# Quality Of Algebra Questions to Measure Mathematical Literacy Ability Using Partial Credit Model 

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#### Abstract

Mathematical literacy skills require someone to understand, analyze, interpret, evaluate, and synthesize knowledge obtained from the problems faced by modeling them into appropriate solutions in solving a problem effectively. The need to develop questions according to students' daily problems can familiarize students with mathematical literacy. The research developed mathematical literacy test questions on tobacco farming in the Puger Jember area to measure students' mathematics literacy abilities at the high school level. The research method used is Research and Development (R\&D) using the Thiagarajan model, which is modified into three stages: definition, planning, and development. Field trial results were analyzed using Ministep software with Rasch modeling using the Partial Credit Model (PCM) method. The results obtained from the ten questions developed can be said to be fit; with the reliability of 139 interactions between students and the question items, the quality is still poor, and 75 students' interactions between students and the question items are of good quality. The item reliability of the literacy questions developed was 0.80 in the first 75 samples, 0.95 in the following 75 samples, and 0.89 in the last 64 samples, indicating that the questions developed were excellent and could measure students' abilities well.


Keywords: Algebra Literacy Problems, Mathematical Literacy Skills, Partial Credit Model
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## INTRODUCTION

Mathematical literacy is the ability of each individual to reason mathematically to formulate, use, and interpret mathematical knowledge related to problems in everyday life (Dinni, 2018; OECD, 2021). Mathematical literacy is an idea or notion that defines part of the mathematical knowledge and competencies needed in personal and social life to participate in the community as citizens who can apply, reflect, and contribute (Geiger \& Dole, 2012). Mathematical literacy is the ability of each individual to reason mathematically to formulate, use, and interpret mathematical knowledge related to problems in everyday life (Fajriyah, 2018; OECD, 2021). Every individual can use literacy skills to face problems related to mathematics using appropriate strategy selection (Muslimah \& Pujiastuti, 2020; Maharani, 2022). Mathematical literacy is about assigning material and using reasoning, concepts, facts, and mathematical tools to solve everyday problems (Genc \& Erbas, 2019; Moschkovich, 2015; Sari, 2015; Sitopu et al, 2024). Someone who understands sorting out mathematical concepts relevant to the problems will have good mathematical literacy (Setiawan et al., 2014; Kusumawardani et al., 2018). In this case, the government supports education development for the benefit of the nation and state in the future by involving countries in taking literacy skills tests.

As a member country of the OECD, Indonesia has participated in establishing PISA since 2000 (Stacey, 2011). The latest data on the average score of the 2018 PISA test in the field of science shows that Indonesian students obtained an average score of 379, which is down from the previous one in the fifth round in 2015 was 402 (Balitbang, 2018). Indonesia is at the lowest level among several participating countries in the world. One of the reasons is students' limitations regarding literacy questions; they rarely give similar questions (Ate \& Lede, 2022). Research conducted by Kurniati shows that students' ability to solve PISA questions shows that out of 30 students across several junior high schools in Jember Regency, 18 could carry out logical reasoning, analysis, evaluation, and creation well. The researcher suggests adding literacy questions at school, and it is also challenging to create instruments related to mathematical literacy (Kurniati et al., 2016).

The development of literacy questions in this research questions on algebra material, a branch of mathematics that studies structure, relationship, and quantity as a means of simplification and as a tool that helps solve problems (Hidayani, 2021). The development of questions in this research uses an agricultural theme around the students' environment, in line with Mardiyah's opinion that the use of themes found in real life allows students to find meaningful relationships with abstract ideas and their application to reallife problems (Mardiyah et al., 2021). Considering that there are still no students' mathematical literacy questions on algebra material on the theme of tobacco farming that can measure students' mathematical literacy abilities, Technology, and science are developing very rapidly, accompanied by information processing in such a way that it is causing changes in human lifestyle which is the third wave (Cintamulya, 2012)

The theme of tobacco farming in the Puger Jember area is the current conditions of society and can cause problems in real life (Bakker, 2018). The theme of tobacco farming is related to the mathematical literacy context, namely societal, with material that will be developed in the test questions, namely algebra, as part of the mathematical literacy content, namely change and relationship with competencies using the three different clusters according to PISA. Based on the description above, it can be seen that there is a need to develop mathematical literacy questions to measure students' literacy abilities. The development of questions in this research is aimed at upper-secondary students. Using the partial credit model, the questions that have been prepared can explain the quality of the questions, which can later be used to measure students' mathematical literacy abilities.

## METHODS

Mathematical literacy questions on algebra material were tested on 214 research subjects. Research on students was carried out because they had studied algebra material. The selected research subjects had various levels of mathematical literacy abilities. The first step in using the Partial Credit Model (PCM) is a summary. Prepare raw data from algebra test results with different maximum scores. Then, the raw data from Excel will be formatted into prn. Next, the data will be explained using the Ministep application. The final step is to interpret the quality of the algebra mathematical literacy question instrument. The following summary of the research method can be seen in the figure 1 .


Figure 1. Research Procedure

## Measure

Items are checked based on the following conditions.

1) OutfitMean Square ( $M N S Q$ ) value received $0,5<M N S Q<1,5$;
2) valueAccepted Outf it Z-Standardcarrefour $-2,0<Z S T D<+2,0$;Point Meaure correlfourn value $0 y o u 4<$ Pt Measure $<0,85$.
(Bambang Sumintono, 2015)

## Statistical Analysis

The test questions in this study were evaluated based on reliability, validity, descriptive statistics, and the Rasch modeling index. The assessment focuses on checking items by considering the ease of identifying sources of anxiety during measurement (Harvani et al., 2023). Literacy test questions were examined based on Cronbach's alpha value, item reliability, and separation index. By looking at Cronbach's alpha value, item reliability, and person reliability, information can be obtained that shows the quality of the instrument's reliability. ZSTD Clothing, MNSQ Score Clothing, and Pt Mean Coor will indicate the validity of the test instrument. The results of measuring mathematical literacy abilities can be seen through the separation value.

## RESULTS \& DISCUSSION

Activities began with limited trials and field trials. Limited trials were tested on a limited basis on 6 class XI students of SMA Negeri 1 Kencong, and field trials were carried
out on 216 class XI students of SMA Negeri 1 Kencong. The purpose of conducting limited trials is to measure the readability of the questions.

Meanwhile, field trials aim to measure the reliability and validity of the questions and their effectiveness. The ten questions are arranged according to indicators of students' level of mathematical literacy abilities. The problems in this test are presented by students' daily problems around tobacco farming. The developing agricultural theme requires students to know the importance of literacy skills for their future progress. What they need to know about making cigars made from Puger Jember tobacco leaves includes the planting process, land area, fertilizer required, workers, overall costs, and sales in the form of algebraic mathematics, which is very useful for them in the future.

Raw scores will be processed according to scoring guidelines. The student scores obtained will be input and processed with the help of Ministep software to predict students' mathematical literacy abilities in completing the given agricultural theme literacy test. This program will analyze using Rasch modeling. The Summary Statistics table displays all information related to the quality of the instruments used and the subjects' quality.

## Validity Analysis

Field trial results were analyzed using Ministep software with Rasch modeling and the Partial Credit Model (PCM) method. Validity analysis is the first carried out; three questions meet the three validity criteria. The rest only meet two and one criterion, but the items can still be said to be fit because they meet one criterion. The following is information about the fit of a question item.


Figure 2. Suitability of Question Items

1) Questions S1, S2, and S4 meet the criteria for Outfit MNSQ, Oufit ZSTD, and Pt Mean Corr
2) Question S3 meets the criteria for Outfit MNSQ and Oufit ZSTD
3) Questions S5, S8, S9 and S10 meet the Oufit ZSTD and Pt Mean Corr criteria
4) Questions S6 and S7 meet the Oufit ZSTD criteria

So, all the questions are categorized as fit questions, and no questions need to be changed or replaced.

## Reliability Analysis

Reliability shows that the value for the first 75 students is 0.61 ; this shows that the interaction between students and the questions is still poor. The next 75 students showed a value of 0.81 , which means that the quality of the interaction between students and the questions was excellent. In comparison, the following 64 students had a value of $<0.5$, which shows that the quality of the interaction between students and the questions was still poor. The following is a summary of field trial statistics.


Person RAW SCORE-TO-MEASURE CORRELATION $=.98$ (approximate due to missing data)
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY $=.61$ SEM $=.77$ STANDARDIZED ( 50 ITEM) RELIABILITY $=.00$

SUMMARY OF 10 MEASURED (NON-EXTREME) Item

|  | TOTAL |  |  | MODEL |  | INFIT |  | OUTFIT |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | SCORE | COUNT | MEASURE | S.E. |  | MNSQ | ZSTD | MNSQ | ZSTD |
| MEAN | 6.4 | 74.9 | 50.00 | 7.96 |  | . 99 | . 10 | . 76 | -. 01 |
| SEM | 2.4 | . 1 | 6.57 | 1.12 |  | . 12 | . 24 | . 18 | . 25 |
| P.SD | 7.3 | . 3 | 19.72 | 3.36 |  | . 35 | . 72 | . 55 | . 75 |
| S.SD | 7.7 | . 3 | 20.79 | 3.54 |  | . 37 | . 76 | . 58 | . 80 |
| MAX. | 23.0 | 75.0 | 67.51 | 11.26 |  | 1.46 | 1.20 | 1.62 | 1.19 |
| MIN. | 1.8 | 74.0 | 13.17 | 3.89 |  | . 40 | -1.28 | . 85 | -1.09 |
| REAL | 9. | TRUE SD | 17.32 SEP | RATION | 1.83 | Item | REL | ABILITY | . 77 |
| MODEL | 8. | TRUE SD | 17.73 SEPA | RATION | 2.05 | Item | REL | ABILITY | . 81 |
| S.E. | tem M | $N=6.57$ |  |  |  |  |  |  |  |

TABLE 3.1 DATA 76-150 ZOU093WS.TXT Dec 132023 19:43 INPUT: 75 Person 10 Item REPORTED: 75 Person 10 Item 2 CATS MINISTEP 5.6.3.0

SUMMARY OF 33 MEASURED Person

| \| | TOTAL SCORE | COUNT | MEASURE | $\begin{gathered} \text { MODEL } \\ \text { S.E. } \end{gathered}$ | INFIT |  | OUTFIT |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| I |  |  |  |  | MNSQ | ZSTD | MNSQ | ZSTD |
| MEAN | 1.9 | 10.0 | 36.85 | 17.27 | . 70 | -. 30 | . 52 | -. 32 |
| SEM | . 1 | . 0 | 3.78 | . 35 | . 28 | . 20 | . 30 | . 23 |
| P.SD | . 8 | . 0 | 21.36 | 1.95 | 1.57 | 1.15 | 1.72 | 1.32 |
| S.SD | . 8 | . 0 | 21.70 | 1.98 | 1.59 | 1.17 | 1.74 | 1.34 |
| MAX. | 3.0 | 10.0 | 64.52 | 19.37 | 7.52 | 4.86 | 9.90 | 6.76 |
| MIN. | 1.0 | 10.0 | 13.14 | 14.65 | . 13 | -. 94 | . 07 | -. 78 |
| REAL | 20.23 | TRUE SD | 6.86 SEP | RATION | . 34 Per | on REL | ABILITY | . 10 |
| \|MODEL | 17.38 | TRUE SD | 12.43 SEP | RATION | .72 Per | on REL | ABILITY | . 34 |
| \| S.E. | erson M | $\mathrm{AN}=3.7$ |  |  |  |  |  |  |

Person RAW SCORE-TO-MEASURE CORRELATION $=1.00$
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY $=.57$ SEM $=.72$ STANDARDIZED ( 50 ITEM) RELIABILITY $=.85$

SUMMARY OF 5 MEASURED Item

|  | TOTAL |  |  | MODELS.E. |  | INFIT |  | OUTFIT |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | SCORE | COUNT | MEASURE |  |  | MNSQ | ZSTD | MNSQ | ZSTD |
| MEAN | 12.6 | 75.0 | 50.00 | 7.63 |  | . 93 | -. 29 | 2.10 | . 48 |
| SEM | 5.6 | . 0 | 17.36 | 1.17 |  | . 12 | . 48 | . 69 | . 64 |
| P.SD | 11.3 | . 0 | 34.72 | 2.33 |  | . 25 | . 95 | 1.38 | 1.29 |
| S.SD | 12.6 | . 0 | 38.81 | 2.61 |  | . 28 | 1.06 | 1.54 | 1.44 |
| MAX. | 31.0 | 75.0 | 87.14 | 10.26 |  | 1.13 | . 43 | 3.41 | 1.58 |
| MIN. | 1.0 | 75.0 | -4.39 | 5.01 |  | . 52 | -1.97 | . 31 | -1.35 |
| REAL | 8.39 | TRUE SD | 33.69 SE | RATION | 4.02 |  | m REL | ABILITY | . 94 |
| \|MODEL | 7.98 | TRUE SD | 33.79 SE | RATION | 4.24 | 4 It | m REL | ABILITY | . 95 |
| S.E. | tem MEA | $=17.36$ |  |  |  |  |  |  |  |

TABLE 3.1 DATA 151-214
ZOU656WS.TXT Dec 152023 18:30 INPUT: 64 Person 10 Item REPORTED: 64 Person 10 Item 2 CATS MINISTEP 5.6.3.0

SUMMARY OF 36 MEASURED (NON-EXTREME) Person

|  | TOTAL |  |  | MODEL |  |  | OUTF |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | SCORE | COUNT | MEASURE | S.E. | MNSQ | ZSTD | MNSQ | ZSTD |
| MEAN | 1.1 | 10.0 | 30.43 | 20.68 | 1.01 | -. 19 | . 62 | -. 40 |
| SEM | . 0 | . 0 | 1.30 | . 36 | . 38 | . 18 | . 22 | . 14 |
| P.SD | . 3 | . 0 | 7.69 | 2.15 | 2.24 | 1.05 | 1.31 | . 85 |
| S.SD | . 3 | . 0 | 7.80 | 2.18 | 2.28 | 1.06 | 1.33 | . 87 |
| MAX. | 2.0 | 10.0 | 55.92 | 21.33 | 7.24 | 2.46 | 4.20 | 1.77 |
| MIN. | 1.0 | 10.0 | 28.11 | 13.54 | . 11 | -. 97 | . 07 | -. 79 |
| REAL | 27.53 | TRUE SD | . 00 SEP | RATION | . 00 Per | O REL | ABILITY | . 00 |
| MODEL | 20.79 | TRUE SD | . 00 SEP | RATION | . 00 Per | on REL | ABILITY | . 00 |
| S.E. OF Person MEAN $=1.30$ |  |  |  |  |  |  |  |  |

Person RAW SCORE-TO-MEASURE CORRELATION $=1.00$
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY $=.00$ SEM $=.58$ STANDARDIZED (50 ITEM) RELIABILITY $=.00$

SUMMARY OF 4 MEASURED (NON-EXTREME) Item

| \| | TOTAL |  | MEASURE MODEL |  | INFIT |  |  | OUTFIT |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| , | SCORE | COUNT |  |  |  | MNSQ | ZSTD | MNSQ | ZSTD |
| MEAN | 9.8 | 64.0 | 50.00 | 7.89 |  | . 97 | . 24 | . 62 | -. 13 |
| SEM | 7.5 | . 0 | 14.71 | 1.48 |  | . 11 | . 17 | . 28 | . 32 |
| P.SD | 12.9 | . 0 | 25.48 | 2.57 |  | . 19 | . 29 | . 48 | . 55 |
| S.SD | 15.0 | . 0 | 29.43 | 2.97 |  | . 21 | . 34 | . 56 | . 64 |
| MAX. | 32.0 | 64.0 | 70.61 | 10.46 |  | 1.26 | . 74 | 1.25 | . 67 |
| MIN. | 1.0 | 64.0 | 8.20 | 5.31 |  | . 81 | . 04 | . 15 | -. 64 |
| REAL | E 8. | TRUE SD | 24.06 SEP | RATION | 2.86 | It | REL | ABILITY | . 89 |
| \|MODEL | 8. | TRUE SD | 24.09 SEP | RATION | 2.90 | It | REL | ABILITY | . 89 |
| S.E. | tem M | $=14.71$ |  |  |  |  |  |  |  |

Figure 3. Summary Statistics

The reliability values of the respondents obtained showed that the first 75 students and the remaining 64 students were unreliable (Aprillia et al., 2021). Meanwhile, the item reliability of the numeracy questions developed was 0.80 in the first 75 samples, 0.95 in the following 75 samples, and 0.89 in the last 64 samples, indicating that the questions developed were excellent and could measure students' abilities well.

| table 13.1 DATA 1-75 <br> zOU969wS.TXT Dec 212023 19:25 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| TABLE 13.1 DATA 1-75 <br> INPUT: 75 Person 10 |  |  | REPORTED: 75 Person |  |  |  | 10 Item 2 |  | CATS MINISTEP 5.6.3.0 |  |  |  |  |
| SEP.: .00 REL.: .00 ... Item: REAL SEP.: 1.83 REL |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Item STATISTICS: MEASURE ORDER |  |  |  |  |  |  |  |  |  |  |  |  |  |
| \|ENTRY | total | total | JMLE | MODEL |  | NFIT |  | TFIT | PTMEASU | R-AL | EXACT | MATCH\| |  |
| \|NUMBER | SCORE | COUNT | MEASURE | S.E. \| | MNSQ | ZSTD | \|MNSQ | ZSTD\| | CORR. | EXP. | OBS\% | ExP\%\| | Item |
| 3 | 1 | 75 | 67.51 | 11.26 | 1.46 | . 75 | . 71 | . 24 \| | . 21 | . 29 \| | 97.1 | 97.1\| | 53 |
| 6 | 1 | 75 | 67.51 | 11.26 | 1.33 | .63\| | . 32 | -.20\| | . 27 | . 29\| | 97.1 | 97.1\| | 56 |
| 7 | 1 | 75 | 67.51 | 11.26 | 1.33 | .63\| | . 32 | -.20\| | . 27 | .29\| | 97.1 | 97.1\| | S7 |
| 9 | 1 | 75 | 67.51 | 11.26 | . 40 | -.63\| | . 05 | -.87\| | . 44 | . 29\| | 97.1 | 97.1\| | 59 |
| 10 | 1 | 75 | 67.51 | 11.26 | . 40 | -.63 | . 85 | -.87\| | . 44 | .29\| | 97.1 | 97.1\| | S10 |
| 1 | 4 | 75 | 48.33 | 6.84\| | \| 96 | . 05 | \|1.19 | .49\| | . 45 | . 45 | 91.4 | 90.51 | S1 |
| 8 | 5 | 75 | 45.01 | 5.48 | 1.06 |  | \| 1.62 | 1.09\| | . 42 | .48\| | 88.6 | 87.8\| | 58 |
| 2 | 13 | 75 | 28.73 | 3.95\| | . 99 | . 02 \| | \| 1.00 | .08\| | . 63 | . 63 \| | 74.3 | 73.3\| | S2 |
| 4 | 14 | 75 | 27.20 | 3.89\| | . 79 | -1.28 | . 71 | -1.09 \| | . 72 | .64\| | 71.4 | 71.7\| | S4 |
| 5 | 23 | 74 | 13.17 | 3.96\| | 1.17 | 1.20 \| | \| 1.59 | 1.19\| | . 68 | . 74 | 67.6 | 67.8 \| | 55 |
| MEAN | 6.4 | 74.9 | 50.00 | 7.96\| | . 99 | .10\| | . 76 | -.01\| |  |  | 87.9 | 87.6\| |  |
| P.SD | 7.3 | . 3 | 19.72 | $3.36 \mid$ | . 35 | .72\| | \| . 55 | .75\| |  |  | 11.4 | 11.4\| |  |


| TABLE 13.1 DATA $76-150$ |  | ZOU093WS.TXT Dec 13 | 2023 | $19: 43$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| INPUT: 75 Person 10 Item REPORTED: 75 Person 10 Item 2 CATS MINISTEP 5.6.3.0 |  |  |  |  |

Person: REAL SEP.: . 94 REL.: . 47 ... Item: REAL SEP.: 2.27 REL.: . 84
Item STATISTICS: MEASURE ORDER

| ENTRY | TOTAL | TOTAL | JMLE | MODEL |  | FIT | OUT | FIT | \| PTMEAS | -AL | EXACT | MATCH |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| NUMBER | SCORE | COUNT | MEASURE | S.E. | MNSQ | ZSTD | \|MNSQ | ZSTD | \| CORR. | EXP. | OBS\% | EXP\% | Item |
| 3 | 0 | 75 | 99.79 | 18.12\| | MAXI | IMUM M | EASURE |  | . 00 | . 00 | 100.0 | $100.0 \mid$ | 53 |
| 7 | 0 | 75 | 99.79 | 18.12 | MAXI | IMUM M | MEASURE |  | . 00 | .00\| | 100.0 | $100.0 \mid$ | S7 |
| 8 | 0 | 75 | 99.79 | 18.12 | MAXI | IMUM M | measure |  | .00 | . $00 \mid$ | 100.0 | $100.0 \mid$ | 58 |
| 9 | 0 | 75 | 99.79 | 18.12 | MAXI | IMUM M | EASURE |  | . 00 | .00\| | 100.0 | $100.0 \mid$ | S9 |
| 10 | 0 | 75 | 99.79 | 18.12 | MAXI | MUM M | EASURE |  | . 00 | .00\| | 100.0 | $100.0 \mid$ | S10 |
| 1 | 1 | 75 | 87.14 | 10.26 | 1.13 |  | \|3.41 | 1.58 | . 13 | . 22 \| | 97.0 | 96.8\| | S1 |
| 6 | 1 | 75 | 87.14 | 10.26 | 1.13 | . 43 | 3.41 | 1.58 | . 13 | . 22 | 97.0 | 96.8\| | S6 |
| 5 | 12 | 75 | 47.50 | 5.08 \| | . 52 | -1.97 | . 31 | -1.35 | . 79 | .73\| | 93.9 | 84.4 | S5 |
| 4 | 18 | 75 | 32.61 | 5.01\| | . 77 | -. 74 | \| . 57 | -.81\| | . 85 | . 82 | 87.9 | 84.1\| | S4 |
| 2 | 31 | 75 | -4.39 | 7.54\| | 1.12 | . 39 | \| 2.81 | 1.38 \| | . 84 | .86\| | 93.9 | 93.8\| | S2 |
| MEAN | 6.3 | 75.0 | 74.90 | 12.87\| | . 93 | -. 29 | \| 2.10 | . 48 \| |  |  | 93.9 | 91.2\| |  |
| P.SD | 10.2 | . 0 | 34.96 | 5.50 \| | . 25 | . 95 | \|1.38 | 1.29 |  |  | 3.3 | $5.8 \mid$ |  |

TABLE 13.1 DATA 151-214 ZOU656WS.TXT DeC 15 2023 18:30
INPUT: 64 Person 10 Item REPORTED: 64 Person 10 Item 2 CATS MINISTEP 5.6.3.0
Person: REAL SEP.: . 00 REL.: . 00 ... Item: REAL SEP.: 1.14 REL.: . 57
Item STATISTICS: MEASURE ORDER

| \|ENTRY | NUMBER | TOTAL SCORE | TOTAL COUNT | JMLE MEASURE | $\begin{aligned} & \text { MODEL } \\ & \text { S.E. } \end{aligned}$ | INFIT |  | OUTFIT |  | \|PTMEASUR-AL |  | $\begin{array}{\|l} \mid \text { EXACT } \\ \text { OBS\% } \end{array}$ | MATCH\| EXP\%| | Item |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | MNSQ | ZSTD | \|MNSQ | ZSTD | CORR. | EXP. |  |  |  |
| 1 | 0 | 64 | 83.46 | 18.32\| | MAXI | MUM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | S1 |
| 3 | 0 | 64 | 83.46 | 18.32\| | MAXI | MUM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | 53 |
| 6 | 0 | 64 | 83.46 | 18.32\| | MAXI | MUM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | 56 |
| 8 | 0 | 64 | 83.46 | 18.32 | MAXI | MUM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | 58 |
| 9 | 0 | 64 | 83.46 | 18.32\| | MAXI | MUM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | 59 |
| 10 | 0 | 64 | 83.46 | 18.32\| | MAXI | MUM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | S10 |
| 4 | 1 | 64 | 70.61 | 10.46 | . 81 | .84 | \| 15 | -.64 | . 30 | . 21 | 97.2 | 97.2\| | 54 |
| 7 | 1 | 64 | 70.61 | 10.46\| | . 81 | .84\| | \| 15 | -.64\| | . 30 | . 21 | 97.2 | 97.2\| | 57 |
| 5 | 5 | 64 | 50.58 | 5.31\| | 1.26 | .74\| | 1.25 | .67\| | . 30 | . 39 \| | 83.3 | 88.2 | S5 |
| 2 | 32 | 64 | 8.20 | 5.34 \| | 1.00 | . 14 | \| 92 | . 09 \| | . 84 | . 84 | 88.9 | 88.9 \| | S2 |
| MEAN | 3.9 | 64.0 | 70.08 | 14.15 | . 97 | .24\| | \| . 62 | -.13\| |  |  | 91.7 | 92.8\| |  |
| P.SD | 9.5 | . 0 | 22.99 | 5.36 \| | . 19 | .29\| | \| . 48 | .55\| |  |  | 5.9 | 4.3\| |  |

Figure 4. Logit measure

## Analysis of the Difficulty Level of Questions

The logit value for each question has been sorted from highest to lowest and is presented in Figure 3. Item S10 has the highest logit value throughout the analysis of 214 samples, namely $+67.51,+99.79,+83.46$. This value shows that question S 10 is the most challenging question, followed by questions S3, S8, and S9. Figure 4.8 shows the distribution of scores on S10 questions. No students could answer the questions correctly, or $100 \%$ of students got a score of 0 . Questions $\mathrm{S} 2, \mathrm{~S} 4$, and S 5 had the lowest relative logit values, with the lowest in question S 2 , namely -4.39 . This value shows that these three questions are the most straightforward questions students can answer. Of the 214 students, 147 of them were able to solve the three questions correctly.

| TABLE 13 INPUT: | $\begin{aligned} & \text { 3.1 DATA } \\ & 75 \text { Perso } \end{aligned}$ | $\begin{aligned} & 1-75 \\ & \text { in } \quad 10 \mathrm{I} \end{aligned}$ | tem REPO | RTED: 7 | 75 Per | rson | ZOU969WS. TXT Dec 212023 19:2510 Item 2 CATS MINISTEP 5.6 .3 .0 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Person: | REAL S <br> Item | P.: .00 <br> TATISTI | REL.: <br> CS: MEAS | .e0 ... <br> UURE ORD | Item: <br> DER | : REAL | SEP.: | $1.83$ |  |  |  |  |  |
| \|entry |NUMBER | $\begin{aligned} & \text { TOTAL } \\ & \text { SCORE } \end{aligned}$ | total count | JMLE MEASURE | $\begin{aligned} & \text { MODEL } \\ & \text { S.E. } \end{aligned}$ | IN | $\begin{gathered} \text { NFIT } \\ \text { ZSTD } \end{gathered}$ | \| OUT| | FIT \|P | $\begin{aligned} & \text { \|PTMEAS } \\ & \text { \|CORR. } \end{aligned}$ | $\begin{aligned} & \text { UR-AL } \mid \\ & \text { EXP. } \end{aligned}$ | $\begin{aligned} & \text { \|EXACT } \\ & \text { \| OBS\% } \end{aligned}$ | MATCH\| EXP\% | Item |
| 13 | 1 | 75 | 67.51 | 11.26 | 1.46 | . 75 | . 71 | .24\| | \| 21 | . 291 | 97.1 | 97.1 | 53 |
| \| 6 | 1 | 75 | 67.51 | 11.26 | 1.33 | . 63 | . 32 | -. 20 \| | \| 27 | . 29 \| | 97.1 | 97.1\| | 56 |
| \| 7 | 1 | 75 | 67.51 | 11.26 | 1.33 | .63 | . 32 | -.20\| | . 27 | . 29 \| | 97.1 | 97.1\| | 57 |
| \| 9 | 1 | 75 | 67.51 | 11.26 | . 40 | -.63 | . 05 | -.87\| | . 44 | . 29 \| | 97.1 | 97.1\| | 59 |
| 10 | 1 | 75 | 67.51 | 11.26 | . 40 | -.63 | . 05 | -.87\| | . 44 | . 29 \| | 97.1 | 97.1 | 510 |
| \| 1 | 4 | 75 | 48.33 | 6.04 | . 96 | . 05 | 1.19 | .49 \| | . 45 | . 45 \| | 91.4 | 90.5 | S1 |
| \| 8 | 5 | 75 | 45.01 | 5.48 | 1.06 | . 28 | 1.62 | 1.09\| | . 42 | . 48 \| | 88.6 | 87.8 | 58 |
| \| 2 | 13 | 75 | 28.73 | 3.95 | . 99 | . 02 | 1.00 | . 08 \| | . 63 | .63\| | 74.3 | 73.3 | 52 |
| \| 4 | 14 | 75 | 27.28 | 3.89 | . 79 | -1.28 | . 71 | -1.09 | \| 72 | . 64 \| | \| 71.4 | 71.71 | 54 |
| \| 5 | 23 | 74 | 13.17 | 3.96 | 1.17 | 1.20 | 1.59 | 1.19\| | \| 68 | .74\| | \| 67.6 | 67.8 | 55 |
| MEAN | 6.4 | 74.9 | 50.00 | 7.96 | \| 99 | .10\| | . 76 | -.01\| |  |  | 87.9 | 87.6\| |  |
| P.SD | 7.3 | . 3 | 19.72 | 3.36 | \| 35 | . 72 | . 55 | . 75 \| |  |  | \| 11.4 | 11.4 |  |



| \|entry | total | total | JmLE | MODEL |  | NFIT | OUT | FIT | PTME | R-AL | , | TCH\| |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \| NUMBER | SCORE | COUNT | MEASURE | S.E. | MNSQ | ZSTD | MNSSQ | zSTD | CORR. | EXP. | OBS\% | EXP\%\| | Item |
| 3 | 0 | 75 | 99.79 | 18.12 | MAXI | Imum ME | EASURE |  | . 00 | . $00 \mid$ | \|100.0 | $100.0 \mid$ | 53 |
| 7 | 0 | 75 | 99.79 | 18.12 | MAXI | 俍MUM ME | EASURE |  | . 00 | . 00 | 100.0 | 100.0 | 57 |
| 8 | 0 | 75 | 99.79 | 18.12 | MAXI | ImuM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0 | 58 |
| 9 | 0 | 75 | 99.79 | 18.12 | MAXI | ImMM ME | EASUR |  | .00 | .00\| | 100.0 | 100.0 | S9 |
| 10 | 0 | 75 | 99.79 | 18.12 | MAXI | IMUM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0 | S10 |
| 1 | 1 | 75 | 87.14 | 10.26 | 1.13 | .43\| | \|3.41 | 1.58\| | . 13 | . 22 | 97.0 | 96.8 | S1 |
| 6 | 1 | 75 | 87.14 | 10.26 | 1.13 | . 43 | 3.41 | 1.58 | . 13 | . $22 \mid$ | 97.0 | 96.8 | S6 |
| 5 | 12 | 75 | 47.50 | 5.08 \| | . 52 | -1.97 | . 31 | -1.35 | . 79 | .73\| | 93.9 | 84.4 | 55 |
| 4 | 18 | 75 | 32.61 | 5.01\| | . 77 | -.74 | . 57 | -.81\| | . 85 | . 82 | 87.9 | 84.1 | S4 |
| 2 | 31 | 75 | -4.39 | 7.54 | 1.12 | .39 | 2.81 | 1.38 \| | . 84 | .86\| | 93.9 | 93.8\| | S2 |
| MEAN | 6.3 | 75.0 | 74.90 | 12.87\| | . 93 | -.29\| | 2.10 | . 48 \| |  |  | 93.9 | 91.2\| |  |
| P.SD | 10.2 | . 0 | 34.96 | 5.50 | . 25 | .95 | 1.38 | 1.29 |  |  | 3.3 | 5.81 |  |

```
TABLE 13.1 DATA 151-214 ZOU656WS.TXT DEC 15 2023 18:30
INPUT: 64 Person 10 Item REPORTED: }64\mathrm{ Person 10 Item 2 CATS MINISTEP 5.6.3.0
Person: REAL SEP.: .00 REL.: .00 ... Item: REAL SEP.: 1.14 REL.: . }5
        Item STATISTICS: MEASURE ORDER
```

| Entry | total | total | JMLE | MODEL |  |  |  |  | PTMEAS | UR-AL | EXACT | MATCH |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| INUMBER | SCORE | COUNT | MEASURE | S.E. | MNSQ | zSTD | MNSQ | zSTD | CORR. | EXP. | OBS\% | ExP\%\| | Item |
| 1 | 0 | 64 | 83.46 | 18.32 | MaXI | UM ME | EASURE |  | . 00 | .00\| | 100.0 | $100.0 \mid$ | S1 |
| 3 | 0 | 64 | 83.46 | 18.32 | MAXI | UM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | 53 |
| 6 | 0 | 64 | 83.46 | 18.32 | MAXI | UM ME | EASURE |  | . 00 | .00\| | 180.0 | $100.0 \mid$ | 56 |
| 8 | 0 | 64 | 83.46 | 18.32 | MAXI | UM ME | EASURE |  | . 00 | .00\| | 100.0 | $100.0 \mid$ | 58 |
| 9 | 0 | 64 | 83.46 | 18.32 | MAXI | UM ME | EASURE |  | . 00 | .00\| | 180.0 | 100.이 | 59 |
| 10 | 0 | 64 | 83.46 | 18.32 | MAXI | UM ME | EASURE |  | . 00 | .00\| | 100.0 | 100.0\| | 510 |
| 4 | 1 | 64 | 70.61 | 10.46 | . 81 | . 84 | . 15 | -.64 | . 30 | .21\| | 97.2 | 97.2 | 54 |
| 7 | 1 | 64 | 70.61 | 10.46 | . 81 | . $04 \mid$ | . 15 | -.64\| | . 30 | .21\| | 97.2 | 97.2 | 57 |
| 5 | 5 | 64 | 50.58 | 5.31 | 1.26 | .74\| | 1.25 | .67\| | . 30 | . 39 \| | 83.3 | 88.2 | 55 |
| 2 | 32 | 64 | 8.20 | 5.34 \| | 1.00 | .14\| | . 92 | .09\| | . 84 | .84\| | 88.9 | 88.91 | S2 |
| MEAN | 3.9 | 64.0 | 70.08 | 14.15 | . 97 | . 241 | . 62 | -. 13 \| |  |  | 91.7 | 92.8\| |  |
| P.SD | 9.5 | . 0 | 22.99 | 5.36 | . 19 | .29\| | . 48 | .55 \| |  |  | 5.9 | 4.3\| |  |

Figure 5. Logit measures

The third analysis is related to the level of difficulty of the questions. The results show that three questions are included in the easy category, three questions are included in the medium category, and four questions are included in the difficult category.

Table 1. Distribution of Question Difficulty Levels

| Question Difficulty level | Question items |
| :---: | :---: |
| Easy | S2, S4, and S5 |
| Currently | S1, S6, and S7 |
| Difficult | S3, S8, S9, and S10 |

Questions in the problematic category measure high-level mathematical literacy skills, namely levels 4,5 , and 6 . Overall, students can answer questions well on low-level questions, which shows that most students have medium to lower mathematical literacy abilities.

## Subject Ability Analysis

Figure 5 displays information related to the logit for each student. The measured column is the logit measure for each respondent. Students with code P009 have a logit value of +65.86 , which means that these students often answer questions correctly compared to other students. Meanwhile, students with code P150 have the lowest logit value, namely -12.90 , which means that these students answer questions incorrectly more often. The overall student logit value is more than 0.00 , meaning that students tend to answer more questions correctly on the test.

```
COU969NS.TXT Dec 21 2023 19:25
Person: REAL SEP.: .ө0 REL.: .0ө ... Iten: REAL SEP.: 1.83 REL.: . }7
    Person STATISTICS: MEASURE ORDER
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline |entry |MMBER & \[
\begin{aligned}
& \text { TOTAL } \\
& \text { SCORE }
\end{aligned}
\] & TOTAL COWNT & \[
\underset{\text { MEASURE }}{\text { JMLE }}
\] & \[
\begin{aligned}
& \text { MOOEL IN } \\
& \text { S.E. |MWSQ }
\end{aligned}
\] & \[
\begin{aligned}
& \text { INFIT } \\
& Q_{\text {ITS }}
\end{aligned}
\] & & & \[
\begin{aligned}
& \text { |PTMEA } \\
& \text { |CORR. }
\end{aligned}
\] & & & MATCH Exp\% & Pers \\
\hline 9 & & 18 & 65.86 & 8.131 .83 & -. 571 & . 53 & . 06 & . 58 & .59] & 80.0 & 74.8 & P999 \\
\hline 68 & 4 & 18 & 44.65 & 9.87|3.87 & \(2.66 \mid 5\) & 15.01 & 2.871 & -. 87 & .79| & 50.8 & 82.81 & P968 \\
\hline 2 & 3 & 18 & 36.00 & 9.59|1.14 & .431 & . 66 & .01| & . 68 & .69| & 80. & 85.71 & P902 \\
\hline 4 & 3 & 18 & 36.00 & \(9.59 \mid 1.28\) & .52 & . 78 & .06 & . 66 & .69| & 80.8 & 85.71 & P984 \\
\hline 18 & 3 & 18 & 36.80 & \(9.59 \mid\). 32 & -1.52 & . 19 & -.80| & . 98 & .69| & 100.8 & 85.71 & P918 \\
\hline 31 & 3 & 18 & 36.80 & \(9.59 \mid\). 32 & -1.52 & . 19 & -.80| & . 98 & .69| & 109.8 & 85.71 & P931 \\
\hline 39 & 3 & 18 & 36.09 & 9.59|1.54 & 1.812 & 2.72 & 1.45 | & . 45 & .69| & 80.8 & 85.71 & P939 \\
\hline 72 & 3 & 19 & 36.00 & \(9.59 \mid\). 32 & -1.52 & . 19 & -.80| & . 98 & .69| & 109.8 & 85.71 & P972 \\
\hline 7 & 2 & 18 & 26.24 & \(18.28 \mid\). 65 & -.571 & . 28 & -.26| & . 74 & .61 & 90.0 & 85.61 & P987 \\
\hline 12 & 2 & 10 & 26.24 & \(10.28 \mid\). 57 & -.78| & . 25 & -.31| & . 76 & .61 & 90.8 & 85.61 & P912 \\
\hline 14 & 2 & 18 & 26.24 & \(18.28 \mid\). 57 & -.78| & . 25 & -.31| & . 76 & .61 & 90.0 & 85.61 & P914 \\
\hline 17 & 2 & 18 & 26.24 & 10.28|1.31 & .71| & . 64 & .18| & . 56 & .61 & 79.8 & 85.61 & Le17 \\
\hline 22 & 2 & 10 & 26.24 & 10.28| . 65 & -.571 & . 28 & -.26| & . 74 & . 61 & 90. & 85.61 & P92 \\
\hline 36 & 2 & 18 & 26.24 & \(18.28 \mid\). 57 & -.78| & . 25 & -.31| & . 76 & .61 & 90.8 & 85.61 & P936 \\
\hline 41 & 2 & 18 & 26.24 & 10.28|1.31 & .71| & . 64 & .18 & . 56 & .61 & 70.8 & 85.61 & Pe41 \\
\hline 52 & 2 & 10 & 26.24 & 18.28|1.96 & 1.59| & 1.23 & .62 & . 35 & .61 & 70.0 & 85.61 & P95 \\
\hline 47 & 1 & & 23.29 & 12.81| 73 & -.26| & . 26 & -.30| & . 58 & . 45 & 88.9 & 88.81 & P947 \\
\hline 1 & 1 & 10 & 13.92 & 12.30|1.95 & 1.33|3 & 3.28 & 1.50| & . 83 & .47| & 80.8 & 90.31 & L®ө1 \\
\hline 13 & 1 & 19 & 13.92 & 12.38| . 47 & -.75 & . 15 & -.52| & . 62 & & 100.8 & 90.31 & P913 \\
\hline 19 & 1 & 18 & 13.92 & 12.38| . 47 & -.75| & . 15 & -.52| & . 62 & & 100.8 & 90.31 & P919 \\
\hline 25 & 1 & 18 & 13.92 & 12.38| . 47 & -.75| & . 15 & -.52| & . 62 & .47| & 180.8 & 90.31 & P925 \\
\hline 30 & 1 & 18 & 13.92 & 12.38| . 47 & -.75 & . 15 & -.52| & . 62 & . 4771 & 100.8 & 90.31 & P939 \\
\hline 32 & 1 & 18 & 13.92 & 12.30| . 47 & -.75| & . 15 & -. 521 & . 62 & .47| & 100.0 & 90.31 & P932 \\
\hline 35 & 1 & 18 & 13.92 & 12.30| . 47 & -.75| & . 15 & -.52| & . 62 & .47| & 180.0 & 90.31 & P935 \\
\hline 46 & 1 & 18 & 13.92 & 12.38| . 47 & -.75| & . 15 & -.52 & . 62 & .47| & 100.8 & 90.31 & P946 \\
\hline 48 & 1 & 18 & 13.92 & 12.38| . 47 & -.75| & . 15 & -.52 & . 62 & .47| & 109.8 & 92.31 & P948 \\
\hline 51 & 1 & 18 & 13.92 & 12.38| . 47 & -.75| & . 15 & -.52| & . 62 & .47| & 100.8 & 90.31 & P951 \\
\hline 54 & 1 & 18 & 13.92 & 12.38| . 47 & -.75| & . 15 & -.52 & . 62 & .47| & 109.8 & 90.31 & P954 \\
\hline 58 & 1 & 18 & 13.92 & 12.38| . 47 & -.75| & . 15 & -. 52 & . 62 & .47| & 100.8 & 90.31 & P958 \\
\hline 68 & 1 & 10 & 13.92 & 12.38|1.48 & .85 & . 58 & .12] & . 36 & .47| & 80.8 & 90.31 & Pase \\
\hline 63 & 1 & 18 & 13.92 & 12.30|1.41 & .76| & . 52 & .25 & . 39 & .47| & 80.8 & 99.31 & P963 \\
\hline 69 & 1 & 18 & 13.92 & 12.38|1.48 & . 85 & . 58 & .12 & . 36 & .47| & & 99.31 & P969 \\
\hline 70 & & 10 & 13.92 & 12.3 & . 30 & & 1.19 & . 88 & & & & P979 \\
\hline
\end{tabular}
```




| $\begin{aligned} & \text { \|ENTRY } \\ & \text { NMMER } \end{aligned}$ | ${ }_{\text {SCORE }}^{\text {TOTAL }}$ | total count | MEALESE |  |  | 2STo｜MMSQ | 25 To｜ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 68 | ${ }^{4}$ | 18 | 48.18 | 8．78 | 2.76 | 2．56｜4．54 | 2.95 | －． 04 | ．67｜ | 44.4 | 80.31 | P968 |
| ${ }_{4}^{2}$ |  | 18 | ${ }^{39.91}$ |  |  | ． 444.81 | ．e5 | ． 65 | ． 67 |  | ${ }_{83.61}^{83.61}$ | Peer |
| 9 | 3 | 18 | ． 91 | 9.4 | 38 | ．8e｜1．98 | ． 12 | ． 50 | ． |  | 83.61 | Pe9 |
| ${ }^{10}$ | 3 | 18 | 39.91 | 9．40｜ | ． 30 | －1．57］．22 | －1．12 | ． 90 | ．67 | 1200.8 | 83.61 | Pe1e |
| ${ }^{31}$ |  | 18 | ${ }^{39.91}$ |  | ${ }^{30}$ | 1．57 |  | ． 99 |  |  | 83.61 |  |
| 39 | 3 | 18 | 39．91 |  | 138 | ． 881.98 | 12 | ． 58 | ． 6 |  |  |  |
| 7 | ${ }^{2}$ | 18 | ${ }_{30.4}^{39.91}$ | 19.22 | ． 60 | －．68］ 38 | ${ }_{-29}$ | ． 75 | ． 61 | ． 9 | ${ }_{84.1}^{83.6}$ | ${ }_{\text {Peor }}$ |
| 12 | 2 | 18 | 33.42 | 18.22 | ．60 | －．68｜．38 | －．29 | ． 75 | ． 61 | 88.9 | ${ }_{84.1}$ | Pe12 |
| 14 | 2 | 18 | ${ }^{30.42}$ | 18.22 | ．60 | －．68｜．30 | －． 29 | ． 75 | ． 61 | 88.9 | 84.1 | P914 |
| ${ }_{22}^{17}$ | ${ }_{2}$ | ${ }_{18}^{18}$ | －30．42 | 110.22 <br> 10.22 <br> 1 |  | ． 7881.38 | ．22 | ． 75 | ． 61 | 66.7 88.9 | 84 |  |
| ${ }_{36}^{22}$ |  | 18 | ce． 3 3．42 | 18.22 |  | －．68｜ 38 | $\stackrel{-29}{ }$ | ． 75 | ． 61 |  | ${ }_{84.1}^{84 .}$ |  |
| ${ }_{52}^{41}$ | 2 | 18 | 30．42 | ${ }^{10.222}$ |  | ．70｜．72 | ． 22 | ． 51 | ． 61 | ${ }_{66.7}^{66.7}$ | ${ }_{84.1}^{84.1}$ | Pes |
| 52 47 |  | ${ }_{9}^{10}$ | co．30.42 <br> 27.50 | ${ }_{11.95}^{18.22}$ | ． 78 | ${ }_{\text {－} 161.6 \mid 1.41}^{\text {－}}$ | － 721 | ． 57 | ${ }_{.431} 6$ |  |  | Pe |
| 1 |  | 18 | 18.19 | ${ }^{12} 231$ |  | 1．334．07 | 1．74 | －．02 | ．47｜ | 7.8 | 89.31 | Lee1 |
| 13 |  | 18 | 18.19 | 12．31 | ${ }^{46}$ | －．76｜．17 | －．48 | ． 64 |  | 189.8 | ．31 |  |
| ${ }_{25}^{19}$ |  | ${ }_{18}^{18}$ | 18．19 | ${ }_{\text {12，}}^{12.31}$ | ． 46 | －．766 | － 48 | ． 64 | ． 47 | 170.8 | 89．3 |  |
| ${ }_{30}^{25}$ | 1 | ${ }_{18}^{18}$ | 18.19 18.19 | ${ }_{12}^{12.31}$ | ． 46 | －．76｜ | －．48 | ． 64 | ．471 | 190.8 | 89.3 |  |
| 32 |  | 18 | 18.19 | ${ }^{12} 2.31$ | ． 46 | －．76｜ 17 | －．48 | ． 64 | ．47 | 120.8 | 89.31 | 32 |
| 35 |  | － | 18.19 | 12．31 | ． 46 | －．76｜．17 |  |  |  |  | ， |  |
| ${ }_{48}^{46}$ |  | ${ }_{18}^{18}$ | 18．19 | ${ }_{12}^{12.31}$ | ． 46 | －．766 |  | ． 64 |  |  | ${ }_{89}^{89.31}$ | ${ }^{\text {Pe46 }}$ |
| ${ }_{51}^{48}$ |  | 18 | ${ }_{18.19}^{18.19}$ | ${ }_{12}^{12.31}$ | ． 46 | －．76｜． 17 | －． 48 |  |  |  | ${ }_{89.31}$ |  |
| 54 |  | 18 | 18.19 | ${ }^{12.31}$ | ． 46 | －．76｜ 17 |  | ． 64 |  |  | 89.3 | Pes4 |
| 58 |  | 18 | 18.19 | 12．31 | ． 46 | －．76｜．17 | －．48 |  |  |  | 89.31 | 58 |
| ${ }_{6}^{68}$ |  | 18 | 18.19 |  | ．46 |  |  |  |  |  | 89．31 |  |
| ${ }_{6}^{63}$ | 1 | ${ }_{18}^{18}$ | 18.19 | ${ }_{12}^{12.31}$ | ${ }_{1}^{1.46}$ | ${ }^{.81}$ ．81 ${ }^{\text {．}} 62$ | ${ }^{16}$ | ． 37 | ． 47 | 77.8 | 89．31 |  |
| ${ }_{78}^{69}$ |  | ${ }_{18}^{18}$ | 18.19 18.19 |  |  |  | ${ }^{1.16}$ | ． 37 |  |  | 89．3） |  |
| 71 |  | 18 | 18.19 | 12．31 | 1．93 | ${ }_{1.38 \mid 2.92}$ | 1.38 | ． 95 |  | 77.8 | 89.31 |  |
| 75 |  | 18 | 18.19 | ${ }^{12.31}$ | ． 46 |  | ． 16 |  |  |  | 39．3 |  |
| ${ }_{5}$ |  | 18 | ${ }^{2.66}$ | 19．38｜ |  |  |  | ．ee |  | 170.8 | 1e0．e｜ |  |
| 5 | $\bigcirc$ | 18 | ${ }_{2}^{2.66}$ | 19．38 | MINI | ASURE |  | ．ee | ．e0 | 120.0 |  | Pees |
| ${ }_{8}^{6}$ | $\stackrel{\ominus}{\circ}$ | 10 | ${ }_{2.66}^{2.66}$ | ${ }_{19}^{19.38}$ |  | ImMM MEASURE |  | ．ee |  |  |  | ${ }_{\text {Lees }}$ |


| ${ }_{11}$ | － | 18 | 2.66 | 19.381 | Minimum measure |  | ．ee | ．ee 11ee．e | 100.0 | P911 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 15 | $\bigcirc$ | 18 | 2.66 | 19．381 | MININMM MEASURE |  | ．ee | ．eel 1 1ee．e | 100.0 | P915 |
| 16 | $\bigcirc$ | 18 | 2.66 | 19．38｜ | MINITMUM MEASURE |  | ．ee | ．ee｜120．0 | 1ee．e｜ | P916 |
| 18 | － | 18 | 2.66 | 19．38｜ | MINIMMM MEASURE |  | ．e8 | ．0e｜120．8 |  |  |
| 28 | － | 18 | 2.66 | 19.38 | MITNIMMM MEASURE |  | ．ee | ．ee 10 |  |  |
| ${ }^{21}$ | $\bigcirc$ | 18 | 2.66 | 19.38 | MINIIMMM MEASURE |  | ．ee | ．eel 120. | 120 | ${ }^{1} 221$ |
| ${ }^{23}$ | － | 18 | 2.66 | 19．38 | MITIIMUM MEASURE |  | ．ee | ．ee｜1ee．e | 190.0 | Pe23 |
| 24 | $\bigcirc$ | 18 | 2.66 | 19．38｜ | MITITMUM MEASURE |  | ．e8 | ．ee｜100．0 | 100．0｜ | P924 |
| 26 | － | 10 | 2.66 | 19．38 | MINIIMMM MEASURE |  | ．e8 | ．ee｜ 1 1ee．e | 180.0 | Pe26 |
| 27 | － | 18 | 2.66 | 19．38 | MTITIMUM MEASURE |  | ．e0 | ．ee｜ 120. | $100.0 \mid$ | Pe27 |
| 28 | － | 18 | 2.66 | 19.38 | MINITMUM MEASURE |  | ．ee | ．ee｜100 |  |  |
| 29 | ${ }^{\circ}$ | 18 | 2.66 | 19.38 | MITNIMUM MEASURE |  | ．ee | ．eel 120 |  | L229 |
| ${ }^{33}$ | － | 18 | 2.66 | 19．38 | MITIIMUM MEASURE |  | ．ee | ．e0｜1ee．e | 100．0 | Le33 |
| 34 | ${ }^{\circ}$ | 18 | 2.66 | 19．38 | MITIIMUM MEASURE |  | ．ee | ．e0 100．0 | 100.8 | P934 |
| 37 | － | 18 | 2.66 | 19．38｜ | MINITMUM MEASURE |  | ．ee | ．ee｜ 100.0 | $109.0 \mid$ | P937 |
| 38 | － | 18 | 2.66 | 19．38 | MINITMUM MEASURE |  | ．ee | ．ee｜ 180.0 | 180.0 | Pe38 |
| 48 | $\bigcirc$ | 10 | 2.66 | 19．38 | MINITMUM MEASURE |  | ．e0 | ．ee｜100．0 | 100.0 | Le40 |
| 42 | － | 10 | 2.66 | 19.38 | MIIIMMM MEASUR |  | ．ee | ．ee｜ 1 ｜ee．0 | 100 | 1242 |
| ${ }^{43}$ | ${ }^{\circ}$ | 18 | ${ }_{2}^{2.66}$ | 19．38 | MITIMUM MEASURE |  | ．ee | ．ee 11e．e 0 | 100.8 | P943 |
| 44 | $\bigcirc$ | 18 | 2.66 | 19．38 | MINIMUM MEASURE |  | ．e0 | ．e0 1100.0 | 100.8 | L244 |
| 45 | ${ }^{\circ}$ | 18 | ${ }_{2}^{2.66}$ | 19．38｜ | MITIIMMM MEASURE |  | ．ee | ．ee｜ 1 1e． 0 | 100.0 | ${ }^{\text {Pa45 }}$ |
| 5 | $\bigcirc$ | 18 | 2.66 | 19．381 | MITIMMM MEASURE |  | ．ee | ．ee｜ 1 1e0．e | 100.0 | P949 |
| 50 | ${ }^{\circ}$ | 18 | 2.66 | 19．38 | MITIIMMM MEASURE |  | ．eө | ．ee｜ 100.0 | 1e0．e｜ | ${ }^{\text {Pe5e }}$ |
| 53 | $\stackrel{\circ}{\circ}$ | ${ }^{18}$ | ${ }_{2}^{2.66}$ | 19．381 | MITIIMUM MEASURE |  | ．ee | ．ee｜ 1100.0 | 100．e） | P953 |
| 55 | － | ${ }^{10}$ | 2.66 | 19.38 | MITIIMMM Measure |  | ．ee | ．ee｜ 1 1ee． 0 | 180.8 | Pes5 |
| 56 | $\bigcirc$ | 18 | ${ }_{2}^{2.66}$ | 19．38 | MITIIMUM MEASURE |  | ．e日 | ．e0 1100．0 | 100.0 | L056 |
| 57 59 | $\stackrel{\ominus}{\circ}$ | 18 | 2．66 | 19．381 | MITIMMM MEASURE |  | ．ee | ．ee 1ee．e | 1e0．e｜ | Le57 |
| 59 61 | $\stackrel{\square}{\circ}$ | 18 | 2．66 | 19.381 19.381 | MITIMMM MEASURE MIIINUM MEASURE |  | ．ee |  | 1e0．e｜ | P959 |
| 62 | － | 18 | 2.66 | 19．38 | MINIIMMM MEASURE |  | ．eө | ．ee｜ 100.0 | 100.8 | P962 |
| 64 | － | 18 | 2.66 | 19．38｜ | MINIIMMM MEASURE |  | ．ee | ．ee｜1ee．e | 100．e｜ | Pe64 |
| 65 | $\bigcirc$ | 18 | 2.66 | 19.38 | MITIIMUM MEASURE |  | ．ee | ．ee｜ 120. |  |  |
| 66 | ${ }^{\circ}$ | 18 | 2.66 | 19．38 | MITIIMUM MEASURE |  | ．ee | ．eel 100.0 | 100．8 | Le66 |
| 57 | ${ }^{\circ}$ | 18 | ${ }_{2}^{2.66}$ | 19．38 | MITIMMM MEASURE |  | ．ee | ．ee 11e0．e | 1e0．e | P967 |
| 73 | $\bigcirc$ | 18 | 2.66 | 19．38 | MITIMMM MEASURE |  | ．ee |  |  | P973 |
| 74 | － | 18 | 2.66 | 19．38｜ | MINITMUM MEASURE |  | ．e8 | ．ee｜100．0 | $100.0 \mid$ | L874 |
|  | 8 | 10.8 | 13.76 | 15．53｜ | ． 97 －．．84 | ． 44 |  | ． 6 | ${ }^{36.61}$ |  |
|  |  |  | 13.50 | ．28 | ． $621.01{ }^{\text {a }} 11.11$ |  |  |  | 2.81 |  |


| ZOU859WS．TXT DeC 152023 20：23 10 Item 2 CATS MINISTEP 5．6．3．0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Person：REAL SEP．：． 94 REL．：． 47 ．．．Item：REAL SEP．： 2.27 REL．：． 84 Person STATISTICS：MEASURE ORDER |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & \text { ENTRYY } \\ & \text { MMMEER } \end{aligned}$ | TOTAL SCOPE | total count | MEALURE | $\begin{aligned} & \text { MODEL } \\ & \text { S.E. } \end{aligned}$ |  | zSTO |  | 2stoic |  |  | ExP\％｜ | Person | $\begin{aligned} & 26 \\ & 30 \end{aligned}$ |  | $\begin{aligned} & 10 \\ & 10 \end{aligned}$ | $\begin{aligned} & -12.98 \\ & -12.99 \end{aligned}$ | 21.201 21.20 21.20 | MINIMUM MEASURE MINIMUM MEASURE MTNTMUM MEASUR |  | ．ee | $. \operatorname{e\theta } \mid 100.0$ $.00 \mid 100.0$ | $10 e .0$ 100. |  |
|  |  |  |  | 17.14 |  |  |  |  |  | 1100.0 |  |  | 34 | － | 18 | －12．98 | ${ }_{21.28}$ | minimum Measure |  | ．e日 | ．ee｜ 1100.8 | $100 . \theta$ | L199 |
| 6 | 3 | 18 | 64.52 | 17.14 | ． 13 | －．671 | ．99 | $\therefore 71$ | ． 93 | ． 8881100.0 | 92.3 | Pes1 | 35 | $\bigcirc$ | 18 | ${ }^{-12.99}$ | ${ }^{21.20}$ | MITIMIMM MeASURE |  | ．ee | ．ee 11e | 1ee．e｜ | ${ }^{1118}$ |
| 12 | ${ }^{3}$ | 18 | 64．52 | 17．14 | ． 13 | －．67 | ．e9 | －．71 | ． 93 | ． 881120.0 | 92．3 | P987 | 37 38 | $\bigcirc$ | 18 | ${ }_{-1229}^{-129}$ | 21.28 <br> 21.28 | MINIMMM MEASURE MINIMM MEASURE |  | ．e日 | ．ee 1100. | 100.0 | ${ }_{\text {P113 }} 112$ |
| ${ }_{19}^{13}$ | ${ }_{3}^{3}$ | 18 | ${ }_{64.52}^{64}$ | ${ }_{17.14}^{17.14}$ | ${ }_{13}{ }^{13}$ | $\stackrel{-67}{-67}$ | ．99 | $\stackrel{-71}{-.71}$ | ． 93 | ． 8881120.0 | ${ }_{92.3}^{92.3}$ | ${ }_{\text {Pegs }}$ | ${ }_{39}^{38}$ | － | 18 | ${ }_{-12.98}^{-12.98}$ | ${ }_{21.28}^{21.28}$ | MINITUMM MEASURE |  | ．ee | ．8e｜ $100 . \mathrm{e}$ | 18.8 | ${ }_{\text {P114 }}$ |
| 22 | 3 | 18 | 64.52 |  | 13 | （6） | ．99 |  | ． 93 | ． 881100.8 | 92.3 | P997 | 48 | － | 18 | －12．98 | 21.28 | minimum Measure |  | ．өө | ．e0｜100． | 180 | 1115 |
| 27 | 3 | 10 | ． 52 |  | 13 |  | ．e9 |  | ． 93 | ． 881120.0 | 92.3 | P192 | ${ }^{41}$ | $\bigcirc$ | 18 | －12．98 | 21.28 | MIIIIMMM MEASURE |  | ．e0 | ．ee｜ 120.8 | 190 | ${ }^{1116}$ |
| 31 | ${ }^{3}$ | 18 | 64.52 | ．14 | ．13 | －．671 | ． 9 | 71 | ． 93 | ． 881120.0 | 92.31 | P196 | 42 | － | 18 | －12．98 | 21.28 | MIIIMUM MEASURE |  | ．ee | ．ee｜120．e | 10e．e｜ | P117 |
| 32 68 | 3 | 18 | 64．52 | 17．14 | ${ }^{13}$ | －．67 | ． 09 | －．71 | ． 93 | ． 881100.8 | 92．31 | ${ }^{\text {P187 }}$ | ${ }^{43}$ | $\bigcirc$ | 19 | ${ }^{-12.98}$ | ${ }^{21.221}$ | MIIIIMMM MEASURE |  | ．e0 | ．ee｜120．e | 10e．e｜ | L118 |
| 68 |  | 18 | 64．52 | 17．14 | ． 13 | －．67 | ． 29 | －．71 | ． 93 | ． 881120.9 | 92．3 | ${ }^{\text {P143 }}$ | 44 | $\bigcirc$ | 10 | －12．98 | 21.28 | minimum Measure |  | ．er | ．ee｜ 110.0 | 1e9．e｜ | 1119 |
| 3 5 | ${ }_{2}^{2}$ | 18 | ${ }_{40.01}^{40.01}$ | l｜l｜i65 | ． 97 | －．94 | ． 88 | －． 32 | ． 76 | ${ }_{\text {．}}^{\text {．} 831120.9}$ | 86．5 8 | ${ }^{\text {Pa78 }}$ Pese | 45 | $\bigcirc$ | 18 | ${ }^{-12.99}$ | ${ }^{21.281}$ | MITIIMUM MEASURE |  | ．ee | ．ee｜ 120. | 180.8 | P120 |
| 9 | 2 | 18 | 40.01 | 14.6517 |  | 4．86｜9 | ． 98 | 6．76 | ． 18 | ．83］ 28.8 | 86.5 | Pe84 | ${ }_{47}^{46}$ | $\stackrel{\square}{\circ}$ | 18 | ${ }^{-12.98}$ | ${ }^{21.281}$ | MINIMMM MEASURE |  |  | ．ee｜ 180. | 100.0 | ${ }^{1221}$ |
| 15 | 2 | 18 | 40.01 | 14．65 | ． 45 | －．94 | 28 | 42 | ． 87 | ．831100．0 | 86.51 | P990 | 47 |  |  | －12．98 |  | MINIMMM MEASURE |  | －e | ．ee 120 |  |  |
| 18 | 2 | 18 | 40.01 | ．65 |  | 94 | 28 |  | ． 87 | ．83110e．e | 86.51 |  |  | e |  |  | 21．28 | MINIMMMM Measure |  | .ee |  |  | ${ }^{123}$ |
| 29 | 2 | 18 | 4.01 | 14．65 | ． 45 | －．94 | ． 28 | －．42 | ． 87 | ．83120．e | 86.5 | 1194 | $\begin{aligned} & 49 \\ & 50 \end{aligned}$ |  | $\begin{aligned} & 10 \\ & 10 \end{aligned}$ | ${ }^{-12} 298$ | ${ }^{21.28}$ | MINIMMMM Measure |  | ค | ． $20 \mid 100.0$ | 100.0 | ${ }^{1224}$ |
| 51 | 2 |  | ${ }_{40.01}^{40.01}$ |  | ． 45 | －．94｜ | ．28 | $\xrightarrow{-.421}$ | ． 87 | ${ }_{\text {．}}^{\text {．} 8311120.9}$ | ${ }_{8}^{86.5}$ | ${ }_{\text {P136 }}^{\text {P135 }}$ | 58 52 | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ | 18 | ${ }_{-12.98}^{-12.98}$ | 21.28 21.20 | MINIMUMM MEASURE |  | $\begin{aligned} & \text {.ee } \\ & \text { en } \end{aligned}$ | ．ee｜ 100.8 | 10e．e｜ | ${ }_{\text {P127 }}$ |
| 62 | 2 | 18 | ${ }_{40.01}^{40.01}$ | ${ }_{14.65}^{14.65}$ | ． 45 | －．94 | ． 28 | ${ }^{-42}$ | ． 87 | ．831100．0 | 86.5 | P137 | 53 | － | 18 | －12．98 | 21.28 | minimum Measure |  | ．өө | ．ee｜1e0．e | 180 | P128 |
| 66 | 2 | 18 | 40.01 | $14.65 \mid 1$ | 97 | 1.44 | ． 85 | ． 36 | ． 76 | ． 83 ｜ 69.0 | 86.5 | P141 | 54 | $\bigcirc$ | 18 | －12．98 | 21.28 | MIIIMUM MEASURE |  | ．ee | ．ee｜ 1100.8 | 1ee．e｜ | ${ }^{129}$ |
| 2 |  | 18 | ${ }^{13.14}$ | 19．371 | ． 14 | －．54 | 97 | 析 | ． 76 | ． 781100.8 | 93．9 | 1677 | 55 | $\bigcirc$ | 18 | ${ }^{-12.98}$ | 21.28 | MIIIMMMM MEASURE |  | ．e0 | ．00｜100．e | 10e．e | 1130 |
|  | 1 | 18 | 1334 | 19．371 | 14 | －．54 | 97 |  | 76 | ．78｜120．0 | 93.91 | P979 | 56 | $\bigcirc$ | 18 | ${ }^{-12.98}$ | ${ }^{21.281}$ | MIIIIMMM MEASURE |  | ．ee | ．ee｜ 110.0 | 1ee．e｜ | ${ }^{\text {P131 }}$ |
| 18 | 1 | 18 | 14 | 19．37｜ | ${ }^{14}$ | －．54 | ．87 | －．78 | ． 76 | ．781100．8 | 93．9 | ${ }^{\text {Pe82 }}$ | 57 | $\bigcirc$ | 18 | ${ }^{-12.99}$ | ${ }^{21.208}$ | MIIIIMMM MEASURE |  | ．ee | ．ee｜ 120.0 | 1ee．e｜ | ${ }^{\text {P132 }}$ |
| 18 |  | 18 |  | $1{ }^{19.37} 1$ | ${ }_{14}^{14}$ | ${ }^{-.54}$ | ．87 |  | ．76 | ．780 1120.9 | ${ }_{93}^{93.9}$ |  | 58 59 | $\bigcirc$ | 18 | ${ }^{-12.98}$ | ${ }^{21.2120}$ | MInimuM Measure |  | ．e0 | ．ee｜ 100.0 | 100．0｜ | ${ }^{\text {P133 }}$ |
| ${ }_{16}^{11}$ |  | 18 | 13．14 | 19．371 1 | ． 14 | ${ }^{-54}$ | ．87 | －．78 | ．76 | ．780 1100.8 | ${ }_{\text {93．9 }}^{\text {93，9 }}$ | ${ }_{\text {Pe91 }}^{\text {Pe86 }}$ | 59 | $\bigcirc$ | 18 | ${ }^{-12.99}$ |  | MINIMMM MEASURE |  | ．ee | ．ee｜ 120.0 | 1ee．e｜ | ${ }^{1} 134$ |
| ${ }_{28}^{16}$ |  | 18 | ${ }_{13.14}^{13.14}$ | 19．37｜ | ${ }_{1}^{14}$ | ${ }^{-.54 \mid}$ | ．87 |  | ．76 | ．7e｜ 120.0 | ${ }_{\text {9331 }}^{\text {93．9 }}$ | Pe91 | 61 | $\bigcirc$ | 18 | －12．98 | ${ }^{21.218}$ | MINITMMM MEASURE |  | ．ee | ．ee｜120．e | 1ee．e｜ | ${ }^{136}$ |
| ${ }^{25}$ | 1 | 18 | ${ }_{13}^{13.14}$ | 19．371 | ． 14 | ${ }^{-54}$ | ．87 |  | ．76 | ． $721100 \cdot 8$ | ${ }^{93.9}$ | P1ee |  | $\begin{aligned} & \bullet \\ & 0 \end{aligned}$ | $\begin{aligned} & 10 \\ & 10 \end{aligned}$ | ${ }_{-12.98}^{-12.99}$ | 21.281 21.281 | MINIMMM MEASURE MINIMM MEASURE |  | .ee | ．ee｜ 1100.8 |  | ${ }_{\text {P138 }}{ }_{\text {P138 }}$ |
| ${ }^{28}$ | 1 | 18 | ${ }^{13.14}$ | 19．371 | ． 14 | ${ }^{-54}$ | 56 |  | ． 76 | ．78｜100．0 | 93．9 | ${ }^{\text {P133 }}$ |  |  |  |  |  |  |  | $\begin{aligned} & \text {.ee } \\ & .0 \ominus \end{aligned}$ |  |  |  |
| ${ }^{36}$ | 1 | 18 |  | ${ }^{19.37375}$ | 5．68 |  | 2．56 | ${ }_{1}^{1.251}$ | ． 76 | ．7e｜ 60.8 | ${ }_{93}^{93} 9$ | ${ }_{\text {P111 }}^{114}$ | 67 | － | $\begin{aligned} & 18 \\ & 10 \end{aligned}$ | ${ }_{-12.98}^{-12.98}$ |  | MINIMUM MEASURE |  | .e0 | ．ee｜ 100.8 | 1 1eo．e｜ | P142 |
| ${ }_{71} 69$ |  | 18 | ${ }_{\substack{13.14 \\ 13.14}}^{\substack{\text { d }}}$ | 19．371 | ${ }_{1}{ }_{14}^{14}$ | －．54｜ |  |  | ．76 | ．780 1100.8 | ${ }_{\text {933．9 }} 9$ |  | 78 | － | 18 | －12．98 | ${ }_{21.28}^{21}$ | minimum Measure |  | ．ee | ．ee｜ 120.8 | $100.8 \mid$ | P145 |
| 74 | 1 | 18 | 13.14 | 19．37 | 14 | －．54｜ | ．87 |  | ． 76 | ．7e｜10e．8 | 93.9 | P149 | 72 | $\bigcirc$ | 18 | －12．90 |  | MINIMUMM MEASURE |  | ．e日 | ．ee｜ 1100.8 | 190. ｜ | ${ }^{1147}$ |
| ${ }_{14}^{8}$ | ${ }^{\circ}$ | 18 | －12．98 | ${ }^{21.28}$ | Mivid | UIMUM MEA | Easure |  | －ee | ．ee 1100.0 | 1ee．e｜ | ${ }_{\text {Pe83 }}$ | 73 75 | $\stackrel{\square}{-}$ |  | ${ }_{-12.98}^{-12.98}$ |  | MINIMMM MEASURE MINIMM MEASURE |  | ．ee | ．ee｜ $1100 . \theta$ |  |  |
| 17 | － |  | ${ }_{-12.90}^{\text {－12．9 }}$ | 21.28 <br> 21.28 <br> 1 | ${ }_{\text {MINTIL }}^{\text {MINI }}$ | UIMMM MEA | EASURE |  | ．ee | ．ee｜ 120.0 |  | ${ }^{\text {Pe89 }}$ Pe92 |  | $\bigcirc$ |  |  |  |  |  |  |  |  |  |
| ${ }_{23}^{21}$ | ${ }^{\circ}$ | 18 | －12．98 | ${ }_{2}^{21.28}$ | mivil | ITMM MEA | Easure |  | －e日 | ．ee 1100.0 | 1ee．e｜ | ${ }^{\text {P9996 }}$ | MEAN | .$^{8}$ | 10.0 | 8.99 28.47 | 19.47 | $\begin{array}{lll}.78 \\ 1.57 & -3.36 \mid .52\end{array}$ | ${ }^{-321}$ |  | 19.9 |  |  |
| 23 23 |  | 18 | ${ }_{-12.98}^{-12.98}$ | ${ }_{21}^{21.28 \mid}$ | ${ }_{\text {MININI }}^{\text {min }}$ | UIIMMM MEA | EASURE |  |  | －ee｜ $112 e .8$ |  |  |  | 1.1 |  | 28.47 |  |  |  |  |  |  |  |

erson：REAL SEP．：．ee REL．：．．eo ．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．．REAL SEP．：1．14 REL．： 57



Figure 6．Person Measure

In Figure 5, the separation value $=2.05$ is obtained, so the value $\mathrm{H}=\mathrm{H}=[(4 \times 2.05)$ $+1]: 3=3.06$, which if rounded to 3 . In Figure 4.2, the separation value $=4.24$ is obtained. value $\mathrm{H}=\mathrm{H}=[(4 \times 4.24)+1]: 3=5.98$ if rounded to 6 . This means that there are six groups of questions. In Figure 5, the separation value $=2.90$ is obtained, so the value $\mathrm{H}=\mathrm{H}=[(4 \times 2.90)$ $+1]: 3=4.2$. So, based on the upper and lower limits of the logit value, students can be divided into six groups with the same logit interval.

Table 2. of Frequency and Percentage of Student Ability Groups

| Ability Group | Logit Interval | Frequency | Percentage |
| :---: | :---: | :---: | :---: |
| Level 1 | $-1,64 \leq P<13,92$ | 110 | $51,4 \%$ |
| Level 2 | $13,92 \leq P<23,29$ | 65 | $30,3 \%$ |
| Level 3 | $23,29 \leq P<26,24$ | 21 | $9,8 \%$ |
| Level 4 | $26,24 \leq P<36,00$ | 16 | $7,4 \%$ |
| Level 5 | $36,00 \leq P<44,65$ | 1 | $0,5 \%$ |
| Level 6 | $44,65 \leq P<65,86$ | 1 | $0,5 \%$ |


GUTTMAN SCALOGRAM OF RESPONSES:
person |Ite|


[^0]

Figure 7. Scalogram

Scalograms sort students' abilities from the highest level to level 6. From left to right, they show the student's score from the lowest level questions to the highest level. The answer pattern shows that student P009 has the highest literacy skills and the highest score.

## CONCLUSIONS

The ten questions developed can be used as an instrument to measure students' mathematical literacy abilities because (1) they are valid as seen from the fulfillment of the MNSQ, ZSTD, and Pt Mean Corr categories, (2) they show item reliability of 0.82 which means they are included in the excellent category and can measure ability students'
mathematical literacy; (3) effective because based on analysis of student abilities 51.4 percent of students are at level $1 ; 30.3 \%$ of students are at level $2 ; 9.8 \%$ of students are at level $3 ; 7.4 \%$ of students are at level 4 ; and $0.5 \%$ of students are at levels 5 and 6 respectively which are the highest.

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