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DEVELOPMENT AND STANDARDIZATION OF MATHEMATICS ACHIEVEMENT TEST FOR FOURTH-GRADE STUDENTS

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ABSTRACT
Assessing students' mathematical achievement is essential for monitoring progress and refining instructional methods. This study focuses on developing and standardizing a Mathematics Achievement Test (MAT) for fourth-grade students, ensuring reliability and validity. Following a structured test construction process, including blueprinting, item analysis, reliability, validity, norms, the test assesses core mathematical skills such as arithmetic operations, fractions, and measurement. By aligning with curriculum standards and incorporating expert feedback, this research provides an effective tool for evaluating mathematics achievement. The standardized MAT aims to support educators in making standardize mathematics tests to enhance learning outcomes in elementary education.

KEYWORDS: *Test Construction, Standardization, Item Analysis, Reliability, Validity, Norm*

INTRODUCTION
The assessment of mathematical achievement in elementary school is crucial for monitoring students' academic progress and identifying areas for improvement. Mathematics achievement tests serve as valuable tools in measuring students' understanding of mathematical concepts, procedural skills, and problem-solving abilities. According to Cohen and Swerdlik (2010), standardized tests ensure consistency in administration and scoring, facilitating reliable comparisons across diverse populations. Additionally, these tests help in making data-driven decisions that guide instructional strategies and curriculum development.

Developing a mathematics achievement test for fourth-grade students involves a rigorous process of test construction, item analysis, and standardization. This ensures that the test is both valid and reliable, allowing educators to make accurate inferences about students' mathematical proficiency. As suggested by Crocker and Algina (2008), the validity of a test depends on its alignment with curriculum standards and its ability to measure the intended constructs accurately. Moreover, standardization allows for the establishment of norms, which help in interpreting individual scores relative to a reference group (Anastasi & Urbina, 1997). Furthermore, Nitko and Brookhart (2011) emphasize the importance of designing assessments that are fair and reflective of diverse student backgrounds, ensuring equitable measurement across different populations.

The present study aims to develop and standardize a mathematics achievement test specifically tailored for fourth-grade students. The test will assess key domains of mathematics, such as numbers, addition, subtraction, multiplication, division, fraction, measurement, providing a comprehensive evaluation of students' skills. By adhering to best practices in test development, this study seeks to contribute a reliable and valid instrument for assessing mathematical achievement in elementary education.

Achievement Test
An achievement test is a type of assessment designed to measure a learner's knowledge, skills, and understanding in a particular subject area after a period of instruction. These tests evaluate how well students have achieved the learning objectives set forth in a curriculum (Anastasi & Urbina, 1997). Unlike aptitude tests, which measure potential or capacity for future learning, achievement tests focus on what has already been learned, typically in a structured educational setting (Brown, 2005). They are instrumental in assessing the effectiveness of teaching methods and curriculum quality and in identifying areas where students may need additional support (Kubiszyn & Borich, 2016).

Mathematics Achievement Test
A mathematics achievement test at the primary level is an assessment designed to measure young students' understanding and mastery of foundational math skills, such as basic arithmetic, counting, and problem-solving. This type of test evaluates how well students grasp core concepts aligned with their grade-level curriculum, helping educators determine if students have met learning benchmarks in areas like addition, subtraction, and basic geometry (Clements & Sarama, 2009). Primary-level mathematics achievement tests are essential for identifying students' strengths and areas needing improvement early on, guiding instructional adjustments to support their mathematical development (Burns et al., 2010).

CONCEPTUAL FRAMEWORK
Objectives
- To develop a mathematics achievement test for fourth-grade students.

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- To standardize the developed mathematics achievement test.

Methodology

To standardize the achievement test, the following steps developed by Cohen and Swerdik (2010), were adopted.



1. Conceptualization of the Test

According to Cohen and Swerdlik (2010), test conceptualization is the very first step in creating a test, where the test developer comes up with the idea or concept for the test. It involves asking key questions like:

- *What is the test going to measure?*
- *Why is the test needed?*
- *Who will take the test?*

During this stage, the researcher defines the overall purpose of the test and outlines the specific abilities or characteristics the test aims to measure. It is like building the blueprint for the test, giving it a clear direction and foundation before writing any questions or items. This helps ensure that every part of the test will align with its intended goals.

1.1 Purpose of the test: The purpose of the test was to assess the achievement of fourth-grade students in mathematics in the topics as follows: number, addition, subtraction, multiplication, division, fraction, and measurement. It was to developed to see whether the students meet the expected learning outcome or not.

1.2 Target Audience: The test was meant for fourth-grade students of West Bengal Board of Primary Education, having age range of 10 to 12 years. Having said that, since it is a standardized test and the syllabus is in line with NCERT it can be applied to fourth-grade students of any board in India.

1.3 Construct Definition: The test targets three domains of the Blooms's Taxonomy, that is, knowledge, understanding, and application in the topics as mentioned earlier.

1.4 Intended Use: The test is to evaluate the performance of fourth-grade students on the desired topics.

1.5 Test Format: Since the test is for primary students, number of questions should not be many. The test consists 60 items initially and the nature of the questions are multiple choice with four alternatives.

1.6 Scoring and Interpretation: Each question carries one mark for right answer and zero mark for the wrong ones. So if a student answers all questions correctly they will get 60 marks and for the other way around zero mark will be assigned.

2. Pilot Work

The Mathematics Achievement Test was systematically developed based on three cognitive objectives: knowledge, understanding, and application. In alignment with these objectives, the researcher conducted a thorough content analysis of the Class IV Mathematics syllabus prescribed by the West Bengal Board of Primary Education. Based on the analysis, seven key topics were identified for inclusion in the test: Number, Addition, Subtraction, Multiplication, Division, Fraction, and Measurement. Prior to constructing the test, the researcher reviewed a range of formative and summative assessment papers from previous academic years. This review revealed that several of these assessments did not align with the principles of standardized achievement testing. Taking these discrepancies into account, the researcher proceeded to develop a mathematics achievement test that adhered to the cognitive objectives and reflected both curricular content and assessment standards.

3. Construction of the Mathematics Achievement Test

The Mathematics Achievement Test was developed to assess students' performance across seven core topics at the fourth-grade level: Number, Addition, Subtraction, Multiplication, Division, Fraction, and Measurement. The development of the test was carried out through the following structured phases.

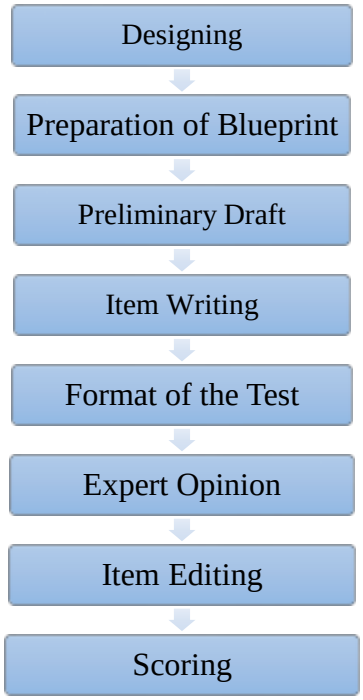
3.1 Planning

The researcher carefully planned the achievement test by considering the subject area, difficulty level, student type, and the specific aspects of what, when, and how to measure. Effective planning is essential, as it ensures the test aligns with educational goals and accurately measures student achievement (Cohen & Swerdlik, 2010). The researcher also made decisions about the weighting of objectives, content coverage, number and type of items, test length, time allocation, and the marking procedures.

3.2 Development

This phase included the following steps.

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3.2.1 Designing of the MAT

While designing the MAT the following points were taken care of.

Identification of objectives: Making specific objectives is the first stage in measuring achievement. Three objectives were defined in behavioral terms focusing on knowledge, understanding and application from the prescribed content of the syllabus.

3.2.2 Preparation of Blueprint

The next step was to prepare a blueprint. After studying the syllabus of the Class IV mathematics textbook used in government primary schools of West Bengal, the main content for the achievement test was determined, and major instructional objectives were identified. According to Shah and Choudhury (2020), blueprints ensure that assessments systematically cover the syllabus while balancing different cognitive domains. Then the first draft of the blueprint was prepared and reviewed. It was constructed with careful consideration of the following aspects: the contents to be covered, the alignment of objectives with content, and the types of questions included. The test was designed to address three instructional objectives: knowledge, understanding, and application, an approach widely recognized for enhancing the validity of educational assessments (Rao, 2019).

Table 1

Blueprint of the Mathematics Achievement Test (First Draft)

Objectives ⟹ / Topics ⇓	Knowledge	Understanding	Application	Total	
				Number of questions	Marks
Numbers	3(3)	5 (5)	---	8	8
Addition	6 (6)	---	7 (7)	13	13
Subtraction	2 (2)		3 (3)	5	5
Multiplication	4 (4)	2 (2)	4 (4)	10	10
Division	3 (3)	2 (2)	2 (2)	7	7
Fraction	4 (4)	4 (4)	2 (2)	10	10
Measurement	2 (2)	3 (3)	2 (2)	7	7
Total	24 (24)	16 (16)	20 (20)	60	60

Note. (Figures within brackets indicate the number of questions and figures outside the brackets indicates marks.)

Table 2

Weightage to Objectives

Weightage to Objectives		
Objectives	**Marks**	**Percentage**
Knowledge	24	40
Understanding	16	27
Application	20	33
Total	60	100

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Table 3
Weightage to Content

Weightage to Content		
Content	**Marks**	**Percentage**
Numbers	8	13.33
Addition	13	21.67
Subtraction	5	8.33
Multiplication	10	16.67
Division	7	11.67
Fraction	10	16.67
Measurement	7	11.67
Total	60	100

3.2.3 Preliminary Draft
After the planning phase, the next step undertaken by the researcher was the preparation of the preliminary draft and the design of questions corresponding to the blueprint. The preliminary draft was prepared through the following stages.

3.2.4 Item Writing
The blueprint was followed for writing the items, as it served as a guiding framework. The following points were considered of utmost priority during the item-writing process.

- Each item in the draft were made corresponding to the framed objectives.
- Questions made were simple, clear and easy to understand.
- Ambiguous statements were avoided.
- Weak alternatives were strengthened.
- Wordings of the items were clarified.
- Items were sequenced from simple to complex

3.2.5 Format of the Test
The test was divided into two parts. The first part contained the demographic details of the students such as their name, class, name of school, sex, date of birth, and General instruction. The second part included the test items.

3.2.6 Expert Opinion
Item checking by experts plays a vital role for making a standard tool. It gives the researcher an overall idea to rectify the mistakes at the onset of their work. The researcher here took expert opinion from 4 primary school teachers, 2 Assistant Professors in Pedagogy of Mathematics of B.Ed. College, 1 Assistant Professor in Pedagogy of Mathematics from a Central University. School teachers and college teachers are from the state of West Bengal. The main purpose was to assess the content validity and the language part since the MAT was bilingual (English and Bengali).

3.2.7 Item editing
Then the items of the test were edited and reviewed as per the suggestions given by experts. The suggestions were incorporated and defects were removed. Some of the items were modified on the basis of their wordings, ambiguity, weak alternatives etc. and 2 items were removed. And finally the researcher was left with 58 items.

3.2.8 Scoring
Since the MAT was a MCQ type test, it was decided to allot one mark for each right answer and zero for wrong ones. And there was no negative marking for incorrect answers.

4. Test Try Out
The success or failure of any achievement test is measured when it is implemented on the students. Poor planning of the administrative process can lead to fake results. That's why after preparing a preliminary draft, it is subjected to tryouts. Test tryout involves administering the test to a smaller, representative sample to identify any issues in question clarity, difficulty levels, or timing (Anastasi & Urbina, 1997). This process helps ensure that the test items are valid and reliable, ultimately enhancing the accuracy of the test in measuring the intended learning outcomes.

4.1 First Tryout
After finalizing the test items, the researcher executed the first try out on 25 students to check if there is any confusion from the students' end. Feedbacks from students were taken; problems faced by them were addressed. Apart from that few more things were taken into consideration during the process. They are: difficulty in understanding any particular word/words, incorrect numbering, misleading statements, and grammatical errors, if there were any. And time taken by each student to complete the test was also noted.

4.2 Second Tryout
To ensure the proper functioning of the test items and to eliminate any shortcomings, it is essential to conduct a second try-out. Second try was carried out in six schools, comprising three schools from rural areas and three from urban areas. The total number of students who attempted the test across all six schools was 112. However, for the purpose of analysis, only 70 response sheets were selected, while the remaining were discarded due to incomplete responses. The final 70 response sheets were then considered for item analysis.

5. Analysis
For the standardization of the test, item analysis was employed to statistically assess the acceptability of each item. The validity of the items was determined through a set of established procedures applied during the analysis. Initially, the 70 response sheets were scored based on student performance and entered into an Excel sheet, both student-wise and item-wise.

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The responses were then arranged in descending order of total scores.

The top 27% of students constituted the high group, while the bottom 27% formed the low group. The middle 46% was excluded from the analysis, as only the two extreme groups were required. For the present study, these high and low groups were used to calculate the Difficulty Value (DV) and Discriminating Power (DP) of each item. The analysis primarily focused on three parameters: Discriminating Power, Difficulty Value, and Distractor Analysis. Each of these is discussed in detail below.

5.1 Calculation of DV and DP

For calculating DV and DP, the following formulas were used.

$$DV = \frac{R_1 + R_2}{N}$$

$$DP = \frac{R_1 - R_2}{N/2}$$

Where

R_1 is total number of right responses in the higher group

R_2 is total number of right responses in the lower group.

N is total number of students in both the groups (38).

Table 4

Calculated DV and DV

Item No	Number of correct responses in the		DV	DP	Remarks
	Higher group (R_1)	Lower group (R_2)			
1.	19	6	0.66	0.68	
2.	16	3	0.50	0.68	
3.	19	2	0.55	0.89	
4.	19	18	0.97	0.05	Rejected (R)
5.	19	13	0.84	0.32	R
6.	17	4	0.55	0.68	
7.	18	2	0.53	0.84	
8.	11	2	0.34	0.47	
9.	18	5	0.61	0.68	
10.	6	6	0.32	0.00	R
11.	14	5	0.50	0.47	
12.	13	7	0.53	0.32	
13.	14	5	0.50	0.47	
14.	18	15	0.87	0.16	R
15.	5	6	0.29	-0.05	R
16.	14	7	0.55	0.37	
17.	17	7	0.63	0.53	
18.	19	5	0.63	0.74	
19.	14	1	0.39	0.68	
20.	18	4	0.58	0.74	
21.	3	7	0.26	-0.21	R
22.	18	3	0.55	0.79	
23.	15	6	0.55	0.47	
24.	11	4	0.39	0.37	
25.	14	6	0.53	0.42	
26.	14	7	0.55	0.37	
27.	16	2	0.47	0.74	
28.	19	12	0.82	0.37	R
29.	18	2	0.53	0.84	
30.	19	13	0.84	0.32	R
31.	19	4	0.61	0.79	
32.	13	3	0.42	0.53	
33.	16	7	0.61	0.47	
34.	18	8	0.68	0.53	
35.	18	10	0.74	0.42	
36.	13	3	0.42	0.53	
37.	18	1	0.50	0.89	
38.	3	7	0.26	-0.21	R
39.	9	3	0.32	0.32	
40.	18	4	0.58	0.74	
41.	17	14	0.82	0.16	R
42.	7	5	0.32	0.11	R
43.	11	2	0.34	0.47	

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44.	14	5	0.50	0.47	
45.	18	4	0.58	0.74	
46.	16	6	0.58	0.53	
47.	13	2	0.39	0.58	
48.	10	7	0.45	0.16	R
49.	12	7	0.50	0.26	
50.	14	3	0.45	0.58	
51.	10	3	0.34	0.37	
52.	13	2	0.39	0.58	
53.	12	2	0.37	0.53	
54.	4	6	0.26	-0.11	R
55.	6	6	0.32	0.00	R
56.	16	11	0.71	0.26	
57.	9	6	0.39	0.16	R
58.	10	3	0.34	0.37	

Table 5
Distractor Analysis

Item No	Option I	Option II	Option III	Option IV	Item No	Option I	Option II	Option III	Option IV
1	2.63	18.42	65.79	13.16	**30**	84.21	7.89	5.26	2.63
2	21.05	50.00	15.79	13.16	**31**	13.16	15.79	60.53	10.53
3	55.26	15.79	18.42	10.53	**32**	10.53	42.11	13.16	34.21
4	**0.00**	97.37	2.63	**0.00**	**33**	60.53	26.32	2.63	10.53
5	**0.00**	10.53	84.21	5.26	**34**	13.16	68.42	7.89	10.53
6	55.26	15.79	23.68	5.26	**35**	73.68	7.89	10.53	7.89
7	7.89	18.42	52.63	21.05	**36**	42.11	42.11	**0.00**	15.79
8	34.21	39.47	18.42	7.89	**37**	10.53	50.00	36.84	2.63
9	10.53	60.53	18.42	10.53	**38**	57.89	5.26	26.32	10.53
10	31.58	28.95	34.21	5.26	**39**	31.58	42.11	13.16	13.16
11	21.05	18.42	50.00	10.53	**40**	2.63	18.42	57.89	21.05
12	52.63	15.79	18.42	13.16	**41**	13.16	81.58	**0.00**	5.26
13	15.79	26.32	50.00	7.89	**42**	10.53	23.68	31.58	34.21
14	**0.00**	2.63	10.53	86.84	**43**	10.53	28.95	26.32	34.21
15	23.68	18.42	28.95	28.95	**44**	7.89	50.00	34.21	7.89
16	15.79	18.42	10.53	55.26	**45**	15.79	10.53	57.89	15.79
17	63.16	18.42	10.53	7.89	**46**	57.89	31.58	5.26	5.26
18	63.16	18.42	13.16	5.26	**47**	7.89	39.47	28.95	23.68
19	21.05	23.68	39.47	15.79	**48**	5.26	44.74	28.95	21.05
20	57.89	15.79	15.79	10.53	**49**	18.42	18.42	50.00	13.16
21	15.79	26.32	55.26	2.63	**50**	42.11	44.74	10.53	2.63
22	23.68	15.79	55.26	5.26	**51**	10.53	34.21	44.74	10.53
23	5.26	13.16	26.32	55.26	**52**	5.26	39.47	39.47	15.79
24	31.58	39.47	18.42	10.53	**53**	18.42	15.79	28.95	36.84
25	15.79	18.42	52.63	13.16	**54**	26.32	50.00	10.53	13.16
26	55.26	18.42	5.26	21.05	**55**	36.84	31.58	23.68	7.89
27	47.37	23.68	23.68	5.26	**56**	71.05	13.16	7.89	7.89
28	**0.00**	2.63	15.79	81.58	**57**	13.16	39.47	21.05	26.32
29	52.63	31.58	15.79	**0.00**	**58**	21.05	18.42	26.32	34.21

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Table 6

Final Items Accepted/Rejected on the Basis of Item Analysis and Distractor Analysis

Item	Accepted/Rejected	Item	Accepted/Rejected	Item	Accepted/Rejected
1	Accepted	**21**	**Rejected**	**41**	**Rejected**
2	Accepted	**22**	Accepted	**42**	**Rejected**
3	Accepted	**23**	Accepted	**43**	Accepted
4	**Rejected**	**24**	Accepted	**44**	Accepted
5	**Rejected**	**25**	Accepted	**45**	Accepted
6	Accepted	**26**	Accepted	**46**	Accepted
7	Accepted	**27**	Accepted	**47**	Accepted
8	Accepted	**28**	**Rejected**	**48**	**Rejected**
9	Accepted	**29**	**Rejected**	**49**	Accepted
10	**Rejected**	**30**	**Rejected**	**50**	Accepted
11	Accepted	**31**	Accepted	**51**	Accepted
12	Accepted	**32**	Accepted	**52**	Accepted
13	**Rejected**	**33**	Accepted	**53**	Accepted
14	**Rejected**	**34**	Accepted	**54**	**Rejected**
15	**Rejected**	**35**	Accepted	**55**	**Rejected**
16	Accepted	**36**	**Rejected**	**56**	Accepted
17	Accepted	**37**	Accepted	**57**	**Rejected**
18	Accepted	**38**	**Rejected**	**58**	Accepted
19	Accepted	**39**	Accepted		
20	Accepted	**40**	Accepted		

6. Revision

Therefore, 18 items got rejected after the final analysis. And the investigator was left with 40 items for the Mathematics Achievement Test. When the questions were put in the blueprint it was seen that the content subtraction got only 1 item, which was less in comparison to other content of the test. Therefore, the researcher modified 3 items to make it 4 in total in the subtraction domain. Eventually there were 43 items for the final Mathematics Achievement Test.

Establishing Reliability

Reliability refers to the consistency, stability, and dependability of a measuring instrument across time and different conditions (Cohen, Swerdlik, & Sturman, 2018). In the context of educational and psychological testing, reliability is essential to ensure that the results of a test are replicable and not significantly influenced by external factors. A reliable test minimizes measurement errors and provides accurate data that reflect the true performance or ability of the examinee (Crocker & Algina, 2008). In achievement testing, establishing reliability is crucial because it supports the validity of interpretations based on test scores and ensures that decisions made from the results are consistent and fair. Therefore, assessing the reliability of the Mathematics Achievement Test was a necessary step in the standardization process. Split-half and Cronbach's alpha correlation was calculated as shown in the table below.

Table 7

Reliability Coefficients of the Mathematics Achievement Test

Type of reliability	Reliability coefficient
Split-half estimated by Spearman-Brown Coefficient	0.85
Cronbach's Alpha	0.90

Establishment Validity

Validity refers to the degree to which a test accurately measures what it is intended to measure. In the context of educational assessment, it reflects the appropriateness, meaningfulness, and usefulness of the inferences made from test scores.

The validity of the mathematics achievement test was established through face, content, and construct validity. Face validity was ensured through expert opinion and feedback from the research supervisor, confirming that the test appeared suitable and relevant for assessing students' mathematical achievement. Content validity was established through expert feedback and recommendations regarding the clarity of language, item difficulty, alignment of the test items with the actual content of the curriculum, and their reflection of the intended instructional objectives. Construct validity was determined through item analysis, including item-total correlations within each dimension and inter-dimension correlations with the overall test score. The correlation coefficients ranged from 0.341 to 0.845, indicating acceptable to high levels of internal consistency and construct representation.

Norms

In the present study z-norms were developed and their interpretation is as follows.

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Table 8

Developed z-norms of the Mathematics Achievement Test

z-scores	Interpretations	Score
+2.01 σ to +3 σ	Very high	34 and above
+1.01 σ to +2 σ	High	28 to 33
-1. σ to +1 σ	Average	15 to 27
-1.01 σ to -2 σ	Low	9 to 14
-2.01 σ to -3 σ	Very low	0 to 8

Table 9

Final Blueprint of the MAT

Weightage to Content			
Dimension	**Items**	**Item numbers**	**Percentage**
Numbers	6	1, 2, 8, 9, 10, 34	13.95
Addition	7	3, 11, 14, 20, 22, 33, 35	16.28
Subtraction	4	21, 30, 36, 43	9.31
Multiplication	7	4, 12, 13, 16, 24, 25, 32	16.28
Division	6	5, 15, 17, 26, 31, 39	13.95
Fraction	7	6, 7, 18, 19, 27, 28, 40	16.28
Measurement	6	23, 29, 37, 38, 41,42	13.95
Total	43	43	100

Mathematics Achievement Test (MAT)

Name……. Class…….

School……. Sex……...

Date of birth……..

Maximum Marks: 60
Maximum Time: 90 minutes'

General Instructions

(i) Fill all the above information in the space provided.
(ii) Read the questions carefully. Each question has four options (a, b, c, d). Choose the correct option and give a tick mark against it.
(iii) For every correct option you will get one mark but there will be no negative marking for an incorrect answer.
(iv) The last page is left blank for rough work.
(v) After completing the test submit it to the investigator.

Scoring

Total Score:

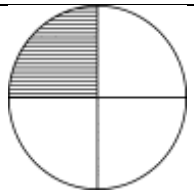
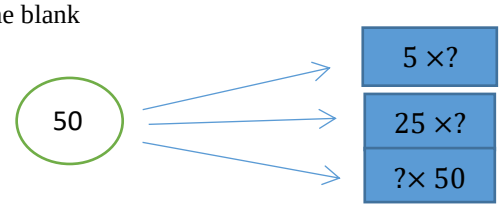
Item No	Items
1.	Which one among the following is a three-digit number? (a) 010 (b) 001 **(c) 100** (d) 000
2.	Find the biggest three-digit number. (a) 888 **(b) 999** (c) 909 (d) 990
3.	Sum of 1000 and 99 will give **(a) 1099** (b) 1009 (c) 1999 (d) 10000
4.	Find the product. 5 6 × 8 0 -------- **(a) 4480** (b) 4840 (c) 4408 (d) 4804

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5.	Find the division of the following 3699÷9 (a) 413 (b) 410 **(c) 411** (d) 412
6.	Write the denominator part of the following fractions. $\frac{1}{8}, \frac{2}{7}, \frac{x}{z}, 12$ **a) 8, 7, z, 1** b) 1, 2, x, 12 c) 1, 7, x, 12 d) 1, 2, z, 12
7.	Find the sum of the following. $\frac{2}{7} + \frac{3}{7} + \frac{1}{7}$ (a) $\frac{8}{7}$ **(b) $\frac{6}{7}$** (c) $\frac{5}{7}$ (d) $\frac{4}{7}$
8.	Which one of the following is a four-digit number? (a) 99999 (b) 0999 **(c) 2359** (d) 0100
9.	Find the smallest four-digit number among the following. **(a) 3000** (b) 3139 (c) 3010 (d) 3001
10.	The place value of 7 in 7652 is (a) 7 (b) 70 (c) 700 **(d) 7000**
11.	Your age is 9 year 2 months and 11 days and your sister's age is 4 years 5 months and 15 days. What is the sum of both of the ages? **a) 13 years 7 months 26 days** b) 12 years 7 months 26 days c) 13 years 7 months 25 days d) 13 years 6 months 24 days
12.	Solve it. 5 5 × 6 6 ---------- **(a) 3630** (b) 3360 (c) 3036 (d) 3306
13.	Shampa drew 26 lines on one page. She did it in 35 pages. How many lines in total did she draw? (a) 810 (b) 7870 **(c) 910** (d) 890
14.	In a library near your locality, there are 608 short story books and 494 novels brought recently. Find the total number of books brought in the library recently. **(a) 1102** (b) 1120 (c) 1201 (d) 1012

Item No	Items
15.	Solve the following. 84÷12 (a) 12 (b) 84 **(c) 7** (d) 8
16.	Seven of your friends went to a place and they spent 385. If each one has to pay equal amount, how much one will pay? (a) 54 (b) 56 (c) 57 **(d) 55**
17.	200 months = ☐ years ☐ a) 16 years 7 months **b) 16 years 8 months** c) 15 years 7 months d) 15 years 8 months
18.	Which one is the smallest among the following? $\frac{3}{10}, \frac{7}{10}, \frac{1}{10}, \frac{9}{10}$ (a) $\frac{9}{10}$ (b) $\frac{7}{10}$ **(c) $\frac{1}{10}$** (d) $\frac{3}{10}$
19.	Determine numerator, denominator and fraction from the given picture.

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	 **(a) 1, 4, $\frac{1}{4}$** (b) 2, 3, $\frac{2}{3}$ (c) 1, 5, $\frac{1}{5}$ (d) 1, 3, $\frac{1}{3}$
20.	Rima's father earns Rs. 9,000/- per month and her mother earns Rs. 9,650/- per month. How much do her parents earn in total? **(a) 18650** (b) 18065 (c) 18605 (d) 18560
21.	Your age is 9 years 10 months and 17 days and your brother's age is 5 years 11 months and 23 days. How much older are you than your brother? **a) 4 years 8 months 24 days** b) 3 years 8 months 24 days c) 3 years 10 months 24 days d) 4 years 10 months 24 days
22.	Ramesh uncle saves Rs. 4959/- per month and Rustam uncle saves Rs. 5042/- per month. Calculate their aggregate monthly savings. (a) 10100 (b) 11000 **(c) 10001** (d) 10010
23.	4 hours 15 minutes is equal to how many minutes? (a) 250 **(b) 255** (c) 245 (d) 240
24.	Fill in the blank  **(a) 10, 2, 1** (b) 5, 3, 4 (c) 9, 6, 10 (d) 10, 2, 2

Item No	Items
25.	One of my story books has 103 pages. Similar 25 books will contain how many pages? (a) 2755 **(b) 2575** (c) 5725 (d) 2555
26.	Your school has purchased 7992 pencils in 8 boxes. If each box contains equal number of pencils then how many pencils are there in one box? **(a) 999** (b) 997 (c) 995 (d) 996
27.	Subtract the following $\frac{4}{5} - \frac{3}{5}$ (a) $\frac{2}{5}$ **(b) $\frac{1}{5}$** (c) $\frac{3}{5}$ (d) $\frac{7}{5}$
28.	There are 9 bananas with you. Out of which $\frac{1}{3}^{rd}$ of them are rotten. How many of the bananas are fresh? (a) 6 (b) $\frac{1}{3}$ (c) 9 **(d) 3**
29.	1 kg equals to how many grams? (a) 1 (b) 10 **(c) 1000** (d) 10000
30.	Do the following subtraction 9 0 0 0 8 0 9 9 --- (a) 909 (b) 901 (c) 990 **(d) 109**
31.	Find the dividend, divisor, and quotient in the following example $20 \div 5 = 4$ a) dividend-4, divisor-5, quotient-20 b) dividend-20, divisor-4, quotient-5 c) dividend-5, divisor-4, quotient-20 d) **dividend-20, divisor-5, quotient-4**
32.	You took 4 months and 11 days to complete a task. How many days did you take to complete the task? (a) 121 **(b) 131** (c) 141 (d) 151

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33.	The distance from Sabnam's home to her school is 21,439 cm and Apurba's home to her school is 36,520 cm. Find the total distance. (a) 58972 (b) 65289 **(c) 57959** (d) 85697
34.	Arrange the following numbers in descending order. 9999, 8992, 9298, 9829, 9289 **a) 9999, 9829, 9298, 9289, 8992** b) 8992, 9289, 9298, 9829, 9999 c) 9298, 9289, 8992, 9999, 9829 d) 8992, 9298, 9999, 9289, 9829
35.	There is flood in your neighbouring district. Your school has donated Rs.8,798/- and another school has donated Rs. 9,999/. Find the total donation by both the schools. (a) 18779 **(b) 18797** (c) 18977 (d) 1789

Item No	Items
36.	Rakib has 1297 marbles with him and he gives 399 of them to Suhana and 399 to Rajesh and 499 to Madhurima. How many marbles is he left with? (a) 299 **(b) 399** (c) 499 (d) 0
37.	1 meter is equal to how many centimetres? (a) 1 (b) 10 **(c) 100** (d) 1000
38.	Your height is measured with a measuring tape and it is found to be 121 cm. What is your height in meter and centimetre? (a) 4 m 21 cm **(b) 1 m 21 cm** (c) 2 m 21 cm (d) 3 m 21 cm
39.	Which one from the following is correct? (i) $Divisor = dividend \times quotient + remainder$ (ii) $Dividend = divisor \times quotient + remainder$ (iii) $Remainder = divisor \times quotient + dividend$ (iv) $Quotient = divisor \times dividend + remainder$ (a) (i) **(b) (ii)** (c) (iii) (d) (iv)
40.	Your father brought a papaya from market. He divided it into 9 equal parts. You took 2 parts, your mother took 3 parts and your father took 2 parts. Your sister ate the rest of the part. How much did your sister eat? (a) $\frac{1}{9}$ **(b) $\frac{2}{9}$** (c) $\frac{3}{9}$ (d) $\frac{4}{9}$
41.	Your mother bought 3m 21cm white curtain and 4m 85cm black curtain. She bought how many meters and how many centimetres of curtain in total? (a) 7 m 6 cm (b) 9 m 26 cm (c) 6 m 36 cm **(d) 8 m 6 cm**
42.	Calculate the following. Km m 9 514 + 8 625 + 7 103 --- **(a) 25 km 242 m** (b) 25 km 240 m (c) 24 km 242 m (d) 24 km 240 m
43.	You have Rs. 1,000/- and you are about to go to market. You want to buy chocolate of Rs. 680/- and biscuits of Rs. 770/-. How much more money do you require? (a) 350 (b) 250 (c) 550 **(d) 450**

CONCLUSION

The development and standardization of the Mathematics Achievement Test (MAT) for fourth-grade students ensure a reliable and valid assessment tool tailored to elementary education. The meticulous process of test construction, expert validation, item analysis, realiability, validity, and norms resulted in a structured and balanced evaluation framework. This standardized test not only helps measure students' mathematical proficiency but also aids educators in refining instructional strategies. Moving forward, its implementation can contribute to more effective learning assessments, ensuring that students receive the necessary support to strengthen their mathematical foundations.

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