ANALYSIS OF STUDENTS' ERRORS AT SDIT BINA INSAN PALU IN COMPLETING THE DAILY TEST MIXED INTEGER ARITHMETIC OPERATIONS REVIEWED FROM ANXIETY LEVEL

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Abstract:

This study aims to describe the errors made by students at SDIT Bina Insan Palu in completing daily tests of mixed integer arithmetic operations based on anxiety levels. This qualitative descriptive research involved two students selected using a mathematics anxiety questionnaire: one with high anxiety, one with moderate anxiety. Error data were analyzed through daily test sheets and interviews, with data credibility obtained through member checking and dependability through verification by academic advisors. Data analysis techniques included condensing interview results, presenting data, and drawing and verifying conclusions. The results showed that students with high anxiety made various errors on all questions, including reading, understanding, transformation, process skills, and writing errors on questions 1, 3, and 5, understanding, transformation, process skills, and writing errors on questions 2 and 4. Students with moderate anxiety made errors in transformation, process skills, and writing on questions 1, 3, and 5, understanding and transformation errors on question 2, and understanding, transformation, process skills, and writing errors on question 4.

Keywords: error analysis, the daily tests mixed integer arithmetic operations, anxiety level

1. Introduction

Mathematics is one of the disciplines taught from elementary school to university level. It has connections with other sciences and plays a crucial role in technological advancement (Susilowati & Ratu, 2020). Therefore, students need a strong foundation in mathematics starting from elementary education. Along these lines, according to Sunaryo & Fatimah (2019), in the early stages of primary education, students begin to

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learn mathematics with a focus on developing logical, critical, creative, systematic, and collaborative thinking skills.

Although students have been introduced to basic mathematical concepts since elementary school, in reality, their understanding of mathematical material is still not entirely accurate. As Fitri & Abadi (2021) pointed out, students encounter difficulties when studying mathematics and perceive it as a difficult and boring subject. As a result, they often make mistakes when solving problems.

Mathematics teachers strive for students to complete daily mathematics exams on mixed integer arithmetic operations without errors, but limited time and the number of students make error correction less than optimal. The topic of mixed integers often causes student errors, indicating a lack of understanding from year to year. There has been no research on the location of student errors in solving mixed integer arithmetic operation problems at SDIT Bina Insan Palu. Students often feel anxious or restless during mathematics lessons, with some even leaving and entering the classroom, indicating a sense of despair before attempting to solve problems. As Watts (2011) stated, excessive anxiety also adversely affects them as it can reduce the effectiveness of their efforts.

An individuals anxiety towards mathematics is due to students' lack of interest in the subject (Sevgi & Arslan, 2020). Furthermore, according to the research by Yazlık & Çetin (2020), it is stated that "*the magnitude of anxiety affects the purity of learning outcomes*". From this statement, it is evident that anxiety is one of the internal factors that can influence the learning process of students. Anxiety in learning mathematics becomes an obstacle for students to comprehend mathematics, thus leading to errors during daily mathematics exams (Putra & Yulanda, 2021). Several research findings linking mathematical anxiety with mathematical understanding abilities indicate a significant relationship, namely that students with high mathematical anxiety have low mathematical understanding abilities (Díaz *et al.*, 2020).

A variety of mistakes made by students when completing mathematics exam questions can be due to anxiety. Analyzing the causes of these mistakes is crucial (Vionita & Hartono, 2021). Detailed error analysis is needed to assist mathematics teachers at SDIT Bina Insan Palu in addressing, anticipating, and describing students' mistakes in mixed integer arithmetic operation questions. This aims to enhance students' knowledge, and reduce errors, especially among anxious students, thus improving mastery of mathematical material and achieving better learning outcomes.

2. Literature Review

2.1 Newman Error Analysis
Error analysis according to Newman's stages, or the Newman error analysis method, was first introduced in 1977 by Anne Newman, a mathematics teacher in Australia. In this method, she proposed five specific activities that are crucial for identifying where errors occur in students' work when solving a problem. The indicators of student errors used in this research are presented in Table 1.

Table 1: Student Error Indicators

Error Types	Indicator
Reading Error	● Students misread words or symbols in the problem.
Comprehension Error	● Students can read the problem well but cannot understand the meaning of the words, symbols, or questions. ● Students cannot understand the meaning of the words, symbols, or questions. ● Students misunderstand the meaning of the words, symbols, or questions.
Transformation Error	● Students incorrectly transform sentences into mathematical form. ● Students incorrectly identify the required mathematical operations. ● Students incorrectly sequence the appropriate operations to successfully complete the problem-solving process.
Process Skill Error	● Students can choose the appropriate operation but cannot perform it accurately. ● Students cannot further process the solution to the problem. ● Students make errors in performing the calculations.
Writing Error	● Students can perform the correct operation but write the final answer incorrectly. ● Students incorrectly present the final answer that matches the intended conclusion of the problem. ● Students cannot write the final answer.

2.2 Mixed Integer Arithmetic Operations

Integers, according to Sudihartinih (2018), consist of non-negative integers, namely 0,1,2,3 ..., and their negatives, namely -1,-2,-3, and so on. So, integers are $\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots$ where negative integers are ..., $-3, -2, -1$ and zero (0) is a number that is neither positive nor negative (neutral).

Mixed arithmetic operations involve arithmetic operations that include more than one integer operation. Arithmetic operations consist of addition, subtraction, multiplication, and division. Mixed arithmetic operations can involve any combination of these four operations. Some rules regarding the execution of mixed arithmetic operations are as follows:

● Arithmetic operations within parentheses are performed first.
● Addition and subtraction have equal precedence, so they are executed sequentially from left to right.
● Multiplication and division have higher precedence than addition and subtraction, so they are prioritized in their execution.
● Multiplication and division have equal precedence, so they are executed sequentially from left to right.
● The operations of addition, subtraction, multiplication, and division of non-negative integers are known.

2.3 Relationship between Student Errors and Mathematics Anxiety

Mathematics anxiety is a condition that inhibits students' ability to achieve their learning potential and mathematics assessment in class, or both, which is an emotional response

and object of fear (Sukri *et al.,* 2022). Additionally, mathematics anxiety is an emotional response to mathematics while attending mathematics classes, solving mathematical problems, and discussing them (Tobias, 1993).

According to Dewi *et al.* (2020), mathematics learning anxiety greatly influences mathematics learning outcomes; the higher the level of mathematics anxiety, the more mistakes students make. High mathematics anxiety leads to low arithmetic skills, lack of knowledge about mathematics, inability to find specific strategies and connections in mathematics, and students with high levels of mathematics anxiety have low mathematics learning achievement.

Mathematical anxiety has levels, according to Cavanagh and Sparrow (2010), which consist of three aspects:

- Low anxiety: this anxiety is related to daily activities full of pressure that cause anxious feelings; low anxiety can encourage learning to stimulate creativity.
- Moderate anxiety: allows someone with this level of anxiety to focus on important things and avoid other things. All of these behaviors aim to relieve tension, so individuals need a lot of guidance to focus on other things.
- High anxiety: affects a person's perception to be more focused and more selective on important things.

Common complaints expressed by individuals experiencing anxiety (Hawari, 2001) include:

1) Anxiety, worry, bad feelings, fear of one's own thoughts, being easily offended.
2) Feeling tense, restless, anxious, easily startled.
3) Fear of being alone, fear of crowds and many people.
4) Disturbances in sleep patterns, stressful dreams.
5) Concentration and memory disturbances.
6) Somatic complaints, such as muscle and bone pain, ringing in the ears (tinnitus), palpitations, shortness of breath, digestive disorders, urinary disorders, headaches, and so on.

Aspects of mathematics anxiety (Desti *et al.,* 2023) are as follows:

1) Somatic, related to changes in a person's body condition, such as sweating or rapid heart rate.
2) Cognitive, related to cognitive changes that occur when someone faces mathematics, such as losing the ability to think clearly or forgetting things that have been remembered.
3) Affective, related to a person's attitude, for example, when someone is asked to do something, they do not want to do.
4) Mathematics knowledge, related to things like the emergence of the idea that someone does not have enough knowledge about mathematics.

3. Material and Methods

This research is a type of descriptive qualitative study aimed at describing the results of the daily test completion on mixed integer arithmetic operations by sixth-grade students at SDIT Bina Insan Palu based on their anxiety levels. The approach used is a qualitative approach to naturally reveal the results of the daily test completion on mixed integer arithmetic operations by sixth-grade students at SDIT Bina Insan Palu based on their anxiety levels.

The research subjects consist of all sixth-grade students of Salahauddin Islamic Integrated Elementary School Bina Insan Palu, totaling 21 students in the 2023/2024 academic year. Two students were selected as respondents for interviews, each with different levels of anxiety: one student with a high level of anxiety and one student with a moderate level of anxiety. The selection of research subjects was based on the highest number of errors in completing the daily test on mixed integer arithmetic operations material using a mathematics anxiety instrument.

The data collection techniques used in this research include test methods, daily test documents, and interview methods. The main instrument in the research is the researcher herself. The supporting instruments in this research are as follows:

3.1 Mathematics Anxiety Test

The instrument used to measure the level of mathematics anxiety is a questionnaire. The questionnaire will be assessed based on the Likert Scale. The questionnaire consists of four answer choices: SA (Strongly Agree), A (Agree), DA (Disagree), and SD (Strongly Disagree). The scores for each answer alternative provided by the respondents are determined, and the scores for each research subject and the total score for each question item are calculated. Next, the total score obtained is converted into a percentage by using the formula Percentage (%) = [(Total score of the subject) ÷ (Maximum total score) × 100]. The level of mathematics anxiety is classified using the percentage from the Likert Scale, as shown in Table 2.

Table 2. Criteria for Levels of Mathematics Anxiety

Percentage Score	Level of Mathematics Anxiety
$25\% < P \leq 50\%$	Low
$50\% < P \leq 75\%$	Moderate
$75\% < P \leq 100\%$	High

(Diana *et al.,* 2020)

| Number | Initial | Statement | | | | | | | | | | | | | | | | | | | | | | | | | Score | Percentage Score | Level of Mathematics Anxiety |
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25			
1	AM	2	1	1	3	3	3	2	1	1	1	1	1	3	2	3	2	3	3	3	3	1	3	3	2	2	70	70%	Moderate
2	AI	3	2	2	1	2	3	3	3	4	3	1	3	3	2	3	3	2	2	3	4	2	4	4	1	3	66	66%	Moderate
3	AA	2	1	1	1	3	1	3	1	1	1	1	2	3	1	3	3	3	1	3	3	3	1	3	1	3	49	49%	Low
4	CG	2	1	1	2	3	2	2	2	1	2	1	2	3	2	2	2	3	3	3	3	1	2	3	1	2	51	51%	Moderate
5	FC	1	1	1	1	1	2	2	1	1	1	1	1	2	1	2	1	2	1	2	2	1	1	2	1	2	34	34%	Low
6	FA	1	1	1	1	1	2	2	1	1	1	1	1	2	1	2	1	2	1	2	2	1	1	2	1	2	34	34%	Low
7	FR	3	1	1	2	3	2	2	1	1	1	2	2	2	2	4	3	3	3	3	3	1	2	2	1	2	52	52%	Moderate
8	HH	2	1	1	3	3	3	3	2	1	1	1	3	2	3	2	3	3	3	4	3	1	3	3	1	2	57	57%	Moderate
9	MA	3	4	4	4	3	4	4	2	2	4	1	3	2	2	4	4	4	2	4	4	1	4	4	4	4	81	81%	High
10	MI	2	2	2	1	2	2	2	1	1	1	1	1	2	1	3	2	2	2	3	2	1	1	3	1	2	43	43%	Low
11	MZ	3	2	2	4	3	4	2	1	1	2	3	2	3	2	3	3	3	3	4	3	1	3	4	2	4	67	67%	Moderate
12	UA	3	1	1	1	2	3	1	3	1	1	1	2	3	3	3	3	3	4	4	1	1	3	1	2	3	54	54%	Moderate
13	MD	3	1	3	4	3	4	2	1	1	1	3	2	3	3	3	3	3	3	3	4	2	3	3	2	2	65	65%	Moderate
14	MF	3	3	2	2	4	4	4	1	1	1	1	1	2	1	3	2	1	1	3	2	1	2	2	1	3	51	51%	Moderate
15	MR	2	1	1	1	2	2	2	1	1	1	2	2	2	1	2	1	2	2	1	2	1	1	1	1	2	37	37%	Low
16	NS	1	1	1	3	3	3	1	1	1	2	1	2	1	1	3	2	3	2	2	2	1	2	1	1	2	43	43%	Low
17	RA	2	1	1	1	3	4	2	1	1	2	4	2	2	1	2	2	2	1	3	3	2	3	2	1	3	51	51%	Moderate
18	RB	3	2	3	4	3	4	3	1	2	3	3	2	3	3	3	3	4	3	4	4	1	4	4	3	4	76	76%	High
19	RN	4	4	4	3	3	4	3	3	2	3	3	3	3	3	4	3	4	3	3	3	2	3	4	2	4	80	80%	High
20	UN	3	2	2	2	2	2	2	1	2	2	2	2	2	2	3	3	3	3	3	4	2	2	3	2	3	59	59%	Moderate
21	ZH	4	4	4	3	3	3	3	3	4	3	2	3	3	3	3	4	3	3	4	4	3	4	4	2	4	83	83%	High

Figure 1: Grouping of Mathematics Anxiety Level Scores

- **Daily Test Sheet**
- **Interview Guidelines**

Data credibility refers to the accuracy of the data and its ability to truly measure what is intended. In this research, the chosen method to obtain accurate data is through checking and extending observations. Data dependability refers to the trustworthiness of the researcher's findings. In this study, examination and verification involve the supervising professors.

The data analysis technique used in this research is the data analysis technique, according to Miles *et al.* (2014). The data analysis technique consists of data condensation, data display, as well as the depiction and verification of several conclusions.

4. Results and Discussion

The meaning of several abbreviations that appear in the daily test results is as follows: the first two characters (ZH, AI) are the initials of the research subjects, the third and fourth characters (01, 02, 03, 04, 05) are the question numbers, the fifth character (B) represents the material on mixed operations with integers, and the sixth and seventh characters (01, 02, 03, …) are the steps or sequences of the subject's responses. For example, ZH01B01 means the daily test answer of subject ZH for question number 1 on mixed operations with integers, the first step. The meaning of several abbreviations that appear in the interview transcript is as follows: the first two characters (ZH, AI) are the initials of the research subjects, the third and fourth characters (W1) are the code for the first interview conducted, the fifth, sixth, and seventh characters (001, 002, 003, …) are the sequence of the interview, and the last character (P, S) is the code that means P for the researcher and S for the subject. For example, ZHW1001P means subject ZH in the first interview, first sequence, researcher. The data in this study is presented as written responses and interview transcripts for each subject as they complete the daily test on mixed operations with integers. \

4.1 Results of the Daily Test and Interviews with Subjects High Anxiety on Question Number 1
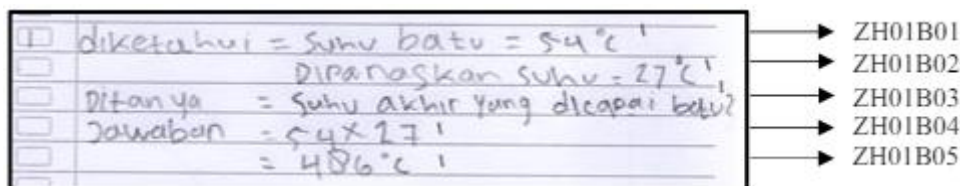

Figure 2: Subject ZH Answer to Question Number 1

Subject ZH in daily test question number 1. These errors included a transformation error (ZH01B04), where the subject incorrectly identified the required mathematical operation by writing 54×27 instead of $-54 + 27 \times (144 \div 18)$. This led to a process skill error (ZH01B05), where subject ZH incorrectly completed the calculation, resulting in 486℃. Additionally, subject ZH made a writing error by not providing a final conclusion. From the interview results, it was found that subject ZH made a reading error by misreading the question and not noticing the degree symbol and negative sign. ($-54℃$). A comprehension error also occurred, where subject ZH misunderstood the meaning of words, symbols, or the question itself. The transformation error was repeated when subject ZH misidentified the mathematical operation by multiplying the initial temperature of the stone with the temperature after heating. This caused a recurring process skill error, where subject ZH incorrectly added the initial temperature and the temperature after heating without considering time. Finally, subject ZH made a recurring writing error by failing to correctly state the appropriate conclusion. These errors were identified through the transcript of ZH interview regarding daily test question number 1.

ZHW1009P: *"All right, read question number 1 first. If there are any words or numbers you don't know, just skip them."*

ZHW1010S: *"Fitrah conducts an experiment in the laboratory. A rock with a temperature of minus fifty-four degrees Celsius is heated, with an average temperature increase of twenty-seven degrees Celsius every eighteen minutes. If the rock is heated for one hundred forty-four minutes, what is the final temperature reached by the rock? (There is visible tension on her face as he reads the question)."*

ZHW1011P: *"Okay, next (pointing to $-54℃$). What does this mean?"*

ZHW1012S: *"Minus fifty-four Celsius, I don't know what it means. (Her voice is trembling)."*

ZHW1013P: *"All right, (pointing to $-54℃$) in integers, that flat symbol should be read as negative, and the small circle should be read as degrees. So, it read as negative fifty-four degrees Celsius, meaning the temperature is very cold. Now, tell me what the question is asking you to solve."*

ZHW1014S: *"The question is asking what the final temperature of the rock is. (Twisting her hair)."*

ZHW1015P: *"What do you mean by that sentence?"*

ZHW1016S: *"It means, umm... (She appears sweaty and silent for a long time. It is also evident that subject ZH is still confused when asked about the final temperature of the rock, meaning the last temperature obtained by the rock after being heated. Subject ZH cannot answer)."*

ZHW1017P: *"Show me how you start finding the answer to this question."*

ZHW1018S: *"To find the final temperature of the rock by multiplying the initial temperature and the temperature after heating. Is that correct?"*

ZHW1019P: *"That's incorrect, dear. The correct answer is to add the total temperature increase to the initial temperature. Now show me how you get the answer."*

ZHW1020S: "54 + 27. (While fidgeting with her feet and fingers)."

ZHW1021P: *"Why did you only add the initial temperature and the temperature after heating but ignore the time?"*

ZHW1022S: (Remains silent, looking anxious).

ZHW1023P: *"Tell me what you did next. Make sure to write down the answer to the question."*

ZHW1024S: *"I worked it out using column addition,* 54 + 27 = 81. *So, the result is* 81℃. " (Appears hesitant in her answer).

Based on the interview results with subject ZH regarding the daily test on mixed integer operations, it was found that the error made by subject ZH on question number 1 was a reading error. The student misread the question, specifically failing to notice the degree symbol and the negative sign in (-54℃). This aligns with Clements' (1980) research, which states that if a student shows that they misread or cannot read an important word in the question, the error is classified as a reading error. Furthermore, subject ZH made a comprehension error, as the student could not understand the meaning of words, symbols, or the question itself. When asked to interpret (-54℃), subject ZH could not provide an answer. This aligns with Friantini & Winatas (2020) research, which states that comprehension errors occur when students cannot understand the sentence in the question. Additionally, subject ZH made a transformation error by incorrectly identifying the required mathematical operation. The student answered that the way to find the final temperature was by multiplying the stones' temperature and the temperature after heating, and wrote the incorrect mathematical equation 54 × 27. The correct approach should be the initial temperature plus the total increase in temperature after heating, which is $-54 + 27 \times (144 \div 18)$, where the initial temperature is -54 and the total increase in temperature after heating is $27 \times (144 \div 18)$. This is consistent with Suratih & Pujiastuti (2020) findings, which state that transformation errors occur due to the incorrect selection of operations when solving problems. As a result, subject ZH also made a procedural skill error by incorrectly performing the calculation operation, failing to sum the initial temperature and the temperature after heating while considering the given time. Subject ZH final calculation was 486℃. This aligns with Suratih & Pujiastuti (2020) research, which states that procedural skill errors occur when students make mistakes in their calculations. Lastly, subject ZH made a writing error by incorrectly showing the final answer in accordance with the question's intended conclusion. Subject ZH did not write the conclusion. This is consistent with Mursyidah *et al.* (2023) research, which states that encoding or writing errors occur when students cannot accurately write the conclusion of their work.

4.2 Results of the Daily Test and Interviews with Subjects High Anxiety on Question Number 2

Figure 3: Subject ZH Answer to Question Number 2

In question number 2, subject ZH made several mistakes. A transformation error occurred when subject ZH incorrectly identified the required mathematical operation (ZH02B03), writing the incorrect mathematical statement: temperature difference = $-12℃ + 12℃$, when it should have been a subtraction operation. Subject ZH also made a process skill error, being unable to further process the solution and not writing down the result of $-12℃ + 12℃$, which led to a writing error by not providing a final conclusion. From the interview results, it was found that subject ZH made a comprehension error, as although they could read the problem well, they could not understand the meaning of words, symbols, or questions, specifically misunderstanding the meaning of the word "decrease." Furthermore, subject ZH again experienced a transformation error by incorrectly identifying the necessary mathematical operation when asked to show how to find the answer, mistakenly adding the temperatures that decreased. Subject ZH also made a process skill error, being able to select the appropriate operation but unable to complete it accurately, subtracting $-12℃ - (-19℃)$ and arriving at the incorrect result of $-31℃$, while the correct answer is $7℃$. This mistake also led to a writing error by incorrectly stating the final answer that aligns with the conclusion intended in the question. These errors can be seen in the transcript of ZH interview regarding daily test question number 2.

ZHW1025P: *"It is okay. Now, let's move on to question number 2. Please read the question first. If there are any words or numbers you don't know, just skip them."*
ZHW1026S: *"One morning, the temperature in a village dropped to negative 12 degrees Celsius. After a few hours, the temperature dropped again to negative 12 degrees Celsius. What is the temperature difference in this drop?"*
ZHW1027P: *"Okay, next* (pointing to the word "dropped"). *What does this word mean?"*
ZHW1028S: *"Dropped means decreased* (Her voice is trembling, and she appears hesitant in answering)."
ZHW1029P: *"Why do you think "dropped" means decreased?"*
ZHW1030S: "(Remains silent for a long time, appears sweaty and confused. It is evident that subject ZH is still confused about the word "decreased," meaning a temperature drop or change to a lower level than before. Subject ZH cannot answer)."
ZHW1031P: *"Okay, that's all right. Now, tell me what the question is asking you to solve."*
ZHW1032S: *"The question is asking what the temperature difference in this drop is"* (Fidgeting with her feet).
ZHW1033P: *"What do you mean by that sentence?"*

ZHW1034S: *"Umm, it means there is a difference, ma'am."*
ZHW1035P: *"Okay, next, show me how you start finding the answer to this question."*
ZHW1036S: *"I start finding the answer by adding the temperature that dropped and the temperature that dropped again* (Appears hesitant in answering)*."*
ZHW1037P: *"Oh, I see. Next, show me how you get the answer."*
ZHW1038S: −12℃ + 19℃.
ZHW1039P: *"Why did you use addition?"*
ZHW1040S: *"Actually, I'm unsure whether the difference should use subtraction or addition."*
ZHW1041P: *"Oh, I see. Yes, if there is a difference, you should use subtraction because the difference is the result of subtracting two numbers. Then, please tell me what you did next. Make sure to write down the answer to the question."*
ZHW1042S: *"The way to solve it is −12℃ − (−19℃) = −31℃. So, the result is −31℃* (Appears hesitant in answering)*."*

In question number 2, the mistake made by subject ZH is a comprehension error. The student can read the problem well but cannot understand the meaning of words, symbols, or questions. Specifically, subject ZH misinterprets the term "decrease," which aligns with Singh *et al.* (2010), who stated that comprehension errors occur when students can read mathematical questions but fail to understand the words, symbols, mathematical terms, or questions contained within the problem. Furthermore, subject ZH experiences a transformation error, which involves incorrectly identifying the necessary mathematical operation. When asked to show how to find the answer, subject ZH added the temperatures that decreased, writing the incorrect mathematical statement "temperature difference = −12℃ + 12℃," when subtraction should be used. This corresponds with Suratih & Pujiastuti (2020), who stated that transformation errors occur when students incorrectly choose the operation to solve the problem. Next, subject ZH makes a process skill error, meaning the student can choose the appropriate operation but cannot accurately complete it. For instance, subject ZH does not write the result of −12℃ + 12℃ and instead, in the interview transcript, subtracts −12℃ − (−19℃), obtaining the incorrect result of −31℃. The correct answer is 7℃. This is consistent with Suratih & Pujiastuti (2020), who noted that process skill errors involve students making calculation mistakes. Finally, subject ZH makes a writing error by failing to present the final answer correctly according to the problem's conclusion. Specifically, subject ZH does not write the conclusion, which aligns with Mursyidah *et al.* (2023), who stated that encoding or writing errors occur when students cannot correctly write the conclusion of their work.

4.3 Results of the Daily Test and Interviews with Subjects High Anxiety on Question Number 3
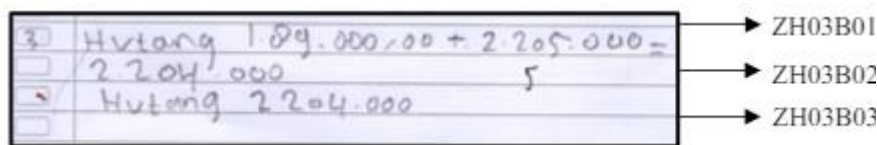

Figure 4: Subject ZH Answer to Question Number 3

In question number 3, subject ZH made several mistakes. A transformation error occurred when subject ZH incorrectly identified the required mathematical operation (ZH03B01), writing the incorrect mathematical statement: 1,089,000.00 + 2,205,000.00. This led to a process skill error (ZH03B02), where subject ZH incorrectly solved the calculation, writing the result as 2,204,000.00. This mistake also resulted in a writing error (ZH03B03), where subject ZH incorrectly concluded a debt of 2,204,000.00. From the interview results, it was found that subject ZH made a reading error by misreading the values of money and debt as Rp 2,205,000.00, Rp 1,089,000.00, and Rp 1,697,000.00. Subject ZH also made a comprehension error, being unable to understand the meaning of words, symbols, or questions, particularly when asked to interpret Rp 2,205,000.00. The transformation error recurred when subject ZH incorrectly identified the necessary mathematical operation, only adding the debts and ignoring the available money instead of considering all the information given in the question. Then, subject ZH made a process skill error, choosing the correct operation but being unable to complete it accurately. She revised her answer in the interview transcript using column addition and subtraction: Rp 2,205,000.00 + Rp 1,089,000.00 = Rp 2,204,000.00 and Rp 1,697,000.00 − Rp 2,204,000.00 = Rp −507,000.00, whereas the correct result should be Rp 2,205,000.00 + Rp 1,089,000.00 = Rp 3,294,000.00 and then Rp 1,697,000.00 - Rp 3,294,000.00 = Rp −1,597,000.00. As a result, subject ZH also made a writing error, correctly demonstrating the operation but incorrectly writing the final answer, concluding with the incorrect amount of Rp 507,000.00. These errors can be seen in the transcript of ZH's interview regarding daily test question number 3.

ZHW1043P: "*Okay, it's all right. Next, for question number 3, please read the question first. If there are any words or numbers you don't know, just skip them.*"
ZHW1044S: "*Mrs. Ani has a debt at the shop of two. Then Mrs. Ani comes back to the shop and borrows another one. Mrs. Ani has a large amount of money that is used entirely to pay off the debt. What is the remaining money or debt that Mrs. Ani has?*"
ZHW1045P: "*All right, next (pointing to the debt of Rp* 2,205,000.00*). What does this mean?*"
ZHW1046S: "*Umm, it means I don't know, and I also forgot how to read it, Ustadzah* (Appears worried and anxious).*"
ZHW1047P: "*That okay (pointing to Rp* 2,205,000.00*), it is read as two million two hundred five thousand rupiahs. Furthermore, it means the debt is two million two hundred five thousand rupiahs. Now tell me, what is the question asking you to solve?*"
ZHW1048S: "*The question is asking what the remaining money or debt that Mrs. Ani has is.*"

ZHW1049P: "*What do you mean by that sentence?*"

ZHW1050S: "*Umm, it means what is left, money or debt.*"

ZHW1051P: "*Okay, next, show me how you start finding the answer to this question.*"

ZHW1052S: "*I start finding the answer by adding up the debts* (Appears hesitant in answering)."

ZHW1053P: "*Why are you only considering the debt and ignoring the money that Mrs. Ani has, which is given in the question?*"

ZHW1054S: "*Umm* (Pauses for a long time but continues answering). *Because I thought only the debt should be considered, Ustadzah (Her voice is trembling and hesitant).*"

ZHW1055P: "*Okay, you should also consider what is given in the question. To find out the remaining money or debt that Mrs. Ani has, subtract the total debt from the amount of money she has. Next, show me how you get the answer.*"

ZHW1056S: "Rp 1,697,000.00 − Rp 2,205,000.00 + Rp 1,089,000.00 (Fidgeting with her feet and fingers)."

ZHW1057P: "*Next, please tell me what you did next. Make sure to write down the answer to the question.*"

ZHW1058S: "*The way to solve it is using column addition and subtraction, Rp* 2,205,000.00 + *Rp* 1,089,000.00 = *Rp* 2,204,000.00. *Then Rp* 1,697,000.00 − *Rp* 2,204,000.00 = *Rp* −507,000.00. *So, the result is Rp* 507,000.00 (Appears hesitant in answering)."

In question number 3, the mistake made by subject ZH is a reading error. The student incorrectly reads the problem, specifically misreading the amounts of money and debts as Rp2,205,000.00, Rp1,089,000.00, and Rp1,697,000.00. This aligns with the research by Clements (1980), which states that if a student misreads and cannot read keywords in the problem, the error is classified as a reading error. Next, subject ZH experiences a comprehension error. The student cannot understand the meaning of words, symbols, or questions, as evidenced when subject ZH is asked to interpret Rp2,205,000.00 but cannot respond. This aligns with the research by Friantini & Winata (2020), which states that comprehension errors occur when students cannot understand the sentences in the problem. Additionally, subject ZH makes a transformation error by incorrectly identifying the required mathematical operation. Subject ZH immediately writes an incorrect mathematical statement, 1,089,000.00 + 2,205,000.00, and when asked to show how to find the answer, ZH only sums the debts, ignoring the money possessed, which should have been considered according to the problem. This corresponds with Suratih & Pujiastuti (2020), who stated that transformation errors occur when students incorrectly choose the operation needed to solve the problem. Subsequently, subject ZH makes a process skill error. While the students can choose the appropriate operation, they cannot complete it accurately. For example, ZH writes the result of the operation as 2,204,000.00 and revises the answer in the interview transcript by using addition and subtraction, Rp2,205,000.00 + Rp1,089,000.00 = Rp2,204,000.00. Then, Rp1,697,000.00 - Rp2,204,000.00 = -Rp507,000.00. The correct results should be Rp2,205,000.00 + Rp1,089,000.00 = Rp3,294,000.00 and then Rp1,697,000.00 - Rp3,294,000.00 = -Rp1,597,000.00. This is consistent with Mursyidah *et al.* (2023), who stated that process skill errors occur because students can determine the method and operation but cannot complete the operation accurately. Finally, this leads to a writing error where the student can show the correct operation but writes the final answer incorrectly. Specifically, subject ZH writes the debt

as 2,204,000 and revises the answer in the interview transcript but still incorrectly concludes the result as Rp507,000.00. This aligns with Mursyidah *et al.* (2023), who stated that writing or encoding errors occur because students can show the correct calculation but write the final answer incorrectly.

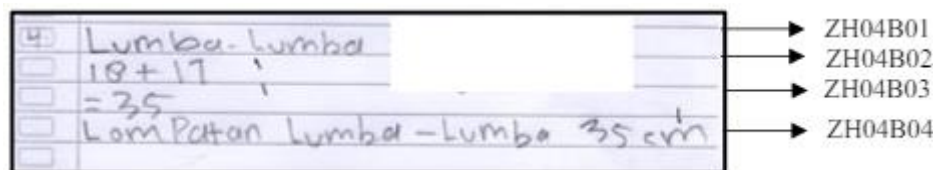## 4.4 Results of the Daily Test and Interviews with Subjects High Anxiety on Question Number 4

Figure 5: Subject ZH Answer to Question Number 4

In question number 4, subject ZH made several mistakes. A transformation error occurred when subject ZH incorrectly identified the required mathematical operation (ZH04B02), by writing the incorrect mathematical statement as 18 + 17, whereas the operation needed was subtraction, which should have been height at the end – height at the beginning. This led to a process skill error (ZH04B03), where subject ZH incorrectly solved the calculation, writing the result as 35, despite having made a mistake in writing the mathematical statement 18 + 17. This error also resulted in a writing error (ZH04B04), where subject ZH concluded that the dolphin's jump was 35 *cm*. From the interview results, it was found that subject ZH made a comprehension error. Although subject ZH could read the problem well, they did not understand the meaning of words, symbols, or questions, specifically the meaning of the word "depth" and the question of "what is the height of the dolphin's jump?". A recurring transformation error occurred when subject ZH again misidentified the required mathematical operation, calculating the height of the dolphins' jump by adding the heights instead of using subtraction. Subject ZH also made a process skill error, selecting the correct operation but failing to perform it accurately. In the interview transcript, subject ZH revised the answer by performing the subtraction 37 – (−18) using column subtraction but obtained the wrong result of 19. Consequently, subject ZH also made a writing error, demonstrating the correct operation but incorrectly writing the final answer, concluding that the height of the dolphins' jump was 19, whereas the correct answer should have been 55 *m*. These errors are evident from the transcript of the interview recording for ZH on daily test question number 4.

ZHW1059P: *"Okay, it is all right. Next, for question number 4, please read question number 4 first. If there are any words or numbers that you do not understand, just ignore them."*
ZHW1060S: *"A dolphin is swimming at a depth of negative eighteen meters below sea level. The dolphin jumps up to a height of thirty-seven meters above sea level. What is the height of the dolphin's jump?"*
ZHW1061P: *"All right, next (pointing to the word *depth*). What does this word mean?"*
ZHW1062S: *"Mmm, I do not know what it means (appears worried, anxious, and sweating)."*

ZHW1063P: *"It's okay. The word *depth* means the distance below sea level. Now, tell me what the question is asking you to do?"*

ZHW1064S: *"The question is asking for the height of the dolphins jump."*

ZHW1065P: *"What do you mean by that sentence?"*

ZHW1066S: *"I do not really know what the question is asking, Ustadzah* (appears very worried, anxious, nervous, and sweating)."

ZHW1067P: *"All right, please show me how you started to find the answer to this question."*

ZHW1068S: *"I started by calculating the height of the dolphins' jump* (appears hesitant in answering)."

ZHW1069P: *"Can you explain to me how you calculated the height of the dolphins' jump?"*

ZHW1070S: *"By adding the heights."*

ZHW1071P: *"Why did you use addition to calculate the height?"*

ZHW1072S: *"Mmm, I'm actually unsure if I should use addition or subtraction to calculate the height"* (seems unfocused).

ZHW1073P: *"Oh, I see. To find the height of the dolphins' jump, you should use subtraction, where the final height minus the initial depth is calculated, with the initial depth being below sea level and the final height being above sea level. Now, show me how you worked it out."*

ZHW1074S: $37 - (-18)$.

ZHW1075P: *"Next, tell me what you did to work on this question. Make sure to write down your answer to the question."*

ZHW1076S: *"I used column subtraction:* $37 - (-18) = 19$. *So, the result is* 19. (Appears hesitant in answering)."

In question number 4, the mistake made by subject ZH is a comprehension error. The student can read the problem well but cannot understand the meaning of the words, symbols, or questions. Specifically, subject ZH does not understand the meaning of the word "depth" and does not grasp the question about the height of the dolphins' jump. This aligns with Singh *et al.* (2010), who stated that comprehension errors occur when students can read mathematical questions but fail to understand the words, symbols, mathematical terms, or questions contained within the problem. Next, subject ZH experiences a transformation error by incorrectly identifying the required mathematical operation. Subject ZH immediately writes the incorrect mathematical statement, $18 + 17$, when the correct method to find the height of the dolphin's jump involves subtraction, i.e., final height - initial height, where the initial height is the depth below sea level and the final height is the height above sea level. When asked to show the method to find the answer, subject ZH uses addition, which is incorrect. This aligns with Suratih & Pujiastuti (2020), who stated that transformation errors occur when students incorrectly choose the operation needed to solve the problem. Then, subject ZH makes a process skill error. The student can choose the appropriate operation but cannot complete it accurately. For instance, subject ZH writes the result as 35, having initially written the incorrect mathematical statement $18 + 17$. In the interview transcript, ZH revises the answer by subtracting $37 - (-18)$ using vertical subtraction and gets 19. This is consistent with Mursyidah *et al.* (2023), who stated that process skill errors occur because students can determine the method and operation but cannot complete the operation accurately.

Finally, this leads to a writing error where the student can show the correct operation but writes the final answer incorrectly. Specifically, subject ZH writes the dolphin's jump height as 35 cm and revises it in the interview transcript to 19, when the correct answer should be 55 m. This aligns with Mursyidah *et al.* (2023), who stated that writing or encoding errors occur because students can show the correct calculation but write the final answer incorrectly.

4.5 Results of the Daily Test and Interviews with Subjects High Anxiety on Question Number 5

Figure 6: Subject ZH Answer to Question Number 5

For Question Number 5, the transformation error occurred when Subject ZH misidentified the required mathematical operation (ZH05B01), writing the incorrect mathematical expression 8 – 12 – 15, instead of first summing the temperature changes from morning to noon and then subtracting the temperature change at night. This led to a process skills error, where Subject ZH incorrectly performed the calculation operation (ZH05B02), resulting in an incorrect outcome of 19. Additionally, Subject ZH made a writing error by failing to provide a final answer or conclusion. Based on the interview results, it was found that Subject ZH made a comprehension error, being able to read the problem well but failing to understand the meaning of words, symbols, or questions, specifically misunderstanding the question "What is the current temperature?" Furthermore, Subject ZH encountered another process skills error, where although they could choose the correct operation, they did not perform the operation accurately in the interview transcript by using column subtraction as $-18 - 12 - 15$. Writing errors occurred when Subject ZH showed the correct operation but wrote the final answer incorrectly, concluding with $-19°C$ instead of the correct answer of $-11°C$. These mistakes are reflected in the interview transcript for Question Number 5 in the daily test.
ZHW1077P: Okay, that is all right. Now, for Question Number 5, please read Question Number 5 first. If there are any words or numbers that ZH does not understand, just ignore them.

ZHW1078S: *"One morning, the temperature in a city was -8 degrees Celsius. By noon, the temperature increased by 12 degrees Celsius. However, by nightfall, the temperature decreased by 15 degrees Celsius. What is the current temperature?"*
ZHW1079P: *"All right, next (pointing to the word "increased"). What does this word mean?"*
ZHW1080S: *"Increased" means the temperature goes up. (Voice trembling.)"*
ZHW1081P: *"Okay. Next, tell me what the question is asking you to do?"*
ZHW1082S: *"The question is asking what the current temperature is. (While rubbing their face.)"*
ZHW1083P: *"What do you mean by that sentence?"*

ZHW1084S: "*I mean, mmm (looking sweaty and silent for a long time. It is also apparent that Subject ZH is still confused when asked about the current temperature, which refers to the temperature after considering the changes throughout the day. Subject ZH could not answer.*)"

ZHW1085P: "*Show me how you started finding the answer to this question?*"

ZHW1086S: "*To find the current temperature, you subtract the changes in temperature. Is that correct?*"

ZHW1087P: "*What method did you use to subtract the changes in temperature? Can you show me how you got the answer?*"

ZHW1088S: $-18 - 12 - 15$.

ZHW1089P: "*Oh, actually you should add the temperature change from morning to noon and then subtract the temperature change at night. Tell me what you did next. Be sure to write down the answer to the question.*"

ZHW1090S: "*Used column subtraction to calculate it*: $-18 - 12 - 15 = 19$. *So, the result is* $-19°C$. (*Appearing hesitant while answering.*)"

In question number 5, the mistake made by subject ZH is a comprehension error. The student can read the problem well but cannot understand the meaning of the words, symbols, or questions. Specifically, subject ZH does not understand the question asking about the current temperature. This aligns with Singh *et al.* (2010), who stated that comprehension errors occur when students can read mathematical questions but fail to understand the words, symbols, mathematical terms, or questions contained within the problem. Next, subject ZH experiences a transformation error by incorrectly identifying the required mathematical operation, choosing the wrong operation to use. This aligns with Suratih & Pujiastuti (2020), who stated that transformation errors occur when students incorrectly choose the operation needed to solve the problem. Then, subject ZH makes a process skill error. The student can choose the appropriate operation but cannot complete it accurately. For instance, ZH writes the result as 19 and revises the answer in the interview transcript when asked to show the method to find the answer. ZH finds the current temperature by subtracting the temperature change using vertical subtraction: $-18 - 12 - 15$. This is consistent with Mursyidah *et al.* (2023), who stated that process skill errors occur because students can determine the method and operation but cannot complete the operation accurately. This leads to a writing error where the student can show the correct operation but writes the final answer incorrectly. Specifically, subject ZH does not write the conclusion and revises the answer in the interview transcript but still incorrectly concludes the result as $-19°C$, whereas the correct answer should be $-11°C$. This aligns with Mursyidah *et al.* (2023), who stated that writing or encoding errors occur because students can show the correct calculation but write the final answer incorrectly.

Subject ZH often makes mistakes due to frequently not fully understanding the questions given, as evidenced by their confusion when answering and frequent hesitation. They often use incorrect or inappropriate arithmetic operations, such as adding or subtracting numbers without considering the context. This aligns with the characteristics of anxiety, according to Suren & Ali Kandemir (2020), which include

difficulty concentrating, confusion, inability to understand the material presented by the teacher, inability to solve problems independently, and lack of confidence. ZH feels afraid of making mistakes, dislikes mathematics, and worries about making errors in front of classmates, impacting their performance in answering questions. This is consistent with what Muyasaroh (2020) stated: anxiety is essentially a psychological condition filled with fear and worry about something uncertain.

ZH exhibits physical signs of severe anxiety, such as moving their feet and fingers, sweating, and having a trembling voice. They often provide answers without adequate explanation or with incorrect explanations, appearing more focused on giving quick answers, often without considering the proper way to solve the problem or fully understanding the question posed. This corresponds with the characteristics of severe anxiety described by Stuart & Sundeen (1998), where individuals tend to focus on specific details and not think about anything else. All behaviors are aimed at reducing tension.

4.7 Results of the Daily Test and Interviews with Subjects Moderate Anxiety on Question Number 1
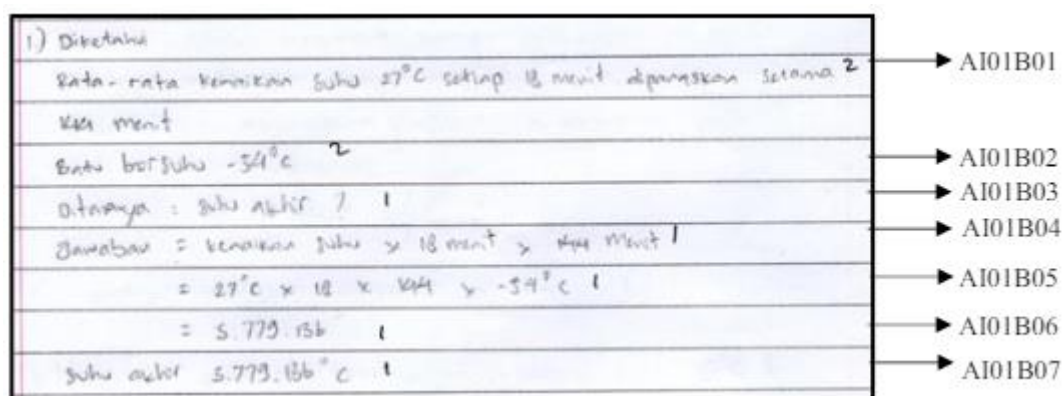
Figure 7: Subject AI Answer to Question Number 1

In the daily test results for question number 1. The transformation error occurred when AI failed to identify the correct mathematical operation required (AI01B04), writing the incorrect mathematical statement: temperature increase × 18 minutes × 144 minutes, and writing (AI01B05) $27 \times 18 \times 144 \times -54$, when the correct method should have been to add the initial temperature to the total temperature increase after heating, which is $-54 + 27 \times (144 \div 18)$. This mistake led to a process skill error (AI01B06), with the result of the calculation being wrong, 3,779,136, and a writing error (AI01B07), where the final temperature conclusion was incorrectly stated as 3,779,136°C. The interview revealed that AI repeated the transformation error by mistakenly identifying the mathematical operation needed, thinking that the final temperature could be determined by multiplying the stones temperature, the temperature after heating, and the duration of heating, and only using multiplication due to the temperature increase. This led to repeated process skill and writing errors, with the incorrect calculation result and final

conclusion of 3,779,136℃. These mistakes are documented in the transcript of the interview with AI for question number 1 from the daily test.

AIW1009P: *"Please read question number 1 first. If there are any words or numbers that you do not understand, just ignore them."*
AIW1010S: *"Fitrah is conducting an experiment in the laboratory. A piece of rock with a temperature of negative fifty-four degrees Celsius is heated at an average temperature increase of twenty-seven degrees Celsius every eighteen minutes. If the rock is heated for a total of one hundred forty-four minutes, what is the final temperature of the rock? (With a tense expression, they read the question carefully."*
AIW1011P: *"Next, (pointing to −54℃) what does this mean?"*
AIW1012S: *"The number −54 represents the temperature in degrees Celsius. (Voice trembling and hesitant.)"*
AIW1013P: *"Good, now tell me what the question in the problem is asking you to solve."*
AIW1014S: *"The question is asking for the final temperature."*
AIW1015P: *"What do you understand by that phrase?"*
AIW1016S: *"It means mmm. (Pauses for a long time.) The final temperature refers to the temperature that the rock will reach after being heated."*
AIW1017P: *"Show me how you started finding the answer to this question."*
AIW1018S: *"To find the final temperature of the rock, I will multiply the temperature of the rock, the temperature increase, and the duration of heating. (Appears hesitant.)"*
AIW1019P: *"Why did you think that multiplication was the only operation to use?"*
AIW1020S: *"Because there is a temperature increase, so to find the total temperature increase, I think about how many times the rock is heated during the total time of 144 minutes. (Pointing to their work.)"*
AIW1021P: *"What did you do next to find the answer?"*
AIW1022S: *"27 × 18 × 144 × −54."*
AIW1023P: *"Tell me what you did next. Continue your work on your worksheet. Make sure to write down your answer to the question."*
AIW1024S: *"I performed the calculation using multiplication: 27 × 18 = 486. Then I multiplied 486 by 144, which gives 69,984, and then multiplied that by −54, resulting in 3,779,136. So, the answer is 3,779,136℃. (Trembling and appearing hesitant.)"*
AIW1025P: *"Wait a moment. I want to ask you about 69,984 × −54 = 3,779,136. How did you know that 69,984 × -54 = 3,779,136? Actually, the product of 69,984 × 54 is 3,779,136, but what about the sign of the multiplication with these numbers? Positive 69,984 multiplied by negative 54?"*
AIW1026S: *"The result is positive 3,779,136. So, 69,984 × −54 = 3,779,136. (Appears hesitant.)"*

Based on the interview results with subject AI regarding the daily test on mixed integer arithmetic operations, the error made by subject AI on the first question was a transformation error. The student misidentified the necessary mathematical operations, directly writing an incorrect mathematical expression: temperature increase 18 minutes × 144 minutes, and wrote 27 × 18 × 144 × −54. The correct approach should have been the initial temperature + total temperature increase after heating, which is −54 + 27 × (144 ÷ 18), where the initial temperature is −54 and the total temperature increase after heating is 27 × (144 ÷ 18). Subject AI incorrectly thought the way to find the final temperature was by multiplying the initial temperature, the temperature after heating, and the heating duration. Subject AI assumed that only multiplication was

needed due to the temperature increase to get the total temperature increase, thinking about how many times the stone was heated over the total time of 144 minutes. This aligns with what Suratih & Pujiastuti (2020) stated, that transformation errors occur due to the incorrect selection of operations in solving problems. This led to subject AI making a process skill error by incorrectly performing the calculation, wrongly writing the result as 3,779,136 and incorrectly stating the operational result as 3,779,136. This aligns with what Suratih & Pujiastuti (2020) mentioned, that process skill errors occur when students make mistakes in performing calculations. Furthermore, it also caused subject AI to make a writing error, incorrectly showing the final answer according to the question's conclusion, wrongly writing and showing the final temperature as 3,779,136°C. This is consistent with what Friantini & Winata (2020) stated, that writing or coding errors occur when the subject incorrectly shows and cannot correctly write the final answer requested in the question.

4.8 Results of the Daily Test and Interviews with Subjects Moderate Anxiety on Question Number 2
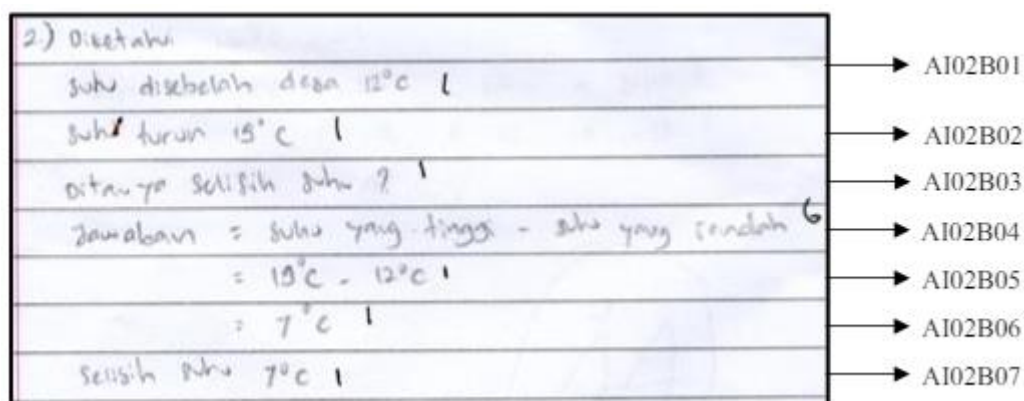
Figure 8: Subject AI Answer to Question Number 2

In question number 2, the AI subject made a transformation error by incorrectly transforming the sentence into a mathematical form (AI02B04) and (AI02B05), specifically by writing the answer as 19℃ – 12℃ for the difference between high and low temperatures, when there should have been a negative sign for the numbers 19 and 12. Based on the interview results, the AI subject also misunderstood the meaning of the word "down" even though it could read the problem correctly. Additionally, the AI subject made another transformation error when asked to show how to find the answer by subtracting 19℃ – 12℃, where there should have been a negative sign. These errors can be seen in the transcript of the interview recording for the daily test question number 2.

AIW1027P: "*It is okay. Next, for question number 2, please read question number 2 first. If there are any words or numbers that the AI doesn't understand, just ignore them.*"

AIW1028S: "*One morning, the temperature in a village dropped to −12 degrees Celsius. After a few hours, the temperature dropped again to −12 degrees Celsius. What is the difference in temperature during this decrease?*"

AIW1029P: "*Okay, next (while pointing to the word "drop"). What does this word mean, dear?*"

AIW1030S: "*"Drop" means there is a decrease in temperature, right, teacher? (Voice trembling and appearing hesitant.)*"

AIW1031P: "*Why does the AI think "drop" means a decrease?*"

AIW1032S: "*(The AI subject is silent, confused, sweating, and struggling.) The subject is still confused about the meaning of "decrease," which refers to a reduction in temperature or a change to a lower state from before. The AI subject seems unable to provide an answer.*"

AIW1033P: "*All right, that's okay. Now, explain to the teacher what is asked in the question to solve it.*"

AIW1034S: "*The question is asking for the difference in temperature.*"

AIW1035P: "*Can the AI explain the meaning of the sentence it just said?*"

AIW1036S: "*The difference in temperature means there is a difference, teacher.*"

AIW1037P: "*Next, please tell the teacher the initial steps the AI took to find the answer to this question.*"

AIW1038S: "*The first step to find the answer is by subtracting the temperature drop from the temperature drop again (Appears hesitant in answering).*"

AIW1039P: "*Next, please explain to the teacher how the AI reached the answer to this question.*"

AIW1040S: "*The difference is high temperature minus low temperature, where the initial temperature drop = high temperature and the subsequent temperature drop = low temperature.*"

AIW1041P: "*What did the AI do next?*"

AIW1042S: "19 – 12 = 7"

AIW1043P: "*Why didn't the AI use the negative signs?*"

AIW1044S: "*I forgot, teacher. (Looks worried.)*"

AIW1045P: "*Oh, I see. Then please tell the teacher what you did next. Make sure to write down the answer to the question.*"

AIW1046S: "*The method used is column subtraction. So, the difference in temperature is* 7℃. (Appears hesitant in answering.)"

On question number 2, the error made by subject AI on the daily test was a comprehension error. The student could read the problem well but could not understand the meaning of the words, symbols, or questions; specifically, subject AI did not know the meaning of the word "decrease." This aligns with what Singh *et al.* (2010) stated, that comprehension errors occur when one can read a mathematical question but fails to understand the words, symbols, mathematical terms, or questions contained in the mathematical problem. Next, subject AI experienced a transformation error, incorrectly transforming the sentence into a mathematical form. Subject AI incorrectly wrote the answer as the higher temperature minus the lower temperature, subtracting 19℃ from 12℃, whereas there should have been a negative sign in front of both 19 and 12. When asked to show the method to find the answer, subject AI responded by subtracting 19℃ from 12℃, but there should have been a negative sign in front of both 19 and 12. This aligns with what Haerani *et al.* (2021) stated, that transformation errors occur when

students cannot transform mathematical sentences into the mathematical model used to solve a problem.

4.9 Results of the Daily Test and Interviews with Subjects Moderate Anxiety on Question Number 3
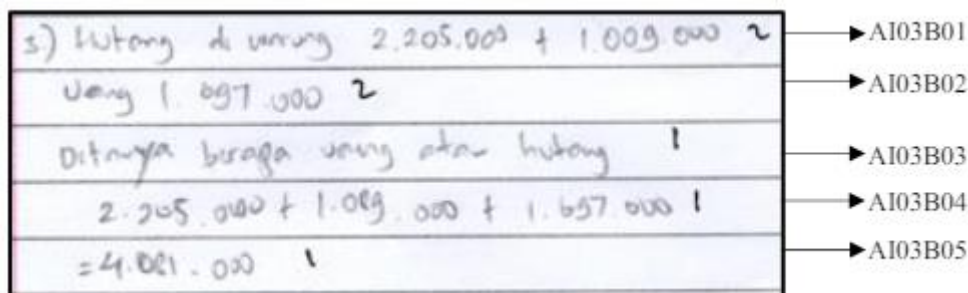

Figure 9: Subject AI Answer to Question Number 3

In question number 3, the AI subject made a transformation error by incorrectly identifying the required mathematical operation (AI03B04), specifically by writing the incorrect mathematical expression as 2,205,000 + 1,089,000 + 1,697,000.00. This led to a process skill error (AI03B05), where the calculation result written was 4,081,000.00. Additionally, the AI subject made a writing error by not providing a final answer or conclusion. Based on the interview results, a misunderstanding also occurred where the AI subject could not comprehend the meaning of words, symbols, or the question, particularly not understanding the meaning of Rp 2,205,000.00. The transformation error happened again when the AI subject incorrectly identified the required mathematical operation by adding the total debt and then adding it to the amount of money available, instead of summing the total debt and then subtracting it from the available money. This resulted in a process skill error with the operation resulting in Rp 4,081,000 using addition, whereas it should have been Rp 2,205,000.00 + Rp 1,089,000.00 = Rp 3,294,000.00 and then Rp 1,697,000.00 − Rp 3,294,000.00 = Rp −1,597,000.00. A writing error occurred again where the AI subject failed to provide a conclusion. These errors can be seen in the transcript of the interview recording for the daily test question number 3.

AIW1047P: "*Okay, its fine. Next, for question number 3, please read question number 3 first. If there are any words or numbers that the AI doesn't understand, just ignore them.*"
AIW1048S: "*Mrs. Ani has a debt of 2,205,000 rupiahs at the store. Then Mrs. Ani goes back to the store and borrows another 1,089,000 rupiahs. Mrs. Ani has 1,697,000 rupiahs which she uses entirely to pay off her debt. What is the remaining amount of money or debt that Mrs. Ani has?*"
AIW1049P: "*Okay, next (while pointing to the number Rp 2,205,000.00). What does this mean?*"
AIW1050S: "*Mmm, I don't know, teacher. (Looks worried and anxious.)*"
AIW1051P: "*Its okay, dear. It means that the debt is 2,205,000 rupiahs. Now tell the teacher what the question is asking you to do.*"
AIW1052S: "*The question is asking how much money or debt is left.*"

AIW1053P: "*What do you mean by that sentence?*"

AIW1054S: "*It means how much money or debt is left, and whether what remains is money or debt.*"

AIW1055P: "*Okay, next, show the teacher how you started finding the answer to this question.*"

AIW1056S: "*I started finding the answer by adding the debts and then adding it to the amount of money I had.* (Appears hesitant in answering.)"

AIW1057P: "*Next, show the teacher how you obtained the answer.*"

AIW1058S: "*Rp 2,205,000.00 + Rp 1,089,000.00 + Rp 1,697,000.00*"

AIW1059P: "*Then tell the teacher what you did next. Continue your work on the worksheet and make sure to write down the answer to the question.*"

AIW1060S: "*I used column addition:* 2,205,000 *+ Rp* 1,089,000 *+ Rp* 1,697,000. *So the result is Rp* 4,081,000.00. (Appears hesitant in answering.)"

On question number 3, the error made by subject AI on the daily test was a comprehension error. The student could read the problem well but could not understand the meaning of the words, symbols, or questions; specifically, subject AI did not know the meaning of Rp2,205,000.00. This aligns with what Singh *et al.* (2010) stated, that comprehension errors occur when one can read a mathematical question but fails to understand the words, symbols, mathematical terms, or questions contained in the mathematical problem. Next, subject AI experienced a transformation error, incorrectly identifying the necessary mathematical operations. Subject AI wrote the incorrect mathematical expression 2,205,000 + 1,089,000 + 1,697,000.00. When asked to show how to start finding the answer, subject AI added the total debts and then added it again to the amount of money they had, whereas the correct method would be to add the total debts and then subtract the total debts from the amount of money they had. This aligns with what Suratih & Pujiastuti (2020) stated: transformation errors occur due to incorrect selection of operations when solving problems. This led to the subject AI making a process skill error by incorrectly performing the calculation, writing the result as 4,081,000.00, and showing the operational result as Rp4,081,000 using the column addition method. The correct result should be Rp2,205,000.00 + Rp1,089,000.00 = Rp3,294,000.00, then Rp1,697,000.00 - Rp3,294,000.00 = −Rp1,597,000.00. This aligns with what Suratih & Pujiastuti (2020) stated, that process skill errors occur when students make mistakes in performing calculations. Furthermore, it resulted in a writing error, where the student could not write the final answer. Subject AI did not write a conclusion, which aligns with what Mursyidah *et al.* (2023) stated, that encoding or writing errors occur when students cannot accurately write the conclusion of their work.

4.10 Results of the Daily Test and Interviews with Subjects Moderate Anxiety on Question Number 4
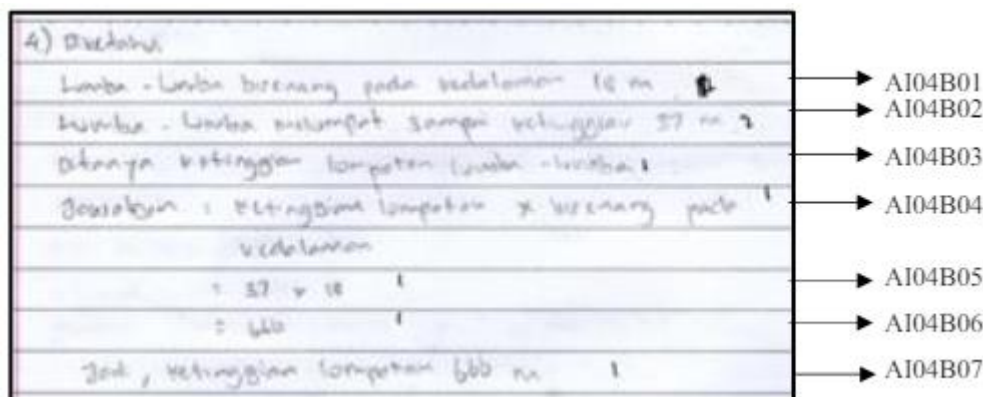

Figure 10: Subject AI Answer to Question Number 4

In question number 4, the AI subject made a transformation error by incorrectly identifying the required mathematical operation (AI04B04 and AI04B05), specifically by writing the incorrect mathematical expression as 37×18, instead of subtracting the initial height from the final height. This error led to a process skill error (AI04B06) with the calculation result being 666, although the mathematical expression itself was incorrect. Additionally, the AI subject made a writing error by showing the incorrect final answer, which was a jump height of 666 meters. Based on the interview, the AI subject also experienced a comprehension error where, despite being able to read the problem correctly, the subject did not understand the meaning of the word "depth" and the intent of the question about the dolphin's jump height. Another transformation error occurred when the AI subject was asked to show how to find the answer by incorrectly multiplying the jump height and the depth of the swim. This led to a process skill error with the operation result of 666, and a writing error with the conclusion of the jump height being 666 meters, whereas the correct answer was 55 meters. These errors can be seen in the transcript of the interview recording for the daily test question number 4.

AIW1061P: *"Its okay, dear. Next, for question number 4, please read question number 4 first. If there are any words or numbers that the AI doesn't understand, just ignore them."*
AIW1062S: *"A dolphin is swimming at a depth of −18 meters below the sea surface. The dolphin jumps to a height of 37 meters above the sea surface. What is the height of the dolphins' jump?"*
AIW1063P: *"Okay, next (while pointing to the word "depth"). What does this word mean?"*
AIW1064S: *"It means I don't know. (Looks worried, anxious, and sweating.)"*
AIW1065P: *"Its okay, dear. "Depth" means the distance below the sea surface. Now tell the teacher what the question is asking you to do."*
AIW1066S: *"The question is asking for the height of the dolphins' jump."*
AIW1067P: *"What do you mean by that sentence?"*
AIW1068S: *"I don't know what the question is asking either. (Looks very worried, anxious, nervous, and sweating.)"*
AIW1069P: *"Okay, next, please show the teacher how you started finding the answer to this question."*

AIW1070S: "*I started finding the answer by calculating how high the dolphins' jump was.* (Appears hesitant in answering.)"

AIW1071P: "*Please explain to the teacher how you calculate the height of the dolphins' jump.*"

AIW1072S: "*By multiplying the jump height and the depth.*"

AIW1073P: "*Why did you use multiplication to calculate the height?*"

AIW1074S: "*Because height is a distance, so I used multiplication, teacher.*"

AIW1075P: "*Oh, I see. Yes, height is a distance, but the question is asking for the height of the dolphin's jump, where the initial height and final height are given, not the time. Now, show the teacher how you got the answer.*"

AIW1076S: "37 × 18."

AIW1077P: "*Next, tell the teacher what you did next. Make sure to write down the answer to the question.*"

AIW1078S: "*I used column multiplication:* 37 × 18 = 666. *So, the height of the jump is 666 meters.* (Appears hesitant in answering)."

In question number 4, the error made by subject AI on the daily test was a comprehension error. The student could read the problem well but could not understand the meaning of the words, symbols, or questions; specifically, subject AI did not understand the meaning of the word "depth" and did not grasp the question asking for the height of the dolphin's jump. This aligns with what Singh *et al.* (2010) stated, that comprehension errors occur when one can read a mathematical question but fails to understand the words, symbols, mathematical terms, or questions contained in the mathematical problem. Next, subject AI made a transformation error, incorrectly identifying the necessary mathematical operations. Subject AI wrote the incorrect mathematical expression: height of the jump × swimming at depth, and wrote 37 × 18, whereas it should have been final height minus initial height (initial height = depth below sea level and final height = height above sea level). When asked to show the method to find the answer, subject AI calculated by multiplying the height of the jump and swimming at depth. This aligns with what Suratih & Pujiastuti (2020) stated, that transformation errors occur due to incorrect selection of operations in solving problems. This led to subject AI making a process skill error by incorrectly performing the calculation, showing the result as 666, even though subject AI had already incorrectly formulated the mathematical expression as 37 × 18. This aligns with what Suratih & Pujiastuti (2020) stated, that process skill errors occur when students make mistakes in performing calculations. Furthermore, this resulted in a writing error, where the student incorrectly showed the final answer according to the question's conclusion. Subject AI concluded the height of the jump as 666 m, whereas the correct answer should have been 55 m. This aligns with what Friantini & Winata (2020) stated, that writing or coding errors occur when the subject incorrectly shows and cannot accurately write the final answer requested in the question.

4.11 Results of the Daily Test and Interviews with Subjects Moderate Anxiety on Question Number 5
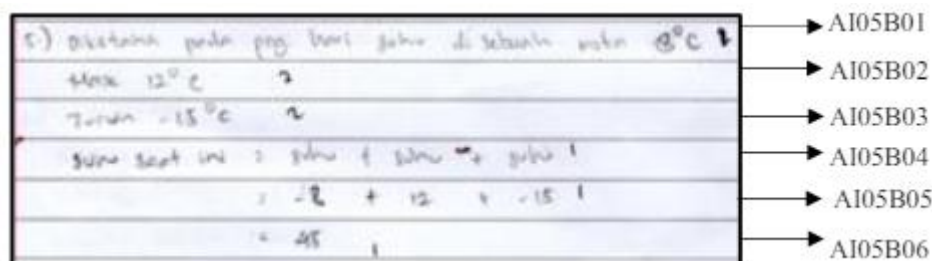

Figure 10: Subject AI Answer to Question Number 5

In question number 5, the AI subject made a transformation error by incorrectly identifying the required mathematical operation (AI05B04 and AI05B05). The subject wrote the incorrect mathematical expression as temperature + temperature + temperature and $-8 + 12 + (-15)$, when they should have first added the temperature changes from morning to afternoon and then subtracted the temperature change at night. This error led to a process skill error (AI05B06), with the calculation result being 45. Additionally, the AI subject made a writing error by not providing a conclusion. Based on the interview, the transformation error was repeated, where the AI subject misidentified the necessary mathematical operation by directly summing the temperature changes instead of adding the temperature changes from morning to afternoon and then subtracting the night temperature change. This caused a process skill error, with the AI subject showing the result of the operation using column addition $-8 + 12 + (-15) = 45$. As a result, the AI subject also made a writing error by showing the incorrect conclusion that the result is 45℃. These errors can be seen in the transcript of the interview recording for daily test question number 5.

AIW1079P: "*Okay, its fine. Next, for question number 5, please read question number 5 first. If there are any words or numbers that the AI doesn't know, just skip them.*"
AIW1080S: "*One morning, the temperature in a city is -8 degrees Celsius. By noon, the temperature rises by 12 degrees Celsius. However, by night, the temperature drops by 15 degrees Celsius. What is the current temperature?*"
AIW1081P: "*Okay, next (while pointing to the word "rise"). What does this word mean, dear?*"
AIW1082S: "*"Rise" means there is an increase in the temperature.*"
AIW1083P: "*Now, tell the teacher what the question is asking you to do.*"
AIW1084S: "*The question is asking for the current temperature. (Voice is hesitant and trembling.)*"
AIW1085P: "*What do you mean by that sentence?*"
AIW1086S: "*It means the temperature now. (Looks sweaty.)*"
AIW1087P: "*Please show the teacher how you started finding the answer to this question.*"
AIW1088S: "*By adding the changes in temperature.*"
AIW1089P: "*How did you go about adding the changes in temperature? Can you show the teacher how you got the answer?*"
AIW1090S: "*$-8 + 12 + (-15)$.*"

AIW1091P: "*Tell the teacher what you did next. Continue your work on the worksheet and make sure to write down the answer to the question.*"
AIW1092S: "*I used column addition:* $-8 + 12 + (-15) = 45$. *So, the result is* $45°C$. (Appears hesitant in answering.)"

In question number 5, the error made by subject AI on the daily test was a transformation error. The student incorrectly identified the necessary mathematical operations, writing an incorrect mathematical expression: temperature + temperature + temperature and $-8 + 12 + -15$, whereas they should have first summed the temperature change from morning to noon and then subtracted the temperature change in the evening. Subject AI found the answer by adding the temperature changes, but they should have first summed the temperature change from morning to noon and then subtracted the temperature change in the evening. This aligns with what Suratih & Pujiastuti (2020) stated, that transformation errors occur due to incorrect selection of operations in solving problems. This led to subject AI making a process skill error by incorrectly performing the calculation, writing the result as 45, and showing the result of the calculation using column addition: $-8 + 12 + (-15) = 45$. This aligns with what Suratih & Pujiastuti (2020) stated, that process skill errors occur when students make mistakes in performing calculations. Furthermore, this resulted in a writing error, where the student incorrectly showed the final answer according to the question's conclusion. Subject AI did not write a conclusion and corrected their answer in the interview transcript to the wrong conclusion: $45°C$. This aligns with what Friantini & Winata (2020) stated, that writing or coding errors occur when the subject incorrectly shows and cannot accurately write the final answer requested in the question.

Subject AI made errors by focusing only on the mechanical or procedural steps in solving problems without truly understanding the basic concepts and logic behind them. This aligns with what Diana *et al.* (2020) stated, that generally, students with moderate anxiety still do not fully understand the concepts but are able to complete each step, though not comprehensively. Some indications of this include errors in arithmetic operations and concepts. In the first question, Subject AI made a mistake by repeatedly using multiplication operations without understanding that what was needed was the addition of temperature increases over specific time intervals. In the second question, Subject AI misunderstood the concept of temperature difference and performed subtraction without considering the negative signs. In the third question, Subject AI considered the addition of debts and payments as the correct solution step, whereas it should have been subtraction to calculate the remaining debt. In the fourth question, Subject AI again used multiplication to calculate the height of the jump, whereas addition or subtraction from the initial to the final position should have been used. In the fifth question, Subject AI added temperature changes but did not correctly account for positive and negative signs. Subject AI showed a lack of understanding of basic mathematical concepts such as negative temperatures, addition and subtraction with negative numbers, and how to convert units of time and temperature. Subject AI often

hesitated in providing answers and showed signs of anxiety, such as a trembling voice, shaking, and sweating. This indicates anxiety that may interfere with the thinking and understanding process, as stated by Ramadan (2019), that the characteristics of anxiety include unpleasant conditions such as fear, trembling, sweating, worrying, and dislike, which are subjective and arise due to a sense of insecurity about potential dangers, disrupting the way of thinking.

Subject AI also expressed a fear of making mistakes due to worrying about the reactions of the teacher and classmates, as well as pressure from parents to achieve high grades. Subject AI tended to follow mechanical steps without attempting to understand or analyze the problem more deeply. For instance, AI would immediately perform arithmetic operations without questioning whether the operation was appropriate for the context of the problem. This aligns with what Harefa *et al.* (2023) stated, that math anxiety is a feeling of pressure, even fear, combined with extreme errors in numbers when solving math problems.

5. Recommendations

Teachers should emphasize to students the importance of systematically and comprehensively writing their answers, starting from stating what is known from the problem, identifying the questions that need to be solved, and outlining the problem-solving approach. It is important to remind students to include conclusions where necessary so that others can understand the meaning of their answers. Often, mistakes occur because conclusions are not mentioned. Teachers should encourage and create a learning atmosphere that is enjoyable so that students feel confident, calm, and unafraid to face mathematics, especially those with severe anxiety. Using research findings to understand the factors causing math anxiety is crucial. Teachers should aim to alleviate rather than exacerbate student anxiety. For example, daily assessments can be modified to focus more on conceptual understanding rather than solely testing problem-solving abilities under time constraints.

Students should regularly practice solving problems related to mixed integer arithmetic operations, especially those involving everyday scenarios. Such practice will help build confidence and reduce anxiety when facing math problems. It is advisable to change negative attitudes towards mathematics and believe that with effort and practice, understanding and mastering mathematical concepts is achievable.

For future researchers, it is recommended to conduct more in-depth interviews with subjects to better understand the mistakes made by students and the causes of math anxiety, thereby finding solutions to address these errors.

6. Conclusion

Based on the research results and discussion, it can be concluded that: subjects with severe anxiety, ZH, in question number 1 made reading errors, comprehension errors,

transformation errors, process skill errors, and writing errors. In question number 2, ZH experienced comprehension errors, transformation errors, process skill errors, and writing errors. In question number 3, there were reading errors, comprehension errors, transformation errors, process skill errors, and writing errors. In question number 4, ZH had comprehension errors, transformation errors, process skill errors, and writing errors. In question number 5, there were comprehension errors, transformation errors, process skill errors, and writing errors. Subject with moderate anxiety, AI, in question number 1 experienced transformation errors, process skill errors, and writing errors. In question number 2, AI had comprehension errors and transformation errors. In question number 3, there were comprehension errors, transformation errors, process skill errors, and writing errors. In question number 4, AI experienced comprehension errors, transformation errors, process skill errors, and writing errors. In question number 5, there were transformation errors, process skill errors, and writing errors.

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