CHAPTER V

PILOT TRY-OUT

Introduction

When a test is prepared it is to be scaled. "As used in mental measurement, a scale may be thought of as a continuum or continuity along which items, tasks and problems and the like have been located in terms of the difficulty or some other attribute".[1/] The units should be equal, possess the same meaning and stable. As the items in the test are arranged according to their indices of difficulty, the index of difficulty of each item is to be found out. Secondly the items should be valid.

Validity and index of difficulty of each item can be found out by the try-out of the test on the representative sample of the population for which the test is meant.

Objectives of the Try-out

The objectives of this pilot try-out are as given below:-

1. To find out weak and defective items viz. over-difficult, over-easy, and those whose distractors are non-functioning
2. To find out the difficulty level of each item so that selection of items can be made to ensure appropriate distribution of difficulty levels through out the scale

1/Garrett H.E., Statistics in Psychology and Education, Longmans, Green and co., New York, London, Toronto, 1954. pp 302.

3. To find out the discrimination power of each item so that only valid items can be selected for the final test
4. To determine the time limits for the test
5. To judge the adequacy of the instructions to both administrators of the test and pupils taking it.

Description of the Population

To select the representative sample for the try-out, one should have as much knowledge of population as possible. This information may be found out from the census reports or the reports published by the Director of Education, Maharashtra.

The Director of Education has published in Marathi "Sankhyikeey Sankshep Granth" in 1974 which contains all statistics regarding education for the year 1970 and 71 and all the figures quoted in this chapter are adopted from Table 3.1 pp 42 and Table 3.2 pp 52 of this book. The tables given below show the classification of pupils studying in standards VIII to X, standardwise, districtwise and sexwise.

Table 4. Number of Pupils Studying in Standards VIII to X in the Five Districts of Aurangabad Division.

District	Number of Pupils studying in standards			Total	Approx. Percentage
	VIII	IX	X		
Aurangabad	14,676	10,703	8,308	33,687	25
Parbhani..	9,057	5,657	4,770	19,484	14
Bhir.....	10,807	6,800	5,533	23,140	17
Nanded....	9,514	6,924	5,600	22,038	16
Osmanabad.	17,247	11,702	10,682	39,631	28
Total.....	61,301	41,786	34,893	1,37,980	100
Approx. Percentage	45	30	25		

Table 5. Number of Boys and Girls studying in Standards VIII to X in Aurangabad Division.

Standard	Boys	Girls	Total
VIII	52,830	8,471	61,301
IX	36,777	5,009	41,786
X	31,099	3,794	34,893
Total	1,20,706	17,274	1,37,980
Approximate Percentage	87.5	12.5	100 %

Though the number of children is rapidly increasing the above table shows that the percentage of girls attending the high schools is very small as compared with that of boys.

Table 6. Number of Pupils of ages 13 to 17 studying in the schools of this region.

Age	Number of Pupils studying in schools	Percentage
13	61,232	29.14
14	50,404	23.97
15	43,343	20.62
16	33,263	15.82
17	21,950	10.45
Total	2,10,192 *	100.00

* This number is more than the total of 1,37,980 because of the fact that many of the pupils belonging to this age-group may be studying in standards either below VIII or above X.

Criterion

If the test is to be valid, the scores obtained must correlate with some other valid objective measure, predetermined. This previously determined objective measure is known as criterion. "A standard used in checking the meaning or nature of a test or sign"[1], is called criterion. "The validity of a test, that is the extent to which it measures whatever it purports to measure is judged by the extent to which it agrees with an accpted criterion"[2].

Some of the commonly used criteria described by Dr. M.M.Shah by quoting Hsu E.W. used in validating the tests are given below:-

"1. The outcome of an activity such as failure or success in school or in vocational situations
2. Another measurement possessing known or assumed validity
3. Associate's Ratings
4. Self ratings
5. Factors isolated by factor-analysis techniques; and
6. Responses of selected groups such as inmates in an institutions or members of vocational groups"[3].

1/Goodenough F.L., Mental Testing, Holt, Rinehart and Winston, New York, 1961. pp 547.

2/Ibid, pp 547

3/Shah M.M., An Aptitude Test for Secondary School Teachers, The Maharaja Sayajirao University of Baroda, Baroda. 1965. pp 67.

This test is concerned with the measurement of intelligence and there are number of intelligence tests available which have been standardized on pupils in different areas. A nonverbal test of intelligence (N.V.T.I.) prepared by Dr. G.F.Nafde, has been used for selecting the criterion group, because,

1. no suitable verbal test in Marathi was available,
2. norms for rural and urban areas are available in case of this test,
3. the test is used by the Vocational Guidance Bureau, Maharashtra State,

and 4. it contains those tests which have been included in the present test.

Validity indices of the test are as given below:

Table 7.[1/] Validity indices of N.V.T.I. by Dr. G.F. Nafde

1	N 2	Coefficient on the exptl. sample 3	Coefficient estimated for a large sample 4	Coefficient after correction for attenuation assuming the average 11 for the test to be .9 5
(a) With NIIP 70/23	99	.51	.74	.82
(b) With progressive Matrices.....	99	.59	.80	.88
(c) With the nonverbal test of the National Foundation of Educational Research, London.....	104	.75	.88	1.00

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1/Long L., Mehta P.H., The First Mental Measurement Hand Book for India. National Council of Educational Research and Training, New Delhi, 1966.

Table 7. (concluded).

1	2	3	4	5
(d) Verbal Test of intelligence of CBVG, Delhi, in Hindi.....	123	.62	.76	.97
(e) D.A.T.A.R form A	61	.71		

Selection of the Criterion Group.

The selection of the criterion groups namely high group and low group has been done by administering the N.V.T.I. to 530 students studying in standards VIII, IX and X in the four below mentioned high schools in Latur, a city in Osmanabad District.

1. Z.P. High School for Boys
2. Z.P. High School for Girls
3. Godavari Lahoti High School for Girls

& 4. Rajastan Marwadi High School for Boys.

On the first day the N.V.T.I. was administered to these pupils. On the second day the test drafted for pilot testing was administered to them. The administration was done by scrupulously following the instructions. The specially prepared answer sheet was used for recording the answers. The pupils were asked to solve all the items and were allowed as much time as they required. Time required for the group was recorded. The answer sheets of both the tests were assessed. The IQ of each pupil was found out on the basis of the performance on the N.V.T.I. Test.

The distribution of population according to IQ is given in the table below:-

Table 8.[1/] The distribution of the population according to IQ

Classification	IQ	Percents of all population.
Near genius or genius	140 and above	1
Very superior.....	130 - 139	2.5
Superior.....	120 - 129	8
Above average.....	110 - 119	16
Normal or average....	90 - 109	45
Below average.....	80 - 89	16
Dull or boarder line.	70 - 79	8
Feeble minded, moron,	60 - 69	2.5
imbelicile, idiot....	59 and below	1

The table shows that the average group consists of pupils with IQ 90-109 and forms 45 per cent of the population. Nearly 27.5 percent of the pupils are above average and their IQ is 110 or more and 27.5 percent of pupils are below the average group and their IQ is 89 or less. For finding the discrimination power 27 % of the group from the top and 27 % of the group from the bottom are selected. So the same criterion has been used here to select the high and low groups.

From the group of 530 pupils, the answersheets of 100 pupils whose IQ was 110 or more and those 100 pupils whose IQ was 89 or less were selected for analysis. The number of pupils doing each

1/Mehrens W.A. Lehmann I.J., Standardized Tests in Education, Holt Rinehart and Winston, Inc., New York, 1969. pp 303.

item correctly from each of these high and low groups was found out separately.

Table 9. Number of students from High and Low groups studying in standards VIII to X.

Standard	Number of pupils		Total
	in the high group	in the low group	
VIII.....	45	45	90
IX.....	30	30	60
X.....	25	25	50
Total.....	100	100	200

Scoring the Test.

The selected answer sheets were scored with the help of the window and strip keys. The response was treated as correct if the mark placed by the scorer and the examinee were coinciding with each other. If the examinee had put two marks as response to an item, it was treated as incorrect response, though one of them was correct.

The total number of correct responses recorded by the examinee were written in appropriate spaces provided for each test on the front page of the answer sheet.

Correction for Guessing

A guess is a decision taken on incomplete information. In testing, it is interpreted as a positive action based on chance.

An omission of an item is not considered as a guess.

In tests 1 to 6 alternate answers are given for each item from which the pupils has to select one which he feels to be correct. The pupil may select an alternative by reasoning based on the correct information he possesses or by reasoning on the incorrect or partial information or by lot (wild guess). In all cases his response may be correct. Selecting a response by reasoning based on the correct information is an intellectual activity. If the examinee has selected it by mere guessing it will unnecessarily add to his score.

So some feel that the individuals should be penalised for guessing and correct his score. Different formulae have been suggested for correcting the scores. The formula commonly used is

$$S = R - \frac{W}{n-K}$$

where

S = score

R = the number of right responses

W = the number of wrong responses

n = the number of suggested responses for a single item

K = the number of responses to be selected or marked for each item".[1/]

"Scoring by this formula involves the assumption that every wrong response is the result of a guess, that all responses are

1/Taxler A.E. "Administering and Scoring the objective Test", Chapter 10. Educational Measurements, Lindquist E.F., Editor, American Council on Education, Washington D.C., 1966. pp 365.

equally attractive or equally likely to be selected, and that therefore the law of chance applies to the situation".[1/]

However it is just possible that the incorrect answer may be due to definite misinformation he possesses about the problems or due to partial information which is misleading. This cannot be said as guessing and such examinees are unnecessarily penalised by correction.

Secondly though the test makers aim at making the incorrect answers plausible to those who do not possess the necessary information or ability, it is doubtful whether all the incorrect alternatives are equally attractive.

Thirdly as Cronbach remarks, "even if standard correction for chance is used the person who gambles on every doubtful item is likely to gain more".[2/]

So the other ways suggested are to give instructions to pupils, "do not guess" or "guess".

But Davis remarks "Naturally more conscientious and timid examinees will omit items more often than will others. Some examinees will deliberately answer all items if they think that the scoring system provides no larger penalty for guessing wrong than for omitting an item".[3/]

1/Ibid, pp 365

2/Cronbach L.J., Essentials of Psychological Testing, Harper & Row, New York, Evanston & London and John Weatherhill Inc., Tokyo, 1965. pp 50.

3/Davis F.B., "Item Selection Techniques", Chapter 9, Educational Measurement, Lindquist E.F., Editor, American Council on Education, Washington D.C., 1966. pp 271-272.

So the problem whether correction for guessing should be applied to scores in psychological testing, is still a controversial one.

If the problem is so controversial then the other way of looking at it is to study the effect of application of the correction. Such studies have been done by Ben D Wood, Ruchand Degraff and others in this direction. These studies show that the reliabilities of corrected and uncorrected scores are not significantly different from each other. However corrected scores increase the validity of the scores slightly.

Guilford remarks, "Another occasion on which it would not pay to use this formula is in a power test in which E attempts practically all items".[1/]

But Davis suggests, "..... it is equally important to make the use of a correction for chance success in obtaining individual raw scores that are to be used for internal-consistancy item analysis purpose".[2/]

As the test is long and is also a power test no correction for guessing is necessary. However correction for guessing has been applied to the raw scores which have been used through out this chapter.

1/Guilford J.P., Psychometric Methods (Second Edition), MacGraw-Hill Company Inc. New York, Kogakusha Company Ltd., Tokyo,pp 449

2/Davis F.B., Op.cit. pp 277.

Discrimination Between High and Low Groups.

The different procedures employed to discriminate between the performances of high and low groups are critical ratio test, Chi-square test and chi-test.

a) Critical Ratio Test

The percentages of number of individuals doing the item correctly are separately calculated and the critical ratio is found out. This critical ratio is used to estimate how far the item is able to differentiate between the performances of these two groups.

b) Chi-Square Test.

Guilford is of the opinion that Chi-square may be used to estimate the discrimination power of each item.

c) Chi-Test.

Cureton, as described by Davis, suggests that the above two procedures are to be used in case of large samples. He suggests that the use of Chi-test is more advisible for small samples.

So chi-test has been applied to validate the items in this test. In case of every item that has been selected in the pilot test, the number of pupils doing the item correctly from the high group is more than that from the low group. So the formula mentioned below has been used.

$$\text{Chi} = \frac{R_H - R_L - 1}{\sqrt{R_T \left(1 - \frac{R_T}{N_T - NR_T} \right)}}$$

where

R_H = the number of examinees in the high scoring group who mark the item correctly,

R_L = the number of examinees in the low scoring group who mark the item correctly,

$R_T = R_H + R_L$

N_T = the number of examinees in the high-scoring and low-scoring groups,

NR_T = the number of examinees in the high-scoring and low-scoring groups who do not reach the item in the time limit".[1/]

The pupils were asked to attempt every item and they were given as much time as they required. The minimum time taken by this group is 0 hours 36 minutes and the maximum time taken is 2 hours 6 minutes. No item was unattempted by any of the pupils from these groups. So NR_T becomes zero in all the cases. The formula is then reduced as below:-

$$\text{Chi} = \frac{R_H - R_L - 1}{\sqrt{R_T \left(1 - \frac{R_T}{N_T} \right)}}$$

The number of pupils in each group is 100 and hence N_T in all the cases is 200.

The abridgement of Table 8, in Statistical Tables for Biological, Agricultural and Medical research, done by Cureton and

1/Ibid, pp 289.

reproduced by Davis[1/] in Educational Measurements, has been used for deciding the significance of Chi. The Chi values of all the items were calculated.

Table 10. Chi values of the Items in the Test.

S = Significant at 0.01 level

NS= Not significant at 0.01 level

N_T= 200

Item No.	R_H	R_L	R_T	Chi	Whether significant	Whether item Retained or Rejected in the final form.
1	2	3	4	5	6	7
			Test 1 Synonyms.			
1	91	52	143	5.953	S	Rejected
2	63	7	70	8.155	S	Retained
3	92	40	132	7.597	S	Retained
4	90	39	129	11.710	S	Retained
5	88	34	122	7.685	S	Retained
6	78	41	119	5.188	S	Retained
7	87	32	119	7.782	S	Retained
8	82	34	116	6.655	S	Rejected

(continued on next page)

1/Ibid, pp 290.

Table 10 (continued)

1	2	3	4	5	6	7
9	85	27	112	9.545	S	Retained
10	91	19	110	10.090	S	Retained
11	73	37	110	4.975	S	Retained
12	79	27	116	7.221	S	Rejected
13	78	26	104	7.303	S	Retained
14	72	30	102	5.799	S	Rejected
15	73	30	103	5.671	S	Retained
16	83	19	102	7.078	S	Retained
17	78	24	102	7.498	S	Retained
18	83	15	98	9.477	S	Retained
19	76	21	97	7.640	S	Retained
20	54	10	64	6.519	S	Retained
21	70	21	91	6.916	S	Rejected
22	69	21	90	6.680	S	Retained
23	66	23	89	6.735	S	Rejected
24	63	26	89	4.585	S	Rejected
25	65	12	77	6.102	S	Rejected
26	77	11	88	9.260	S	Retained
27	58	28	86	3.291	S	Rejected
28	57	21	78	5.075	S	Rejected
29	53	26	79	3.731	S	Retained

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Table 10. (continued)

1	2	3	4	5	6	7
30	54	19	73	4.989	S	Rejected
31	64	9	73	7.923	S	Rejected
32	48	23	71	3.546	S	Retained
33	42	15	67	3.895	S	Retained
34	46	16	62	4.434	S	Retained
35	41	5	46	5.882	S	Rejected
36	40	7	47	5.335	S	Retained
37	36	6	42	5.035	S	Rejected
38	34	4	38	5.228	S	Retained
		Test 2 Antonyms.				
1	99	65	164	6.074	S	Rejected
2	99	63	162	6.310	S	Retained
3	94	60	154	5.533	S	Rejected
4	97	53	150	7.023	S	Rejected
5	97	45	142	7.949	S	Retained
6	93	48	141	6.808	S	Rejected
7	97	62	159	5.955	S	Rejected
8	80	52	132	4.031	S	Retained
9	84	46	130	5.486	S	Retained
10	93	32	125	8.764	S	Retained

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Table 10 (continued)

1	2	3	4	5	6	7
11	90	35	125	7.886	S	Retained
12	79	42	121	5.207	S	Rejected
13	85	33	118	7.333	S	Rejected
14	85	29	114	7.856	S	Retained
15	82	30	112	7.266	S	Retained
16	80	31	111	6.829	S	Retained
17	83	27	107	7.798	S	Retained
18	83	21	104	8.634	S	Rejected
19	77	23	100	7.494	S	Retained
20	67	34	101	4.526	S	Retained
21	79	21	100	8.060	S	Retained
22	84	16	100	9.473	S	Retained
23	65	32	97	4.527	S	Rejected
24	60	34	94	3.542	S	Retained
25	70	24	94	6.375	S	Retained
26	82	12	94	9.774	S	Retained
27	79	12	91	9.371	S	Retained
28	62	25	87	5.135	S	Retained
29	73	14	87	8.271	S	Rejected
30	56	29	85	3.719	S	Retained
31	63	22	85	5.723	S	Rejected

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Table 10 (continued)

1	2	3	4	5	6	7
32	64	18	82	6.471	S	Retained
33	68	14	82	7.621	S	Retained
34	52	28	80	3.320	S	Rejected
35	79	42	121	5.207	S	Rejected
36	53	24	77	4.069	S	Retained
37	60	11	71	7.092	S	Rejected
38	63	20	83	6.027	S	Retained
		Test 3 Classification				
1	99	77	176	4.569	S	Retained
2	97	69	166	5.083	S	Retained
3	99	63	162	6.310	S	Retained
4	95	60	155	5.758	S	Retained
5	93	54	147	6.088	S	Retained
6	89	53	142	5.455	S	Retained
7	80	57	137	3.349	S	Retained
8	78	44	122	4.784	S	Retained
9	92	31	123	8.720	S	Retained
10	69	42	111	3.700	S	Retained
11	78	32	110	6.396	S	Rejected
12	75	34	109	5.680	S	Retained

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Table 10 (continued)

1	2	3	4	5	6	7
13	69	42	111	3.700	S	Retained
14	81	11	92	9.788	S	Retained
15	78	8	86	9.854	S	Rejected
16	62	22	84	5.588	S	Retained
17	61	21	82	5.608	S	Retained
18	94	47	141	5.666	S	Rejected
19	56	22	78	4.784	S	Retained
20	66	7	73	8.519	S	Retained
21	59	14	73	6.465	S	Rejected
22	63	10	73	7.638	S	Retained
23	56	14	70	6.078	S	Rejected
24	59	8	67	7.491	S	Rejected
25	46	19	65	3.925	S	Rejected
26	45	22	67	3.296	S	Rejected
27	58	6	64	7.732	S	Retained
28	48	16	62	4.741	S	Retained
29	52	11	63	6.090	S	Rejected
30	49	10	59	5.899	S	Retained
31	43	13	56	4.566	S	Retained
32	42	6	48	5.795	S	Retained
33	43	4	47	6.337	S	Rejected

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Table 10 (continued)

1	2	3	4	5	6	7
34	30	5	35	4.466	S	Rejected
35	28	5	33	4.191	S	Rejected
36	26	5	31	3.907	S	Rejected
37	25	1	26	4.837	S	Retained
			Test 4 Analogies			
1	99	65	164	6.074	S	Retained
2	90	58	148	4.997	S	Rejected
3	91	51	142	6.077	S	Retained
4	88	51	139	5.529	S	Rejected
5	92	44	136	7.124	S	Rejected
6	98	37	135	9.059	S	Retained
7	91	37	128	7.809	S	Rejected
8	90	35	125	7.886	S	Retained
9	99	34	133	9.585	S	Retained
10	86	35	121	7.233	S	Rejected
11	80	34	114	6.427	S	Retained
12	72	41	113	4.279	S	Rejected
13	70	26	96	6.087	S	Rejected
14	76	21	97	7.640	S	Rejected
15	69	22	91	6.534	S	Retained

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Table 10 (continued)

1	2	3	4	5	6	7
16	86	24	110	8.670	S	Rejected
17	61	28	89	4.553	S	Retained
18	75	14	89	8.539	S	Rejected
19	71	13	84	8.166	S	Retained
20	67	26	93	5.671	S	Retained
21	66	16	82	7.046	S	Rejected
22	67	16	83	7.176	S	Retained
23	61	20	81	5.762	S	Retained
24	60	26	86	4.713	S	Rejected
25	60	23	83	5.166	S	Rejected
26	60	15	75	6.427	S	Retained
27	60	14	74	6.591	S	Retained
28	64	11	75	7.595	S	Retained
29	60	11	71	7.092	S	Rejected
30	61	10	71	7.389	S	Retained
31	51	17	68	4.926	S	Retained
32	52	13	65	5.744	S	Rejected
33	52	13	65	5.744	S	Rejected
34	53	12	65	6.046	S	Retained
35	51	10	61	6.145	S	Rejected
36	44	13	57	4.699	S	Retained

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Table 10 (continued)

1	2	3	4	5	6	7
37	38	6	44	5.291	S	Retained
38	38	5	43	5.507	S	Retained
			Test 5 Reasoning			
1	99	59	158	6.772	S	Rejected
2	99	40	139	8.908	S	Retained
3	93	43	136	7.429	S	Retained
4	91	40	131	7.439	S	Retained
5	96	32	128	9.281	S	Retained
6	92	35	127	9.694	S	Rejected
7	98	27	125	10.220	S	Retained
8	95	27	122	9.714	S	Retained
9	88	32	120	7.939	S	Retained
10	83	35	118	6.756	S	Retained
11	90	19	109	9.940	S	Rejected
12	87	21	108	9.221	S	Rejected
13	72	32	104	5.521	S	Rejected
14	86	15	101	9.902	S	Retained
15	70	27	97	5.941	S	Retained
16	61	26	87	4.850	S	Rejected
17	63	16	79	6.810	S	Retained

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Table 10 (continued)

1	2	3	4	5	6	7
18	52	21	83	4.305	S	Retained
19	49	18	67	4.447	S	Retained
20	43	17	60	3.858	S	Retained
21	45	12	57	5.012	S	Retained
22	41	13	54	4.300	S	Rejected
			Test 6 Inferences			
1	91	53	144	5.826	S	Retained
2	95	62	157	5.507	S	Retained
3	82	34	116	6.733	S	Rejected
4	76	37	113	5.420	S	Rejected
5	77	36	113	5.706	S	Retained
6	73	38	111	4.839	S	Retained
7	75	33	108	5.817	S	Retained
8	72	33	105	5.380	S	Rejected
9	77	27	104	6.936	S	Retained
10	67	35	102	4.385	S	Retained
11	73	28	101	6.224	S	Retained
12	71	28	99	5.940	S	Retained
13	58	26	84	4.441	S	Retained
14	52	23	85	4.015	S	Rejected

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Table 10 (continued)

1	2	3	4	5	6	7
15	57	13	70	6.375	S	Rejected
16	50	12	62	5.657	S	Retained
17	31	14	45	2.704	S	Rejected
18	31	12	43	3.098	S	Rejected
			Test 7 Arithmetic Problems			
1	100	80	180	4.479	S	Rejected
2	99	78	177	4.434	S	Rejected
3	98	70	168	5.208	S	Rejected
4	92	24	116	9.380	S	Retained
5	82	30	112	7.286	S	Retained
6	85	27	112	8.121	S	Retained
7	84	27	111	7.969	S	Retained
8	71	15	86	7.856	S	Retained
9	67	14	81	7.319	S	Retained
10	62	13	75	7.308	S	Retained
11	68	12	80	7.939	S	Retained
12	63	6	69	8.332	S	Retained
13	66	5	71	8.867	S	Retained
14	56	3	59	8.081	S	Retained
15	60	4	64	8.339	S	Retained

(continued on next page)

Table 10 (continued)

1	2	3	4	5	6	7
16	56	6	62	8.407	S	Retained
17	58	4	62	9.093	S	Retained
18	55	5	60	7.406	S	Retained
19	56	7	63	7.307	S	Retained
20	48	6	54	6.530	S	Retained
21	46	2	48	7.120	S	Rejected
22	45	2	47	7.003	S	Retained
23	40	6	46	5.546	S	Rejected
		Test 8 Number Series				
1	99	85	174	2.733	S	Rejected
2	99	73	172	5.094	S	Retained
3	99	69	168	5.594	S	Retained
4	100	69	169	5.861	S	Retained
5	99	38	137	11.920	S	Retained
6	93	29	122	9.133	S	Retained
7	94	28	122	9.433	S	Retained
8	86	20	106	9.208	S	Retained
9	94	13	107	11.320	S	Retained
10	86	14	100	10.040	S	Retained
11	84	10	94	10.340	S	Retained

(concluded on next page)

Table 10. (concluded)

1	2	3	4	5	6	7
12	80	8	88	10.160	S	Retained
13	78	9	87	8.786	S	Retained
14	73	11	84	8.960	S	Rejected
15	68	6	74	8.933	S	Retained
16	66	2	68	9.383	S	Rejected
17	66	2	68	9.383	S	Retained
18	60	4	64	9.833	S	Rejected
19	59	3	62	8.410	S	Retained
20	59	2	61	8.602	S	Rejected
21	58	1	59	8.886	S	Retained
22	56	1	57	8.459	S	Retained

It will be seen from the above table that Chi of all the items selected for pilot try-out are significant at .01 level. Thus all the items selected for pilot tryout are able to discriminate between the performances of high-scoring and low-scoring group.

Administration of the Test.

Letters were written to the head masters of 3 to 5 high schools from each of the five districts, requesting them to permit the tryout of the test in their schools. All of them were kind enough to grant permission. Then the dates for the tryout were fixed. The

author of the test himself administered the test in all these schpols.

The author wanted to take the assistance of some persons for the final tryout. He had selected some persons who were willing to assist him and in whose ability and integrity the author had every faith.

Some of these persons were assisting the author in administration of every tryout. Before the completion of this round of tryout every one of these had attended more than one administrations of the tests and gained experience in administering the test.

These persons are either lecturers in the college of education or are trained teachers who have served as teachers in high schools for more than five years.

On reaching the school, the head master was given the idea regarding the nature of the work and was requested to ask the class-teachers of the respective classes to give help in supervising the work.

The test was to be given to one division of each standard, VIII to X, to be decided by the headmaster. However he was requested to select the standard in which the attendence of pupils was maximum.

Before administering the test the author had a small conference with the teachers who were to supervise the work. He explained to them the purpose of this test, the way in which it is to be administered and their role during the supervision. They were requested not to help the pupils but to record the difficulties experienced by the pupils while taking the test.

The test was first administered to the pupils of standard VIII, which constitutes generally the youngest group of the three and hence it can be safely assumed that if these pupils follow the instructions properly, the other two groups, namely the pupils studying in standard IX and those in standard X, should find no difficulty in following the instructions.

The pupils were seated in their class and the author had a casual talk with them for a couple of minutes. Then the answer sheets were distributed to them. They were asked to write on it the personal information about them in the space provided for the purpose.

The test booklets and sheets giving the answers of practice examples were then distributed to them. The demonstration of the way of taking the test and recording the answers was given to them with the help of the first practice example in the first test. They were asked to solve the practice examples of a test and compare their answers with the given ones. If the answers were correct, then they were asked to solve the test proper. When they completed the first test, they were asked to solve the next one without waiting for the instructions, and proceed with the work until they completed all the tests.

They were told that they would be allowed as much time as they required and hence not to leave any item unattempted. The pupils started the work instantaneously after the caution word 'start' was given to them.

The author moved in the class and observed the working of the pupils until some of them completed the first test. When he was sure that pupils were solving the test and recording the answers as per instructions, he moved to the next class requesting the teacher to supervise the work, and to collect the test booklets and answer sheets from the pupils who had completed it by recording on the answer sheets the time taken by the pupil for completing the test.

The same procedure was followed in standards IX and X. The persons who had accepted the request to help in the final try out, observed the administration. When they observed one or two administrations they were asked to administer the test in some of the schools under the supervision of the author. This helped the author to decide whether a particular person has been properly trained in administering the test.

When the testing was over, the author had a casual talk with pupils and the supervising teachers to note down their reactions towards the testing programme. The reactions of the pupils are as given below:-

1. They enjoyed the work done by them on the test.
2. After completing the sixth test, they experienced some fatigue.
3. They wanted to know the results of their performances.
4. Test 3 (classification) was more difficult than test 4 (Analogy)
5. Test 8 (Number series) was the most difficult one.

6. Though Arithmetic problems were easy, they experienced some difficulty in doing them mentally.

The reaction of the teachers was that the test was long and pupils get tired. So it may be given in two sittings with some rest in-between.

The birthdates given by the pupils were verified with School registers.

Sample Tested

The decisions regarding difficulty value, discrimination power of items and the attractiveness of destractors depend upon how far the sample selected for tryout is representative of the population for which the test has been designed. The representativeness of sample does not depend on mere size of the sample, "A tryout sample of 20,000 pupils all taken from the same school system will generally not serve as well as a sample of 400 pupils from many school systems".[1/] So schools were selected from each district.

Table 11. Number of Schools in which the Pilot Tryout was given.

District	Aurangabad	Parbhani	Bhir	Nanded	Osmanabad	Total
Number of schools in which Pilot tryout was given.....	5	3	4	4	5	21

1/Conard H.S. "The Experimental Tryout of Test Materials". Chapter VIII. Educational Measurement Lindquist E.F., Editor, American Council on Education, Washington D.C. 1966. pp 253.

The test was given on the whole to 2471 pupils. On an average it was given to 118 pupils per school. Thus it may safely be assumed that the number of schools selected for the pilot tryout was adequate.

The classification of the pupils formulating the sample is done districtwise and classwise, and the percentages of the pupils were compared with the respective percentages in the population.

Table 12. Number of pupils in the tested sample from each district.

District	Number of pupils tested.	Percentage	Percentage in the population (from Table No. 4, page No. 60)
Aurangabad.....	562	23	25
Parbhani.....	327	13	14
Bhir.....	469	19	17
Nanded.....	444	18	16
Osmanabad.....	669	27	28
Total.....	2471	100	100

The above table shows that the districtwise percentages of pupils in the selected sample and the population (total number of pupils studying in these standards in these five districts) are almost the same.

Table 13. Number of pupils in the tested sample studying in each of the standards VIII, IX and X.

Standard	Number of pupils tested	Percentage	Percentage in the population from Table no. 5, page no. 61.
VIII	1098	44	45
IX	764	31	30
X	609	25	25
Total	2,471	100	100

The percentages of pupils studying in each standard in these five districts and similar percentages in the sample are almost the same.

The standardwise and districtwise percentages of the pupils in the tested sample and population are nearly the same, it can safely be concluded that the tested sample is representative of the population. Out of these 2471 pupils tested, 57 were either above the age 17 or below the age 13. These were discarded. The remaining answer sheets were then sorted out into five groups according to the ages 13 to 17 years. Then 14 answer sheets were removed at random from the groups in which the total number of answer books was either more than 370 or more than 555. The calculations of item analysis become very simple if the sizes of the samples are

370, 555, 740 etc. So 370 answer sheets from each of the age groups 13 and 17 years and 555 answer sheets from each of the age groups 14, 15 and 16 years were selected for item analysis.

Scoring the Test.

The selected answer sheets were scored with the help of the window and strip keys already prepared for the purpose. The procedure adopted was the same as that described earlier.

Item Analysis.

"The process of evaluating single test items by any of several methods"[1/], is called item analysis. The main purposes of item analysis are:-

1. to validate the items with reference to some external criterion (which has been already described earlier),
2. to find the discriminating power of the items,
3. to find the difficulty values of the items.

Procedure.

1. All the 370 answersheets of the pupils of age group 13 years were arranged according to the descending order of the scores obtained in Test 1. The answer sheet of the pupil with highest score was at the top and that of the pupil with the lowest score was at the bottom.
2. From the top of the pile 27 % answer sheets were taken out serially which formed the upper group.
3. From the bottom of this pile 27 % of answer sheets were

1/Mehrens W.A. & Lehmann I.J., op. cit. pp 304.

taken out which formed the lower group.

4. The middle 46 % of answer sheets were discarded.
5. The procedure was repeated in case of the answer sheets of age groups 14 to 17.

The details regarding the number of answersheets selected for item analysis are as given in the following table.

Table 14. Number of answer sheets from higher group and lower group of each age group selected for item analysis.

Age group (yrs)	13	14	15	16	17	Total
Total number of answer books...	370	555	555	550	370	2400
Number of answer sheets in high group (27%)....	100	150	150	150	100	650
Number of answer sheets in low group (27%)....	100	150	150	150	100	650

By tabulating the data, the number of pupils from high group and low group doing ~~the~~ each item correctly was found out separately.

Item Difficulty

The difficulty value of an item is determined either by judgement of experts or by determining the time required for solving the item or by number of pupils doing the item correctly. The first procedure was used while arranging the items in the form used for

the first preliminary tryout. The third procedure has been adopted in arranging the items in the final form of the test.

"Difficulty value is "the percent of some specified group, such as students of a given age or grade, who answer an item correctly"[1/]. The average of the performance of the high scoring and low scoring groups on the item has been treated as the difficulty value of the item.

The formula used for calculating the difficulty value is as given below:-

$$"D = \frac{U + L}{2}$$

where

D = Difficulty value of the item

U = Percentage of correct responses to an item from the upper 27 percent of the group

L = Percentage of correct response to an item from the lower 27 percent of the group"[2/].

(Values of D, U and L are also shown out of one, instead of 100)

The performances of only 54 percent of the sample have been taken into account while estimating the value of D. Doubts have been raised by some about the reliability of the value of 'D' calculated by this method, as it does not take into account the the performance of the middle 46 percent of the population. But as

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1/Ibid, pp 301.

2/Shah M.M., Op.cit. pp 101.

Davis points out, "Experimental evidence, has shown that difficulty indices of the sort described, are extremely reliable when they are based on sample as large as 400". As the sample used for each age group is nearly 400 or more than 400 the 'D' values of the items calculated by this method may safely be assumed as sufficiently reliable.

The values of each item calculated by this method are given in table No. 13.

Discriminating Power

Not only Difficulty value but discriminating power of the item also is taken into account while selecting the item. Discriminating power of an item is defined as "the ability of a test item to differentiate between persons possessing much of some trait and those possessing little".[1/]

The discrimination between two such individuals may be done in terms of the whole test or may be in terms of some external criterion scores. If there is only one test and if it is to have maximum validity then "..... each item must correlate as high as possible with the external criterion and as low as possible with the other items in the test".[2/] This is a battery of test consisting of 8 tests. So other procedures have been followed for this purpose.

The item validity technique has already been applied before

1/Mehrens W.A., Lehman I.J., Op.cit. pp 301.

2/Guilford J.P., Op.cit. pp 442.

the pilot tryout, on the basis of the data collected by the tryout of the test on the high and low groups decided by performances on N.V.T.I.

Indices of Item Consistency.

The other criterion used for item selection is to find the item consistancy. This is determined by finding the correlation of the scores of an item with the total test score. They are calculated in terms of biserial 'r', point-biserial 'r', tetrachoric 'r' and phi coefficient.

Davis suggests, "To provide an index of discriminating ability that is essentially unaffected by differences in the percent of testees answering correctly items scored 'right' or 'wrong', the biserial 'r' may be employed when the criterion variable is continuous".[1/]

Garret also says, "the biserial method is the standard procedure for determining item validity through correlation".[2/] So the biserial 'r' has been used to find the discrimination power of the item.

The best formula to be used for the biserial 'r' in the item-analysis application is:-

$$r_b = \frac{M_p - M_t}{\sigma_t} \cdot \frac{p}{y}$$

where

M_p = Mean criterion score of those passing item

1/Davis F.B., Op.cit. pp 292

2/Garret H.E., Op.cit., pp 351

M_t = Mean criterion score of all examinees

σ_t = Standard deviation of all total scores

p = Proportion passing item

y = Ordinate in unit normal distribution corresponding to p".[1/]

Calculation of Biserial 'r' of all these 236 items is very laborious. Flanagan has prepared the tables from which the biserial 'r' of the given scores can readily be found out.

The validity index based on the upper 27 % and lower 27% is the estimate of the coefficient of correlation between item and test obtainable from tables prepared by Flanagan. By entering the tables in appropriate row and column the biserial 'r' may be read directly.

The internal consistency indices of all the items in terms of biserial 'r' are also given in the following table:-

Table 15. Internal Consistency Indices and Difficulty Values of the items.

Item No.	Age	Fraction of pupil out of one doing the item correctly from		D= u+L / 2	Internal consist-ency Index (Biserial 'r')	Whether Rejected/ retained or New Serial number.
		Upper 27% of the sample u	Lower 27% of the sample L			
			Test 1 Synonyms			
1	13	.93	.68	.395	.805	

1/Guilford J.P., Op.cit. pp 427

Table 15. (continued)

1	2	3	4	5	6	7
	14	.95	.68	.450	.815	
	15	.91	.63	.390	.770	
	16	.95	.77	.355	.860	
	17	.89	.69	.290	.790	Rejected
2	13	.42	.18	.280	.300	
	14	.55	.16	.430	.355	
	15	.63	.17	.485	.400	
	16	.59	.35	.350	.470	
	17	.73	.23	.500	.480	19
3	13	.90	.45	.520	.675	
	14	.93	.46	.570	.695	
	15	.93	.55	.500	.740	
	16	.93	.60	.460	.765	
	17	.97	.58	.595	.775	1
4	13	.89	.20	.685	.545	
	14	.88	.28	.610	.580	
	15	.85	.41	.450	.630	
	16	.95	.36	.670	.655	
	17	.92	.42	.580	.670	3

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
5	13	.80	.28	.520	.540	
	14	.85	.29	.570	.570	
	15	.86	.33	.550	.595	
	16	.88	.40	.520	.640	
	17	.91	.40	.575	.655	4
6	13	.70	.17	.540	.435	
	14	.80	.15	.640	.475	
	15	.84	.23	.605	.535	
	16	.85	.29	.570	.570	
	17	.88	.30	.600	.590	11
7	13	.79	.15	.630	.470	
	14	.83	.18	.640	.505	
	15	.86	.25	.610	.555	
	16	.91	.27	.660	.590	
	17	.84	.37	.495	.605	8
8	13	.83	.29	.555	.560	
	14	.83	.56	.350	.695	
	15	.93	.41	.600	.670	
	16	.91	.42	.560	.665	
	17	.91	.34	.615	.625	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
9	13	.75	.22	.530	.485	
	14	.80	.30	.510	.550	
	15	.85	.28	.580	.565	
	16	.85	.34	.530	.595	
	17	.88	.37	.545	.625	6
10	13	.90	.29	.635	.595	
	14	.88	.37	.545	.625	
	15	.95	.33	.685	.640	
	16	.88	.45	.485	.665	
	17	.95	.44	.620	.695	2
11	13	.67	.18	.500	.425	
	14	.74	.19	.550	.465	
	15	.80	.21	.585	.505	
	16	.84	.22	.610	.530	
	17	.80	.32	.490	.560	13
12	13	.74	.16	.580	.450	
	14	.68	.20	.490	.440	
	15	.83	.21	.610	.520	
	16	.77	.21	.560	.490	
	17	.90	.22	.680	.560	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
13	13	.82	.26	.560	.540	
	14	.85	.30	.560	.575	
	15	.87	.29	.590	.580	
	16	.84	.35	.510	.595	
	17	.94	.35	.655	.645	5
14	13	.70	.22	.490	.460	
	14	.79	.28	.510	.535	
	15	.84	.33	.525	.585	
	16	.77	.35	.430	.560	
	17	.79	.38	.430	.585	Rejected
15	13	.50	.11	.465	.305	
	14	.48	.19	.325	.335	
	15	.56	.13	.480	.345	
	16	.62	.20	.440	.410	
	17	.68	.22	.470	.450	21
16	13	.76	.20	.560	.480	
	14	.86	.18	.670	.520	
	15	.88	.24	.640	.560	
	16	.90	.30	.630	.600	
	17	.90	.32	.610	.610	7

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
17	13	.69	.17	.530	.430	
	14	.76	.18	.580	.470	
	15	.88	.18	.690	.530	
	16	.80	.29	.515	.545	
	17	.84	.32	.530	.580	12
18	13	.72	.21	.510	.465	
	14	.82	.16	.650	.490	
	15	.85	.24	.610	.545	
	16	.85	.29	.570	.570	
	17	.87	.33	.560	.600	9
19	13	.68	.19	.500	.435	
	14	.75	.22	.530	.485	
	15	.82	.26	.560	.540	
	16	.81	.34	.480	.575	
	17	.88	.32	.580	.600	10
20	13	.50	.17	.375	.335	
	14	.60	.15	.475	.375	
	15	.62	.25	.380	.435	
	16	.71	.27	.440	.490	
	17	.74	.27	.470	.505	18

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
21	13	.71	.24	.470	.475	
	14	.71	.25	.460	.480	
	15	.68	.12	.580	.400	
	16	.66	.25	.420	.455	
	17	.66	.18	.490	.420	Rejected
22	13	.63	.12	.545	.375	
	14	.68	.15	.545	.415	
	15	.71	.18	.535	.445	
	16	.69	.28	.410	.485	
	17	.68	.33	.360	.505	17
23	13	.38	.19	.235	.285	
	14	.59	.11	.530	.350	
	15	.50	.26	.260	.380	
	16	.57	.28	.300	.425	
	17	.50	.22	.310	.360	Rejected
24	13	.55	.19	.390	.370	
	14	.61	.23	.395	.420	
	15	.69	.25	.440	.470	
	16	.61	.27	.350	.440	
	17	.64	.20	.460	.420	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
25	13	.71	.24	.470	.475	
	14	.70	.25	.450	.475	
	15	.68	.12	.580	.400	
	16	.66	.24	.430	.450	
	17	.66	.18	.490	.420	Rejected
26	13	.64	.12	.550	.380	
	14	.58	.27	.320	.425	
	15	.73	.20	.530	.465	
	16	.72	.28	.440	.500	
	17	.73	.33	.405	.530	16
27	13	.46	.23	.255	.345	
	14	.44	.13	.375	.285	
	15	.49	.17	.365	.330	
	16	.52	.16	.400	.340	
	17	.50	.14	.420	.320	Rejected
28	13	.31	.14	.235	.225	
	14	.29	.12	.250	.205	
	15	.48	.10	.470	.290	
	16	.42	.09	.430	.255	
	17	.44	.16	.330	.300	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
29	13	.62	.23	.405	.425	
	14	.59	.30	.300	.445	
	15	.68	.28	.400	.480	
	16	.72	.31	.410	.515	
	17	.78	.32	.470	.550	14
30	13	.41	.17	.290	.290	
	14	.41	.24	.190	.325	
	15	.49	.20	.320	.345	
	16	.42	.27	.165	.345	
	17	.44	.32	.130	.380	Rejected
31	13	.53	.10	.505	.315	
	14	.53	.13	.455	.330	
	15	.63	.15	.510	.390	
	16	.62	.19	.455	.405	
	17	.62	.18	.470	.400	Rejected
32	13	.54	.27	.285	.405	
	14	.56	.32	.250	.440	
	15	.61	.33	.290	.470	
	16	.66	.36	.310	.510	
	17	.77	.33	.450	.550	15

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
33	13	.46	.07	.510	.265	
	14	.46	.10	.450	.280	
	15	.54	.06	.590	.300	
	16	.64	.06	.650	.350	
	17	.62	.12	.540	.370	24
34	13	.55	.07	.575	.310	
	14	.59	.10	.550	.345	
	15	.58	.20	.400	.390	
	16	.66	.17	.505	.415	
	17	.66	.26	.410	.460	20
35	13	.21	.14	.110	.175	
	14	.24	.16	.120	.200	
	15	.33	.10	.330	.215	
	16	.37	.12	.330	.245	
	17	.40	.17	.285	.285	Rejected
36	13	.52	.08	.530	.300	
	14	.55	.09	.540	.320	
	15	.55	.11	.500	.330	
	16	.66	.10	.600	.380	
	17	.68	.15	.545	.425	22

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
37	13	.36	.15	.275	.255	
	14	.45	.12	.400	.285	
	15	.41	.10	.405	.255	
	16	.42	.18	.280	.300	
	17	.38	.16	.280	.270	Rejected
38	13	.48	.10	.470	.290	
	14	.43	.18	.290	.305	
	15	.53	.11	.490	.320	
	16	.58	.16	.450	.370	
	17	.65	.13	.550	.390	23
			Test 2 Antonyms			
1	13	.99	.45	.745	.720	
	14	.97	.46	.665	.715	
	15	.99	.73	.600	.860	
	16	.97	.77	.440	.870	
	17	1.00	.53	[illegible]	.765	Rejected
2	13	.98	.44	.710	.710	
	14	.97	.46	.665	.715	
	15	.98	.52	.670	.750	
	16	.99	.54	.710	.765	
	17	.99	.62	.670	.805	1

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
3	13	.92	.26	.680	.590	
	14	.95	.24	.735	.595	
	15	.94	.40	.620	.670	
	16	.95	.33	.685	.640	
	17	.90	.39	.565	.645	Rejected
4	13	.92	.31	.645	.615	
	14	.90	.21	.690	.555	
	15	.93	.40	.605	.665	
	16	.93	.40	.605	.665	
	17	.97	.36	.715	.665	Rejected
5	13	.96	.43	.650	.695	
	14	.96	.44	.640	.700	
	15	.98	.45	.705	.715	
	16	.99	.55	.705	.770	
	17	.99	.60	.680	.795	2
6	13	.96	.46	.630	.710	
	14	.97	.53	.630	.750	
	15	.95	.51	.580	.730	
	16	.97	.53	.630	.750	
	17	.96	.61	.535	.785	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
7	13	.97	.28	.755	.625	
	14	.96	.30	.720	.630	
	15	.95	.30	.700	.625	
	16	.95	.41	.640	.680	
	17	.97	.40	.700	.685	Rejected
8	13	.62	.26	.370	.440	
	14	.71	.37	.350	.540	
	15	.77	.35	.430	.560	
	16	.78	.36	.430	.570	
	17	.80	.36	.460	.580	12
9	13	.83	.22	.605	.525	
	14	.88	.23	.650	.555	
	15	.90	.29	.635	.595	
	16	.90	.30	.630	.600	
	17	.89	.34	.585	.615	6
10	13	.90	.20	.700	.550	
	14	.93	.30	.665	.615	
	15	.96	.35	.695	.655	
	16	.96	.41	.665	.685	
	17	.95	.44	.620	.695	3

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
11	13	.65	.24	.420	.445	
	14	.84	.23	.605	.535	
	15	.86	.25	.610	.555	
	16	.87	.27	.610	.570	
	17	.85	.30	.560	.575	13
12	13	.84	.20	.630	.520	
	14	.96	.34	.700	.650	
	15	.92	.39	.595	.655	
	16	.90	.44	.530	.670	
	17	.92	.92	.580	.920	Rejected
13	13	.93	.21	.720	.570	
	14	.90	.22	.680	.560	
	15	.95	.31	.695	.630	
	16	.90	.44	.530	.670	
	17	.95	.24	.735	.595	Rejected
14	13	.89	.21	.630	.550	
	14	.91	.23	.685	.570	
	15	.95	.32	.690	.635	
	16	.97	.40	.700	.685	
	17	.98	.40	.730	.690	4

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
15	13	.66	.22	.450	.440	
	14	.83	.23	.600	.530	
	15	.85	.25	.600	.550	
	16	.86	.26	.600	.560	
	17	.89	.25	.650	.570	14
16	13	.82	.16	.650	.490	
	14	.85	.23	.615	.540	
	15	.79	.35	.450	.570	
	16	.81	.35	.475	.580	
	17	.76	.42	.360	.590	10
17	13	.88	.20	.670	.540	
	14	.91	.22	.690	.565	
	15	.93	.29	.670	.610	
	16	.93	.35	.640	.640	
	17	.95	.34	.680	.645	5
18	13	.88	.09	.765	.485	
	14	.82	.18	.630	.500	
	15	.87	.25	.620	.560	
	16	.83	.23	.600	.530	
	17	.90	.22	.680	.560	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
19	13	.86	.15	.690	.505	
	14	.80	.29	.515	.545	
	15	.94	.24	.720	.590	
	16	.90	.30	.630	.600	
	17	.92	.29	.655	.605	7
20	13	.60	.24	.370	.420	
	14	.68	.32	.370	.500	
	15	.70	.34	.370	.520	
	16	.68	.42	.270	.550	
	17	.70	.43	.280	.565	17
21	13	.74	.15	.590	.445	
	14	.89	.19	.690	.540	
	15	.90	.23	.675	.565	
	16	.88	.27	.620	.575	
	17	.88	.29	.605	.585	11
22	13	.76	.10	.670	.430	
	14	.79	.23	.560	.510	
	15	.85	.23	.615	.540	
	16	.80	.31	.500	.555	
	17	.83	.30	.540	.565	16

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
23	13	.61	.30	.320	.455	
	14	.63	.21	.440	.420	
	15	.70	.11	.615	.405	
	16	.67	.30	.375	.485	
	17	.72	.20	.520	.460	Rejected
24	13	.76	.24	.520	.500	
	14	.77	.32	.460	.545	
	15	.87	.29	.590	.580	
	16	.87	.32	.570	.595	
	17	.82	.38	.470	.600	8
25	13	.62	.24	.390	.430	
	14	.76	.28	.480	.520	
	15	.77	.32	.460	.545	
	16	.80	.33	.480	.565	
	17	.83	.32	.520	.575	15
26	13	.61	.19	.445	.400	
	14	.69	.13	.580	.410	
	15	.75	.11	.650	.430	
	16	.76	.12	.640	.440	
	17	.77	.24	.530	.505	21

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
27	13	.64	.19	.470	.415	
	14	.67	.19	.490	.430	
	15	.80	.13	.660	.465	
	16	.82	.14	.670	.480	
	17	.82	.17	.640	.495	20
28	13	.69	.30	.390	.495	
	14	.78	.35	.440	.565	
	15	.83	.32	.520	.575	
	16	.86	.31	.565	.585	
	17	.83	.36	.490	.595	9
29	13	.35	.20	.180	.275	
	14	.43	.27	.175	.350	
	15	.37	.20	.205	.285	
	16	.40	.24	.180	.320	
	17	.50	.26	.260	.380	Rejected
30	13	.67	.15	.540	.410	
	14	.71	.16	.560	.435	
	15	.78	.16	.610	.470	
	16	.78	.20	.570	.490	
	17	.85	.19	.650	.540	19

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
31	13	.83	.35	.500	.590	
	14	.85	.35	.520	.600	
	15	.81	.39	.445	.600	
	16	.71	.33	.385	.520	
	17	.68	.23	.460	.455	Rejected
32	13	.48	.24	.260	.360	
	14	.52	.22	.330	.370	
	15	.60	.17	.460	.385	
	16	.60	.23	.385	.415	
	17	.60	.28	.330	.440	23
33	13	.52	.18	.430	.350	
	14	.52	.20	.350	.360	
	15	.60	.15	.485	.375	
	16	.61	.18	.460	.395	
	17	.72	.11	.625	.415	24
34	13	.55	.17	.415	.360	
	14	.51	.20	.340	.355	
	15	.50	.27	.245	.385	
	16	.46	.19	.305	.325	
	17	.41	.21	.235	.310	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
35	13	.67	.27	.405	.470	
	14	.67	.28	.395	.475	
	15	.63	.29	.370	.460	
	16	.57	.20	.395	.385	
	17	.57	.19	.410	.380	Rejected
36	13	.60	.24	.370	.420	
	14	.63	.37	.270	.500	
	15	.66	.36	.310	.510	
	16	.74	.30	.440	.520	
	17	.80	.26	.540	.530	18
37	13	.58	.32	.270	.450	
	14	.57	.25	.340	.410	
	15	.70	.27	.430	.485	
	16	.59	.27	.330	.430	
	17	.61	.20	.430	.405	Rejected
38	13	.48	.15	.385	.315	
	14	.58	.15	.465	.365	
	15	.62	.16	.490	.390	
	16	.64	.24	.410	.440	
	17	.69	.20	.500	.445	22

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
			Test 3	Classification		
1	13	.90	.17	.715	.535	
	14	.94	.18	.760	.560	
	15	.95	.19	.760	.570	
	16	.91	.34	.615	.625	
	17	.97	.34	.725	.655	5
2	13	.78	.28	.500	.530	
	14	.89	.26	.640	.575	
	15	.92	.28	.660	.600	
	16	.88	.37	.545	.625	
	17	.91	.43	.550	.670	4
3	13	.96	.28	.730	.620	
	14	.98	.30	.770	.640	
	15	.98	.34	.750	.660	
	16	.97	.37	.710	.670	
	17	.98	.47	.695	.725	1
4	13	.86	.16	.680	.510	
	14	.91	.16	.735	.535	
	15	.86	.23	.540	.545	
	16	.95	.21	.750	.580	
	17	.98	.34	.750	.660	7

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
5	13	.95	.12	.810	.535	
	14	.96	.19	.775	.575	
	15	.98	.25	.795	.615	
	16	.93	.33	.650	.630	
	17	.91	.41	.570	.660	3
6	13	.80	.26	.540	.530	
	14	.88	.20	.670	.540	
	15	.87	.23	.640	.555	
	16	.87	.31	.580	.590	
	17	.88	.32	.580	.600	6
7	13	.76	.15	.610	.455	
	14	.84	.10	.720	.470	
	15	.89	.14	.730	.515	
	16	.85	.23	.615	.540	
	17	.85	.27	.585	.560	8
8	13	.60	.23	.385	.415	
	14	.74	.18	.560	.460	
	15	.77	.21	.560	.490	
	16	.76	.28	.480	.520	
	17	.80	.27	.530	.535	10

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
9	13	.94	.14	.780	.540	
	14	.95	.19	.760	.570	
	15	.97	.29	.750	.630	
	16	.95	.34	.680	.645	
	17	.90	.43	.535	.665	2
10	13	.52	.18	.380	.350	
	14	.57	.19	.410	.380	
	15	.66	.18	.490	.420	
	16	.69	.16	.540	.425	
	17	.62	.28	.350	.450	17
11	13	.65	.25	.410	.450	
	14	.63	.23	.410	.430	
	15	.71	.22	.495	.465	
	16	.60	.18	.450	.390	
	17	.67	.23	.450	.450	Rejected
12	13	.70	.14	.570	.420	
	14	.79	.16	.620	.475	
	15	.79	.23	.560	.510	
	16	.74	.29	.450	.515	
	17	.82	.26	.560	.540	9

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
13	13	.58	.21	.390	.395	
	14	.68	.20	.490	.440	
	15	.69	.27	.420	.480	
	16	.74	.27	.470	.505	
	17	.74	.30	.440	.520	12
14	13	.72	.06	.700	.390	
	14	.70	.14	.570	.420	
	15	.77	.16	.605	.465	
	16	.80	.16	.630	.480	
	17	.77	.20	.565	.485	14
15	13	.86	.03	.825	.445	
	14	.89	.10	.765	.495	
	15	.89	.19	.690	.540	
	16	.87	.14	.710	.505	
	17	.88	.15	.710	.515	Rejected
16	13	.67	.10	.605	.385	
	14	.62	.20	.440	.410	
	15	.67	.21	.470	.440	
	16	.73	.18	.550	.455	
	17	.76	.17	.590	.465	16

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
17	13	.73	.07	.690	.400	
	14	.78	.12	.660	.450	
	15	.78	.19	.585	.485	
	16	.80	.22	.570	.510	
	17	.85	.21	.630	.530	11
18	13	.97	.13	.830	.550	
	14	.88	.15	.710	.515	
	15	.88	.20	.670	.540	
	16	.93	.28	.680	.605	
	17	.93	.33	.650	.630	Rejected
19	13	.51	.09	.510	.300	
	14	.59	.15	.475	.370	
	15	.64	.18	.480	.410	
	16	.66	.19	.480	.425	
	17	.68	.18	.510	.430	19
20	13	.70	.06	.680	.380	
	14	.78	.06	.730	.420	
	15	.76	.14	.620	.450	
	16	.82	.11	.700	.465	
	17	.81	.15	.650	.480	15

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
21	13	.51	.15	.410	.330	
	14	.49	.20	.320	.345	
	15	.63	.12	.545	.375	
	16	.55	.23	.340	.390	
	17	.64	.23	.420	.435	Rejected
22	13	.65	.07	.640	.360	
	14	.67	.10	.605	.385	
	15	.73	.10	.645	.415	
	16	.74	.10	.650	.420	
	17	.69	.18	.520	.435	18
23	13	.68	.14	.560	.410	
	14	.66	.13	.555	.395	
	15	.60	.19	.435	.395	
	16	.53	.15	.425	.340	
	17	.63	.18	.475	.405	Rejected
24	13	.45	.30	.160	.375	
	14	.48	.24	.260	.360	
	15	.63	.21	.440	.420	
	16	.52	.21	.340	.365	
	17	.52	.16	.400	.340	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
25	13	.54	.15	.435	.345	
	14	.49	.11	.460	.300	
	15	.57	.20	.395	.385	
	16	.55	.18	.400	.365	
	17	.53	.18	.385	.355	Rejected
26	13	.34	.09	.360	.215	
	14	.39	.12	.350	.255	
	15	.43	.17	.305	.300	
	16	.37	.16	.270	.265	
	17	.44	.17	.315	.305	Rejected
27	13	.70	.09	.640	.395	
	14	.78	.08	.700	.430	
	15	.80	.15	.640	.475	
	16	.86	.12	.720	.490	
	17	.83	.17	.650	.500	13
28	13	.49	.09	.495	.290	
	14	.52	.21	.340	.365	
	15	.51	.26	.270	.385	
	16	.61	.21	.420	.410	
	17	.60	.23	.385	.415	20

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
29	13	.52	.09	.515	.305	
	14	.58	.08	.580	.330	
	15	.51	.04	.615	.275	
	16	.42	.12	.380	.270	
	17	.52	.13	.445	.325	Rejected
30	13	.48	.09	.490	.285	
	14	.45	.20	.280	.325	
	15	.46	.21	.280	.335	
	16	.50	.20	.330	.350	
	17	.60	.20	.420	.400	21
31	13	.46	.05	.555	.255	
	14	.45	.09	.460	.270	
	15	.51	.09	.510	.300	
	16	.56	.08	.560	.320	
	17	.55	.14	.460	.345	23
32	13	.46	.04	.580	.250	
	14	.52	.04	.620	.280	
	15	.51	.11	.470	.310	
	16	.63	.09	.590	.360	
	17	.65	.15	.520	.400	22

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
33	13	.43	.12	.385	.275	
	14	.40	.14	.330	.270	
	15	.41	.14	.335	.275	
	16	.37	.16	.270	.265	
	17	.38	.15	.295	.265	Rejected
34	13	.39	.17	.275	.280	
	14	.34	.12	.300	.230	
	15	.41	.14	.335	.275	
	16	.47	.13	.405	.300	
	17	.44	.19	.285	.315	Rejected
35	13	.44	.17	.315	.305	
	14	.37	.14	.300	.255	
	15	.55	.14	.460	.345	
	16	.49	.18	.350	.335	
	17	.37	.14	.300	.255	Rejected
36	13	.40	.00	.680	.200	
	14	.41	.07	.470	.240	
	15	.42	.08	.450	.250	
	16	.50	.11	.465	.305	
	17	.58	.06	.610	.320	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
37	13	.42	.08	.450	.250	
	14	.48	.05	.575	.265	
	15	.44	.14	.360	.290	
	16	.45	.17	.325	.310	
	17	.54	.13	.465	.335	24
			Test 4 Analogy			
1	13	.97	.42	.690	.695	
	14	.95	.50	.585	.725	
	15	.98	.60	.620	.790	
	16	.98	.61	.615	.795	
	17	.98	.64	.590	.810	1
2	13	.92	.42	.580	.670	
	14	.93	.33	.650	.630	
	15	.97	.42	.690	.695	
	16	.95	.50	.585	.725	
	17	.93	.36	.630	.645	Rejected
3	13	.92	.43	.570	.675	
	14	.95	.46	.610	.705	
	15	.95	.49	.590	.720	
	16	.95	.53	.565	.740	
	17	.96	.63	.520	.795	2

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
4	13	.93	.30	.665	.615	
	14	.92	.43	.570	.675	
	15	.83	.46	.405	.645	
	16	.91	.50	.500	.705	
	17	.97	,44	.675	.705	Rejected
5	13	.91	.39	.580	.650	
	14	.82	.38	.470	.600	
	15	.94	.41	.615	.675	
	16	.92	.63	.410	.775	
	17	.93	.42	.595	.675	Rejected
6	13	.90	.39	.565	.645	
	14	.94	.37	.645	.655	
	15	.93	.42	.595	.675	
	16	.95	.49	.590	.720	
	17	.97	.53	.630	.750	3
7	13	.91	.30	.640	.605	
	14	.94	.31	.675	.625	
	15	.97	.45	.670	.710	
	16	.97	.45	.670	.710	
	17	.98	.36	.740	.670	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
8	13	.95	.22	.745	.585	
	14	.93	.31	.660	.620	
	15	.99	.33	.795	.660	
	16	.95	.41	.640	.680	
	17	.97	.47	.660	.720	4
9	13	.55	.17	.415	.360	
	14	.59	.17	.450	.380	
	15	.68	.16	.530	.420	
	16	.69	.20	.500	.445	
	17	.77	.15	.615	.460	17
10	13	.92	.34	.630	.630	
	14	.92	.28	.660	.600	
	15	.95	.35	.675	.650	
	16	.91	.31	.630	.610	
	17	.92	.30	.650	.610	Rejected
11	13	.89	.25	.650	.570	
	14	.94	.23	.725	.585	
	15	.90	.31	.620	.605	
	16	.94	.31	.675	.625	
	17	.96	.32	.710	.640	5

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
12	13	.84	.20	.630	.520	
	14	.71	.27	.440	.490	
	15	.72	.32	.400	.520	
	16	.73	.30	.430	.515	
	17	.75	.29	.460	.520	Rejected
13	13	.94	.31	.675	.625	
	14	.89	.20	.685	.545	
	15	.94	.30	.680	.620	
	16	.93	.31	.660	.620	
	17	.95	.32	.690	.635	Rejected
14	13	.43	.20	.265	.315	
	14	.43	.23	.225	.330	
	15	.42	.21	.245	.315	
	16	.43	.17	.305	.300	
	17	.44	.22	.250	.330	Rejected
15	13	.74	.20	.540	.470	
	14	.80	.20	.600	.500	
	15	.87	.20	.660	.535	
	16	.85	.27	.585	.560	
	17	.90	.24	.670	.570	9

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
16	13	.94	.26	.710	.600	
	14	.95	.26	.725	.605	
	15	.97	.28	.755	.625	
	16	.97	.29	.750	.630	
	17	.97	.31	.740	.640	Rejected
17	13	.71	.17	.550	.440	
	14	.77	.17	.600	.470	
	15	.73	.23	.500	.480	
	16	.77	.26	.510	.515	
	17	.82	.24	.580	.530	12
18	13	.93	.25	.700	.590	
	14	.95	.24	.735	.595	
	15	.92	.25	.685	.585	
	16	.97	.25	.770	.610	
	17	.90	.30	.630	.600	Rejected
19	13	.84	.15	.675	.495	
	14	.87	.14	.710	.505	
	15	.88	.20	.670	.540	
	16	.95	.20	.755	.575	
	17	.94	.22	.730	.580	8

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
20	13	.70	.24	.460	.470	
	14	.73	.27	.460	.500	
	15	.79	.23	.560	.510	
	16	.87	.24	.630	.555	
	17	.93	.22	.715	.575	10
21	13	.54	.14	.450	.340	
	14	.59	.18	.440	.385	
	15	.71	.16	.560	.435	
	16	.66	.24	.430	.450	
	17	.82	.31	.520	.565	Rejected
22	13	.79	.17	.610	.480	
	14	.80	.20	.600	.500	
	15	.83	.18	.640	.505	
	16	.87	.23	.640	.550	
	17	.85	.29	.570	.570	11
23	13	.65	.13	.550	.390	
	14	.63	.17	.485	.400	
	15	.80	.14	.650	.470	
	16	.81	.19	.610	.500	
	17	.89	.15	.720	.520	14

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
24	13	.67	.20	.480	.435	
	14	.61	.23	.395	.420	
	15	.69	.17	.530	.430	
	16	.63	.22	.425	.425	
	17	.70	.26	.440	.480	Rejected
25	13	.67	.22	.460	.445	
	14	.65	.16	.510	.405	
	15	.78	.09	.690	.435	
	16	.73	.12	.620	.425	
	17	.71	.15	.570	.430	Rejected
26	13	.68	.17	.520	.425	
	14	.76	.19	.570	.475	
	15	.82	.14	.670	.480	
	16	.82	.18	.630	.500	
	17	.85	.19	.650	.520	13
27	13	.58	.18	.430	.380	
	14	.62	.16	.490	.390	
	15	.65	.27	.390	.460	
	16	.73	.26	.490	.495	
	17	.77	.25	.520	.510	15

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
28	13	.89	.13	.740	.510	
	14	.90	.16	.720	.530	
	15	.95	.17	.780	.560	
	16	.96	.20	.770	.580	
	17	.97	.23	.780	.600	6
29	13	.71	.23	.480	.470	
	14	.66	.20	.470	.430	
	15	.75	.27	.480	.510	
	16	.83	.16	.660	.495	
	17	.82	.16	.650	.470	Rejected
30	13	.82	.20	.610	.510	
	14	.85	.19	.650	.520	
	15	.91	.19	.715	.550	
	16	.92	.22	.700	.570	
	17	.94	.24	.720	.590	7
31	13	.52	.21	.340	.365	
	14	.59	.18	.440	.385	
	15	.74	.16	.580	.450	
	16	.75	.23	.520	.490	
	17	.85	.19	.650	.520	16

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
32	13	.52	.23	.315	.375	
	14	.44	.20	.270	.320	
	15	.49	.19	.335	.340	
	16	.51	.15	.410	.330	
	17	.41	.16	.305	.285	Rejected
33	13	.81	.37	.460	.590	
	14	.84	.19	.640	.515	
	15	.84	.27	.575	.555	
	16	.82	.25	.570	.535	
	17	.85	.26	.590	.555	Rejected
34	13	.54	.16	.420	.350	
	14	.60	.15	.485	.375	
	15	.69	.14	.565	.415	
	16	.70	.15	.560	.425	
	17	.78	.10	.680	.440	18
35	13	.53	.21	.350	.370	
	14	.41	.13	.350	.270	
	15	.58	.23	.370	.405	
	16	.55	.18	.400	.365	
	17	.60	.22	.400	.410	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
36	13	.42	.15	.325	.285	
	14	.45	.16	.340	.305	
	15	.50	.21	.320	.355	
	16	.64	.14	.530	.390	
	17	.65	.17	.500	.410	19
37	13	.39	.13	.335	.260	
	14	.50	.08	.520	.290	
	15	.49	.15	.395	.320	
	16	.55	.15	.445	.350	
	17	.62	.13	.525	.375	21
38	13	.39	.16	.290	.275	
	14	.44	.18	.300	.310	
	15	.48	.15	.385	.315	
	16	.59	.18	.440	.385	
	17	.58	.20	.400	.390	20
			Test 5	Reasoning		
1	13	.84	.37	.495	.605	
	14	.91	.33	.620	.620	
	15	.91	.34	.615	.625	
	16	.94	.41	.615	.675	
	17	.92	.50	.520	.710	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
2	13	.86	.28	.590	.570	
	14	.94	.29	.690	.615	
	15	.97	.35	.720	.660	
	16	.95	.41	.640	.680	
	17	.95	.42	.635	.685	4
3	13	.90	.27	.645	.585	
	14	.90	.42	.540	.660	
	15	.91	.49	.510	.700	
	16	.96	.46	.630	.710	
	17	.96	.48	.620	.720	3
4	13	.91	.45	.540	.680	
	14	.95	.50	.585	.725	
	15	.95	.57	.540	.760	
	16	.95	.61	.505	.780	
	17	.93	.66	.410	.795	1
5	13	.77	.20	.565	.485	
	14	.82	.22	.600	.520	
	15	.93	.24	.705	.585	
	16	.97	.24	.775	.605	
	17	.97	.32	.735	.645	9

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
6	13	.80	.20	.600	.500	
	14	.90	.25	.660	.575	
	15	.96	.28	.730	.620	
	16	.90	.31	.620	.605	
	17	.95	.37	.665	.660	Rejected
7	13	.92	.17	.740	.545	
	14	.90	.24	.670	.570	
	15	.97	.32	.735	.645	
	16	.95	.41	.640	.680	
	17	.99	.39	.775	.690	5
8	13	.78	.23	.550	.505	
	14	.86	.24	.620	.550	
	15	.95	.26	.725	.605	
	16	.95	.31	.695	.630	
	17	.91	.42	.560	.665	7
9	13	.82	.27	.550	.545	
	14	.82	.33	.500	.575	
	15	.91	.33	.620	.620	
	16	.86	.45	.440	.655	
	17	.89	.48	.480	.685	6

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
10	13	.82	.43	.420	.625	
	14	.98	.41	.725	.695	
	15	.95	.49	.590	.720	
	16	.91	.55	.460	.730	
	17	.96	.58	.560	.770	2
11	13	.95	.22	.745	.585	
	14	.92	.25	.685	.585	
	15	.99	.27	.820	.630	
	16	.98	.43	.715	.705	
	17	.96	.42	.660	.690	Rejected
12	13	.88	.22	.660	.550	
	14	.96	.27	.735	.615	
	15	.89	.27	.630	.580	
	16	.96	.39	.675	.675	
	17	.92	.37	.605	.645	Rejected
13	13	.78	.18	.600	.480	
	14	.87	.29	.590	.580	
	15	.91	.33	.620	.620	
	16	.88	.39	.530	.635	
	17	.92	.37	.605	.645	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
14	13	.81	.16	.640	.485	
	14	.92	.11	.780	.515	
	15	.98	.22	.800	.600	
	16	.99	.23	.830	.610	
	17	.93	.39	.610	.660	8
15	13	.72	.22	.500	.470	
	14	.73	.24	.490	.485	
	15	.75	.29	.460	.520	
	16	.77	.29	.480	.530	
	17	.94	.26	.710	.600	10
16	13	.61	.25	.370	.430	
	14	.65	.19	.475	.420	
	15	.64	.29	.360	.465	
	16	.65	.23	.430	.440	
	17	.62	.25	.380	.435	Rejected
17	13	.66	.12	.570	.390	
	14	.70	.16	.550	.430	
	15	.80	.18	.610	.490	
	16	.82	.23	.590	.525	
	17	.86	.30	.570	.580	11

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
18	13	.44	.12	.390	.280	
	14	.45	.13	.385	.290	
	15	.51	.16	.395	.335	
	16	.56	.16	.440	.360	
	17	.61	.15	.490	.380	14
19	13	.53	.16	.410	.345	
	14	.62	.10	.570	.360	
	15	.68	.15	.545	.415	
	16	.63	.22	.425	.425	
	17	.74	.27	.470	.505	12
20	13	.46	.15	.365	.305	
	14	.54	.20	.370	.370	
	15	.54	.23	.330	.385	
	16	.65	.17	.500	.410	
	17	.66	.22	.450	.440	13
21	13	.36	.14	.290	.250	
	14	.42	.13	.360	.275	
	15	.48	.15	.385	.315	
	16	.54	.17	.405	.355	
	17	.55	.20	.38	.375	15

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
22	13	.55	.15	.445	.350	
	14	.53	.24	.310	.385	
	15	.55	.16	.430	.355	
	16	.56	.13	.480	.345	
	17	.59	.18	.440	.385	Rejected
			Test 6 Inferences			
1	13	.87	.44	.480	.655	
	14	.88	.50	.450	.690	
	15	.90	.50	.480	.700	
	16	.90	.54	.450	.720	
	17	.90	.58	.410	.740	2
2	13	.92	.66	.380	.790	
	14	.96	.65	.500	.805	
	15	.97	.65	.540	.810	
	16	.91	.74	.280	.825	
	17	.97	.70	.505	.835	1
3	13	.76	.38	.390	.570	
	14	.78	.33	.460	.555	
	15	.85	.45	.445	.650	
	16	.76	.42	.360	.590	
	17	.78	.37	.425	.575	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
4	13	.88	.38	.540	.630	
	14	.84	.34	.520	.590	
	15	.88	.34	.570	.610	
	16	.88	.43	.500	.655	
	17	.88	.38	.540	.630	Rejected
5	13	.79	.29	.505	.540	
	14	.75	.37	.390	.560	
	15	.84	.32	.530	.580	
	16	.84	.36	.500	.600	
	17	.86	.43	.475	.645	4
6	13	.67	.27	.405	.470	
	14	.69	.27	.420	.480	
	15	.70	.28	.420	.490	
	16	.72	.31	.410	.515	
	17	.77	.30	.475	.535	9
7	13	.84	.32	.530	.580	
	14	.93	.25	.700	.590	
	15	.84	.36	.500	.600	
	16	.89	.34	.585	.615	
	17	.94	.37	.645	.655	3

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
8	13					
	14					
	15					Rejected (Misprint)
	16					
	17					
9	13	.76	.20	.560	.480	
	14	.74	.26	.480	.500	
	15	.78	.25	.530	.515	
	16	.79	.27	.520	.530	
	17	.96	.14	.810	.550	6
10	13	.50	.24	.280	.370	
	14	.56	.22	.360	.390	
	15	.67	.19	.490	.430	
	16	.66	.28	.390	.470	
	17	.71	.27	.440	.490	10
11	13	.78	.20	.570	.490	
	14	.72	.28	.440	.500	
	15	.82	.22	.600	.520	
	16	.80	.28	.520	.540	
	17	.80	.35	.465	.575	5

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
12	13	.74	.21	.530	.475	
	14	.73	.26	.470	.495	
	15	.78	.24	.540	.510	
	16	.81	.24	.570	.525	
	17	.89	.22	.670	.555	7
13	13	.68	.26	.420	.470	
	14	.77	.20	.565	.485	
	15	.80	.20	.600	.500	
	16	.81	.24	.570	.525	
	17	.84	.24	.600	.540	8
14	13	.42	.14	.340	.280	
	14	.35	.12	.310	.235	
	15	.40	.27	.145	.335	
	16	.42	.12	.380	.270	
	17	.40	.16	.300	.280	Rejected
15	13	.48	.18	.340	.330	
	14	.43	.14	.350	.285	
	15	.45	.11	.420	.280	
	16	.43	.18	.290	.315	
	17	.53	.12	.470	.325	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
16	13	.40	.15	.315	.275	
	14	.45	.11	.420	.280	
	15	.54	.22	.340	.380	
	16	.59	.21	.400	.400	
	17	.66	.20	.470	.430	11
17	13	.25	.09	.270	.170	
	14	.29	.17	.160	.230	
	15	.33	.14	.260	.235	
	16	.27	.19	.110	.230	
	17	.29	.09	.310	.190	Rejected
18	13	.67	.42	.260	.545	
	14	.67	.29	.385	.480	
	15	.69	.27	.420	.480	
	16	.69	.34	.360	.515	
	17	.69	.40	.300	.545	Rejected
			Test 7	Arithmetic Problems		
1	13	1.00	.99	-	.995	
	14	1.00	.97	-	.985	
	15	1.00	.98	-	.990	
	16	1.00	.95	-	.975	
	17	.99	.96	.230	.975	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
2	13	.96	.94	.080	.950	
	14	.99	.95	.265	.970	
	15	.98	.94	.190	.960	
	16	.99	.95	.265	.970	
	17	1.00	.95	-	.975	Rejected
3	13	1.00	.86	-	.930	
	14	1.00	.93	-	.965	
	15	.99	.95	.265	.970	
	16	.99	.96	.230	.975	
	17	1.00	.98	-	.990	Rejected
4	13	.95	.20	.755	.575	
	14	.94	.30	.680	.620	
	15	.97	.38	.705	.675	
	16	.97	.47	.660	.720	
	17	.97	.54	.620	.750	1
5	13	.86	.19	.660	.525	
	14	.92	.16	.750	.540	
	15	.81	.35	.475	.580	
	16	.89	.33	.590	.610	
	17	.94	.42	.610	.680	3

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
6	13	.79	.17	.610	.480	
	14	.89	.15	.720	.520	
	15	.90	.20	.700	.550	
	16	.91	.29	.645	.600	
	17	.92	.33	.635	.625	4
7	13	.89	.17	.705	.530	
	14	.90	.20	.700	.550	
	15	.92	.30	.650	.610	
	16	.93	.38	.620	.655	
	17	.92	.43	.570	.675	2
8	13	.73	.15	.585	.440	
	14	.74	.18	.560	.460	
	15	.75	.20	.550	.475	
	16	.76	.24	.520	.500	
	17	.93	.13	.780	.530	8
9	13	.81	.11	.690	.460	
	14	.86	.10	.740	.480	
	15	.84	.14	.680	.490	
	16	.76	.24	.520	.500	
	17	.90	.18	.710	.540	7

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
10	13	.82	.11	.700	.465	
	14	.90	.10	.770	.500	
	15	.87	.16	.690	.515	
	16	.94	.14	.780	.540	
	17	.96	.20	.770	.580	6
11	13	.77	.17	.600	.470	
	14	.81	.23	.580	.520	
	15	.85	.23	.615	.540	
	16	.87	.26	.615	.565	
	17	.91	.30	.640	.605	5
12	13	.72	.08	.660	.400	
	14	.76	.08	.690	.420	
	15	.85	.07	.765	.460	
	16	.86	.08	.760	.470	
	17	.90	.15	.730	.525	10
13	13	.67	.16	.525	.415	
	14	.84	.04	.840	.440	
	15	.83	.10	.715	.465	
	16	.88	.11	.745	.495	
	17	.91	.15	.740	.530	9

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
14	13	.74	.02	.790	.380	
	14	.80	.01	.840	.405	
	15	.85	.03	.820	.440	
	16	.85	.05	.790	.450	
	17	.95	.06	.850	.505	11
15	13	.69	.03	.740	.360	
	14	.71	.06	.69	.385	
	15	.78	.07	.715	.425	
	16	.82	.06	.760	.440	
	17	.86	.06	.780	.460	12
16	13	.58	.03	.690	.305	
	14	.69	.01	.805	.350	
	15	.75	.06	.715	.405	
	16	.78	.06	.730	.420	
	17	.82	.10	.710	.460	13
17	13	.51	.03	.650	.270	
	14	.56	.02	.710	.290	
	15	.62	.02	.730	.320	
	16	.74	.04	.740	.390	
	17	.78	.03	.780	.405	15

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
18	13	.51	.03	.650	.270	
	14	.49	.07	.535	.280	
	15	.50	.12	.450	.310	
	16	.59	.09	.570	.340	
	17	.68	.10	.610	.390	16
19	13	.51	.05	.590	.280	
	14	.59	.03	.695	.310	
	15	.69	.07	.660	.380	
	16	.72	.09	.650	.405	
	17	.82	.08	.730	.450	14
20	13	.48	.02	.670	.250	
	14	.53	.01	.735	.270	
	15	.53	.08	.540	.305	
	16	.63	.01	.780	.320	
	17	.66	.05	.680	.355	17
21	13	.20	.00	.530	.100	
	14	.47	.03	.630	.250	
	15	.57	.03	.680	.300	
	16	.53	.01	.735	.270	
	17	.61	.00	.775	.305	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
22	13	.48	.02	.670	.250	
	14	.51	.03	.650	.270	
	15	.55	.03	.670	.290	
	16	.52	.10	.500	.310	
	17	.57	.09	.550	.330	18
23	13	.13	.00	.445	.065	
	14	.18	.02	.430	.100	
	15	.30	.08	.350	.190	
	16	.29	.03	.495	.160	
	17	.26	.00	.590	.130	Rejected
			Test 8 Number Series			
1	13	.96	.74	.420	.850	
	14	.99	.64	.660	.815	
	15	.96	.75	.410	.855	
	16	.99	.74	.590	.865	
	17	.96	.72	.440	.840	Rejected
2	13	.97	.60	.580	.785	
	14	.99	.61	.675	.800	
	15	.99	.63	.665	.810	
	16	.98	.70	.550	.840	
	17	.98	.74	.510	.860	1

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
3	13	.97	.33	.730	.650	
	14	.96	.43	.650	.680	
	15	.98	.44	.710	.710	
	16	.98	.48	.690	.730	
	17	.99	.56	.700	.775	2
4	13	.91	.28	.650	.595	
	14	.95	.35	.675	.650	
	15	.97	.39	.700	.680	
	16	.95	.46	.610	.705	
	17	.96	.54	.580	.750	3
5	13	.98	.16	.830	.570	
	14	.97	.20	.790	.585	
	15	.95	.35	.675	.650	
	16	.98	.37	.735	.675	
	17	.97	.43	.680	.700	4
6	13	.90	.06	.810	.480	
	14	.96	.08	.840	.520	
	15	.95	.11	.815	.530	
	16	.97	.15	.820	.560	
	17	.93	.34	.645	.635	7

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
7	13	.89	.13	.740	.510	
	14	.99	.12	.870	.555	
	15	.97	.16	.815	.565	
	16	.99	.24	.830	.615	
	17	.99	.29	.815	.640	5
8	13	.90	.12	.760	.510	
	14	.96	.12	.820	.540	
	15	.96	.14	.810	.550	
	16	.91	.22	.690	.565	
	17	.94	.35	.655	.645	6
9	13	.86	.04	.810	.450	
	14	.89	.04	.825	.465	
	15	.91	.08	.800	.495	
	16	.92	.13	.765	.525	
	17	.94	.26	.710	.600	8
10	13	.56	.04	.640	.300	
	14	.66	.06	.660	.360	
	15	.70	.06	.680	.380	
	16	.75	.07	.700	.410	
	17	.76	.12	.640	.440	13

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
11	13	.72	.08	.660	.400	
	14	.78	.09	.690	.435	
	15	.80	.13	.660	.465	
	16	.84	.12	.700	.480	
	17	.90	.18	.710	.540	9
12	13	.65	.06	.655	.355	
	14	.72	.12	.610	.420	
	15	.79	.09	.700	.440	
	16	.84	.10	.720	.470	
	17	.89	.14	.730	.515	10
13	13	.58	.06	.610	.320	
	14	.65	.08	.620	.365	
	15	.73	.09	.660	.410	
	16	.75	.09	.670	.420	
	17	.82	.10	.710	.460	12
14	13	.41	.03	.590	.220	
	14	.66	.02	.750	.340	
	15	.56	.03	.675	.295	
	16	.52	.00	.730	.260	
	17	.58	.00	.760	.290	Rejected

(continued on next page)

Table 15. (continued)

1	2	3	4	5	6	7
15	13	.46	.04	.580	.250	
	14	.48	.06	.550	.270	
	15	.54	.07	.570	.305	
	16	.56	.08	.560	.320	
	17	.58	.12	.510	.350	16
16	13	.28	.00	.610	.140	
	14	.50	.08	.520	.290	
	15	.53	.04	.625	.285	
	16	.50	.04	.610	.270	
	17	.50	.03	.645	.265	Rejected
17	13	.52	.05	.595	.285	
	14	.57	.07	.590	.320	
	15	.64	.07	.630	.355	
	16	.68	.09	.625	.385	
	17	.72	.09	.650	.405	14
18	13	.37	.00	.665	.185	
	14	.69	.04	.715	.365	
	15	.64	.02	.740	.330	
	16	.59	.00	.765	.295	
	17	.55	.00	.745	.275	Rejected

(continued on next page)

Table 15. (concluded)

1	2	3	4	5	6	7
19	13	.68	.03	.735	.355	
	14	.76	.07	.705	.415	
	15	.75	.09	.670	.420	
	16	.80	.09	.710	.445	
	17	.88	.10	.760	.490	11
20	13	.19	.00	.520	.095	
	14	.32	.00	.630	.160	
	15	.49	.00	.720	.245	
	16	.52	.00	.730	.260	
	17	.43	.00	-	.215	Rejected
21	13	.49	.03	.640	.260	
	14	.58	.04	.660	.310	
	15	.62	.06	.640	.340	
	16	.69	.06	.675	.375	
	17	.70	.08	.650	.390	15
22	13	.46	.04	.580	.250	
	14	.47	.06	.540	.265	
	15	.50	.06	.560	.280	
	16	.54	.06	.590	.300	
	17	.52	.10	.500	.310	17

Selection of Items.

1. All items whose internal consistancy indices were less than .25 for any age group were rejected
2. All items whose difficulty values were not gradually increasing from one age group to its consequtive age group were rejected
3. Only valid items have been included in the final form
4. Garrett says, "In general, any item with a biserial r of .20 or more can be taken to be valid if the test is fairly long."[1/] To be on safer side, all items whose biserial r is less than .25 for any age group have been discarded.
5. The items are to be arranged according to the descending order of their difficulty values. The difficulty value of any item should be less than that of the age group immediately following the first. So the items whose difficulty values were not gradually increasing according to the ascending order of the age groups were discarded
6. The items with difficulty value .50 are the best items. However it is difficult to get all items of that value. It may be above .90 or below .10 if the test is to have a good prediction value, a range of difficulty value of the items will have to be maintained.

1/Garrett H.E., Testing for Teachers. Eurasia Publishing House(P) Ltd., New Delhi. 1959, pp. 215-216.

Garrett suggests the distribution as given below:-

Difficulty value D	Percentage
.25 and less	25 %
.26 - .75	50 %
.76 and more	25 %

The distribution suggested by Summer is given below:-

Items of difficulty Range 0 -40	20 %
Items of difficulty Range 41-60	60 %
Items of difficulty Range 61-100	20 %

The difficulty values of each item varies according to the age groups. So the items are arranged according to the median age group of 15 years. The selection of items to maintain the range of difficulty is also done according to its difficulty values of the items of the age group 15.

Table 16. The Distribution of Items in this Test (Final Form) According to Difficulty Values (Age group 15 years)

Test	Difficulty value			Total
	0-40	41-60	61-100	
Synonyms	6	15	3	24
Antonyms	3	16	5	24
Analogy	3	13	5	21

(concluded on next page)

Table 16. (concluded)

Test	Difficulty value			Total
	0-40	41-60	61-100	
Classification	5	16	3	24
Reasoning	3	5	7	15
Inferences	1	8	2	11
Arithmetic Problems	5	11	2	18
Number Series	5	8	4	17
Total	31	92	31	154
Percentage	20.13	59.74	20.13	100

The selection of the item is done to maintain the distribution of difficulty values in the test as suggested by Summer. The table above shows that the distribution of difficulty values in the final form of the test, fully agrees with Summer's suggestion.

Order of the Tests:

In the pilot test, the serial number of the test on classification was 3 and that of the analogy was 4. The reaction of the pupils was that test of classification was more difficult than the test of Analogies. The inspection of the performances on these tests by the pupils in the high and low group also indicates the same trend. So the orders of these tests have been interchanged in the final form. To avoid the confusion, in all the tables the names of the tests have been quoted.

Order of the Items.

The selected items were arranged in the descending order of the difficulty values of age group 15 years.

Table 17. Difficulty Values of Items for Each Age Group.

Item No.	Age Group				
	13 Years	14 Years	15 Years	16 Years	17 Years
1	2	3	4	5	6
		Test 1 Synonyms			
1	.675	.695	.740	.765	.775
2	.595	.625	.640	.665	.695
3	.545	.580	.630	.655	.670
4	.540	.570	.595	.640	.655
5	.540	.575	.580	.595	.645
6	.485	.550	.565	.595	.625
7	.480	.520	.560	.600	.610
8	.470	.505	.555	.590	.605
9	.465	.490	.545	.570	.600
10	.435	.485	.540	.575	.600
11	.435	.475	.535	.570	.590
12	.430	.470	.530	.545	.580
13	.425	.465	.505	.530	.560
14	.425	.445	.480	.515	.550

(continued on next page)

Table 17. (continued)

1	2	3	4	5	6
15	.405	.440	.470	.510	.550
16	.380	.425	.465	.500	.530
17	.375	.415	.445	.485	.505
18	.335	.375	.435	.490	.505
19	.300	.355	.400	.470	.480
20	.310	.345	.390	.415	.460
21	.305	.335	.345	.410	.450
22	.300	.320	.330	.380	.425
23	.290	.305	.320	.370	.390
24	.265	.280	.300	.350	.370
		Test 2 Antonyms			
1	.710	.715	.750	.765	.805
2	.695	.700	.715	.770	.795
3	.550	.615	.655	.685	.695
4	.550	.570	.635	.685	.690
5	.540	.565	.610	.640	.645
6	.525	.555	.595	.600	.615
7	.505	.545	.590	.600	.605
8	.500	.545	.580	.595	.600
9.	.495	.565	.575	.585	.595
10	.490	.540	.570	.570	.590

(continued on next page)

Table 17. (continued)

1	2	3	4	5	6
11	.445	.540	.565	.575	.585
12	.440	.540	.560	.570	.580
13	.445	.535	.555	.570	.575
14	.440	.530	.550	.560	.570
15	.430	.520	.545	.565	.575
16	.430	.510	.540	.555	.565
17	.420	.500	.520	.550	.565
18	.420	.500	.510	.520	.530
19	.410	.435	.470	.490	.540
20	.415	.430	.465	.480	.495
21	.400	.410	.430	.440	.505
22	.315	.365	.390	.440	.445
23	.360	.370	.385	.415	.440
24	.350	.360	.375	.395	.415
		Test 3 Analogy			
1	.695	.725	.790	.795	.810
2	.675	.705	.720	.740	.795
3	.645	.655	.675	.720	.750
4	.585	.620	.660	.680	.720
5	.570	.585	.605	.625	.640
6	.510	.530	.560	.580	.600

(continued on next page)

Table 17. (continued)

1	2	3	4	5	6
7	.510	.520	.550	.570	.590
8	.495	.505	.540	.575	.580
9	.470	.500	.535	.560	.570
10	.470	.500	.510	.555	.575
11	.480	.500	.505	.550	.570
12	.440	.470	.480	.515	.530
13	.425	.475	.480	.500	.520
14	.390	.400	.470	.500	.520
15	.380	.390	.460	.495	.510
16	.365	.385	.450	.490	.520
17	.360	.380	.420	.445	.460
18	.350	.375	.415	.425	.440
19	.285	.305	.355	.390	.410
20	.275	.310	.315	.385	.390
21	.260	.290	.320	.350	.375
		Test 4	Classification		
1	.620	.640	.660	.670	.725
2	.540	.570	.630	.645	.665
3	.535	.575	.615	.630	.660
4	.530	.575	.600	.625	.670
5	.535	.560	.570	.625	.655
6	.530	.540	.555	.590	.600

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Table 17. (continued)

1	2	3	4	5	6
7	.510	.535	.545	.580	.660
8	.455	.470	.515	.540	.560
9	.420	.475	.510	.515	.540
10	.415	.460	.490	.520	.535
11	.400	.450	.485	.510	.530
12	.395	.440	.480	.505	.520
13	.395	.430	.475	.490	.500
14	.390	.420	.465	.480	.485
15	.380	.420	.450	.465	.480
16	.385	.410	.440	.455	.465
17	.350	.380	.420	.425	.450
18	.360	.385	.415	.420	.435
19	.300	.370	.410	.425	.430
20	.290	.365	.385	.410	.415
21	.285	.325	.335	.350	.400
22	.250	.280	.310	.360	.400
23	.255	.270	.300	.320	.345
24	.250	.265	.290	.310	.335
		Test 5 Reasoning			
1	.680	.725	.760	.780	.795
2	.625	.695	.720	.730	.770

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Table 17. (continued)

1	2	3	4	5	6
3	.585	.660	.700	.710	.720
4	.570	.615	.660	.680	.685
5	.545	.570	.645	.680	.690
6	.545	.575	.620	.655	.685
7	.505	.550	.605	.630	.665
8	.485	.515	.600	.610	.660
9	.485	.520	.585	.605	.645
10	.470	.485	.520	.530	.600
11	.390	.430	.490	.525	.580
12	.345	.360	.415	.425	.505
13	.305	.370	.385	.410	.440
14	.280	.290	.335	.360	.380
15	.250	.275	.315	.355	.375
		Test 6 Inferences			
1	.790	.805	.810	.825	.835
2	.655	.690	.700	.720	.740
3	.580	.590	.600	.615	.655
4	.540	.560	.580	.600	.645
5	.490	.500	.520	.540	.575
6	.480	.500	.515	.530	.550
7	.475	.495	.510	.525	.555

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Table 17. (continued)

1	2	3	4	5	6
8	.470	.485	.500	.525	.540
9	.470	.480	.490	.515	.535
10	.370	.390	.430	.470	.490
11	.275	.280	.380	.400	.430
		Test 7 Arithmetic Problems			
1	.575	.620	.675	.720	.750
2	.530	.550	.610	.655	.675
3	.525	.540	.580	.610	.680
4	.480	.520	.550	.600	.625
5	.470	.520	.540	.565	.605
6	.465	.500	.515	.540	.580
7	.460	.480	.490	.500	.540
8	.440	.460	.475	.500	.530
9	.415	.440	.465	.495	.530
10	.400	.420	.460	.470	.525
11	.380	.405	.440	.450	.505
12	.360	.385	.425	.440	.460
13	.305	.350	.405	.420	.460
14	.280	.310	.380	.405	.450
15	.270	.290	.320	.390	.405
16	.270	.280	.310	.340	.390

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Table 17. (concluded)

1	2	3	4	5	6
17	.250	.270	.305	.320	.355
18	.250	.270	.290	.310	.330
		Test 8	Number Series		
1	.785	.800	.810	.840	.860
2	.650	.680	.710	.730	.775
3	.595	.650	.680	.705	.750
4	.570	.585	.650	.675	.700
5	.510	.555	.565	.615	.640
6	.510	.540	.550	.565	.645
7	.480	.520	.530	.560	.635
8	.450	.465	.495	.525	.600
9	.400	.435	.465	.480	.540
10	.355	.420	.440	.470	.515
11	.355	.415	.420	.445	.490
12	.320	.365	.410	.420	.460
13	.300	.360	.380	.410	.440
14	.285	.320	.355	.385	.405
15	.260	.310	.340	.375	.390
16	.250	.270	.305	.320	.350
17	.250	.265	.280	.300	.310

From the above table it can be seen that as the age increases

the difficulty value of each item gradually increases. The key of answers was revised in the light of the revision of the test based on the results of item analysis.

Printing the Test.

To provide answers to the practice examples, scored Marathi types were not available. So the modification in the instructions was made in respect of the way of recording the answers. Instead of scoring the alphabet, denoting the alternative selected, they are asked to underline it.

In the new answersheet the answers of the practice items are given on the last page of the answer sheets.

In the light of the past experience, the test is now to be given in two sittings. Thus in the new form it has been divided into two parts each consisting of 4 tests.

3000 copies of the battery in the form of two booklets and 15000 copies of the answer sheets were printed for the final tryout.

Fixation of Time.

According to the way in which the test is timed, the tests can be classified as speed tests and power tests.

"A speed test is often defined as one in which no examinee has time to attempt all items. A power test is often defined as one in which every examinee has a chance to attempt every item".[1/]

In speed tests the individual difference is measured in terms

1/Guilford J.P., Op.cit. pp 368.

of speed of performance. The items used are uniform and low in their difficulty level and all are within the reach of the examinee. The power test consists of items which have difficulty levels steeply graded and some of them being too difficult. The timing is so long that it permits every one to attempt all items. Both the types take care that no one will get the perfect score. Such a distinction between the tests is one of degree. No test is purely a speed test nor a power test.

In the present test the items included have the difficulty values ranging from .86 to .25 and hence may be safely called as a power test. Thus enough time is to be fixed, so that all will have the opportunity to attempt all items. However, for practical considerations it cannot be unlimited. One has to make the most efficient use of the time available. "Accordingly, test authors usually set the time limits so that between 80 to 90 percent of the pupils can consider or attempt all of the items....".

The second consideration while fixing the time is whether the battery is to be timed as a whole or each of the constituent tests should be timed separately. Second alternate is preferred by many test constructors so that the examinee will not linger on any one of the tests, at the cost of the performances on the other tests. However it involves many technicalities in administering the test. As the teachers and pupils are new to such type of work in this area it was first decided to time the test as a whole. But the experience during pilot tryout was that the pupils get

fatigued after test 6. So the battery has been split into two parts and each part has been timed separately.

Each part was administered to 1000 pupils from eight secondary schools. The agewise classification of the pupils is given below:-

Table 18. Agewise classification of pupils tested for fixation of time.

Age	13	14	15	16	17	Total
Number Tested	202	238	254	164	142	1,000

The pupils were asked to do the test as fast as they could. When they completed the first part, they were asked to stand up. One of the four supervisors who as supervising that particular group of ten pupils was moving to the pupil and recording the time taken by him. When all the pupils completed the first part, the second part was administered after an interval of 15 minutes of rest.

Table 19. The time taken by the pupils for completing the test.

Time in	Number of pupils(f) completing the test in that time			
	Part I		Part II	
	f	cum. f	f	cum. f
1	2	3	4	5
45 & above	-	1000	10	1000
44	-	1000	3	990

(continued on next page)

Table 19. (continued)

1	2	3	4	5
43	8	1000	8	987
42	4	992	4	979
41	8	988	12	975
40	17	980	15	963
39	13	963	25	948
38	14	950	26	923
37	16	936	44	897
36	18	920	45	853
35	51	902	53	808
34	39	851	73	755
33	35	812	51	682
32	47	777	65	631
31	53	730	35	566
30	52	677	53	531
29	67	625	58	478
28	55	558	67	420
27	44	503	49	353
26	58	459	41	304
25	62	401	57	263
24	59	339	39	206
23	50	280	34	167

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Table 19. (concluded)

1	2	3	4	5
22	34	230	37	133
21	41	196	23	96
20	34	155	21	73
19	32	121	22	42
18	35	89	7	20
17	26	54	6	13
16	10	28	3	7
15	18	18	4	4

Slightly more than 90 % of pupils i.e. 902, have completed the first part of the test in 35 minutes and 923 pupils have completed the second part of the test in 38 minutes. So the time limit fixed for the first part is 35 minutes and for the second part is 38 minutes.

Now the test is ready for the final tryout.

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