



CONSTRUCTION AND STANDARDIZATION OF AN ACHIEVEMENT TEST IN MATHEMATICS AND ENGLISH GRAMMAR FOR CLASS IX STUDENTS

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Abstract: This study has been undertaken to construct and standardize of an achievement test in Mathematics and English Grammar for class IX students. It intends mainly three objectives: to construct and standardize an achievement test in Mathematics and English Grammar for class IX students, to try out the academic achievement test in Mathematics and English Grammar for class IX students and to standardize the academic achievement test in Mathematics and English Grammar for class IX under Board of Secondary students in Assam. The study was considered basically under the scope of descriptive survey-cum-exploratory research. Total 100 participants/sample (i.e., 50 boys and 50 girls) were selected on the basis of stratified random sampling from the 10 Secondary schools of Sivasagar district of Assam. For developing the test, at first 160 items were prepared tentatively and on the basis of Difficulty Value (DV) and Discriminating Power (DP) all the 160 items were discussed and examined by the researcher and consulted with other experts in the field of test construction for constructive suggestions. After getting constructive suggestions from the experts, the researcher finalized the test with 100 items. Odd-even method was used to split the test into two equal halves. The reliability of the English medium schools achievement was found ($r=0.69$) and reliability of the Assamese medium school students on achievement was found ($r=0.76$). The coefficient of the test was estimated by using Spearman-Brown Prophecy Formula and the reliability of the test of English version achievement test in Fundamentals of English Grammar was found ($r=0.82$) and the Assamese version achievement test was found ($r=.88$).

Keywords- Academic Achievement, Standardization, Secondary School

1. INTRODUCTION

The most important methods for evaluating pupils' academic performance and IQ are achievement tests. It aids in assessing the success of instructional strategies (Kumar, 2016). In another definition, achievement is the information obtained or ability developed in academic topics, which is often determined by test results and teacher-assigned grades. The development of high-quality, accessible achievement test requires substantial knowledge of content area-such as mathematics, language arts, or science- and the design of test items that are fair and valid measures of important knowledge and skills in a given content area (Elliott, 2017). A standardized test is one for which the material has been chosen and experimentally validated, standards have been established, consistent procedures of administration and scoring have been designed, and it can be scored with a high degree of objectivity (Good, 1973). The standardization of an achievement test is the performance of an achievement test under standard conditions. A standardization of an achievement test is a test with a defined set of test items and specified administration and scoring instructions. The same examination can be offered to all students to appear under the same conditions in the standardized test of achievement (Bhuyan & Deori, 2016). Standardized tests are often submitted to a

preliminary trial run on a representative student population, allowing the test items to be arranged in any desirable order in terms of difficulty level and discriminating power.

2. IMPORTANCE OF MATHEMATICS

We are surrounded by mathematics, and it plays a significant part in our daily lives. By any standard, mathematics is a science and is utilised by all other disciplines, including physics, chemistry, engineering, and medicine (Jayanthi, 2014). Because it opens up additional academic and/or professional prospects, mathematics is a crucial topic in the classroom (Akinsola & Tella, 2003). Despite being one of the required courses in the school curriculum, mathematics failure rates are quite concerning. One would not be able to advance without any grasp of mathematics. The attainment of a suitable level of accomplishment in Mathematics has a significant impact on success in science and other courses.

3. IMPORTANCE OF ENGLISH GRAMMAR

Grammar plays an important role in language which helps in the process of communication and also developed the language skills and writing skills among the students. Grammar also gives an insight into the structure of language. Correct expression and systematic knowledge of the language is not possible without the proper knowledge of Grammar. If the language is consider to be a vehicle of one's thoughts and feelings than grammar is the machine by which that vehicle is set in motion. Hence knowledge of English grammar is the most important because English is the most widely spoken language of the world (Sharma & Poonam, 2017).

4. OBJECTIVES OF THE STUDY

This objective encompasses the following sub-objectives:

- A. To construct and standardize an achievement test in Mathematics and English Grammar for class IX Students:
 - a. To plan the test
 - b. To prepare the design.
 - c. To prepare a blue print of the test
 - d. To prepare the test
 - e. To prepare scoring key of the test
- B. To try out the Achievement test in Mathematics and English Grammar for class IX Students:
 - a. Preliminary tryout
 - b. Item analysis
 - c. Administration of the final test
- C. To standardise the Achievement test in Mathematics and English Grammar for class IX Students:
 - a. To establish Reliability of the test
 - b. To establish Validity of the test

5. REVIEW OF RELATED LITARURE

The researcher made an effort to find the relevant literature in order to learn more about various steps related to construction and standardization of achievement test. These are-

Bhuyan (2004) conducted a study on 'Construction and standardization of the achievement test in General Science curriculum' on a sample of 224 students studying in class X and 300 science teachers in Dibrugarh district. The steps followed in this study were-

- a. Planning
 - Length of the test
 - Weigtage to different units

- b. Preparing the blue print
 - Preparatory State
 - Writing the items
 - Reviewing and editing test items
 - Arranging the items in the test
 - Reviewing the items in the test
 - Recording the answers
- c. Administering and scoring the test
- d. Appraising the test
 - Item analysis
 - Difficulty of a test
 - Estimating item discriminating power
- e. Standardization of test
- f. Estimation of reliability
- g. Estimation of validity
- h. Derivation of norms

Bhagat & Baliya (2016) entitled his study as 'Construction and standardization of the achievement test in Science of VIII standard based on the text book prescribed by J&K Board'. The test consisted of 141 items covering all aspects of Science text book. After doing rigorous item analysis, 100 items were retained in the final version of the test. Test –retest reliability was calculated and value of coefficient of correlation was found to be 0.82. Validity of the test was established by content validity. The following steps of construction and standardization of an achievement test were used in this study-

- Planning the test
- Preparing of the test
- Administration of the Test/Pilot Testing/ First tryout
- Final tryout of the test
- Preparing final form of the test
- Standardization of the Test: Establishing reliability and validity

Gupta & Kapoor (2012) entitled their study as 'Development of objective type achievement test in science (Biology) for class X students. Different steps followed to develop the achievement test were- Planning, preparation, pre try-out, try out, scoring, item analysis (difficulty and item discrimination) and final form. An objective type achievement test including 110 multiple choice items and fill in the blanks was administered for try out. The 200 student sample was selected by using random sampling technique from the Secondary schools in Sonipat district. Ebel's (1979) criteria and guidelines were used for categorizing discriminating indices. Split –half method was based for estimation of reliability which was found as 0.90. The test was also validated against the criteria of content validity.

Kumar (2016) entitled his study as 'Achievement test in Panjabi for class IX'. In this study, 50 school students of Moga district was randomly selected. Reliability of the test was calculated by Split-half method which was found as 0.60 and validity calculated by comparing the test marks with school marks was 0.90. Statistical techniques used in this study were- mean, correlation, standard deviation, chi-square etc. Item analysis was done by Kelly's method to find the poor items.

Kaur & Singh (2015) in their study on 'Construction and standardization of achievement test in Social studies' used the following procedure of development of achievement test. These are-

- Planning
- Preparing
- Item selection
- Tryout

- Scoring and item analysis.

The test initially consisted of 145 items, later after discussions with experts and administration of the students; the items were reduced to 131. After through item analysis the final draft of test reduced to 60 items. The retest reliability was found to 0.90 and validity was established by content validity method.

Mahajan (2015) followed the following steps to standardize the achievement test in Economics for class XI students-Planning the test, Preparation, Tryout of preliminary draft, Item analysis, Final draft, Establishing reliability and validity. The Difficulty Value (DV), and Discriminating Power (DP) of the test were determined by adopting Kelley's (1939) method. On the basis of the DV and DP the preliminary draft of the achievement test was modified. In total 70 items having difficulty value (DV) ranging from 0.20 to 0.75 and the items ranging from 0.20 to 0.90 on discriminating power (DP) were retained.

Singh & Yadav (2018) in their study followed the following steps of test construction-

A. Planning of the test

- Purpose of the test
- Target population
- Content of the test
- Objectives of the test
- Types of the test items

B. Blue print of first draft

- First try out of item analysis
- Difficulty Value of (DV) of the achievement test
- Discriminating power (DP) of achievement test
- Second try out of achievement test and item analysis

C. Reliability of achievement test

D. Validation of achievement test

6. RATIONALE OF THE STUDY

In India especially in case of Assam it is seen that at school level both the teacher and students mostly are scared to learn the Mathematics and English language as well as the English grammar. The Secondary school teachers and students of Sivasagar district of Assam are also not exceptional in this regard. It is observed from the reviews that there is a big gap of research on academic achievement test of English grammar in IX standard. Hence, the researcher is keenly interested to study on the construction and standardization of an achievement test in English grammar for class IX.

It was observed that different steps were followed by the researchers in construction and standardization of different achievement test. By reading all the above mentioned steps of construction and standardization of an achievement test, the researcher has developed An Achievement Test in Mathematics and English Grammar for class IX students.

7. Steps involved in Construction and Standardization of Achievement Test in Mathematics and English Grammar for Class IX students:

7.1 Planning of the test:

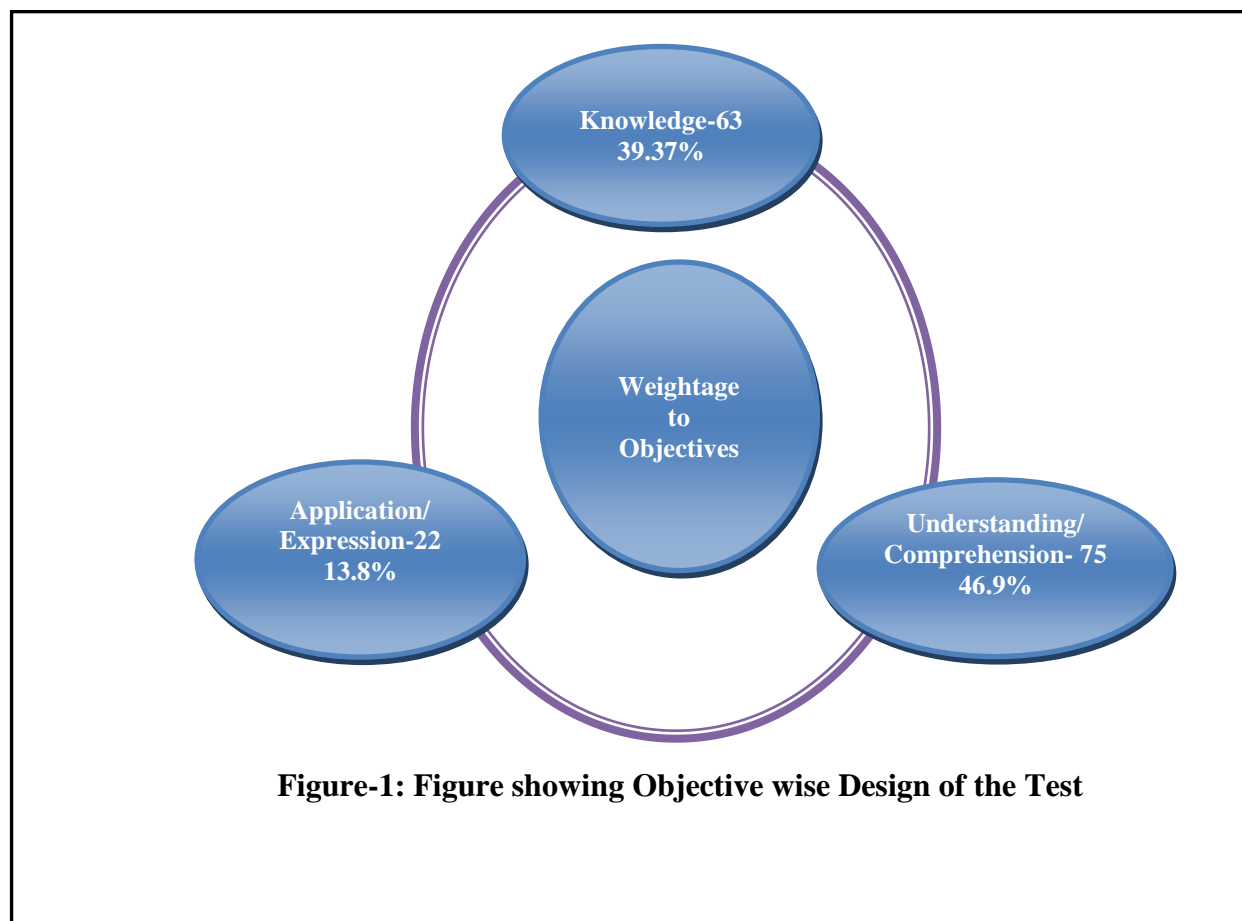
Planning a test involves all of the varied operations that go into producing the tests. It involves the operation of an outline specifying the objectives to be tested, content to be covered, types of items to be included, difficulty level of the items, direction to the examinee etc. In this study the investigator planned the test considering the following steps:

7.2 Preparation of Design of the Test

The objectives of the achievement test in Mathematics and English Grammar were set in behavioral terms according to the Indian adaptation of Bloom taxonomy of educational objectives. As such in cognitive domain knowledge, understanding/comprehension and application/expression have been listed. But analysis, synthesis and evaluation have been merged in to application objectives. Objective wise weightage is presented in the Table-1 and Figure-1 below:

Table: 1 Objective wise Design of the Test

Sl No	Objective	Marks			Percentage of Marks
		Mathematics	English Grammar	Total	
1	Knowledge,	26	37	63	39.37
2	Understanding/comprehension	37	38	75	46.9
3	Application/expression	17	05	22	13.8
Total		80	80	160	100



7.3 Content wise Design:

The content of the test was taken from the Mathematics text book and English Grammar syllabus of class IX developed by NCERT. There were overall 15 chapters in which 2 chapters from Arithmetic, 2 chapters from Algebra, 10 chapters from Geometry and 1 chapter from Statistics in the Mathematics textbook. On the other hand the content of the English Grammar was taken from English Grammar syllabus of class IX. There were overall 12 contents and weightage to which were given according to the guideline given by SEBA. Unit wise weightage given is presented in the Table-2 below

Table-2: Content wise Design of the Test

Sl. No	Subject	Unit	Marks	Percentage of Marks
1	Mathematics	Number system	6	7.5
2		Polynomials	6	7.5
3		Coordinate Geometry	6	7.5
4		Linear Equation in two variables	5	6.25
5		Introduction to Euclids Geometry	3	3.75

6		Lines and Angles	8	10	
7		Triangles	5	6.25	
8		Quadrilaterals	7	8.75	
9		Areas Parallelograms and Triangles	2	2.5	
10		Circles	7	8.75	
11		Constructions	4	5	
12		Heron's Formula	6	7.5	
13		Surface area and values	7	8.75	
14		Statistics	6	7.5	
15		Probability	2	2.5	
16		Determiner	8	10	
17		English	Tense form	10	12.5
18			Vocabulary	8	10
19			Direct and Indirect Narration	8	10
20			Voice	7	8.75
21			Preposition	11	13.75
22	Verb Phrases		7	8.75	
23	Antonyms		4	5	
24	Synonyms		6	7.5	
25	Comprehension		3	3.75	
26	Paragraph writing		3	3.75	
27	Letter writing		5	6.25	
Total			160	100	

7.4 Item wise Design

In the present study achievement test in Mathematics and English Grammar are comprised of four options of multiple choice items, completion type items, fill in the blanks, and yes/no answer type items. Initially a pool of overall 160 items was selected for the first draft of the test.

7.5 Preparation of Blue Print

Blue Print is a detail plan of any action or outline. It provides the users with basic instruction on the rationale for the process in creating test blue print. In education area, blue print provides students an interactive approach for education planning, curriculum expectation and the learning objective. A test Blue Print ensures appropriate items representation of content. The details of test after second try out have been given in the form of blue print. The graphical presentation is given in the Table-3 below:

Table-3: Blueprint of the Achievement Test in Mathematics and English Grammar for class IX students

Sl. No	Subject	Content	Knowledge	Understanding/Comprehension	Application/Expression	Total
1	Mathematics	Number system	5 (5)	1(1)	-	6(6)
2		Polynomials	1 (1)	1(1)	4(4)	6(6)
3		Coordinate Geometry	4(4)	1(1)	1(1)	6(6)
4		Linear Equation in two variables	-	3(3)	2(2)	5(5)
5		Introduction to Euclids	3(3)	-	-	3(3)
6		Lines and Angles	2(2)	4(4)	2(2)	8(8)

7		Triangles	2(2)	3(3)	-	5(5)
8		Quadrilaterals	3(3)	4(4)	-	7(7)
9		Areas Parallelograms and Triangles	-	-	2(2)	2(2)
10		Circles	3(3)	2(2)	2(2)	7(7)
11		Constructions	-	4(4)	-	4(4)
12		Hérons Formula	-	4(4)	2(2)	6(6)
13		Surface area and values	2(2)	5(5)	-	7(7)
14		Statistics	1(1)	4(4)	1(1)	6(6)
15		Probability	-	1(1)	1(1)	2(2)
16	English	Determiner	8 (8)	-	-	8(8)
17		Tense form	-	10(10)	-	10(10)
18		Vocabulary	8(8)	-	-	8(8)
19		Direct and Indirect Narration	-	8(8)	-	8(8)
20		Voice		7(7)	-	7(7)
21		Preposition	11(11)	-	-	11(11)
22		Verb Phrases	-	7(7)	-	7(7)
23		Antonyms	4(4)	-	-	4(4)
24		Synonyms	6(6)	-	-	6(6)
25		Comprehension	-	3(3)		3(3)
26		Paragraph writing	-	3(3)	-	3(3)
27		Letter writing	-	-	5(5)	5(5)
Total			63	75	22	160

(Figures within bracket indicate number of questions and figures outside the bracket indicate marks)

7.6 Preparing the Test

On the basis of the blueprint first draft of achievement test in Mathematics and English Grammar were developed. The first draft of the achievement test in Mathematics and English Grammar consisted of 180 items. After constructing the preliminary draft it was given to subject experts as well as measurement & evaluation experts for criticism and suggestions. On the basis of the suggestions 10 items have been modified and 20 items have been removed.

7.8 Scoring of the Test

In order to score the test items a scoring key was developed by the investigator. The Scoring Key helps to prevent inconsistency in judgment. In this study multiple choice items were included in the constructed achievement test in Mathematics and English Grammar for class IX students. Scoring of the items was done as 1(one) for correct response and 0 (zero) for wrong response and there were no negative marking. Maximum marks for the test was 160 and maximum provided time was 160 minutes.

7.9 First try out

After modification of the achievement test in Mathematics and English Grammar on the basis of the experts suggestions the pilot testing was done on a sample of 100 class IX students, selected on the basis of purposive sampling.

7.10 Item Analysis

After a test had been administered and scored, the effectiveness of the test was evaluated. This was done by item analysis. It was done to find the ambiguities, ineffectiveness of the distracters, and any other technical flaws, and provides information for improving test items. Item analysis consisted of the following steps:

- i. Answer sheets were arranged in order from the highest scores to lowest scores.
- ii. The upper 27% of the total answer sheets i.e. 27, with the highest score were selected and named “Upper Group”, and the lower 27 answer sheets with lowest scores were named as “Lowest Group”. The rest answer sheets constituted the “Middle Group”.
- iii. For each item, the number of students in the upper group was counted who selected each alternative. The same procedure was done for the lower group.

7.11 Estimating item difficulty

The difficulty of the test item is determined by the percentage of the pupils who got the item right. It is the relative frequency, with which examinees choose the correct response (Thorndike, Cunningham, Thorndike, & Hagen, 1991). It has an index ranging from a low of 0 to a high of +1.00. Higher the values of the difficulty index, easier the item is, Brown (1983) The difficulty of the tests was calculated by using the following formula:

$$D.V = \frac{R_H + R_L}{N_H + N_L}$$

Where,

R_H = rightly answered in Highest group.

R_L = rightly answered in Lower group.

N_H = the total number of pupils who attempted the item in higher group

N_L = the total number of pupils who attempted the item in lower group

By applying this formula the difficulty value of each items of the test were calculated. Detailed have been given in the (table-4)

7.12 Estimating item Discriminating Power

The discriminating power of the test items were calculated by comparing the number of students in the upper and lower groups who answered the item correctly. It refers to the degree to which it discriminate between pupils with high and low achievement. It can be calculated by the formula:

$$D = \frac{R_U - R_L}{\frac{1}{2}T}$$

Where,

D = discriminative power of the test-item.

R_U = number of pupils who answered the item correctly in the upper group.

R_L = number of pupils who answered the item correctly in the lower group.

T = total number of pupils in the two groups.

The discriminating power of the items were computed and given in the(table-4)

Table-4: Item wise Difficulty Value (DV) and Discrimination Index (DP) for the Achievement Test in Mathematics and English Grammar (N=160)
(A- Accepted, R- Rejected)

Test Item	Total No. of Correct Responses in Upper 27%	Total No. of Correct Responses in Lower 27%	DV	Remark	DP	Remark
1	21	9	0.5556	A	0.4444	A
2	27	14	0.7593	R	0.4815	A
3	27	26	0.9815	R	0.0370	R
4	19	8	0.5000	A	0.4074	A
5	20	7	0.5000	A	0.4815	A
6	26	11	0.6852	A	0.5556	A
7	27	15	0.7778	R	0.4444	A
8	26	14	0.7597	R	0.4444	A
9	27	13	0.7597	R	0.5185	A
10	24	24	0.8889	R	0.0000	R
11	26	12	0.7037	A	0.5185	A
12	27	11	0.7037	A	0.5926	A
13	21	10	0.5741	A	0.4074	A
14	27	21	0.8889	R	0.2222	A
15	27	13	0.7597	R	0.5185	A
16	26	9	0.6481	A	0.6296	A
17	25	6	0.5741	A	0.7037	A
18	15	11	0.4815	A	0.1481	R
19	16	9	0.4630	A	0.1993	R
20	19	8	0.5000	A	0.4074	A
21	25	20	0.8333	R	0.1852	R
22	27	23	0.9259	R	0.1481	R
23	25	11	0.6667	A	0.5185	A
24	27	13	0.7597	R	0.5185	A
25	12	8	0.3704	A	0.1481	R
26	26	13	0.7222	A	0.4815	A
27	27	17	0.8148	R	0.3704	A
28	26	11	0.6852	A	0.5556	A
29	22	11	0.6111	A	0.4074	A
30	26	22	0.8889	R	0.1481	R
31	26	14	0.7597	R	0.4444	A
32	26	13	0.7222	A	0.4815	A
33	27	13	0.7597	R	0.5185	A
34	27	24	0.9444	R	0.1111	R
35	27	12	0.7222	A	0.5556	A
36	27	11	0.7037	A	0.5926	A
37	22	10	0.5926	A	0.4444	A
38	23	9	0.5926	A	0.5185	A
39	19	18	0.6852	A	0.0370	R
40	26	12	0.7037	A	0.5185	A

41	25	13	0.7037	A	0.4444	A
42	25	11	0.6667	A	0.5185	A
43	14	11	0.4630	A	0.1111	R
44	21	7	0.5185	A	0.5185	A
45	8	6	0.2593	A	0.0741	R
46	20	8	0.5185	A	0.4444	A
47	25	14	0.7222	A	0.4074	A
48	26	13	0.7222	A	0.4815	A
49	25	23	0.8889	R	0.0741	R
50	26	13	0.7222	A	0.4815	A
51	20	9	0.5370	A	0.4074	A
52	26	13	0.7222	A	0.4815	A
53	27	22	0.9074	R	0.1852	R
54	23	11	0.6296	A	0.4444	A
55	24	12	0.6667	A	0.4444	A
56	20	9	0.5370	A	0.4074	A
57	13	8	0.3889	A	0.1852	R
58	21	10	0.5741	A	0.4074	A
59	24	8	0.5926	A	0.5926	A
60	11	9	0.3704	A	0.0741	R
61	22	7	0.5370	A	0.5556	A
62	9	6	0.2778	A	0.1111	R
63	21	16	0.6852	A	0.1852	R
64	21	7	0.5185	A	0.5185	A
65	27	3	0.5556	A	0.8889	A
66	25	13	0.7037	A	0.4444	A
67	18	6	0.4444	A	0.4444	A
68	26	15	0.7593	R	0.4074	A
69	26	13	0.7597	R	0.4815	A
70	27	16	0.7963	R	0.4074	A
71	21	8	0.5370	A	0.4815	A
72	23	10	0.6111	A	0.4815	A
73	24	20	0.8148	R	0.1481	R
74	20	8	0.5185	A	0.4444	A
75	21	9	0.5556	A	0.4444	A
76	18	8	0.4815	A	0.3704	A
77	27	7	0.6296	A	0.7407	A
78	14	12	0.4815	A	0.0741	R
79	21	9	0.5556	A	0.4444	A
80	25	12	0.6852	A	0.4815	A
81	27	12	0.7597	R	0.5556	A
82	21	9	0.5556	A	0.4444	A
83	27	22	0.9074	R	0.1852	R
84	20	9	0.5370	A	0.4074	A
85	27	22	0.9074	R	0.1852	R
86	27	22	0.9074	R	0.1852	R
87	27	10	0.6852	A	0.6296	A
88	26	8	0.6296	A	0.6667	A
89	22	7	0.5370	A	0.5556	A
90	27	9	0.6667	A	0.6667	A
91	19	8	0.5000	A	0.4074	A

92	27	11	0.7037	A	0.5926	A
93	26	23	0.9074	R	0.1111	R
94	25	8	0.6111	A	0.6296	A
95	26	21	0.8704	R	0.1852	R
96	25	11	0.6667	A	0.5185	A
97	27	23	0.9259	R	0.1481	R
98	27	8	0.6481	A	0.7037	A
99	20	14	0.6296	A	0.1922	R
100	21	16	0.6852	A	0.1852	R
101	6	0	0.1111	R	0.2222	A
102	27	11	0.7037	A	0.5926	A
103	21	9	0.5556	A	0.4444	A
104	20	7	0.5000	A	0.4815	A
105	23	11	0.6296	A	0.4444	A
106	26	21	0.8704	R	0.1852	R
107	27	13	0.7597	R	0.5185	A
108	9	2	0.2037	R	0.2593	A
109	21	8	0.5370	A	0.4815	A
110	23	10	0.6111	A	0.4815	A
111	20	8	0.5185	A	0.4444	A
112	21	6	0.5000	A	0.5556	A
113	27	26	0.9815	R	0.0370	R
114	26	0	0.4815	A	0.9630	A
115	20	8	0.5185	A	0.4444	A
116	26	8	0.6296	A	0.6667	A
117	27	10	0.6852	A	0.6296	A
118	21	9	0.5556	A	0.4444	A
119	1	0	0.0185	R	0.0370	R
120	28	12	0.7597	R	0.5926	A
121	4	4	0.1481	R	0.0000	R
122	27	11	0.7037	A	0.5926	A
123	27	13	0.7597	R	0.5185	A
124	25	11	0.6667	A	0.5185	A
125	11	1	0.2222	R	0.3704	A
126	26	10	0.6667	A	0.5926	A
127	16	3	0.3519	A	0.4815	A
128	20	9	0.5370	A	0.4074	A
129	26	16	0.7778	R	0.3704	A
130	25	22	0.8704	R	0.1111	R
131	11	6	0.3148	A	0.1852	R
132	20	3	0.4259	A	0.6296	A
133	21	9	0.5556	A	0.4444	A
134	19	8	0.5000	A	0.4074	A
135	25	9	0.6296	A	0.5926	A
136	20	9	0.5370	A	0.4074	A
137	7	7	0.2593	A	0.0000	R
138	20	8	0.5185	A	0.4444	A
139	3	3	0.1111	R	0.0000	R
140	26	11	0.6852	A	0.5556	A
141	22	8	0.5556	A	0.5185	A
142	23	7	0.5556	A	0.5926	A

143	15	6	0.3889	A	0.3333	A
144	24	11	0.6481	A	0.4815	A
145	20	9	0.5370	A	0.4074	A
146	22	8	0.5556	A	0.5185	A
147	13	8	0.3889	A	0.1852	R
148	5	4	0.1667	R	0.0370	R
149	21	8	0.5370	A	0.4815	A
150	19	8	0.5000	A	0.4074	A
151	28	7	0.6481	A	0.7778	A
152	24	7	0.5741	A	0.6296	A
153	20	12	0.5926	A	0.2963	A
154	26	12	0.7037	A	0.5185	A
155	23	6	0.5370	A	0.6296	A
156	21	6	0.5000	A	0.5556	A
157	19	9	0.5185	A	0.3704	A
158	24	23	0.8704	R	0.0370	R
159	23	9	0.5926	A	0.5185	A
160	26	11	0.6852	A	0.5556	A

7.13 Selection of the Items for the Final Draft

The final selection of the items for the achievement test in Mathematics and English Grammar for class IX students was made on the basis of difficulty value (DV) and discrimination index (DP) of each item. An item was considered difficult when the DV was less than 0.25 and the item was considered easy when the DV was greater than 0.75. Both difficult and easy items were rejected from the achievement test developed in this study and the items selected were of median difficulty level. Moreover, items were selected based on the guidelines suggested by **Ebel and Frisbie (1986)**. As suggested by them quality of an item is excellent and should be preserved when DP is greater than equal to 0.40. On the other hand, an item with a DP from 0.30 to 0.39 is good and has a possibility for enhancement. Likewise an item with a DP from 0.20 to 0.29 is average and needs to review. But an item with a DP of less than 0.20 is poor and needs to be rejected or review in depth and an item with a negative DP is worst and need to be removed.

The lists of items selected based on their analysis along with their difficulty value have been presented in the table-5 and table-6 below:

Table-5: Analysis of Item of the Achievement Test in Mathematics and English Grammar based on DV.

Sl. No.	D.V.	Frequency	Test Item						Remarks
1	0.75 and Above	37	2	3	7	8	9	10	Very Easy Item (Rejected)
			14	15	21	22	24	27	
			30	31	33	34	49	53	
			68	69	70	73	81	83	
			85	86	93	95	97	106	
			107	113	120	123	129	130	
			158						

2	0.50 to 0.75	98	1	4	5	6	11	12	Reasonably Good Item (Accepted)
			13	16	17	20	23	26	
			28	29	32	35	36	37	
			38	39	40	41	42	44	
			46	47	48	50	51	52	
			54	55	56	58	59	61	
			63	64	65	66	71	72	
			74	75	77	79	80	82	
			84	87	88	89	90	91	
			92	94	96	98	99	100	
			102	103	104	105	109	110	
			111	112	115	116	117	118	
			122	124	126	128	133	134	
			135	136	138	140	141	142	
			144	145	146	149	150	151	
			152	153	154	155	156	157	
159	160								
3	0.25 to 0.49	18	18	19	25	43	45	57	Marginal Items (Modified)
			60	62	67	76	78	114	
			127	131	132	137	143	147	
4	Below 0.25	7	101	108	119	121	125	139	Very Difficult Item (Rejected)
			148						

Table-6: Analysis of Item of the Achievement Test in Mathematics and English Grammar based on DP.

Sl. No.	D.P.	F	Test Item	Remarks					
1	0.40 Above	and 109	1	2	4	5	6	7	Accepted
			8	9	11	12	13	15	
			16	17	20	23	24	26	
			28	29	31	32	33	35	
			36	37	38	40	41	42	
			44	46	47	48	50	51	
			52	54	55	56	58	59	
			61	64	65	66	67	68	
			69	70	71	72	74	75	
			77	79	80	81	82	84	
			87	88	89	90	91	92	
			94	96	98	102	103	104	
			105	107	109	110	111	112	
			114	115	116	117	118	120	
			122	123	124	126	127	128	
			132	133	134	135	136	138	
140	141	142	144	145	146				
149	150	151	152	154	155				
156									
2	0.20 to 0.39	12	14	27	76	101	108	125	Modified
			129	143	153	157	159	160	
3	0.19	and 39	3	10	18	19	21	22	Rejected

Below	25	30	34	39	43	45
	49	53	57	60	62	63
	73	78	83	85	86	93
	95	97	99	100	106	113
	119	121	130	131	137	139
	147	148	158			

7.14 Final Draft of the Achievement Test in Mathematics and English Grammar for class IX students

On the basis of the analysis of the items presented in the above table-6, 94 items with DV ranging from 0.25 to 0.75 and DP more than 0.40 were retained in the achievement test in Mathematics and English Grammar. Likewise, 6 marginal items having DV between 0.25 to 0.49 and DP between 0.20 to 0.39 have been modified with respect to language and clarity and then accepted and retained in the final draft of Achievement test in Mathematics and English Grammar. On the other hand, 60 very easy and very difficult items and having DP of below 0.19 were rejected. Thus, the final draft of the Achievement test in Mathematics and English Grammar so developed consisted of 100 items.

A unit wise and objective wise analysis of the items of the final draft of the Achievement test in Mathematics and English Grammar for class IX students has been prepared in the Table-7 below:

Table-7: Unit wise and Objective wise Analysis of the Items Included in the Final Draft

Sl. No	Subject	Content	Knowledge	Understanding/C omprehension	Application /Expression	Total
1	Mathematics	Number system	1,4,6	5		4
2		Polynomials	11	-	12	2
3		Coordinate Geometry	13,16	-	17	3
4		Linear Equation in two variables	-	-	20,23	2
5		Introduction to Euclids Geometry	26	-	-	1
6		Lines and Angles	28	29,32	-	3
7		Triangles	37,38	35,36	-	4
8		Quadrilaterals	40,41,42	44,46	-	5
9		Areas Parallelograms and Triangles	-	-	47,48	2
10		Circles	51	50,52,76	54	5
11		Constructions	55	56,58	-	3
12		Heron's Formula	-	59,77	61	3
13		Surface area and values	64,80	65,66,67	-	5
14		Statistics	79	71,72		3
15		Probability	-	74	75	2
16	English	Determiner	82,84,87,88	-	-	4
17		Tense form	-	89,90,91,92,94,96,98	-	7
18		Vocabulary		102,103,104,105	-	4
19		Direct and Indirect Narration	-	109,110,111,112,114	-	5

20		Voice	-	115,116,117,118	-	4
21		Preposition	-	122,124,126,127, 128,132	-	6
22		Verb Phrases	-	133,134,135,136, 138	-	5
23		Antonyms	140,141,142,143	-	-	4
24		Synonyms	144,145,146, 149	-	-	4
25		Comprehension	-	150,151,152	-	3
26		Paragraph writing	-	153,154,155	-	3
27		Letter writing		-	156,157,1 59,160	4
		Total	30	57	13	100

Table-8: Blueprint of the Items Selected for the Final Draft of Achievement Test and English Grammar for Class IX students

BLUEPRINT

Sl. No	Subject	Content	Knowledge	Understanding/Comprehension	Application/Expression	Total
1	Mathematics	Number system	3(3)	1(1)		4(4)
2		Polynomials	1(1)	-	1(1)	2(2)
3		Coordinate Geometry	2(2)	-	1(1)	3(3)
4		Linear Equation in two variables	-	-	2(2)	2(2)
5		Introduction to Euclids Geometry	1(1)	-	-	1(1)
6		Lines and Angles	1(1)	2(2)	-	3(3)
7		Triangles	2(2)	2(2)	-	4(4)
8		Quadrilaterals	3(3)	2(2)	-	5(5)
9		Areas Parallelograms and Triangles	-	-	2(2)	2(2)
10		Circles	1(1)	3(3)	1(1)	5(5)
11		Constructions	1(1)	2(2)	-	3(3)
12		Heron's Formula	-	2(2)	1(1)	3(3)
13		Surface area and values	2(2)	3(3)	-	5(5)
14		Statistics	1(1)	2(2)		3(3)
15		Probability	-	1(1)	1(1)	2(2)
16	English	Determiner	4(4)	-	-	4(4)
17		Tense form	-	7(7)	-	7(7)
18		Vocabulary		4(4)	-	4(4)
19		Direct and Indirect Narration	-	5(5)	-	5(5)

20	Voice	-	4(4)	-	4(4)
21	Preposition	-	6(6)	-	6(6)
22	Verb Phrases	-	5(5)	-	5(5)
23	Antonyms	4(4)	-	-	4(4)
24	Synonyms	4(4)	-	-	4(4)
25	Comprehension	-	3(3)	-	3(3)
26	Paragraph writing	-	3(3)	-	3(3)
27	Letter writing		-	4(4)	4(4)
	Total		30	57	13
				13	100

(Figures within bracket indicate number of questions and figures outside the bracket indicate marks)

7.15 STANDARDIZATION OF ACHIEVEMENT TEST

After the item analysis, the final test items were selected for the final draft of the achievement test. The standardization of the test was validated by establishing reliability and validity.

7.18 Estimating Reliability of the Test

To compute the reliability of the Achievement Test in Mathematics and English Grammar the investigator adopted the following procedure:

- Reliability of the test was estimated by the split half method. The reliability of the test refers to the consistency of test scores. In the present study to estimate the reliability of the test the final form Achievement Test was administered upon a sample of 200 class IX students out of which 100 English Medium and 100 Assamese Medium students of different Government Provincialised and Private school of Sivsagar district of Assam.
- Odd-even method was used to split the test into two equal halves.
- .The scoring of each answer sheet was done separately for these two halves of odd even items.
- Then the coefficient of correlation between these two parts of the test was calculated using the formula of Product moment co-efficient of correlation which showed the reliability of the half test. The reliability of the test in case of English medium school students was found to be as $r=0.69$. Similarly the reliability of the test in case of Assamese medium school students achievement was found to be as $r=0.76$.
- The coefficient of the whole test was then estimated by using Spearman-Brown Prophecy formula and the reliability of the full test of the English version was found as $r=0.82$ and Assamese version was found as $r=0.88$.

7.19 Estimating the Validity of the Test

Validity of the test refers to the degree to which it measures or what it intends to measure. The test was validated against the criteria of "content validity". The validity of the test was determined by giving the test to the four General Mathematics teachers and to the supervisor of the study. They compare each item with the content and to the stated objectives of content. The experts also had evaluated the scoring key and

agreed with the distribution of the test items to objectives and with the scoring of the test. This establishes the validation of the test.

8.CONCLUSION

Achievement testing is crucial for assessing students' levels of learning. The objectives and subject matter are the major focus of an achievement test. The aim of the present study was to develop a Mathematics and English Grammar achievement test that would be valid and reliable. These tests can provide a precise evaluation of both teachers and students. The findings of this study will aid in identifying corrective solutions for Mathematics and English Grammar for the students. The academics will benefit from knowing if their teaching methods are successful or not, and it will aid them in making the necessary corrections. The achievement test gives us information that will assist us understand where the students are and how they may develop.

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