended to provide more complete representations of the given and required information and were more likely to review the plausibility of their answers. Male students generally performed calculations more quickly but often omitted the checking stage and occasionally skipped intermediate reasoning. Among students with low problem-solving ability, both males and females experienced difficulty planning effective solution strategies and connecting the given information with relevant geometric concepts. Gender differences were more evident in the quality of the problem-solving process than in the final answers. Therefore, mathematics instruction should emphasize explicit problem-solving routines, strategic planning, and systematic checking to support all learners.

Keywords: Area, Gender differences, Geometry, Mathematical problem-solving ability, Perimeter

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Introduction

Problem-solving skills are the main competency in mathematics learning, because this ability represents higher order thinking skills that include reasoning, analysis, and reflection. Problem-solving is seen as the core of mathematics learning activities and not just an additional skill. Through this, students not only learn to apply concepts, but also develop logical and systematic thinking skills in dealing with contextual situations. Students should have this ability optimally. But the fact is that in the field, most students tend to have low skills (Patmaniar et al., 2021; Afiyati et al., 2020). The results of the PISA survey in the field of mathematics are still very low with a score of 379 in 73rd place (Cormann, 2023). These results

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illustrate that there are problems in solving math problems. Students are poorly trained in solving problems that present critical understanding and reasoning (Pujiastuti et al., 2020), the questions given have not facilitated to optimize students' mathematical problem-solving skills and mathematics learning tends to be student-centered (Gunawan et al., 2023; Ramadhani, 2018; Simamora et al., 2018). The mathematical problem-solving ability of students at the junior high school/MTs level is still in the low to medium category, especially in story-based problems and contextual problems (Antonius Bhoy & Palobo, 2025; Jaenudin et al., 2025; Sholihah et al., 2023). Students often have difficulty understanding the meaning of the questions, determining relevant information, compiling mathematical models, and reflecting on the results obtained. This condition indicates that mathematics learning is still predominantly oriented towards the final result, not on the mathematical thinking process of students.

Mathematical problem solving essentially involves several systematic cognitive stages. These stages include understanding the problem, planning solutions, implementing plans, and re-examining the results obtained (Putri & Miatun, 2023; Aprilla Trisna et al., 2022; Nurhalimah et al., 2022). This stage requires students to integrate verbal, visual, numerical, and logical reasoning skills simultaneously (Astuti et al., 2025; Enabela Novilanti et al., 2021). The stage of understanding the problem includes the student's ability to identify what is known and asked and to represent the problem in the form of symbols or images. The planning the completion stage has to do with the ability to choose appropriate strategies, such as creating mathematical models or determining relevant formulas. The stage of implementing the plan requires precision in the calculation and consistency of the completion steps. The last stage, re-examination, is a form of cognitive reflection on the results obtained (Islami et al., 2022). Several research results show that the re-examination stage is the stage that is most often overlooked by students (Astuti et al., 2025; Syarifuddin, 2025). Students tend to quit after obtaining the final answer without verifying the correctness of the solution. This shows the weakness of metacognitive awareness in the process of solving mathematical problems. Therefore, problem solving is an important indicator in assessing the quality of mathematics learning.

Gender as a factor that affects students' learning characteristics, including in mathematics learning. One of the factors that affect the variation in students' problem-solving abilities is gender. Gender is not only related to biological differences, but is also influenced by social constructs that shape students' ways of thinking, attitudes, and learning strategies (Winggowati et al., 2023). Gender is not only understood as a biological difference between men and women, but also as a social construct that influences the way we think, learn, and interact with the learning environment (Romadhon et al., 2024). Some research results show that there is a difference in cognitive characteristics between male and female students in solving math problems. Male students tend to excel in speed and spatial ability, while female students are more meticulous, systematic, and strong in verbal abilities (Winggowati et al., 2023; Nurhalimah et al., 2022). The average score of female students' mathematical problem-solving ability is higher than that of male students, especially on indicators of understanding problems and re-examining the results of solving (Jaenudin et al., 2025). Similar findings Islami et al. (2022) show that female students are more consistent in following complete problem-solving steps. This is attributed to the tendency of female students to be more reflective and careful in making mathematical decisions. However, some studies show that differences in problem-solving abilities based on gender are not always statistically significant, but are more visible in the variation in the resolution strategies used (Jaenudin et al., 2025; Negara, 2023). This means that gender differences are more visible in the thought process than in the final result. This emphasizes the importance of a qualitative approach in assessing students' problem-solving skills, to provide an in-depth analysis of the characteristics of mathematical thinking among male and female students.

In the context of mathematics learning at Madrasah Tsanawiyah (MTs), the study of gender-based problem-solving skills is becoming increasingly relevant. MTs has heterogeneous characteristics of students both in terms of social background and academic ability. Teachers are required to understand individual student differences in order to design inclusive and adaptive learning. Understanding gender differences in problem solving can help teachers determine more targeted approaches, strategies, and forms of evaluation. Geometric materials, especially squares and triangles, were chosen as a research context because they have abstract characteristics and demand high visualization and reasoning skills. Geometry is often a source of difficulty for students because it requires integration between concepts, formulas, and visual representations (Jaenudin et al., 2025; Pujiastuti et al., 2020). Research by Sari et al. (2021) shows that most students have difficulty in compiling mathematical models on contextual geometry problems, especially when it comes to determining the relationships between flat building elements.

Based on the results of initial observations at one of the MTs, it was found that many students have not been able to solve problem solving problems systematically. Students often write down answers right away without showing the appropriate completion steps. In addition, there are indications that female students are more complete in writing the completion process, while male students are faster but less thorough in checking the answers. This indicates that there are differences in problem-solving abilities between male and female students, and this dynamic has prompted many learning experts to conduct further research (Negara, 2023; Nurhalimah et al., 2022). These findings reinforce the urgency of research that specifically examines mathematical problem-solving abilities viewed from a gender perspective (Syarifuddin, 2025; Romadhon et al., 2024; Winggowati et al., 2023). This research is important because there are still limited qualitative studies that describe in detail the problem-solving process of MTs students based on gender in geometry materials. Most of the study results emphasize more on quantitative score comparisons, not on the analysis of students' thinking stages. In fact, understanding the students' thought process is very important to design the right learning intervention. Based on the previous presentation, this study aims to describe the mathematical problem-solving ability of Madrasah Tsanawiyah students reviewed from gender differences based on the stages of problem-solving. The results of the study are expected to make a theoretical contribution to the study of mathematics education and provide practical implications for teachers in developing learning strategies that are sensitive to the differences in the characteristics of male and female students.

Methods

This study employed a descriptive qualitative approach to obtain an in-depth account of students' mathematical problem-solving processes viewed from a gender perspective. The setting was MTsN 2 Banda Aceh. The focus of the tasks was perimeter and area of plane figures.

Participants were selected purposively from Class VII-1. An initial screening test was administered to identify students' levels of mathematical problem-solving ability. Based on the screening results, four students were chosen as focal participants: two students in the high-ability group (one male and one female) and two students in the low-ability group (one male and one female). This variation allows researchers to explore in-depth and comprehensive information regarding the strategies, obstacles, and problem solving proficiencies owned by every subject. Thus, the data obtained will hopefully provide a thorough and representative picture of the phenomenon of problem-solving skills in mathematics learning.

The instrument used was a mathematical problem-solving test, by Polya's indicators consisting of a) understanding the problem, b) devising a plan, c) executing the plan, and d) double-checking or reflecting on the solution obtained. Previously, the instrument was validated by a mathematics lecturer and an experienced junior high school mathematics teacher. The evaluation covered the following aspects: the alignment of the indicators with the research objectives, the appropriateness of the content, the construction of the items, and the use of language. The validation results showed that all test items were deemed valid. In qualitative research, the researcher serves as the primary instrument for data collection and interpretation, including conducting interviews and generating analytic memos.

Data collection proceeded in two steps. First, students completed the written problem-solving test. Second, each student participated in an individual interview to clarify the reasoning behind their written work, including how they interpreted the problem, chose strategies, executed procedures, and checked results. Interviews were conducted on the same day as the test at different times for each participant.

Data were analyzed using Miles and Huberman's interactive model, includes data reduction, data display, and conclusion drawing/verification. During the data reduction phase, the researchers summarized the data collected regarding students' mathematical problem-solving abilities using subject coding. For reporting purposes, participants were assigned initials: AK (male–high), NA (female–high), MF (male–low), and ZK (female–low). This study did not include participants with moderate achievement levels because the variation among them was deemed not to contribute significantly to the conclusion. This exclusion was made to focus the analysis on the higher achievement and lower achievement groups, so that the gap between them could be seen clearly. The reduced data were then organized in displays to support cross-case comparison by Polya's stages: understanding the problem, planning, carrying out the plan, and looking back (Nurhalimah et al., 2022).

Trustworthiness was strengthened through time triangulation by administering comparable problem-solving tasks on different occasions and examining the consistency of participants' strategies and explanations (Creswell, 2009).

Results

Following the screening test, four focal participants were interviewed to explain their written solutions (Table 1). The interviews provided process-level evidence regarding how students interpreted problems, selected strategies, executed procedures, and checked answers.

Table 1. Initial Screening Results

Problem-Solving Capabilities	Quantity
Height	13
Low	5

Qualitative inspection of students' work suggests distinct patterns. The high-ability male participant (AK) completed all items but did not consistently perform the 'looking back' stage. The low-ability male participant (MF) identified given information but made substantial errors in planning; as a result, the solution could not be completed correctly. In contrast, the high-ability female participant (NA) produced solutions that were accurate, orderly, and easy to follow, with complete steps aligned with Polya's indicators. The low-ability female participant (ZK) showed adequate initial comprehension but struggled to plan a viable strategy, leaving parts unanswered and leading to an incorrect or incomplete solution (Table 2).

Table 2. Selected Participants and Screening Scores

Gender	Initials	Score LTKPM	Category
Male	AK	94	Height
	MF	28	Low
Women	OR	100	Height
	ZK	34	Low

The mean score is summarized by indicator and gender (Table 3). Both genders performed well in understanding the problem, and both groups showed weaknesses in planning. Differences emerged more clearly during the execution of the plan, especially in checking. Female students obtained higher mean scores in carrying out the plan (62,50 vs 59,37) and in checking solutions (59,37 vs 40,62), yielding a higher overall mean score for females.

Table 3. Mean Scores by Polya's Indicators and Gender

Indicator	Average Score	
	Male	Women
Understanding the Problem	96,75	100
Plan Troubleshooting	50	50
Implementing Troubleshooting	59,37	62,5
Double-check troubleshooting	40,62	59,37
Average	61,685	67,967

The male students who achieved the highest marks answered all the questions correctly. However, there is one stage where male students sometimes fail: the re-checking indicator (Figure 1a and Figure 1b). Male students who achieved the lowest scores at the problem-understanding stage were correct in identifying the question. However, their solution planning still contained errors or was not addressed at all, indicating they were unable to solve the problem correctly (Figure 2a and Figure 2b).

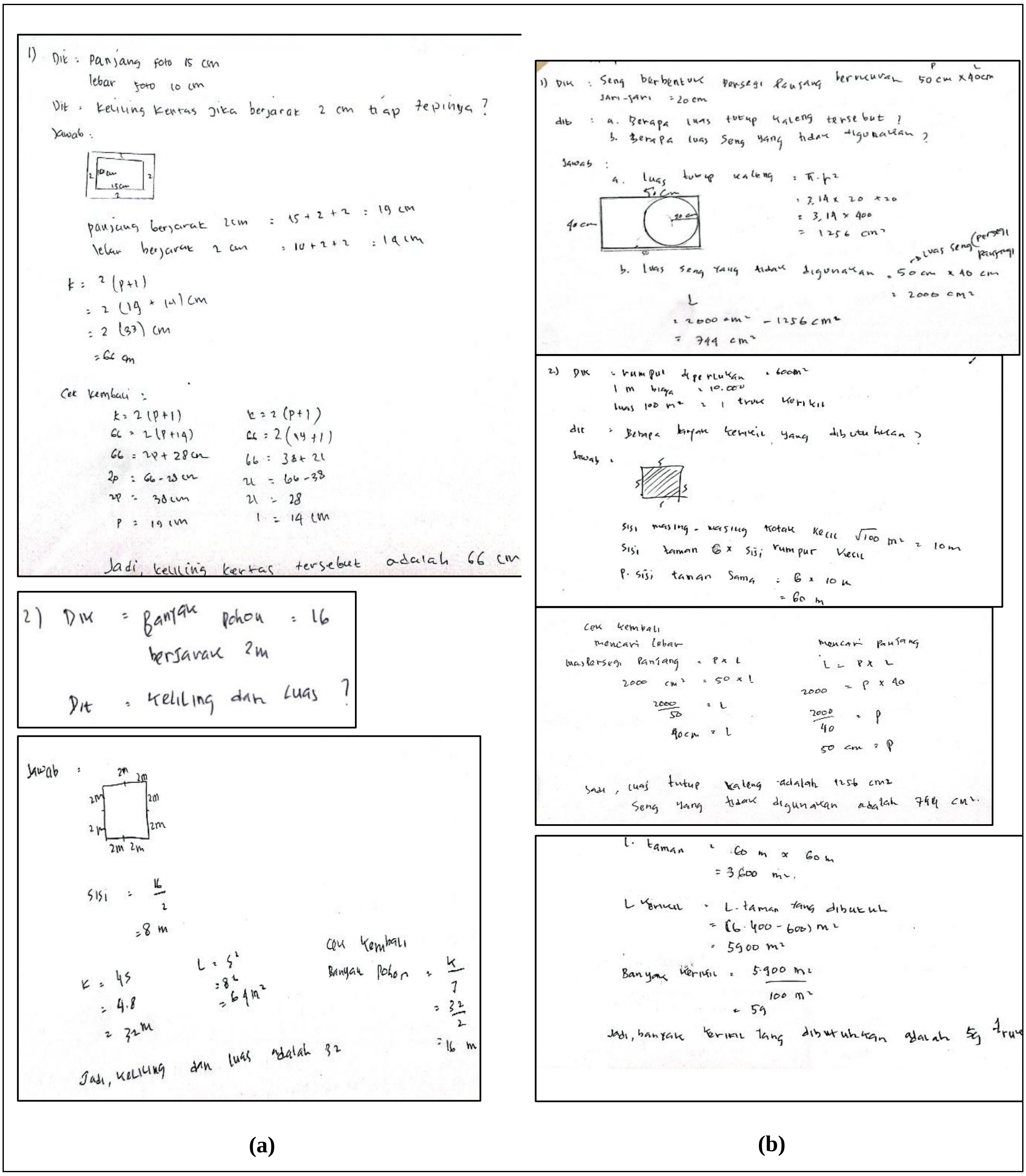
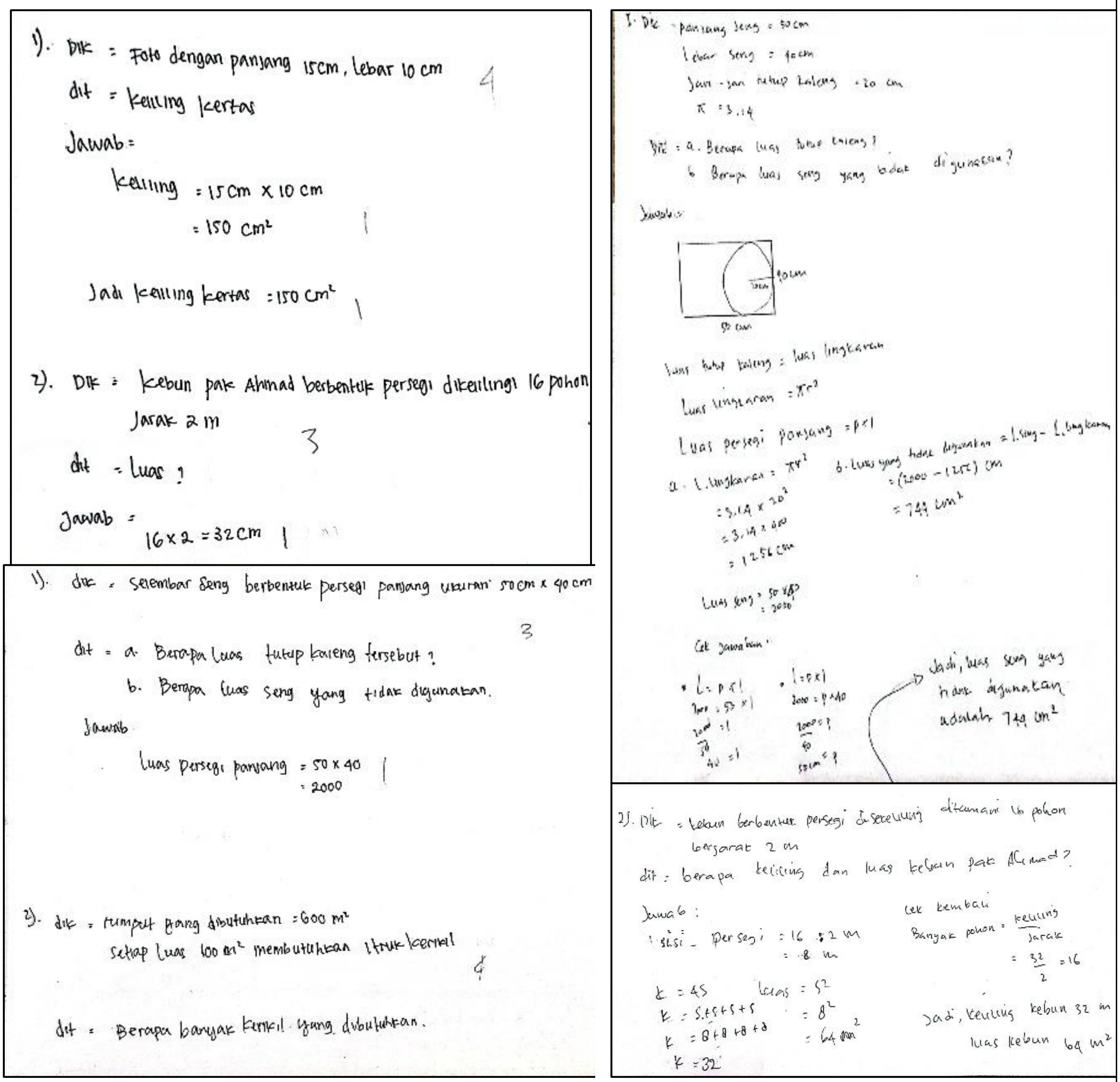


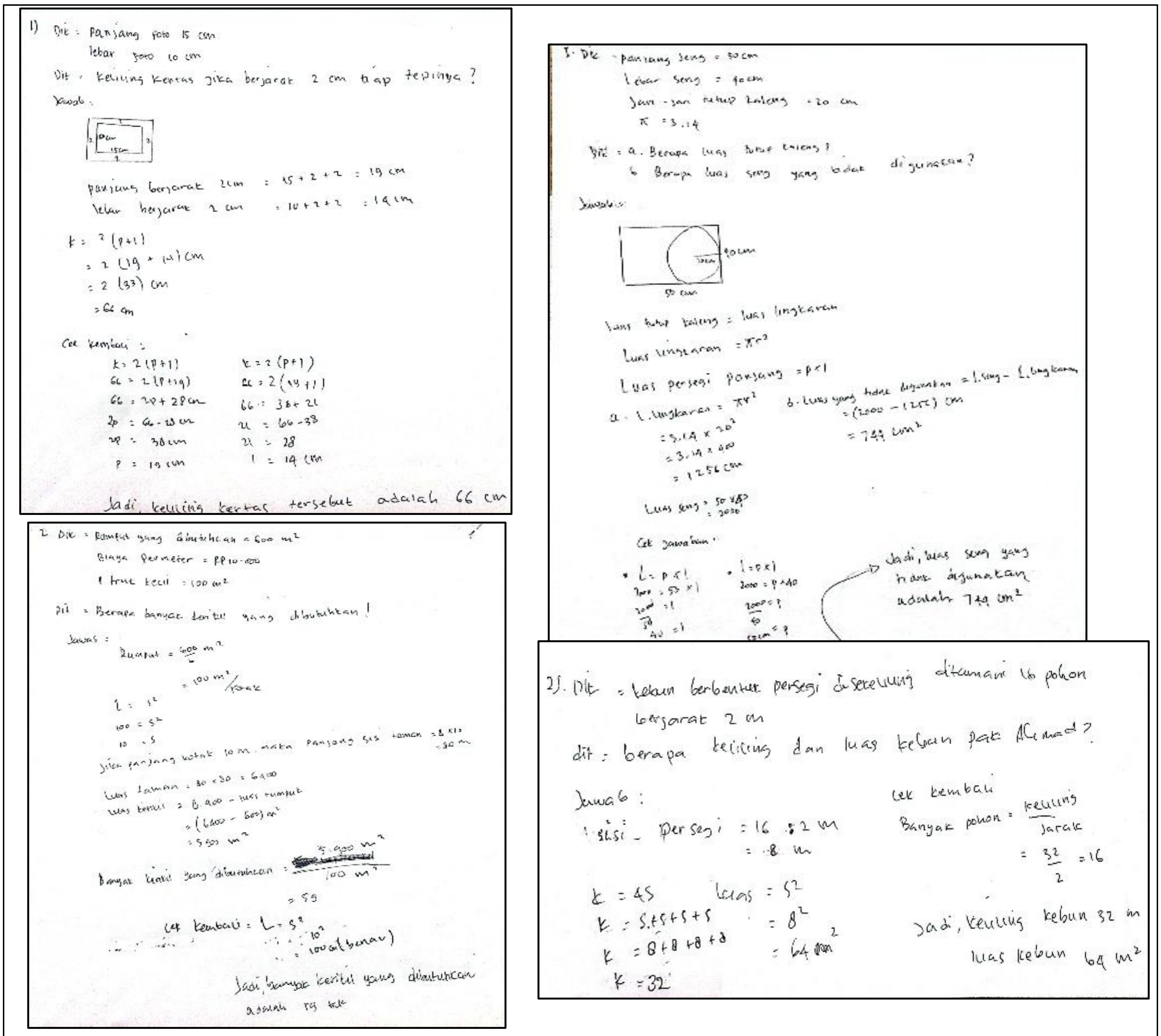
Figure 1. Results of male students who achieved the highest scores



(a) (b)

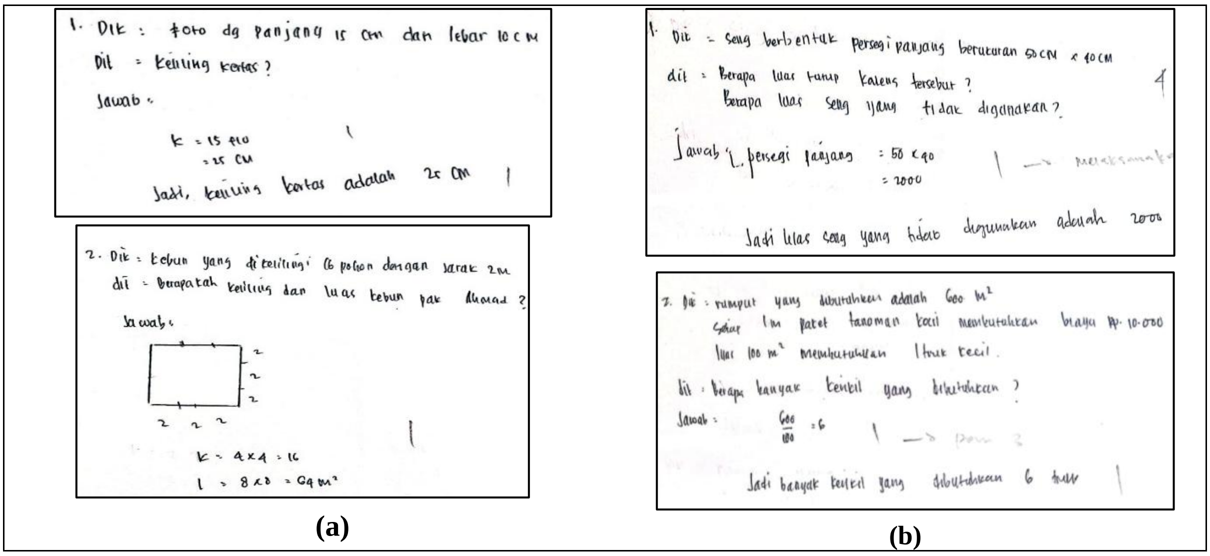
Figure 2. Results of male students who achieved the lowest scores

The female student who achieved the highest mark answered all questions correctly and in the correct order, and her answers were easy to understand. The answers were complete and correct (Figure 3a and Figure 3b). The female student who achieved the lowest score in understanding the problem correctly identified what was in the question and its implications; however, in planning the solution, she made errors, and some parts were not addressed, leaving her unable to solve the problem correctly (Figure 4a and Figure 4b).



(a) (b)

Figure 3. Results of female students who achieved the highest scores



(a) (b)

Figure 4. Results of female students who achieved the lowest scores

Discussion

The results of this study show that there is a difference in the tendency of mathematical problem-solving skills between male and female students, especially in the aspects of accuracy, completeness of solution steps, and the ability to re-examine answers. Female students generally perform better at the stage of understanding problems and re-examining the results of the solution than male students. These findings are in line with the results of research by Putri & Miatun (2023) which stated that female students are more systematic in interpreting questions and more consistent in following problem-solving procedures. Patmaniar et al. (2021) found that the thinking process of female students in solving mathematics problems tends to be more structured than that of male students.

At the stage of understanding the problem, female students in this study were able to identify the information that was known and asked more completely. This supports the findings of Garcia & Cadawas (2025) who stated that gender differences affect the way students interpret question texts, especially in story-form questions. Syarifuddin (2025) added that female students have a tendency to read questions more carefully so that conceptual errors in the early stages can be minimized. This accuracy is also influenced by relatively better verbal abilities in female students, as reported by Sholihah et al. (2023). In contrast, male students showed a tendency to do calculations without first writing down the complete known information. This pattern is in line with the results of Romadhon et al. (2024) research which found that male students often skip the problem interpretation stage and go straight to the calculation procedure. This phenomenon indicates that male students are more oriented towards the final result rather than the completion process, which ultimately has the potential to increase miscalculations and misconceptions (Astuti et al., 2025; Syarifuddin, 2025; Negara, 2023; Putri & Miatun, 2023).

At the stage of planning completion, both male and female students still show weaknesses in choosing the right strategy. This difficulty is consistent with the findings of Sholihah et al. (2023) who stated that many students experience obstacles in connecting the problem information with relevant mathematical concepts. Aprilla Trisna et al. (2022) also emphasized that students' failure to plan strategies is often caused by weak metacognitive skills and lack of experience in solving nonroutine problems. In the context of this study, students with low abilities, both male and female, have not been able to construct mathematical models appropriately. These findings support the results of research by Romadhon et al. (2024) which shows that low-category students tend to make mistakes in formulating problems into symbolic forms. Nurhalimah et al. (2022) also reported that strategy errors were the most dominant mistakes in male students due to the lack of a mature planning stage. The stage of implementing the completion showed that female students were more consistent in following the planned steps, while male students tended to jump on certain procedures without a complete explanation. These results are in line with Romadhon et al. (2024) research which states that female students are more meticulous in carrying out procedures, while male students are more daring to take risks in calculations. Winggowati et al. (2023) emphasized that successful problem-solving depends heavily on the balance between procedural accuracy and conceptual understanding, which in this study is more visible to female students.

At the stage of re-examining the results of the settlement, the gender differences are more apparent. Female students more often recheck the final steps and answers, while male students tend to stop after obtaining the calculation results. These findings are consistent with the research of Sutrisno (2019) which concluded that female students have higher reflective awareness than male students. Negara (2023) stated that female students are more accustomed to verifying answers through re-substitution or alternative calculations.

The results showed that students with high abilities, both male and female, were able to go through the four stages, although there were differences in the quality of each stage. These findings are in line with the Cormann (2023) which reported that students with high math ability tend to have better metacognitive control in re-examining their solutions. Gender differences in mathematical problem solving are also influenced by affective and social factors. Islami et al. (2022) states that differences in social roles between men and women can affect the way they view math tasks. Negara (2023) stated that gender stereotypes towards mathematics still affect students' confidence, so that male students tend to be more confident but less thorough, while female students are more cautious but less confident in the early stages. In the context of classroom learning, the findings of this study support the recommendation of that teachers need to develop learning that emphasizes the thought process, not just the final outcome. Antonius Bhoy & Palobo (2025) emphasize the importance of problem-based learning that provides space for students to explain their strategies verbally or in writing. This approach can help male students improve accuracy and female students increase confidence in solving math problems.

This study corroborates the findings of Garcia & Cadawas (2025) that gender differences do not indicate extreme ability gaps, but rather differences in characteristics in the completion process. Thus, gender differences should not be seen as an absolute advantage of one group, but as a variation of thinking styles that need to be accommodated in learning (Syarifuddin, 2025; Faradillah & Fadhilah, 2021; Ramadhani, 2018). From a curriculum perspective, the results of this study are relevant to the view of Nurhalimah et al. (2022) that mathematics learning needs to emphasize reasoning and reflection, not just mechanistic procedures. Patmaniar et al. (2021) state that understanding of concepts develops through social interaction and discussion, which allows male and female students to complement each other in problem-solving strategies. Overall, the results of this study concluded that female students excelled in the aspects of rigor, completeness of steps, and re-examination, while male students excelled in speed but lacked in the final reflection stage (Garcia & Cadawas, 2025; Syarifuddin, 2025; Putri & Miatun, 2023; Sholihah et al., 2023; Islami et al., 2022). The Cormann (2023) emphasizes that improving students' reflective abilities is the key to improving mathematical literacy globally.

The implication is that teachers need to design learning that trains all students to carry out the four stages of problem solving completely. Teachers can provide exercises that emphasize the activities of writing down known and asked information, developing a completion plan, and reflecting on the final answer. This is in accordance with (Schoenfeld, 2022) recommendation that problem-solving learning should develop students' metacognitive awareness. This the gender difference in mathematical problem solving is more visible in the process than in the final result. Therefore, a learning approach that is sensitive to the differences in the characteristics of male and female students is expected to improve the quality of overall mathematical problem-solving (Schoenfeld, 2022).

Conclusion

This study concludes that students' mathematical problem-solving shows gender-related tendencies primarily at the process level. Female students tended to be more thorough in interpreting problem statements and more consistent in checking solutions, whereas male students tended to compute faster but were less consistent in completing all stages of problem solving, particularly the checking stage.

Both male and female students exhibited weaknesses in planning and in linking given information to relevant concepts, with these difficulties most pronounced among low-ability participants. The findings suggest that strengthening strategy selection, representation, and metacognitive monitoring is essential for improving problem solving for all students.

Therefore, mathematics instruction should explicitly train students to (1) state what is known and what is asked, (2) plan and justify a strategy, (3) execute procedures carefully, and (4) verify results through checking and reflection. Gender differences should be interpreted as variation in problem-solving approaches rather than as absolute superiority, and classroom practices should be designed to support systematic reasoning and reflective habits for every learner.

Declarations

Author Contribution	:	NS: Conceptualization, Writing - Original Draft, Formal Analysis, and Methodology. KI: Writing - Review & Editing, Editing, and Visualization. DAP: Writing - Review & Editing, Editing, and Visualization. VH: Validation and Supervision
Conflict of Interest	:	The authors declare no conflict of interest.
Additional Information	:	Additional information is available for this paper.

References

Afiyati, Y., Warniasih, K., & Utami, N. W. (2020). Problem-solving with guided inquiry learning: An analysis of student's problem-solving ability. *Journal of Physics: Conference Series*, *1581*(1). https://doi.org/10.1088/1742-6596/1581/1/012035

Antonius Bhoy, Y., & Palobo, M. (2025). Analysis of the seventh grade students' ability at SMP YPK Merauke in solving fraction problems. *Riemann: Research of Mathematics and Mathematics Education*, *7*(3), 287-295. https://doi.org/10.38114/riemann.v7i3.129

Aprilla Trisna, T., Ikhsan, M., & Elizar, E. (2022). Abilities and difficulties of ninth-grade students in solving geometry transformation problems. Jurnal Pendidikan MIPA, 23(4), 1724-1737. http://dx.doi.org/10.23960/jpmipa/v23i4.pp1724-1737

Astuti, S. A. B., Siregar, R. N., & Rangkuti, R. K. (2025). Analysis of students' mathematical critical thinking in solving function derivative problems based on gender differences. *JIML*, *8*(1), 188–199. https://doi.org/10.22460/jiml.v8i1.p27166

Cormann, M. (2023). *OECD* (Vol. 1). OECD Publishing. https://doi.org/10.1787/53f23881-en

Creswell, J. W. (2009). *Research Design*. SAGE Publication Asia-Pasific Pte.Ltd.

Enabela Novilanti, F. R., Susanti, W. D., & Suripah, S. (2021). Students' problem-solving ability in geometry during the Covid-19 pandemic. *Jurnal Tadris Matematika*, *4*(2), 175–186. https://doi.org/10.21274/jtm.2021.4.2.175-186

Faradillah, A., & Fadhilah, Y. H. R. (2021). Mathematical problem-solving on slow learners based on their mathematical resilience. *Jurnal Elemen*, *7*(2), 351–365. https://doi.org/10.29408/jel.v7i2.3321

Garcia, Marjorie L. & Cadawas, Sonia S. (2025). Gender difference in mathematical reasoning and academic performance among junior high school students. *IRE Journals*. 8(12). 2456-880. https://www.irejournals.com/paper-details/1709205

Gunawan, R. G., Mudjiran, Suherman, Yerizon, Musdi, E., Armiati, Rozika, E. (2023). An analysis of mathematical problem-solving skills of junior high school students. *Indonesian Journal of Science and Mathematics Education*, 6(3), 351-365, https://doi.org/10.24042/ijsme.v6i3.18062

Islami, S., Zawawi, I., & Khikmiyah, F. (2022). Analysis of students' mathematical problem solving ability based on self-confidence. *Jurnal Pendidikan MIPA*, *23 (4)*(4), 1670–1679. https://doi.org/10.23960/jpmipa/v23i4.pp1670-1679

Jaenudin, S., Aminah, M., & Yusuf, Y. (2025). Analysis of students' mathematical problem-solving abilities. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *9*(1), 195–202. https://doi.org/10.31004/cendekia.v9i1.3743

Negara, H. R. P. (2023). Mathematical reasoning ability of male and female students in problem base learning. *JTAM (Jurnal Teori Dan Aplikasi Matematika)*, *7*(3), 688. https://doi.org/10.31764/jtam.v7i3.15023

Nurhalimah, A., Mandailina, V., Mahsup, & Syaharuddin. (2022). Measuring the difficulty level of mathematical problems based on polya criteria. *Journal of Education Research and Evaluation*, *6*(4), 595–607. https://doi.org/10.23887/jere.v6i4.46316

Patmaniar, A. S. M., & Sulaiman, R. (2021). Students' growing understanding in solving mathematics problems based on gender. *Journal on Mathematics Education, 12*(3), 507–530. https://doi.org/10.22342/JME.12.3.14267.507-530

Pujiastuti, H., Utami, R. R., & Haryadi, R. (2020). The development of interactive mathematics learning media based on local wisdom and 21st century skills: Social arithmetic concept. *Journal of Physics: Conference Series*, *1521*(3). https://doi.org/10.1088/1742-6596/1521/3/032019

Putri, C. V., & Miatun, A. (2023). Analysis of high school students' mathematical problem-solving ability based on mathematics anxiety and gender. *Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram*, *11*(3), 726. https://doi.org/10.33394/j-ps.v11i3.7991

Ramadhani, R. (2018). The enhancement of mathematical problem solving ability and self-confidence of students through problem based learning. *Jurnal Riset Pendidikan Matematika*, *5*(1), 127–134. https://doi.org/10.21831/jrpm.v5i1.13269

Romadhon, N. I., Amir, M. F., & Wardana, M. D. K. (2024). Assessing students' mathematical reasoning in problem-based learning: a gender perspective. *International Journal of Evaluation and Research in Education*, *13*(6), 3763–3774. https://doi.org/10.11591/ijere.v13i6.29580

Sari, I. K, Nasriadi, A., Agustiani, R., & Nursalim, R. (2021). Analysis of students' mathematical problem-solving skills. *Journal of Hunan University Natural Sciences, 48*(9). https://www.jonuns.com/index.php/journal/article/view/705/0

Schoenfeld, A. H. (2022). Why Are Learning and teaching mathematics so difficult? in *handbook of cognitive mathematics*. 1–35. *Springer International Publishing*. https://doi.org/10.1007/978-3-030-44982-7_10-1

Sholihah, I., Chandra, D., & Anita, Y. (2023). Analysis of students' mathematical problem-solving ability in terms of gender differences. *International Journal of Insights for Mathematics Teaching*, *06*(1), 49–55. https://journal2.um.ac.id/index.php/ijoimt/article/view/52276

Simamora, R. E., Saragih, S., & Hasratuddin, H. (2018). Improving students' mathematical problem solving ability and self-efficacy through guided discovery learning in local culture context. *International Electronic Journal of Mathematics Education*, *14*(1), 61–72. https://doi.org/10.12973/iejme/3966

Sutrisno, A. B. (2019). Problem solving ability of junior high school students towards geometry: gender and mathematical disposition analysis. *Jurnal Pendidikan Progresif*, *9*(2), 209–219. https://doi.org/10.23960/jpp.v9.i2.201923

Syarifuddin, M. (2025). Gender differences in mathematical proficiency: A review of mathematics performance. *Jurnal Riset Pendidikan Dan Inovasi Pembelajaran Matematika (JRPIPM)*, *8*(2), 167–181. https://doi.org/10.26740/jrpipm.v8n2.p167-181

Winggowati, S., Wahyudin, & Herman, T. (2023). The Effect of Gender on Elementary Students' Mathematical Communication Ability. *Jurnal Cakrawala Pendas*, *9*(2), 370–377. https://doi.org/10.31949/jcp.v9i2.4626