

**COGNITIVE STYLE AND SELECTED NON-COGNITIVE
VARIABLES IN RELATION TO ACHIEVEMENT IN
MATHEMATICS OF PUPILS OF STANDARD X**

ANCEL MARIA

**THESIS
SUBMITTED FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN EDUCATION**

**DEPARTMENT OF EDUCATION
UNIVERSITY OF CALICUT
1998**

DECLARATION

I, **Ancel Maria**, hereby declare that the thesis entitled "**Cognitive style and selected non-cognitive variables in relation to Achievement in Mathematics of pupils of standard X**" is a bonafide piece of research work carried out by me under the supervision and guidance of **Dr. Santhamma Raju**, Professor, Department of Education, University of Calicut and that no part there of has been presented earlier for the award of any Degree, Diploma, Title or Recognition.

Calicut University Campus

16 -11-1998




Ancel Maria

Dr. Santhamma Raju
Professor
Department of Education
University of Calicut.

CERTIFICATE

I, Dr. Santhamma Raju, do hereby certify that this thesis
**“COGNITIVE STYLE AND SELECTED NON-COGNITIVE VARIABLES IN
RELATION TO ACHIEVEMENT IN MATHEMATICS OF PUPILS OF
STANDARD X”** is a record of bonafide study and research carried out by
Ancel Maria, under my supervision and guidance.

Calicut University Campus
16-11-1998.


Dr. Santhamma Raju
(Supervising Teacher)

ACKNOWLEDGEMENT

The investigator hereby acknowledge deep gratitude and indebtedness to her supervising teacher, **Dr. Santhamma Raju, Professor, Department of Education, University of Calicut** for her constant encouragement, inspiring guidance and generous help in completing the present study.

The investigator would like to express her deep gratitude to **Dr. P. Kelu**, Professor and Head of the Department of Education, University of Calicut for providing all necessary facilities and encouragement.

The investigator is highly thankful to all Headmasters/ Headmistresses, teachers and students of the selected High Schools for the co-operation extended by them in administering the tests and in collecting the data for the study.

Calicut University Campus

16 - 11-1998.


Ancel Maria

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER		PAGE
I	<i>INTRODUCTION</i>	1 – 15
II	<i>REVIEW OF RELATED LITERATURE</i>	16 – 56
III	<i>METHODOLOGY</i>	57 – 110
IV	<i>ANALYSIS AND INTERPRETATIONS</i>	111 – 180
V	<i>SUMMARY OF PROCEDURE, CONCLUSIONS AND SUGGESTIONS</i>	181 – 200

BIBLIOGRAPHY

APPENDICES

LIST OF TABLES

Table No.	Description of tables	Page
1	Details of categories of cognitive style.	19
2	Details of the tools used for data collection.	61
3	Statement showing the weightages to objectives in Achievement test in Mathematics.	63
4	Statement showing the weightages to content in Achievement test in Mathematics.	64
5	Statement showing the weightages to difficulty level in Achievement test in Mathematics	65
6	Blue Print of the Achievement test in Mathematics for Standard X	66
7	Data and results of item analysis of the achievement test in Mathematics for Standard X	68
8	Details of item analysis of the scale of Attitude towards Mathematics	83
9	Details of item analysis of Class room Environment Inventory for Mathematics	87
10	Details of item analysis of Home Environment Inventory for Mathematics	91
11	Details of item analysis of Home practice Inventory for Mathematics.	94
12	Psychometric details of the tools used	97
13	Inter correlation between the measures of the tools constructed	98
14	Break up of the final sample	102

15	Break up of cognitive style for the final sample	103
16	Details of school wise distribution of the sample	104
17	Model of the results of step wise Regression Analysis	110
18	Summary of the statistical constants of Achievement in Mathematics for the total sample	112
19	Details of percentile and percentile points of scores of achievement in Mathematics.	115
20	Summary of the statistical constants of the scores of the selected independent variable	116
21	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of total sample.	127
22	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of Boys.	130
23	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of girls.	133
24	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of urban sample.	136
25	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of Rural sample.	139
26	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of urban boys.	143
27	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of urban girls.	146

28	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of Rural boys.	148
29	Details of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of Rural girls.	150
30	Summary of correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of the whole sample and relevant sub samples	153
31	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with cognitive style)	155
32	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with FD cognitive style)	156
33	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with INT cognitive style)	157
34	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with FI cognitive style)	159
35	Summary of the result of test of significance of difference between 'r's for the relevant sub samples ('r's of achievement in Mathematics with FD/INT/FI cognitive styles)	160
36	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with level of aspiration)	161

37	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with attitude towards Mathematics)	163
38	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with classroom environment)	165
39	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with home environment)	167
40	Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with home practice)	169
41	Summary of the test of significance of difference between 'r's for relevant sub samples('r' of achievement in Mathematics with cognitive style and selected non-cognitive variables)	171
42	Mean and standard deviations of 'achievement in Mathematics' (criterion variable) and 'cognitive style & selected non-cognitive variables' (predictor variables)	174
43	Correlation matrix of cognitive style and selected non-cognitive variables for the whole sample(N=740)	175
44	Result of step I Analysis	176
45	Result of step II Analysis	178
46	Increment in percentage variation after step II Analysis	179
47	Details regarding increase in correlation and percentage variation	179

LIST OF FIGURES

FIGURE		PAGE
1	Smoothened frequency curve of the distribution of scores on Achievement in Mathematics	114
2	Smoothened frequency curve of the distribution of scores on Attitude towards Mathematics	118
3	Smoothened frequency curve of the distribution of scores on Class room environment for Mathematics	120
4	Smoothened frequency curve of the distribution of scores on Home environment for Mathematics.	122
5	Smoothened frequency curve of the distribution of scores on Home practice for Mathematics.	124

LIST OF APPENDICES

Appendix

- I. Achievement test in Mathematics for Standard X- Draft.
- II. Achievement test in Mathematics for Standard X -Draft (English version)
- III. The Response sheet for the draft test in Mathematics.
- IV. The Scoring Key for the draft test in Mathematics.
- V. Achievement test in Mathematics for standard X - final test.
- VI. Achievement test in Mathematics for standard X -final test (English version)
- VII. The Response sheet for the final test in Mathematics
- VIII. The Scoring Key for the final test in Mathematics.
- IX. Scale of Attitude towards Mathematics – Draft
- X. Scale of Attitude towards Mathematics – Final form.
- XI. Scale of Attitude towards Mathematics – Final form (English version)
- XII. The Response sheet for the scale of Attitude towards Mathematics
- XIII. Class room Environment Inventory for Mathematics- Draft
- XIV. Class room Environment Inventory for Mathematics – Final form
- XV. Class room Environment Inventory for Mathematics – Final form (English version)

- XVI. Response sheet for Class room Environment Inventory
- XVII. Home Environment Inventory for Mathematics –Draft
- XVIII. Home Environment Inventory for Mathematics- final form
- XIX. Home Environment Inventory for Mathematics – final form (English version)
- XX. Response sheet for Home Environment Inventory for Mathematics
- XXI. Home Practice Inventory for Mathematics (Draft)
- XXII. Home Practice Inventory for Mathematics – final form
- XXIII. Home Practice Inventory for Mathematics – final form (English version)
- XXIV. Response sheet for Home Practice Inventory for Mathematics

CHAPTER I

INTRODUCTION

Need and significance
Statement of the problem
Definition of the terms
Objectives
Hypotheses
Methodology
Scope and limitations
Organisation of the report

INTRODUCTION

Man has always been concerned with overall and complete development of all his fellow men. Through the process of education he has been aiming at the optimum realization and fullest development of individual potentialities. From the earliest records of history we know that man has been pooling and investigating all the various kinds of resources at its command to educate his child in the best possible way so that he may develop as a well educated person and as a responsible citizen. In spite of the available efforts and educational inputs to the teaching-learning situation, we find that children are unable to show educational performance up to the level that is expected of their age and grade in the school.

Each year educationalists, politicians and social activists expound on the problems of present education. The world is becoming more and more competitive and the quality of performance has become the key factor for personal progress. India is now facing challenges from the continuing revolution in the field of science and technology and many other problems relating to the quality and security of life. The National Policy of Education (1986) has envisaged many changes to provide contemporary relevance and futuristic outlook to prepare the students for the twenty first century. Education enables the individuals to acquire knowledge, skills and values that can help to build a dynamic, vibrant and cohesive nation capable of providing its people with better and more purposeful life (Mohanty, Jaganath, 1988).

Mathematics is the subject which indisputedly forms the very basis of entire world's scientific, technological and commercial system. Mathematics has not only been useful in its own right, but also in the development of other fields of Knowledge. There is no science, no art and no profession where

Mathematics does not hold a key position. According to Young (1961) if Mathematics is removed the whole material civilisation would inevitably collapse.

In October of 1957 when the Soviets launched “Sputnik”, the first space capsule, the reaction of many American educators, especially those in the field of Science and Mathematics was one of dismay. The general conclusion was that Russians were able to be the “first in space” because of the superiority of their educational system. American method of instruction especially of mathematical skills, which are basic to all aspects of technology and research was pointed to as very below standard. The difficulty with mathematics instruction, the reasoning went, was due to the traditional mathematics curriculum in the elementary schools which was a hodgepodge of concepts and skills that gave students no real understanding of the logic of quantity and served as a very poor foundation of Algebra and higher mathematics. In short, Mathematics is the corner-stone of modern scientific and technological development and mathematical methods and mathematical style of thinking and problem solving are penetrating every walk of life. Moreover, Mathematics is a man-made science. The new approaches to mathematical concepts, principles, facts and ideas are emerged according to the need of the situation.

This points out that utmost care should be given to impart up to date learning to such an indispensable subject as Mathematics, which calls for substantive school renewal and redesign from the inside out and policy formation at national, community and school levels. It also looks for transformational change in learning, that is curricular reconceptualisation that goes beyond the cognitive and into meta cognitive realm, in which the uses, applications and creative transfer of learning become the most significant outcomes. So, what is necessary today is, to bring about the optimal

development of the whole individual by way of quality education. A sound mathematics education can have a profound effect upon the development of rationality and which, in turn, may influence the total development of the learner to proceed much farther.

Therefore, within the system as it exists today, the learning of mathematics can gear to satisfy the needs and hopes of the present generation only if the educators and researchers find out the various factors influencing the overall performance of the children particularly, in the scholastic achievement of the subject.

NEED AND SIGNIFICANCE

The period of secondary education is the actual take off age in one's life. By imparting primary and elementary education, we will perform our constitutional duty but it is not adequate to prepare or equip the child to face the realities of life and meet newer challenges. Rao, the then Prime minister of India, in one of the seminars of NCERT (1991) emphasised the burning need of a transformation in the secondary education system prevailing in India. According to him the base of the educational pyramid comprising primary education has been made strong and at present there is need to strengthen the secondary education which is the back bone of real education so that it leads to excellence in higher education. The importance of scholastic or academic achievement has raised several important questions for educational researchers. What factors promote achievement in students? How far do those different factors contribute towards academic achievement?. Researchers have come out with varied results, at times complementing each other but at other times, contradicting each other. A complete and comprehensive picture of academic achievement still seems to be eluding the researchers. Educational researchers

all over the world are still seeking a break through in elucidating this phenomenon.

Mathematics is known to be one of the important subjects in secondary school curriculum since the skills used in the learning of the subject are known to have a carry over value for learning other subjects. At the same time Mathematics is considered as one of the most tough subjects by most of the school students of Kerala. A good number of teachers also accept it to as a difficult subject. The complexity has further increased due to the fact that Mathematics curriculum has been up-dated a number of times in the recent past to include new content areas and new organisational principles. Many teachers find it difficult to catch up with the new content areas included from time to time. Also vast majority of them consider it difficult to improve the performance of pupils in Mathematics. Moreover, as Kunnunkal & Others (1992), reported, the educational system in our country has, by and large shown resistance to the adoption of innovations and the teachers who understand the importance of such innovations are few.

Various committees and commissions have taken measures to improve the instructional efficiency of Mathematics in Kerala. But in actual class room practice, the curriculum place a premium on bookish knowledge and rote learning. The development of useful skills and the inculcation of the right kind of interests, attitudes and values are not given sufficient emphasis. Moreover, it is completely examination centered and does not cater for individual differences. Another drawback is that, it does not provide a strategic plan for tracking students' transfer of learning.

The statistics relating to the Secondary School Leaving Certificate (SSLC) examinations show that the failure rate in Mathematics is one of the highest in comparison to other subjects. The average marks of students in the

state for Mathematics during the years 1996 to 1998 are 33 percent, 34 percent & 30 percent respectively which is below the percentage of marks fixed for a pass in the subject. This indicates that proper instructional strategies are not followed for the teaching of the subject and so special attention should be underlined for its teaching and learning.

Questions have been asked as to who really is responsible for the poor educational programme. People usually find fault with wrong government policies, incompetency of the teachers, lack of learning facilities in the school, absence of proper care at home etc. The investigator is of the opinion that each party mentioned above has a part to play. A great deal of recent attention has been focused on providing adequate training to the teachers, parents and others concerned with the learning process, to help the pupils to modify their learning by inculcating in them good attitudes and also by providing a better environment in the school and at home. Kilpatrick (1976) is of the opinion that all individuals are capable of obtaining secondary school education, capable of mastering the school material within the limits of curriculum; and the teacher should see to it that all pupils do so.

The educational achievement of children begins from the home itself. The members of the family can set a better background for learning Mathematics at home. There is no denying the fact that the education does not commence with the alphabet; it begins with a mother's look, with a father's nod of approbation or a sign of reproof, with a sister's gentle pressure of the hand or a brother's noble act of forbearance. Home factors such as parental involvement and participation of members of the family in the learning process, the care and considerations received at home by children, the practices and habits they acquire at home etc. play the key role in their achievement.

In the past cognitive variables were supposed to be the decisive factors in learning and even among these factors, main thrust was on intelligence. However, information processing skills, which were inherent among the individual students were rarely considered. Cairns (1931) considers that mathematical ability is a separate ability running through all the branches of the subject and closely connected with other mental ability. In our school, most of the pupils who are backward in Mathematics are either normal or sometimes superior in other subjects. Hence if educational programmes are to be effective, it is essential that the students learning styles are matched to instructional elements.

A wide range of educational application of cognitive style and achievement have stemmed from a number of investigations. There are a number of studies of cognitive style and academic achievement which yielded in conclusive results (Ritchey, Lashier, 1981; Lamka, 1983; Ballard, 1985; Verma and Quadr, 1992). There are studies which substantiated the existence of sex difference in cognitive style with regard to school achievement (O' Brien, 1991) and at the same time, point out the similarity of both the sex groups in school achievement (Lamka, 1983; Brennan, 1984). Despite the fact that the research has been carried on about the relationship of cognitive style and achievement, in India and abroad, empirical data have not been sufficient enough to establish the relationship of the variable (Verma, Quadr, 1992).

The factors affecting scholastic achievement have been classified differently by researchers. But most of these variables can be classified into two major categories, the cognitive and non-cognitive factors. The publication of educational objectives by Bloom *et al.* (1956) and Krawthwohl (1964) has opened a new dimension about the expected outcomes of education by grouping them into three domains and this division also made clear, the presence of two categories of variables: cognitive and non-cognitive.

The overlap between educational out come and non-cognitive variables has been fairly well established by recent researchers. This has great educational significance in view of the implied possibility of using non-cognitive changes as a method of producing desired cognitive out comes. A vast review of the research in this field points out the inadequacy of the existing studies, in identifying a group of non-cognitive variables that correlate significantly with achievement in Mathematics.

Thus the above considerations motivated the investigator to conduct study comprising cognitive style and selected non-cognitive variables in relation to achievement in Mathematics of the pupils of standard X.

STATEMENT OF THE PROBLEM

The problem of the present study entitled as **“cognitive style and selected non-cognitive variables in relation to achievement in mathematics of pupils of standard X”**.

DEFINITION OF KEY TERMS

A number of psychological and educational terms have been used in the problem. The key terms that require a definition are presented below.

Cognitive style

Cognitive style refers to a person's preference for certain ways of receiving and processing information from the surroundings.

Witkin *et al.* (1977) defines cognitive style as characteristic self consistent mode of functioning which individuals show in their perceptual and intellectual activities.

Witkin *et al.* (1971), Messick (1976) and Kogan (1976) have classified different categories of cognitive style. For the present study, the Field dependent–Field independent dimensions, as measured by group Embedded Figures Test (Oltman *et al.* 1971) is considered.

Non - Cognitive Variables

The term ‘non - cognitive variables’ refers to the variables other than cognitive variables.

In the present study, it stands for a group of five selected non - cognitive variables which are

- (i) Level of aspiration
- (ii) Attitude towards Mathematics
- (iii) Class room environment for Mathematics
- (iv) Home environment for Mathematics
- (v) Home practice for Mathematics

(i) Level of aspiration

Level of aspiration means the achievement target which an individual sets for himself to attain and which he/she feels is capable of achieving. This is an important motivational aspect on which educational performance is very much connected.

(ii) Attitude towards Mathematics

Attitude refers to a learned pre-disposition to react consistently in a given manner either positively or negatively to certain persons, objects or concepts. According to Augoustinos & Walker (1995), attitude denote a

person's orientation to some object or attitude referent. All attitudes have a referent, an object of thought.

According to Thurston and Chave (1957), "Attitude is the degree of positive or negative effect associated with some psychological objects. It is a personal response to an object developed through experience, which can be characterised as favourable or unfavourable.

In the present study the psychological object is Mathematics. The personal response to this object is measured in different dimensions such as the appreciation of the role of Mathematics, preference for Mathematics, extra learning in the field, devotion and commitment to Mathematical ideas and activities. For this a standardised scale of attitude towards Mathematics was used.

(iii) Class room environment for Mathematics

Class room environment refers to the environment prevailing in a class room when the process of teaching learning takes place. This includes the emotional, physical and intellectual climate set up by the teacher and students to create a wholesome learning situation.

For the present study class room environment refers to the environment for learning the subject Mathematics characterised by the conceptual and pedagogical approach, innovative practises, interpersonal relationships and other classroom facilities which is measured by a standardised inventory of classroom environment for Mathematics.

(iv) *Home environment for Mathematics*

All the objects, conditions and factors in the home of an individual which has the power to influence him, constitutes the home environment of the person.

In the present study the environment at home in terms of physical facilities cohesion, parental behaviour, achievement motivation and intellectual and cultural orientation related to the learning of Mathematics is measured by a standardised Inventory of Home Environment for Mathematics.

(v) *Home practice for Mathematics*

Home practice refers to the meaningful learning experiences related to school instruction which are planned, carried out outside the school and evaluated under the guidance of the parents tutoring by teachers or other adults etc.

For the present study home practice refers such practices related to the learning of Mathematics in the form of family interaction patterns, values parental control and parental cultural and social participation which is measured by Home Practices Inventory for Mathematics.

(vi) *Achievement in Mathematics*

Achievement in Mathematics refers to tangible accomplishment or proficiency of performance of students in Mathematics as measured using a standardised test.

In the present study achievement in Mathematics is confined to the curricular areas prescribed for the pupils of standard X and the test used has been confined to the objectives of cognitive domains of Bloom's taxonomy.

(vii) Mathematics

In this study the term 'Mathematics' stands for the content of mathematics text book prescribed for standard X of schools of Kerala.

(viii) Students of standard X

Students of standard X refers to the students attending standard X of the recognised schools of Kerala state.

OBJECTIVES OF THE STUDY

1. To find the extent of relationship between achievement in Mathematics and each of the selected independent variables, for the whole sample and relevant sub samples.
2. To examine whether equivalent correlations obtained for achievement in Mathematics with (i) cognitive style (ii) each of Field Dependent (FD), Intermediate (INT) and Field Independent (FI) orientations of cognitive style and (iii) selected non-cognitive variables for, sex groups (boys / girls) and locale (urban / rural), differ significantly.
3. To predict 'Achievement in Mathematics' using a few selected independent variables, by means of stepwise regression by ANOVA approach.

HYPOTHESES

- I. There will be significant and positive relationship between achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub samples.

- II. There will be significant differences in the correlation between achievement in Mathematics and (i) cognitive style, (ii) each of Field Dependent (FD) Intermediate (INT) and Field Independent (FI) orientations of cognitive style and (iii) selected non-cognitive variables for, sex groups (boys/girls) and locale (urban/rural).
- III Achievement in Mathematics can be predicted with the help of certain selected independent variables.

VARIABLES

The study was conducted by treating achievement as dependent variable and cognitive style, and selected non-cognitive variables as independent variables. The details are presented below:

(a) Dependent variable:

Achievement in Mathematics of the students of standard X

(b) Independent variables:

- (i) Cognitive style
- (ii) Level of aspiration
- (iii) Attitude towards Mathematics
- (iv) Classroom environment for Mathematics
- (v) Home environment for Mathematics ✓
- (vi) Home practice for Mathematics

METHODOLOGY

Sample

The study was conducted on a representative sample of 740 students of standard X, selected by proportionate stratified sampling method. While

selecting the sample due weightage was given to sex, locale, type of management and efficiency level of schools. The sample covered the pupils studying in the schools of three educational districts of Kottayam Revenue district of Kerala state.

Tools

For the present study, the investigator used standardised tools of accepted validity and reliability for measuring the variables. The tools used were:

- (i) Achievement test in Mathematics for standard X
- (ii) Group Embedded Figures Test
- (iii) Letter Cancellation Test
- (iv) Scale of Attitude towards Mathematics
- (v) Class room Environment Inventory for Mathematics.
- (vi) Home Environment Inventory for Mathematics
- (vii) Home Practice Inventory for Mathematics

Of the above seven tools, Group Embedded Figure Test developed by Oltman *et al.* (1971), and Letter Cancellation Test by Muthayya (1960) were adapted. The remaining five tools were constructed by the investigator in collaboration with her supervising teacher, Santhamma Raju.

Statistical techniques used.

The following statistical techniques were used for the analysis of the data.

- (i) Pearsons' product moment correlation coefficient
- (ii) Fisher's test of significance for correlation coefficient
- (iii) Shared variance of correlated variables.
- (iv) Test of significance of the difference between correlations
- (v) Stepwise regression by ANOVA approach

SCOPE AND LIMITATIONS

The present study is an attempt to reveal the relationship of cognitive style and selected non-cognitive variables with achievement in Mathematics of standard X pupils. The investigator selected one cognitive variable which is cognitive style and five non-cognitive variables, viz., level of aspiration, attitude towards Mathematics, classroom environment for Mathematics, home environment for Mathematics and home practice for Mathematics after a careful study of the factors affecting achievement of the students of standard X, with special reference to the achievement in the subject, Mathematics.

The investigator confined the study to a representative sample of students of standard X from Kottayam District of Kerala State. The selection of the sample need not be strictly representative of schools all over the state. But every precaution was taken to see that the most representative sample is obtained.

The tools of accepted validity and reliability were used to collect the data. The selection of independent variables was confined to a limited number considering the difficulty of measuring the variables and availability of the standardised tools. The selection of dependent variable was also restricted. For the present study, 'Achievement in Mathematics' only has been selected. The objectives included are those related to the cognitive domain of Bloom's Taxonomy. The objectives related to other two domains-affective and psychomotor-are not measured through the present test.

The findings are valid and generalisable to the extent to which the sample, tool, variables and statistical methods are valid. All possible precautions were taken to attain the highest degree of accuracy in respect of these factors.

In spite of all these restrictions and limitations, the study obtained dependable results. It is hoped that the implications of the findings of the present study are of great help to the teachers, educators and parents for developing new trends and approaches in education.

ORGANISATION OF THE REPORT

The report has been presented in five chapters.

The first chapter comprises of a brief introduction-presenting the rationale for selecting the present problem, need and significance, statement of the problem, definitions of the key terms, variables of the study, objectives of the study, hypotheses, brief description of the procedure and scope and limitations of the study.

The second chapter presents the reviewed literature in the area, presented in two sections: viz; theoretical frame work of the selected variables and review of the related studies and a trend report of the studies reviewed.

The methodology of the study has been described in the third chapter. This chapter includes details of variables, objectives, hypotheses, design of the study, tools, sample, data collection procedure, scoring and statistical techniques used for the study.

The fourth chapter deals with the details of statistical analysis, taken up in the order of the objectives of the study. The analysis has been followed by an interpretation of the major results.

The fifth chapter presents a summary of the study, major findings, educational implications and suggestions for further research in the area.

CHAPTER II

REVIEW OF RELATED LITERATURE

*Theoretical frame work of cognitive style
and selected non-cognitive variables*

Review of related studies

A trend report of the studies.

REVIEW OF RELATED LITERATURE

A scientific approach to a worthwhile study in any field of knowledge requires an adequate understanding of the related work in the area, as it enables the investigator to find out what is known; what methods and approaches have been used and what problems remain to be solved in the field.

The collection of reliable data to examine the relation of cognitive style and selected non-cognitive variables with achievement in Mathematics was the major concern of the investigator while reviewing the related literature of the study. The reviewed literature has been classified and presented under the following sections.

- (i). Theoretical frame work of the independent variables.
- (ii). Review of the related studies

(i) THEORETICAL FRAMEWORK OF COGNITIVE STYLE AND SELECTED NON-COGNITIVE VARIABLES.

This part of the report deals with a brief discussion of cognitive style and the selected non-cognitive variables, namely level of aspiration; attitude towards Mathematics, classroom environment, home environment and home practice.

COGNITIVE STYLE

Cognitive style refers to a person's preferences for certain ways of receiving and processing information from the surroundings and using different strategies to respond to tasks. Cognitive styles are called 'styles' rather than abilities because they refer how people process information and solve problems, not how well they do so.

Since the time of Allport (1937), many investigators have used the term 'Cognitive style' to denote individual differences in modes of cognitive functioning in children and adults. The idea that students differ in terms of behaviour in their mode of cognition came up for serious discussion in early 1950's. It was coined for the first time by R.W Gardner in 1953 (Hussen & Postethwaito 1985). Vernon (1973) traced the idea of cognitive style to an article in 1951 by Klein as the 'personal world through perception'.

Cognitive preference is one class of Cognitive style. The term cognitive style can be used only to distinguish consistent preferences for a particular mode of thinking among individuals of similar and overall intellectual capacities. In the concerned literature there are considerable degrees of confusion regarding cognitive style due to the usage of many different terms to describe the aspects of cognitive style and an equivalent variety of test materials. Since then many sets of dichotomies have been used to describe cognitive style.

Dimensions of Cognitive style

Although researchers may broadly agree on a general definition of cognitive style, they have defined it experimentally in various ways. Consequently, the related literature contains references to a number of dimensions of cognitive style. Williams (1975), summarises them as below:

One of most frequently examined dimensions of cognitive style is that of Field-dependence- independence and much of the work on this dimension stems from Witkin and his co-workers (Witkin 1950, 1954). Whether or not a group or individually administered test has been used, the concept of field-independence has come to be recognised as the ability to select relevant stimuli that are embedded in a larger context and to resist the interfering effects of the contextual stimuli.

A second cognitive style dimension that has been studied by several investigators (Gardner & Others, 1959.) is that of levelling-sharpening dimension which contrasts simplicity of the cognitive field and complexity and differentiation.

Two other dimensions of cognitive style that are similar in nature are known as category width and equivalence range. Studies in this area have examined consistent, individual preferences in modes of categorising judged similarities and differences.

Kagan & others (1963) studied a dimension of cognitive style which they regard as similar to field-dependence-independence. They call this dimension analytic cognitive style and define it as 'the tendency to analyse and to differentiate the stimulus environment in contrast to categorisation that are based on the stimulus as a whole'.

Finally, Williams (1975) mentioned the cognitive style dimensions proposed principally by Broverman (1960). The dimensions defined were conceptual versus perceptual motor dominance, and strong versus weak automatization, which were regarded as cognitive subsystems, developmental information and maintained by the force of habit strength associated with them.

Messick (1976) and Kogan (1976) have been trying to classify the meaning of the term 'cognitive style' and have discussed possible overlaps between the different approaches. Messick has described nineteen terms that are frequently used in cognitive style research. These description also implied overlaps. A break of the major categories and styles were compiled by the investigator. It is seen that there is still little empirical evidence between different descriptive categories. The categories are presented below along with the major authors who worked along these lines.

TABLE I
Details of Categories of Cognitive Style

	Categories	Style	Author with year
1	Information processing	Cognitive complexity-cognitive simplicity	Bieri, Atkin, Breur, Leaman, Millar and Tripadi(1966)
2	Categories and Concepts	Broad- Narrow Relational-analysis	Wallach & Kogan (1965)
3	Thinking	Divergent-convergent Impulsive-reflective	Hudson (1968)
4	Learning	Holist-serialist	Pask (1976)
5	Perceiving	Field independence- Field dependence Articulated-global	Witkin (1954)
6	Personality	Expressive-self constraint Emotional-Inhibited Cognitive complex-Practical	Hudson, Entwistle & Morison (1984)

Among the different approaches to cognitive style, the Field independent-Field dependent dimensions of Witkin (1954) which comes under the major category of perceiving has been considered in the present research.

Field independent - Field dependent Cognitive Style (FI/FD)

Some of the early experiments on perception have been shown the importance of contextual factors in perception of an item in an embedding field. Field independent person is described as one who experiences his surroundings analytically, with objects seen as discrete from their backgrounds. A field dependent person on the other hand tends to experience his surroundings in a global and non-analytical manner. Thus Field independence-dependence dimension is also described as 'analytical vs. global'.

Characteristics of FI/FD

Witkin et al. (1977) has drawn attention to the fact that some individuals seem less and others more able to separate the given variables from its context or the Field, and are more analytical in the approach to various situations. People who are Field independent tend to be more cognitive in their perceptual orientation (and are not easily distracted by extraneous things than) people who are Field dependants.

Research has established the associated forms of personality characteristics with Field independent - dependent dimension of cognitive style, Tennat, (1988). Older children are more Field independent than younger children. Witkin noted that children show an increase in Field independence up to the age of seventeen. Within any particular age group some children are more Field independent than others. Individuals who showed relative preferences for one cognitive style over the other continue to display this preference well to adulthood. It is a convincing evidence that Field independence-dependence style describes an essential component of a person's cognitive individuality. In contrast to intelligence, there is no high or low

cognitive style and usually these are treated as polar opposites like FI/FD. Each pole is high with a different purpose and describing different aspects of one fundamental process, the mode of perception and thinking.

In social situations, Field dependent people are more attentive to and to make use of prevailing social frames of reference. They may be more sensitive to other people and interact more with others. In general, they prefer to be with people in social situations (Witkin et al. 1977). As a result Field dependent people tend to be better liked by others, as they are known to be tactful, considerate and affectionate and be known to more people than field independent people.

Contributing factors

Studies in cognitive style have evolved the important factors that contribute to a person's preferences for his or her cognitive style. External factors are more important in determining the cognitive style of the individual. Witkin viewed that cognitive styles are culturally induced. It develops from socialisation practices, respect for social conventions, child rearing practices and degree of parental authority. Cross-cultural studies conducted by Witkin and his associates have substantiated the effect of such external factors.

Educational implications of cognitive style

Witkin *et al.* (1977) provided the most comprehensive analysis of the educational implications of cognitive style. It highlights the importance of learning process rather than teaching techniques.

Field independent students generally do better in analytic, impersonal academic areas in disciplines such as physical and biological sciences, Mathematics, engineering, technical and mechanical activities. Field dependent students do better in interpersonal areas requiring social skills such

as social sciences and social welfare. They like to choose occupations related to social work, teaching, administration and politics.

Field independent students are more likely to have self defined goals and respond to intrinsic reinforcement, but Field dependent students may require more extrinsic reinforcement. Field dependent students are more motivated by praise and encouragement than Field independent students who tend to pursue their own goals.

Field dependent teachers are interested primarily in creating and maintaining positive attitudes and good group dynamic where as Field independent teachers perceive them as emphasising application of general principles. The latter inform the students when they are incorrect and tell them why they are incorrect and express displeasure with students who are performing below capacity

Extreme Field independents have social adjustment problems and extreme Field dependants seem to lack a mind of their own. Field independent students are not likely to respond strongly or even positively to warmth or praise from the teachers.

From the discussion it is clear that the knowledge of the cognitive style is helpful for the teachers to plan their teaching strategies so as to meet the individual differences of the students.

LEVEL OF ASPIRATION

Educational performance is very much connected with the motivational aspects. Level of aspiration is one of such motivational aspects, which influences a person's striving to a considerable extent. In some people the drive to be successful at what they undertake is tremendously strong. They have very high level of aspiration while in others it is relatively weak.

Level of aspiration may be defined as a 'goal setting' by an individual based upon expectancy of achievement. Goal attainment is perceived as success and inability to do so as failure.

Boyd (1952) defined level of aspiration as an individual's ambition in a dynamic situation, i.e., it is an individual's goal or expectation in regard to the goodness of his own future performance for a given task. Backer & Seigal (1957) visualised level of aspiration as an individual's strivings for a particular goal or level of achievement. Hurlock (1967) conceived level of aspiration as a longing to achieve higher level of performance in a task. This aspired level of performance is higher than one's achievement and is of intense personal significance to him. Drever defined level of aspiration as a frame of reference involving one's self esteem. In other words, it is a standard with reference to which an individual experiences the feeling of success or failure. Joshi (1963) opined that an individual's level of aspiration is with reference to his positive striving towards a goal that is generally in keeping with his assets, where as in wish fulfillment one is lost in his fantasies.

In the opinion of many researchers, the level of aspiration is the expected level of achievement of the individual. Its measurement involves noting the difference between the scores of a person's actual performance and expected performance in a task (For example, Humphrey and Argle, 1962).

Level of Aspiration-Degree

Some people set high goals of accomplishment making high demands on themselves. Some on the other hand are modest with regard to their achievements because they are aware of their limitations. There are also those who have no aspirations at all, they are indifferent to what they may or may not achieve.

In general people set their goals just a little higher than they are sure of attaining and this is healthy. In some people there is a large discrepancy between the level of aspiration and the level of performance, because they have learned to set goals that gain the approval of their parents and associates. In others, the level of aspiration falls considerably below the capacity to achieve. This discrepancy often occurs because individuals have learned to fear failure. They do not set their goals high for fear of not attaining them.

Factors of level of Aspiration

According to Hoppe (1930), level of aspiration is essentially quantitative in nature and an individual's level of aspiration is to be ascertained with the help of certain experimental procedures. He proposed that level of aspiration is a function of various factors as mentioned below:

- (i) The subjective nature of an individual's goal.
- (ii) The occurrence of success and failure as experienced after the goal is achieved.
- (iii) The conflicting and decision making experience.
- (iv) The influence of immediate past experience on the subsequent level of goal setting behaviours.

Educational Implications

Level of aspiration is an important psychological construct in understanding achievement behavior. Researches indicate that repeated success or failure can influence a student's goal setting or level of aspiration-the level of performance to which an individual expect to rise on a given task. A student may reveal such information when asked, what he is aiming for in the next test or how many problems he thinks, he will get correct on the next assignment. Success in every trial leads to higher level of aspiration, where as failure tends to lower the aspiration level. Hoppe found that on the given task, if a person's

performance falls short of his expectations or level of aspiration, he experiences the feeling of 'failure'. But in case his performance meets or exceeds the level of aspiration, he feels success. This may be explained as having a negative feeling and positive feeling respectively.

In the modern world, the concern for excellence in academic performance has increased more than ever before, because of the ever-increasing competitions as well as by the exorbitant demands and pressures put on the individual by modern sociocultural milieu. But most of the children in our schools are unable to show educational performance up to the level that is expected of their age and grade. Sharma (1992) observed that, there is usually the lack of sufficient motivation and incentives from the part of the students, teachers, parents and others involved in the teaching learning process. Every student has to decide about what goal he is to set for himself. He has to decide whether he is to try on tasks or levels of performances that appear very difficult to achieve or to remain satisfied with success at relatively much easier tasks or moderate level of performance. In all such situations, persons concerned with educational process, have to guide the students to fix their level of aspiration before starting the work. Also it is often necessary to motivate, considerably talented persons without ambition, to put in their best efforts to attain what they can achieve.

ATTITUDE TOWARDS MATHEMATICS

Attitudes are positive or negative feelings that an individual holds about different objects, persons or ideas and are generally regarded as enduring though modifiable by experience. Attitudes are also seen as pre-dispositional readiness to respond to certain situations, persons or objects in a consistent manner which has been learned and has become one's typical mode of response. The degree of strength of a person's attitude may vary from extremely positive through a gradation to extremely negative. Page *et al.*

(1977) defines attitude as pre disposition to perceive, feel or behave towards specific objects or certain people in a particular manner.

Attitude denotes a person's orientation to some object, or attitude referent. All attitudes have a referent, an 'object of thought'. (Augoustinos & Walker, 1995). Thus attitude towards mathematics deal s with attitude hold is 'orientation' to the referent- mathematics and that person's evaluation of the referent. When the object of attitude is important to the person, the evaluation of the object produces an affective or emotional reaction in that person.

Nature of attitudes

Anderson (1981) has identified five essential features of affective characteristics. They are (1) emotion (2) consistency (3) target (4) intensity. The relationship of these characteristics with attitude will be helpful to understand the nature attitude.

(i) Emotion:

Since attitude is an affective characteristics it involves a person's feeling and emotions. It is a complex of feelings, desires, fears, convictions, prejudices and other tendencies that have given a set or readiness to act a person object or situation because of varied experiences.

(ii) Consistency:

Allport cites consistency as an essential feature of attitudes. A reasonable degree of consistency of response is necessary before it can be inferred that a person possesses attitudes.

(iii) Target:

All emotions and feelings are directed toward some target. Allport identified these targets as objects and situations:

(iv) Direction:

Direction is concerned with the positive or negative orientation of the emotion or feeling towards the target. Allport suggests the appropriate bipolar adjectives for attitudes as favourable and unfavourable.

(v) Intensity:

Intensity refers to the degree or strength of the emotion or feelings. Intensity is related to the level of preparedness and the extent to which attitude predisposes action.

Theories of attitude

The major theories of attitude are the following:

(i) The Postual Response Theory

This is the theory of neuromuscular set, characterised by the behaviouristic approach. This theory implies an organic state of readiness accompanied by neuromuscular adjustments which in turn develops acts of the inter stimulation of the individuals. An attitude includes the stimulus and response, but even more so, the preparation of the response set up in the neuromuscular system. This theory has been supported by Allport(1935).

(ii) The theory of mental set

This theory is based on the 'conscious act' theory of behaviour. The conscious act makes difference to the individuals experiencing it. A conscious act is prospective or intentional. Thus an attitude will determine the general characteristic of the act.

(iii) The general theory

This theory includes the affective and cognitive element of organisation. A more comprehensive conception expressed by Guilford is that the attitude of a personal disposition common to individuals, but possessed in different

degrees which impel them to react to objects, situations of persons in favourable or unfavourable ways.

Levels of attitude

According to Krathwhol et al. (1964), behavior characterised by valuing in the affective domain is sufficiently consistent stable to have taken on the characteristic of the belief or an attitude. The learner displays this behaviour with sufficient consistency, in appropriate situations that he comes to the perceived, as per his attitude. Thus levels of attitudes can be listed as follows.

(i) Acceptance of value

At this level, people are concerned with the ascribing of worth to a phenomenon, behaviour, object etc. The holding of particular beliefs or attitudes is an evidence of its acceptance.

(ii) Preference for a value

Behaviour at this level implies not just the acceptance of the value, to the point of being willing to be identified with it, but the individual is sufficiently committed to pursue it, to seek it out, to want it.

(iii) Commitment

The person who displays behaviour at this level is clearly perceived as holding the value. He acts to further the thing valued in some way, to extend the possibility of his developing it, to deepen his involvement with it and with the things representing it. He tries to convince others and seeks converts to his cause.

Enduring attitudes develop through many learning experiences related to other people. Allport has suggested four conditions for the formation of attitudes.

- i. The accretion and integration of response learned in the course of growing up
- ii. The individuation, differentiation, or segregation of experiences: Experiences do not merely accumulate: they become sharpened and patterned, so that some attitudes become more specific as the individual grows up.
- iii. The influence of some dramatic experience or trauma. Some times a single experience may have lasting influence, and may generalise to related stimuli.
- iv. The adoption of ready-made attitudes:- sometimes attitudes are picked up through imitation of the attitudes of parents or others.

Because attitudes are so inter-woven with affective and highly motivate experiences, they become abiding personality characteristics. On the other hand attitudes as components of personality cannot be separated from the object or events in the social context to which they refer.

Factors of attitude towards Mathematics

According to Zenna & Rempel (1988) attitude deals with the categorization of a stimuler object along an evaluative dimension based up on or generated from three general classes of information:

- (1) Cognitive information
- (2) Affective/emotional information and
- (3) Information concerning past behaviors or behavioural intentions.

On the basis of the categorisation of attitude described by Zanna & Rempel (1988), theories of attitude by Krathwohl (1964) and factors attitude towards mathematics by Gronlund & Robert (1990) the investigator selected the following dimensions.

1. Appreciation of the role of mathematics.

2. Preference for Mathematics.
3. Extra learning.
4. Active involvement in related problems.
5. Devotion to Mathematical ideas and activities.
6. Commitment.

CLASS ROOM ENVIRONMENT FOR MATHEMATICS

Environment may be defined by saying that all that surrounds an organism and is external to it is environment (sharma,1992). psychologist typically treats behaviour as a function of an interaction between the individual and his environment. Members of a group behave differently in different kinds of social and emotional climate. Students actually spend most of their time within classrooms, and thus it is important to directly study these environments. A good deal of work suggests that class room environments are very important influencing students' attitudes towards school as well as their achievement, and that the class room environment can mediate between more macro-level influence, such as school and community, and individual student outcomes, (Cohen et al. 1989; Moos,1979; Mumane,1975).

Class room Social climate

In classroom situation, where conditions of good climate exist, there is an opportunity for the pupils to express themselves freely. In a good climate, the teacher has skill in helping pupils to become independent rather than dependent entirely up on the teacher (Singhal, 1991). According to Singhal, the dimensions of class room environment which has strong influence on learning and development of children include nine aspects: (1) involvement (2) affiliation (3) teacher support (4) task orientation (5) competition (6) order and organisation (7) role clarity (8) teacher control and (9) innovation.

Effective classroom environment has been enhanced by Stockard and Mayberry (1992). According to them, much of our knowledge of effective teaching and classrooms comes from the tradition of 'process product' research. This work focuses directly on how the instructional behaviours of teachers affect students' learning and has been instrumental in improving teachers' day-to-day pedagogical practices. (Rosenshine 1971; Centra & Potter; Fraser 1986; Brophy & GOOD 1986).

The other major source of work in this area comes from the 'socio ecological' studies of class room climate, which examine the relationship of students achievement to the perception of their classrooms. This research is rapidly expanding and is far from conclusive. However it has been found that the achievement-related expectations and values of students and teachers, the role of the teacher as an effective instructor, an orderly atmosphere conducive to learning and high student and teacher morale influence the student achievement.

The class room climate involves both structural and affective dimensions. The structural dimension refers to the organisation of student roles within the class, role expectations, and shared group sanctioned behaviour or norms. The affective dimension refers to the, unique ways in which individual personality needs are satisfied. Some research also indicate that the congruence between students preferred classroom environment and their actual class room environment may be just as important as the actual nature of the class room environment.

Factors of class room environment for Mathematics

A large number of studies demonstrate that schools in which both students and staff value academic excellence tends to have higher levels of academic achievement. For instance, from their extensive work with secondary students, Edward McDill and his associates (McDill et al. 1967; Mc Dill And

Rigsby, 1973) suggest that schools that teachers and students, see as emphasizing intellectualism, subject matter competency, and commitment to academic excellence are more likely to have higher levels of Mathematics achievement and higher levels of educational aspirations.

Such environmental variables significantly influence students even when individuals attributes, such as there when individual attributes, such as their socio-economic background, ability, academic values, and socioeconomic context of their schools are controlled.

Even though, nearly four decades of researches have contributed to the current portrait of effective learning environment in general, researches on effective learning environment of Mathematics are very few. Based on the available literature, five components of classroom environment for the investigator selected mathematics: They are presented below.

- (i) Conceptual approach
- (ii) Pedagogical approach
- (iii) Classroom facilities
- (iv) Innovative Practices
- (v) Interpersonal relationship

HOME ENVIRONMENT FOR MATHEMATICS

Much of the research on home environment has assessed learning environment in terms of such global social status indicators as occupation of the father, income of the family and birth order. Gross variables however accounted for only small percentages of variables in measures of affective characteristics and they have only low to moderate concurrent validities in relation to cognitive and academic performance at the same time global classificatory environmental variables have failed to effect: the dynamics of learning environment that families create for their children. Hence family

environment has to be examined in terms of proximal socio-psychological variables that can be manipulated in parent teacher programme, in an effort to make family learning context more stimulating for students.

Learning in school can be made easier for children if the continuities between development at home and development in school are recognised and built upon. The needs of the children are many and varied. Most obviously they require physical care, comfort and protection both for their physical well being and the adequate development of motor abilities. Relative success or failure in school is not just the responsibility of individual pupils. They may encounter a number of problems when support from the family and from wider community is not forthcoming, such problems are readily evident in parts of so called third world countries, which have no long tradition of formal education such as westernised countries have, and which are beset with a range of problems; including poverty.

Moos & Moos (1982), categorised the dimensions of home environment as follows:

- i. Cohesion -the degree of commitment, help and support family members provide.
- ii. Expressiveness - in most of our families youngsters are not allowed to express their feelings openly, especially girls. It also seems that girls are trained not to express their aggression and anger openly in the family since social desirability is greater in girls.
- iii. Conflict– ideological or behavioural.
- iv. Independence- Training to take one's own decision and lesser complaints expected.
- v. Achievement-creating academic orientation in children. Emphasis on the achievements give rise to the feeling of competition.

- vi. Intellectual- cultural activities: Encouragement from the part of the family members to take part in political, social, intellectual and cultural activities.
- vii. Recreational orientation
- viii. Moral, religious emphasis: Leads to the enforcement of greater discipline.
- ix. Organisation: structural and organised environment provided can be exhibited through controls, rules and procedures to be followed.
- x. Orientation.

Effect of home environment

According to Srivastva (1991), the home environment will be more effective if the educational environment of the student is such that it permits certain modes of behaviour such as: 1) habit of reading, library consultation, planned study. 2) emphasis on being goal oriented, hardworking and realistic (3) support from, the family members to respond effectively to outward activities and (4) help to develop a capacity to decide about the future.

A large amount of evidence now supports the view that parental involvement is an important ingredient in improving individual children's achievement and in enhancing school effectiveness. According to Henderson (1988), Bench (1988), Collins *et al.* 1972), students whose parents are actively involved in the school, tend to have higher achievement and better attendance, behaviour and grades as well as higher self confidence, regardless of their ethnicity or social class.

Factors for home environment for Mathematics

If the parents monitor school work and help with school plans, child's attitude about school will improve in a way that improves grades in school. (Hellmandeollar, 1992). Weissberg & Hempton (1995) explain how school achievement is influenced by parent-child interactions, how early adolescents are affected by the overlapping spheres of influences of school family,

community and peer group: and how family environment influences educational attainment. Based on the available literature, the following main dimensions of home environment for the learning of Mathematics were selected:

- i) Physical facilities
- ii) Cohesion
- iii) Parental behaviour
- iv) Achievement orientation
- v) Intellectual and cultural orientation

HOME PRACTICE FOR MATHEMATICS

The home is the first socialising agency of the children in our society that they view the world through the eyes of its family. It is therefore very possible that many of the values latter transmitted by the school were first included in the child at home. Parents as well as other members of the family should therefore, pay special attention to the intellectual, social and emotional development of their children.

Home provides an important educational foundation on which the child's formal learning will be built. From birth to the age of fifteen children are in school only for 14 percent of the time. The rest of the time they are under the influence of the family. The educational practices that the members of the family provide during these critical years at home is virally important.

Parents, tutors or other adults involved in providing home practice may merely provide more practice of certain skill that is feasible or seems justified in the class room or may involve a group of related activities which require careful planning and apply principles and techniques already learned to solving problems of personal, family or community life.

Factors of home practice

(i) Interaction.

Family interaction patterns, norms and values have ~~are~~ important influences on ability and student attitudes and beliefs. These variables are largely beyond the control of school officials and policy makers.

(ii) Academic orientation.

Parents who insist their children to follow a time schedule for tasks such as doing homework, reading newspapers, magazines, Periodicals, library consultations, receiving help from parents etc. influence the practice of learning.

(iii) Parental cultural contact and social participation

A culture is the way of life of ^agroup of people, the configuration of all the more or less stereotyped pattern of learned behavior^u that are handed down from generation to the next through the means of language and mutation. A person is destined to learn a pattern of behaviour prevalent in the society in which he grows up.

(iv) Behavioural control

The practice of exercising controls and following ^aset of rules and procedures at home has important influence on child's attitudes and performances.

(v) Participation in co-curricular activities.

(vi) Effective use of free time.

(vii) The exposure to mass media and provision for making use of learning materials.

(viii) Regular parental support.

Educational and vocational plans of individuals strengthen the drive for achievement which often leads to the development of better study habits. Effective study habits and attitudes intern will lead to better academic performance.

Draper (1990) explains how certain habits acquired by practice at home through the influence of the parents of and other family members determined the future success of and an individual.

Based on the variable literature the main dimensions of home practice for Mathematics, selected by the investigator are:

- (i) Programme orientation
- (ii) Pattern of behaviour
- (iii) Approach to learning of Mathematics and
- (iv) Interaction and exposure.

ii REVIEW OF RELATED STUDIES

The various studies conducted in India and abroad in the field of achievement in relation to cognitive style and selected non-cognitive variables are collected and arranged in the chronological order under the major heads:

1. Cognitive style and achievement in Mathematics.
2. Level^{of} aspiration and achievement in Mathematics.
3. Attitude towards achievement in Mathematics.
4. Class room environment for achievement in Mathematics.
5. Home environment and achievement in Mathematics.
6. Home practice for achievement in Mathematics.

COGNITIVE STYLE AND ACHIEVEMENT IN MATHEMATICS

Over the last four decades extensive research has been conducted on cognitive style. Diggary (1972) reported that in field dependent students, the

ability to retain digest information is lacking since these abilities require a moderate degree of analytical thinking or Field independence.

Witkin, Moore, Goodenough and Cox (1975) presented an excellent review of the research on cognitive style. In their opinion, there is no high correspondence between field independence and overall scholastic achievement, but specifically field-independent subjects, would achieve very high grade in these domains, which require cognitive restricting skills and scientific analytic skills. A study conducted by Ogunyemi (1973) in Nigeria found a significant relationship between science achievement and cognitive style for boys but not the girls.

Span (1973) Starkly (1976) Chatterjea & Paul (1982) have demonstrated that performances on various version of Embedded Figure Test (EFT) is related to various non-social types of scientific achievement like Mathematics, Natural Sciences, Geometry etc.

Pascal (1977) in his study found that success on many of the Piagetian concrete operational task was significantly restricted by Field-dependence. Dembo (1977) observed significant differences between field independent and Field-dependent people in internalising, organising and learning materials when unstructured and showed superiority of field-dependent individuals.

A study conducted by Lawson and Wollman (1977) on students of sixth grade classes found high correlation between Field-independence and success on problems of functional fixity and value judgement. Buriel (1978) investigated school groups in different culture and have shown over-all **high** scholastic achievement among Field-dependent subjects even after the variance attributable to intelligence.

Bachman (1979) from his study on the relationship between cognitive style and concept attainment and success revealed low correlation between cognitive style and concept attainment.

Studies by Vaidya & Chamsky (1980). Watkin & Astilla (1980) and Sharma Ahuja (1982) on school groups in different cultures have shown overall higher scholastic achievement among Field-independent subjects.

Watkin & Astilla (1980) studied the relationship between Field-dependence and school achievement of Philippine girls and found a positive relationship between Field-independence, intelligence and school achievement.

Ritchey and Lashier (1981) investigated a significant relationship between cognitive style and instructional mode to achievement of college science students. Significant positive relationship was observed from the study conducted by Sharma & Ahuja (1982) between cognitive style and school achievement.

In a study Onyejiaku (1982) examined academic performance of the selected schools of Ibadan and Nigeria and reported a significant relation between the student's cognitive style and performance of mathematics tasks.

Lamka (1983) studied whether cognitive style is a predictor of student performance in secondary classes. The results indicated that Field-independent students were superior to Field-dependent students in most of the factors under study and concluded that cognitive style is considered as a predictor of student performance. Harmon (1983) obtained a contradictory result when he examined the academic success in college freshmen calculus. He found a weak correlation between cognitive style and achievement in calculus.

A study designed by Saracho (1984) to examine the effect of Field-dependence or field-independence on levels of academic achievement observed that students cognitive style and door grade level are related to one another.

Gobriyal (1984) studied the interactive relationship between cognitive style and recognition memory of university studies and no significant difference between Field-independent Field-dependent cognitive style on pictorial recognition memory test was noted.

Chatterjea & Paul (1984) observed Field -dependent students significantly superior since achievement proficiency in both intelligence uncontrolled and controlled condition.

Brennan (1984) studied the effect of hemispheric preference, cognitive style and method of instruction upon Mathematics achievement of tenth grade students and reported that there was no significant difference between cognitive style and Mathematics achievement. But Hadfield *et al.* (1992) investigated that Field-independent persons generally score significantly higher on total Mathematics concepts and on problem solving.

The relationship between self perception, cognitive style and learning was studied by Das (1985) and found that cognitive styles were significant and positively correlated to school achievement.

Effect of cognitive style and adjunct question on learning from connect discourse have been examined by Panda (1985) in a study on school students and found that Field-independent students' learn and retain prose significantly more often than Field-dependents. A significant correlation between Field-independence and achievement scores in language and second language proficiency level was observed by Ballard (1985).

Husen & Postiethwaite (1985) reported that Field-independence tests correlated highly with performance on intelligent tests. At the same time

Globerson *et al.* (1985) found that there is no association between cognitive style and cognitive development.

Arrington (1987) studied the relationship between Field-independent and Field-dependent visualisation and problem solving in adolescents and found a positive correlation between cognitive style and problem solving. Field-independents are superior to Field-dependents in these abilities.

Harcker (1989) found a significant relation between cognitive style and achievement. Field-independent students had better performance than Field-dependent students irrespectively of instructional conditions.

Paramo & Tinajero (1990) measured school performance by mean grade in mathematics, natural science and Spanish and over all grades. It was found that Field-independent, students performed better in all -subjects, especially boys.

Nah *et al.* (1990) administered a multi-diamentional measure of cognitive style and an achievement test in Korean sample and found a significant relationship between cognitive style and achievement.

Verma & Swain (1991) reported close relationship between cognitive style and school achievement of students taken as a whole and in independent subjects. A significant positive, correlation was obtained between Field-independence and academic achievement by Moore & Dwyer (1991)

Riding & Mathias (1991) conducted a study of 11-years old children's learning mode preferences; reading attainment, and cognitive ability and highest achievement was predicted for wholistic, varbalizers.

O' Brien (1991) compared cognitive style preferences of male and female college Students associated with major area of study. The findings reveal distinctive differences in cognitive styles between males and females as

systematic differences associated with major area of study, level of academic achievement and educational level.

Russel (1992) studied to identify the differential effects on learning of subjects with Field - dependent and Field- independent between GEFT and achievement.

Fenton (1992) conducted a study to find out how individual difference in cognitive style interact with student performance and reported weak relationship between cognitive style and academic, achievement.

Studies conducted by Hadfield *et al* (1992) revealed that field independent persons generally score significantly higher on total Mathematics concepts and problem solving.

Sudheeshkumar (1993) investigated on interaction effect of intelligence cognitive style and approach to studying on achievement in Biology on secondary school pupils and found that cognitive style has significant main effect on total achievement in Biology only for girls.

Riding and Douglas (1993) revealed that both cognitive styles (Field independence and Field-dependence) had interaction with learning performance depending on how the task is presented.

Demick & Koebu (1993) investigated that the degree of Field-dependence- independence was the best predictor of children's reading readiness. Also cognitive style works to enhance a student's ability to learn.

Santhoshkumar (1995) studied the effect of cognitive style and the class room environment on achievement in social science of X standard and found that the relationship between cognitive style and achievement is positively significant.

LEVEL OF ASPIRATION AND ACHIEVEMENT IN THE MATHEMATIS

Hoppe (1930) performed the first experimental analysis of operational phenomena. The experimental results stimulated other researches to investigate into the factors that influence goal-setting behaviour. Joshi (1963) opened that an individual's level of aspiration is with reference to his positive striving towards a goal that is generally in keeping with his assets. Later a number of studies were done to show the relationship between achievement, motivation and level of aspiration which in turn affects the academic performance.

Muthayya (1960) in his study of "Level of aspiration and its relation to modes of reaction to frustration among adolescents" found a slight correlation between level of aspiration and school achievement.

Bhargava (1972) in his study of level of aspiration and need for achievement observed that these variables are not related.

In another study Bisht (1972) obtained a positive relationship between educational attainment and the level of educational aspiration. Mohanty (1972) studied the level of aspiration as function of sex, socio-economic status and class performance. The findings of the study were indicative of the positive relationship between level of aspiration and academic success.

Hussain (1977) in his study of academic attainment in relation to level of aspiration and anxiety, reported that academic performance of the group which showed a moderate goal discrepancy was better than that of the groups showing either high or low goal discrepancy which implied a curvilinear relationship between the level of aspiration and academic performance.

Sharma (1979) in his study, observed that level of aspiration did not influence academic achievement and that the difference on academic achievement influenced the levels of aspiration.

Sivappa (1980) in his study of the factors affecting achievement in high school pupils revealed that the intelligence, n-achievement, manifest, anxiety, educational aspiration and study habits are the factors that contributed in predicting academic achievement.

A study of need achievement in relation to creativity, values, level of aspiration and anxiety, was conducted by Sexena (1981) and found relationship between achievement motivation and level of aspiration .

Nowaczyk (1982) found a considerably higher correlation with academic standing for aspiration level and for rearing environment.

Sharma (1992) examined the effect of reinforcement in educational performance and aspirations of adolescents and concluded that the reinforced group was better in the level o aspiration as compared to the non-reinforced group. Also he observed that reinforcements are effective in improving the students educational performances and in bringing about desirable changes in their level of aspiration.

ATTITUDE TOWARDS MATHEMATICS AND ACHIEVEMENT

The study conducted by Aiken (1970) on elementary, high school and college levels revealed that even though there exists a positive correlation between attitudes and achievement, they did not always reach the level of statistical significance.

Behr (1973) found that correlation between attitude and achievement in mathematics varies not only with grade level but also with the sex of the student. The study also found that girls' Mathematics marks were more predictable from their attitudes than boys' marks.

Zacharia (1977) in his study on the impact of attitudes and interest on achievement of secondary pupils in social studies found that there is high

positive correlation between achievement and their attitude regarding social studies.

Joseph (1979) in his study found that attitude towards science has a significant correlation with achievement in chemistry at the pre-degree level. Jain (1979) identified the major factors which influenced attainment of Mathematics at high school stage. Attitude towards Mathematics was found to be one of such factors that played vital role in the learning of Mathematics.

The study conducted by Pillai (1981) and Nair (1984) obtained the result that for each of the sex group, there is significant relation between science achievement and attitude towards problem solving.

Schofield (1982) studied the relationship between attitude and achievement in connection with sex of students grade level, type of achievement test and time during school year at which the measurements were taken. Findings indicated that observed relationship between attitudes and achievement were significantly stronger in boys than girls.

Patel (1984) and Budhev (1990) found that pupils possessing a favourable attitude towards Mathematics were better in mathematical ability than those with less favourable towards science were higher achievers in physical and life sciences.

Baby (1987) and Madhavan (1990) found that attitude towards education and achievement in Malayalam are significantly related.

A study by Pillai (1987) found that subjects of the three levels of attitude towards science differ significantly in their Biology achievement, whereas Sujatha (1987) contradicted this.

Kaaya (1987) indicated that there were significant differences in Mathematics attitude between achievers and under achievers, but no significant

differences in between the two sub groups of female achievers and female under achievers.

Indira (1989) reported that the relation between attitude towards science and achievement in physics is significant for low, average and high intelligent groups..

Noushad (1989) and Varghese (1989) obtained a significant positive relationship between attitude towards problem solving and process outcomes in Biology.

Padmakumari (1990) revealed in her study that socially advanced and disadvantaged groups differ in their mean score of achievement in mathematics and attitude towards Mathematics. It was also found that both variables, achievement in Mathematics and attitude towards Mathematics have significant relation with each of socio-economic status, caste, locale and family size.

Jayasree (1991) obtained a positive correlation between attitude towards science and Biology achievement. Thorndike (1991) showed that attitude toward Mathematics was predictive of final Mathematics course grade and the intention to continue to participate in Mathematics courses once enrolment becomes optional.

Tocci & Engelhard (1991) investigated the relationship of attitude towards Mathematics with Mathematics achievement and gender using samples from US and Thailand. In both countries achievement was significantly correlated with attitude towards Mathematics.

Wheat *et al.* (1991) noticed a relationship between students attitude towards Mathematics and their success in college Algebra. Tocci & Engelhard (1991) in their study in United States and Thailand also found that achievement is an effective predictor of attitude towards Mathematics.

Madsen *et al.* (1992) observed that conceptual understanding enhanced students' computational competence and promoted more positive attitude toward Mathematics. Reynolds & Walberg (1992) tested a structural model of Mathematics achievement and attitude with a probability sample of 3,116 adolescents from the longitudinal study of American youth. It was concluded that prior achievement and home environment influenced subsequent achievement and previous attitude had the most powerful influence on subsequent attitude.

McLeod (1992) revealed that attitude towards Mathematics have an important influence on the development of Mathematical skills and on the emotional reaction of children associated with Mathematics.

Wong (1992) investigated the relationships among Mathematics achievement affect and home background for Hong Kong students in grades 7-13. Achievement was most closely related to academic and non-academic self concepts and attitude toward Mathematics.

Sundararajan & Rajasekar (1993) investigated that effective teacher behaviour perceived by the students influences their attitude towards the subjects. The sex of the students and the locality of the school do not effect any significant difference in their attitude towards the study of Mathematics. But Singh (1993) observed that the students residing in industrial and urban localities have a more favourable attitude towards Mathematics in comparison with the students residing in rural localities.

Randhawa *et al.* (1993) observed Mathematics self efficiency as a mediator between mathematics attitude and achievement. Rech (1994) found that higher achieving black eighth grades have poorer attitudes towards Mathematics than other students.

Patel (1995) reported that students possessing high attitude towards Mathematics were found better in Mathematical ability than students possessing low attitude towards Mathematics. Krap (1991) had found that the attitude of teachers towards Mathematics have bearing on the Mathematical performance of students.

Malini (1995) studied the gender differences in certain psychological variables of Mathematics domain at secondary school level. The findings showed that the attitude towards Mathematics is significantly selected to achievement for girls but not for boys.

Stage & Kloosterman (1995) found that previous Mathematics skills were significantly related to beliefs about Mathematics, but beliefs were unrelated to final course grade for males. Conversely beliefs about Mathematics were significantly related to final course grade for females.

House (1995) investigated the predictive relationship between initial student attitudes, college admission test scores, years of High School Mathematics taken and subsequent achievement in introductory college chemistry. Results also indicated that initial attitudes were significant predictors of student performance, possibly better than traditional measures.

CLASS ROOM ENVIRONMENT FOR MATHEMATICS AND ACHIEVEMENT

Silbergeld & Koeing (1975) conducted studies, to evaluate the classroom psycho social environment for student behaviour and achievement It was found that science classes were moderately effective in personal development than English classes. Classroom environment was significantly related to science achievement and personal development.

Puri (1977) investigated the relationship between classroom climate and achievement motivation on sample of Gujarati medium schools of Baroda and

significant relationship between classroom climate and achievement was observed.

Sandeep (1977) found that poor, school environment affected adversely the attainment of perceptual and cognitive skills of the subject.

A study^{of} class room climate in secondary schools by Desai (1979) investigated that the level of classroom climate was positively related to pupils motivation and their academic achievement.

Fry & Coe (1980) reported distinct association between classrooms characterised by teacher support and involvement, with pupil motivations of enjoyment of learning.

Fraser & Fisher (1980) studied the effect of classroom psycho-social environment on student learning. The investigators revealed that there is significant association between student learning outcome and their classroom environment perception. Fraser & Rentoul (1980) investigated a significant amount of achievement variance between actual and preferred classroom interactions.

Mintazes (1982) revealed that achievement is related to students perceptions of the frequency of information. Students would judge a teacher only on the basis of what they see in the classroom.

Christian (1984) conducted a study on Group Dynamics, Academic Motivation, Classroom Climate and academic performance among the higher secondary students. It was observed that pupils in urban classrooms had shown higher mean scores on Academic Motivation as well as classroom climate but an average score on Academic performance.

The study by Doctor (1984) indicated a significant relationship between classroom climate and academic achievement. Upadhyaya (1984) conducted a similar study on tribal population of Bastar District in M^{dr}dhya Pradesh. It was

found that each of three aspects of classroom environment (inter personal relationships, goal orientation and system maintenance and change) was significantly related to academic achievement.

Fraser & Brien (1985) explored the association between class room environment and elementary school students' achievement.

Byrne *et al.* (1986) studied the relation ship between student achievement and classroom environment perception. Higher achievement scores were found in schools perceived as happy places with many opportunities.

In an investigation of the classroom environment for learning science in secondary schools of (the classroom) Kerala, Sivaprasad (1988) observed that most of the learning in the class rooms did not have provision for extra learning which narrows the learning circumference.

Singhal (1991) observed that academic achievement had significant positive correlation to academic motivation, affiliation, teacher support task orientation, competition and innovation-dimensions of class room social climate. Cooper & Robinsen (1991) found that perceived support from parents and teachers had positive but weak relationship with Mathematics self efficacy. Padhi (1992) observed that the creative ability and psycho-social characteristic of class room environment of the students are significantly related to their academic self concept and achievement in school subjects.

In a study on preferred and actual class room environment and the approach to learning Watkins & Akande (1993) found that Nigerian students prefer more teacher control a less competitive atmosphere and less emphasis on student friendships. Strykowski (1993) provided empirical evidence that instructional and class room environment as well as home environment influence educational outcomes.

Lee's findings (1993) reported that class room guidance can positively influence students' academic achievement in Mathematics. Puthenpurayil (1994) observed that there is only a low relationship between achievement in basic concepts of biological science and class room climate. Santhoshkumar (1995) found that the effect of class room environment on achievement in social science was not significant.

HOME ENVIRONMENT FOR MATHEMATICS AND ACHIEVEMENT

Wolf (1964) examined the important potential areas of the environment, leading to academic achievement. These included parental pressure for achievement motivation, their aspiration for the child and the kinds of rewards they gave.

Studies by Pillai (1965), Warriar (1966) and Joseph (1975) all showed that home environment and socio-economic level of the family have a significant influence on the achievement of pupils.

Dayer (1967) and Kellaghan (1977) found significant relationship between family environment and measures of academic achievement and intelligence.

Keeves (1972) found that structural variables of the home background are not significantly associated with final achievement in Mathematics or science, but home attitudes are found to be associated with final achievement in these subjects.

Reddy (1973) found that home environment was prominent as a potential predictor of academic achievement after intelligence. The study was mainly intended to find out the relationship between academic achievement in a subject or group of subjects at the first year degree examination and intelligence, need for achievement, personality and home environment of the students.

James & Hesselbrock (1976) in their study on perceived family environment and school adjustment of children reported that competent children are reared at homes that encourage cognitive and social initiative. It was supported by Tortman (1976) when he examined the question whether socio-economic status indicators, sufficiently represent those aspects of the home environment relevant to IQ and found that family's environment predicted academic achievement as well as did the child's IQ.

Salunke (1979) made an attempt to study the home environment, educational climate in the home, emotional climate in the home, SES, economic management and academic achievement and found that (i) the academic achievement of the students was related to their home environment. (ii) educational facilities and emotional happiness in the home contributed positively to the academic achievement of students.

Hildebrand & Patraci (1979) found that conceptual understanding of Mathematics at each developmental stage was influenced significantly by family environment of the subject. Grover (1979) indicated some influence of aspirations of father and mother over children's academic achievement. White (1982) and Subrahmaniam (1983) found that home environment is one of the factors which influence the academic achievement of a child.

In the study on affective correlates of the gifted under achievers, Maitra (1985) found that home environment is an important variable which could cause under achievement among gifted. In another study Jaganadhan (1985) indicated a significant effect of home environment on academic achievement.

Agarwal (1986) conducted a study on the effect of parental encouragement upon the educational development of the students and recorded that the high achieving group had been getting higher parental encouragement.

Trivedi (1987) observed that parental attitude was significantly related to academic achievement. Later, Diaz (1989) found that home environment differed from the higher and lower achievers' family with parental aspirations higher for higher achievers.

In a study Feldman & Wentzel (1990) reported significant relationship between achievement and parent-child interactions. Also it was observed that mother-father hostility is an indirect predictor's son's academic achievement.

Wong (1992) conducted a study on the Relationship among Mathematic achievement, Affective variables and Home Background and obtained a positive relation between achievement in Mathematics and home background. But Kloosterman & Cougan (1994) found that students who enjoyed Mathematics were also confident of their Mathematic abilities and that there was little correlation between parental support and student achievement.

Keith *et al.* (1995) examined the influence of parental involvement on the academic achievement of 8th grade Mexican-American children. The most salient findings was that, parental involvement influenced over all academic achievement, as well as promoting gains in the specific subject areas of reading, Mathematics, science and social studies.

Chaudhury & Basu (1998) in the study parent child relationship school achievement and adjustment of adolescent boys, concluded that parenting had significant association with school adjustment and school achievement. School achievement was most significantly associated with the parenting dimensions.

Leenadevi (1996) obtained a positively significant correlation between home environment and achievement in English.

HOME PRACTICE FOR MATHEMATICS AND ACHIEVEMENT

Weighened (1957) in his study on Adaptiveness and role of parents in academic success observed that parental reinforcement positively related to

academic achievement. Hudson (1966) opined that the difference between convergent and divergent thinkers is due to early experience in the environment.

Backer (1971) found that parents influenced their children's educational performances directly or indirectly. Pillai (1974) in his study revealed that the factors like coaching and practice have a considerable influence on intelligence test scores.

Grover (1979) conducted a study on parental aspiration as related to personality and school achievement of children and reported significant differences between school achievement of children of low aspiring parents and middle aspiring parents. In his study Mehra (1980) proved the influence of parental visit to school and teaching the child at home on achievement.

Agarwal (1986) examined the effect of parental encouragement up on educational development of secondary school students. He found that high achieving group had been getting parental encouragement.

Despande (1986) investigated the relationship between home work and achievement. According to the study there is an indication that students who are given regular home work perform better.

Yadev (1986) in an study found that time advocate by pupils to do home task, reading newspaper and magazine, receiving help from parents or father at home and time engaged in co-curricular activities outside the school hours are positively related to their academic achievement.

Basavayya & Patnaik (1989) conducted a study to investigate the factors related to student's liking Mathematics at secondary school levels. They found that the education of brothers and sisters of the students has got positive effect towards the student liking mathematics, as they get help in solving their mathematical problems from them.

Portes (1991) in his study on assessing children's cognitive environment through parent-child interactions observed that material verbal guidance was a significant predictor of academic achievement particularly for Mathematics and references skills.

The relationship between family ethnicity and scholastic achievement was examined by Ferguson *et al.* (1991) and found that ethnicity was not related to measure of performance. They suggested that family ethnicity and test results can be adequately explained by variations on socio-economic status.

Shrivastava (1991) observed that families of high achievers were more structured and exercised more controls than those of low achievers.

O'connell (1992) reported that students working with parental partners displayed higher problem solving ability than those not working with partners.

Reynolds (1992) compared parental involvement and their effects on academic achievement and reported that teachers rating of parental involvement in children's education exhibited high correlation with reading and Mathematics.

Mumthas (1993) conducted a study on standard VIII pupils of Kerala on the effect of practice of tutoring at home on achievement in Mathematics, and found that tutoring at home has a significant effect on the achievement of Mathematics.

Georges and Elliot (1995) investigated the influence of the students home work time and parental time and involvement in helping activities on the academic performance of students in grade III and V. Basheer (1995) found that significant and positive correlation existed between the variables home practice in achievement in Chemistry.

A TREND REPORT OF THE STUDIES

While attempting to review the researches in the country and abroad with respect to the problem area of the study, it is seen that several attempts have been made to study the effect of cognitive and non-cognitive variables on achievement.

It becomes obvious from the review that some of the studies yielded positive results, some negative results and some other studies came up with inconclusive results. There are more studies showing positive and significant relationship than those showing no relationship and negative results.

There are several studies in the area which have attempted in replicating earlier studies, taking different samples or by including different school subjects at various levels and by adding or eliminating one or the other factors in the study.

Another point that becomes obvious is that the studies probe into multiplicity of variables in a single research, using a large number of tools, whether standardised or adopted or constructed, and using various statistical techniques for analyzing the data.

The survey also indicated some agreements but some inconsistencies in the findings. In this context the investigator decided to take up a study to know how important and consistent is each cognitive and non-cognitive variables selected in influencing achievement in Mathematics. The present study is an area in which very little work has been done and the investigator hopes that the findings of the study will be a significant addition to the knowledge in this field.

CHAPTER III

METHODOLOGY

Variables, Objectives, Hypotheses
Methodology
Design of the study
Tools used for data collection
Description of the tools
Sample for the study
Data collection procedure
Scoring and consolidation
Statistical techniques used

METHODOLOGY

Research investigations require gathering of data for testing the hypotheses. Different methods and procedures are adopted for acquisition of data using research tools, depending on the nature of the study.

In this chapter the design of the study is described under the sections: variables, objectives, hypotheses and methodology with details of tools used for measuring the variables, sample drawn, data collection procedure, and major statistical techniques used for analysing the data, scoring and consolidation of data.

VARIABLES

The present investigation is an attempt to determine the extent of relationship between “achievement in Mathematics” and ‘cognitive style and selected non-cognitive variables”. Also an attempt is made to find the efficiency of the independent variables in predicting the “achievement in Mathematics”. The dependent and independent variables selected for the study are:

Dependent variable

Achievement in Mathematics

Independent variables

1. Cognitive style
2. Level of aspiration
3. Attitude towards Mathematics
4. Class room environment for Mathematics
5. Home environment for Mathematics
6. Home Practice for Mathematics

Selection of Variables

An extensive review of literature in the area, helped the investigator to identify variables that are considerably related to school performance and achievement. The investigator reviewed the wide spectrum of research in this area conducted in developed countries and in India in detail.

Better school performance was initially attributed to the function of cognitive constituents of personality like intelligence and aptitude. But now it has been established that academic achievement depends to a great extent on non-cognitive factors also.

The selection of any variable as an independent variable was based on the assumption that the variable might be related to student performance and achievement in Mathematics and could be used as a probable predictor of achievement in Mathematics.

The investigator had to be satisfied with the limited number of variables as tools were not available for most of them, in the context of prevailing education system in Kerala. Hence the investigator developed such certain tools for the study.

OBJECTIVES AND HYPOTHESES

Objectives of the study

- I. To find the extent of relationship between achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub-samples.
- II. To examine whether the equivalent correlations obtained for achievement in Mathematics with (i) cognitive style (ii) each of Field Dependent (FD), Intermediate (INT) and Field Independent (FI) orientations of cognitive style (iii) selected non-cognitive variables for, sex groups (boys / girls) and locale (urban / rural), differ significantly.

- III. To predict achievement in Mathematics using a few selected independent variables, by means of step wise regression by ANOVA approach.

Hypotheses

- I. There will be significant and positive relationship between achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub samples.
- II. There will be significant differences in the correlation between achievement in Mathematics and (i) cognitive style (ii) each of Field Dependent (FD), Intermediate (INT) and Field Independent (FI) orientations of cognitive style and selected non-cognitive variables for, sex groups (boys / girls) and locale (urban / rural).
- III. Achievement in Mathematics can be predicted with the help of a few selected independent variables.

METHODOLOGY

The testing of the hypotheses of the study demands for the selection of appropriate procedure, suitable tools, the collection of relevant data and adoption of appropriate statistical techniques. These are described under the following heads.

- (i) Design of the study
- (ii) Tools used for Measurement
- (iii) Sample for the study
- (iv) Data collection Procedure
- (v) Scoring and consolidation of data
- (vi) Statistical techniques used

(i) DESIGN OF THE STUDY

The present study, as indicated earlier is an attempt to find out the relationship of cognitive style and selected non-cognitive variables with achievement in Mathematics of standard X pupils. The study is therefore designed with achievement in Mathematics of the pupils of standard X as dependent variable and cognitive style and selected non-cognitive variables as independent variables.

(ii) TOOLS USED FOR DATA COLLECTION

The tools used for measuring the variables of the study are the following:

- (1) Achievement Test in Mathematics (Santhamma Raju and Ancel Maria)
- (2) Group Embedded Figures Test – GEFT (Oltman *et al.* 1971)
- (3) Letter Cancellation test (Muthayya B.C, 1959)
- (4) Scale of Attitude towards Mathematics (Santhamma Raju and Ancel Maria)
- (5) Class room Environment Inventory for Mathematics (Santhamma Raju and Ancel Maria)
- (6) Home Environment Inventory for Mathematics (Santhamma Raju and Ancel Maria)
- (7) Home Practice Inventory for Mathematics (Santhamma Raju and Ancel Maria).

(iii) DESCRIPTION OF TOOLS

Details of the tools used for Data collection is presented in Table 2.

TABLE 2

Details of the tools used for data collection

Sl. No	Name of the tool	Author	Variable measured	No. of items	Time limit
1.	Group Embedded Figures Test (GEFT)	Oltman (1971)	Cognitive style (FD/INT/FI)	25	45 min.
2.	Scale of Attitude towards Mathematics	Investigator and the supervising teacher	Attitude towards Mathematics	32	No time limit.
3.	Letter cancellation Test	Muthayya B.C.	Level of Aspiration	41 rows of letters	120 sec. For each Repetition
4.	Class room Environment Inventory for Mathematics	Investigator and supervising teacher	Class room Environment for Mathematics	42	30 min.
5	Home Environment Inventory for Mathematics	Investigator and the supervising teacher	Home Environment for Mathematics	22	30 min.
6.	Home Practice Inventory for Mathematics	Investigator & supervising teacher	Home practice for Mathematics	24	15 min.
7.	Achievement Test in Mathematics for standard X	Investigator and the supervising teacher	Achievement in Mathematics	60	90 min.

Achievement Test in Mathematics

This test is intended to evaluate the achievement in **Mathematics** of the pupils of standard X. It is constructed and standardised by the investigator under the supervision of Dr. Santhamma Raju, Professor, Department of Education, University of Calicut.

The procedures followed and techniques used in the standardisation of the achievement test in Mathematics for standard X are discussed below.

Planning of the Test

An achievement test in Mathematics was constructed based on Bloom's Taxonomy (1979) of educational objectives of the cognitive domain. The objectives considered were Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The test covers the content area of the syllabus prescribed for Mathematics of Standard X of Kerala State.

Preparation of the test

The syllabus of Mathematics for Standard X of Kerala state for the academic year 1997-98 was analysed carefully. Text Books, reference materials, question banks, question papers, hand books, and other standardised tests of Mathematics achievement were utilised as sources for framing items. Special literature on preparing objective tests as Harper & Harper (1990) and Grounlund & Linn (1990) were also used in developing items.

Weightage to the objectives and content area of the proposed test was decided in consultation with experts in the field of test construction and evaluation, high school teachers who deal with Mathematics and based on the time required to teach the topics. A blueprint ensuring content coverage of the test with respect to the weightages given for various objectives was prepared.

First step in the construction of an achievement test is the preparation of a design which involves the following stages.

Weightage to Objectives:

It was decided to follow Bloom's Taxonomy of objectives (cognitive domain) for the item construction in the achievement test in Mathematics for standard X. All the six levels of objectives under cognitive domain viz., Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation were included in the test. Test items were prepared according to the different

abilities specified under each category. The weightage assigned for various objectives has been presented in Table 3.

Table 3

**Statement showing the weightages to objectives in
Achievement test in Mathematics**

Sl. No.	Objectives	Marks	Percentage*
1.	Knowledge	28	18
2.	Comprehension	27	17
3.	Application	26	16
4.	Analysis	26	16
5.	Synthesis	26	16
6.	Evaluation	27	17
Total		160	100

* Approximate percentage

Weightage to Content

The objectives selected can be verified only through some content. Hence for the evaluation of objectives in the cognitive domain, suitable topics were selected and weightage was given accordingly. The weightages assigned to content in Mathematics of standard X of are given to in Table 4.

Table 4
Statement showing the weightages to content in
Achievement test in Mathematics

Sl. No.	Content sub units	Marks	Percentage*
1.	Function	11	7
2.	Polynomials	14	9
3.	Progression	13	8
4.	Solids	15	9
5.	Circles-I	10	6
6.	Trigonometry	18	11
7.	Logarithm	11	7
8.	Rational Expressions	8	5
9.	Quadratic Equations	15	9
10.	Circles – II (more about circles)	12	8
11.	Statistics	12	8
12.	Different systems of numeration	11	7
13.	Computing	10	6
Total		160	100

*Approximate percentage

Weightage to difficulty level!

Each question must have a capacity to differentiate bright pupils from below average pupils. So it was decided that the test should contain approximately 25 percent easy item, 50 percent moderatory difficult and 25 percent difficult items so that test as a whole may be of average difficulty. The weightages assigned for the difficulty level are given in Table 5.

TABLE 5
Statement showing the weightages to difficulty level in
Achievement test in Mathematics

Sl. No.	Level of difficulty	Marks	Percentage*
1.	Easy	42	26
2.	Average	86	54
3.	Difficult	32	20
Total		160	100

*Approximate percentage

Preparation of Blue-print

Blue-print is a three dimensional chart specifying the content covered by the test in relation to the weightage assigned for different objectives and type of items. Here only objective type items were opted, and therefore, the blue print is a two dimensional chart indicating the content area and the number of questions under each objective. The blue-print of the achievement test is given in Table 6.

TABLE 6

**Blue print of the Achievement
test in Mathematics for standard X**

Sl. No	Topics	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation	Total
1.	Function	3	2	1	2	2	1	11
2.	Polynomials	3	2	2	2	2	3	14
3.	Progression	2	2	2	3	2	2	13
4.	Solids	2	2	2	3	3	3	15
5.	Circles-I	1	2	3		2	2	10
6.	Trigonometry	3	4	3	3	2	3	18
7.	Logarithms	2	2	2	2	3		11
8.	Rational Expressions	1	1	1	2	2	1	8
9.	Quadratic Equations	2	2	3	2	3	3	15
10.	Circles – II	3	2	2	2	1	2	12
11.	Statistics	3	2	2	2	1	2	12
12.	Numeration	1	2	2	2	1	3	11
13.	Computing	2	2	1	1	2	2	10
Total		28	27	26	26	26	27	160

The draft test comprising of 160 items was pooled. The items were arranged objective wise according to Bloom's Taxonomy of objectives in the cognitive domain viz; Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The draft test was prepared in a booklet form along with a response sheet. For answering the test items, the students had to draw a small circle around the letter a, b, c or d corresponding to the right answer. A score of '1' is given to each right answer and a '0' score to each wrong answer. The scoring key also was prepared. The draft test along with the response sheet and scoring key are given in Appendices I - IV.

Try out of the test

The draft test was tried out on a representative sample of 425 students studying in standard X. Students from six schools were randomly selected for the pilot testing.

Item Analysis

The item analysis was done using the method suggested by Ebel (1972). The answer sheets of 425 students were scored. Incomplete answer sheets were rejected. 385 answer sheets were obtained for analysis. The number again was reduced to 370 by random rejection of 15 answer sheets to facilitate computational procedures. The answer sheets were arranged from the highest score to the lowest score to get two extreme groups. From this, the upper 100 answer sheets, which is approximately 27 percent of the total, having highest scores and the lower 100, having the lowest scores were selected.

Adopting the procedure suggested by Ebel (1972), the test was item analysed by computing the indices of item difficulty and discriminating power. The number of pupils making the correct answer for an item in the high achieving and low achieving groups were counted. The discriminating power was calculated using the formula,

$$Dp = \frac{U - L}{N} \text{ and}$$

the difficulty index using the formula

$$DI = \frac{U + L}{2N}$$

Where, U = the number of correct responses in the upper group

N = the number of subjects in each group

L = the number of correct responses in the lower group

TABLE 7

**Data and results of item analysis of the
achievement test in Mathematics for standard X.**

Q. No.	U	L	$D.I. = \frac{U+L}{2N}$	$D_p = \frac{U-L}{N}$	Items selected
1	91	78	0.825	0.13	
2.	66	46	0.56	0.20	
3.	77	53	0.65	0.24	
4.	72	52	0.62	0.20	
5.	80	48	0.64	0.32	
6.	65	25	0.45	0.40	Selected
7.	80	66	0.73	0.14	
8.	87	66	0.765	0.21	
9.	84	41	0.625	0.43	Selected
10.	47	28	0.375	0.19	
11.	85	42	0.635	0.43	Selected
12.	41	33	0.37	0.08	
13.	72	50	0.61	0.22	
14.	87	18	0.525	0.69	Selected
15	89	17	0.53	0.72	Selected
16	73	27	0.50	0.46	Selected
17	81	40	0.605	0.41	Selected
18	92	50	0.71	0.42	Selected
19	71	20	0.455	0.51	Selected
20	93	52	0.725	0.41	Selected

Q. No.	U	L	$D.I. = \frac{U+L}{2N}$	$D_p = \frac{U-L}{N}$	Items selected
21	65	25	0.45	0.40	selected
22	69	23	0.46	0.46	selected
23	90	44	0.67	0.46	selected
24	87	43	0.65	0.44	selected
25	91	48	0.70	0.43	selected
26	83	40	0.615	0.43	
27	69	13	0.41	0.56	
28	41	10	0.255	0.31	
29	87	60	0.735	0.27	
30	83	58	0.705	0.25	
31	57	25	0.41	0.32	
32	83	42	0.63	0.41	selected
33	88	46	0.67	0.42	selected
34	91	46	0.685	0.45	selected
35	26	33	0.295	0.07	
36	93	73	0.83	0.20	
37	88	47	0.675	0.41	selected
38	72	30	0.51	0.42	selected
39	71	13	0.42	0.58	selected
40	63	25	0.44	0.38	selected
41	93	41	0.67	0.52	selected
42	79	7	0.43	0.72	selected
43	89	22	0.555	0.67	selected
44	73	27	0.50	0.46	selected
45	67	23	0.45	0.44	selected
46	19	2	0.105	0.17	
47	6	37	0.215	-0.31	
48	29	32	0.305	-0.03	
49	71	30	0.51	0.41	selected
50	14	11	0.125	0.03	
51	90	50	0.70	0.40	selected
52	86	21	0.535	0.65	selected
53	84	13	0.485	0.71	selected
54	2	11	0.065	0.09	
55	12	11	0.115	0.01	
56	93	52	0.725	0.41	selected
57	76	31	0.535	0.45	selected
58	77	35	0.56	0.42	selected
59	29	8	0.185	0.21	
60	12	7	0.095	0.05	

Q. No.	U	L	$D.I. = \frac{U+L}{2N}$	$D_p = \frac{U-L}{N}$	Items selected
61	66	18	0.42	0.48	selected
62	18	1	0.095	0.17	
63	36	21	0.285	0.15	
64	28	12	0.20	0.16	
65	62	18	0.40	0.44	selected
66	72	11	0.415	0.61	selected
67	78	8	0.43	0.70	selected
68	17	3	0.10	0.14	
69	43	40	0.415	0.03	
70	64	18	0.41	0.46	
71	63	20	0.42	0.43	selected
72	45	32	0.385	0.13	
73	89	60	0.745	0.29	
74	20	20	0.20	0	
75	23	15	0.19	0.08	
76	17	1	0.09	0.16	
77	37	36	0.365	0.01	
78	30	17	0.235	0.13	
79	19	2	0.105	0.17	
80	31	11	0.21	0.20	
81	62	22	0.42	0.40	
82	88	47	0.675	0.41	selected
83	79	33	0.56	0.46	selected
84	63	50	0.565	0.13	
85	86	46	0.66	0.40	
86	39	16	0.275	0.23	
87	66	24	0.45	0.41	selected
88	68	27	0.475	0.41	selected
89	67	51	0.59	0.11	
90	67	27	0.47	0.40	selected
91	65	15	0.40	0.50	selected
92	53	20	0.365	0.33	
93	73	25	0.49	0.48	selected
94	32	21	0.265	0.11	
95	23	20	0.215	0.03	
96	57	22	0.395	0.35	
97	73	32	0.525	0.41	selected
98	67	23	0.45	0.44	selected
99	52	18	0.35	0.34	
100	65	22	0.435	0.43	selected

Q. No.	U	L	$D.I. = \frac{U+L}{2N}$	$D_p = \frac{U-L}{N}$	Items selected
101	48	22	0.35	0.26	
102	42	28	0.35	0.14	
103	41	32	0.365	0.09	
104	47	20	0.335	0.27	
105	50	12	0.31	0.38	
106	35	7	0.21	0.28	
107	68	42	0.55	0.26	
108	91	66	0.785	0.25	
109	79	28	0.535	0.51	selected
110	82	47	0.645	0.35	
111	83	35	0.59	0.48	
112	75	28	0.515	0.47	selected
113	84	37	0.605	0.47	selected
114	52	30	0.41	0.22	
115	14	12	0.13	0.02	
116	46	20	0.33	0.26	
117	37	18	0.275	0.19	
118	68	10	0.39	0.58	
119	56	31	0.435	0.25	
120	66	31	0.485	0.35	
121	41	31	0.36	0.10	
122	24	28	0.26	-0.04	
123	13	5	0.09	0.08	
124	39	23	0.31	0.16	
125	66	45	0.555	0.21	
126	16	26	0.21	-0.10	
127	62	11	0.365	0.51	
128	67	22	0.445	0.45	selected
129	40	43	0.415	-0.03	
130	8	25	0.165	-0.17	
131	39	22	0.305	0.17	
132	51	26	0.385	0.25	
133	37	6	0.215	0.31	
134	76	32	0.54	0.44	selected
135	51	35	0.43	0.16	
136	40	20	0.30	0.20	
137	81	50	0.655	0.31	
138	62	17	0.395	0.45	
139	69	28	0.49	0.41	selected
140	53	21	0.37	0.32	

Q. No.	U	L	D.I. = $\frac{U+L}{2N}$	D _p = $\frac{U-L}{N}$	Items selected
141	41	36	0.385	0.05	
142	79	35	0.57	0.44	Selected
143	59	24	0.415	0.35	
144	20	15	0.175	0.05	
145	46	3	0.245	0.43	
146	71	9	0.40	0.62	selected
147	16	16	0.16	0	
148	16	2	0.09	0.14	
149	36	35	0.355	0.01	
150	59	40	0.495	0.19	
151	40	21	0.305	0.19	
152	34	15	0.245	0.19	
153	28	16	0.22	0.12	
154	34	16	0.25	0.18	
155	28	22	0.25	0.02	
156	56	26	0.41	0.30	
157	67	23	0.45	0.44	selected
158	39	5	0.22	0.34	
159	75	32	0.535	0.43	selected
160	32	6	0.19	0.26	

Note: U = Percentage of correct responses in the upper group.

L = Percentage of correct responses in the lower group.

DI = Difficulty index.

D_p = Discriminating power.

Selection of items for final test

Items having the difficulty index around 0.5 and discriminating power above 0.35 were readily selected. In order to comply with the blue print, five items having difficulty index around 0.7 were also chosen. 60 items were thus selected for the final test.

The final test in Malayalam and the corresponding English version are presented as Appendices V and VI respectively. The response sheet and the scoring key of the final test are given in Appendices VII and VIII respectively.

Scoring

The test being an objective type, the scoring scheme of the test is '1' score for each correct answer and '0' score for each incorrect answer.

Validity of the test

The content validity and concurrent validity of the test were established in the present study.

Content validity was ensured by the clear statement of the instructional objectives on the six levels viz; knowledge, comprehension, application, analysis, synthesis and evaluation, with the content of Mathematics of standard X.

Concurrent validity was established by finding out the coefficient of correlation between the test score and one external criterion. The average marks obtained in Mathematics for the terminal examinations was taken as the external criterion. The validity coefficient was computed by Pearson, Product moment correlation coefficient:

$$r_{xy} = \frac{N\sum xy - \sum x \sum y}{\sqrt{\left[N\sum x^2 - (\sum x)^2 \right] \left[N\sum y^2 - (\sum y)^2 \right]}}$$

where,

r_{xy} = Coefficient of correlation

x = scores obtained on the test of achievement in Mathematics

Y = Average marks obtained for the terminal examinations in Mathematics

N = Total number of pupils.

The correlation coefficient thus calculated was found to be 0.76 (N = 40) which is a high correlation. The test therefore can be considered as a valid tool to measure achievement in Mathematics.

Reliability of the test

The reliability of the test was calculated by split-half method. The test scores obtained by each student was divided into two comparable sets by separating the odd-even items. Thus there were two sets of scores for a single student. The product moment correlation coefficient was found out to be 0.76 (N = 40). The correlation thus obtained gives the reliability coefficient of half the test. The reliability of the whole test was calculated using the Spearman Brown formula (Ebel, 1972).

$$r_{11} = \frac{2 r_{1/2 1/2}}{1 + r_{1/2 1/2}}$$

Where r_{11} = the reliability coefficient of the test

$r_{1/2 1/2}$ = the reliability coefficient of half the test.

$$\begin{aligned} \text{Reliability coefficient of the whole test} &= (2 \times 0.76) / (+0.76) \\ &= 0.86 \end{aligned}$$

The reliability of the test using Test-retest method was found to be 0.88 (N = 50) which is a high correlation.

The indices of validity and reliability indicate that the achievement test has acceptable psychometric properties to measure the achievement in Mathematics of Standard X pupils of Kerala State following the state syllabus.

Illustrative test items of each objective are given below.

(i) Knowledge:

Knowledge is the remembering of previously learned material. This may involve the recall or recognition of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.

Example:

What is the formula for calculating the price index number

- | | |
|-----------------------------|-----------------------------|
| a. P_0 / P_1 | b. P_1 / P_0 |
| c. $(P_0 \times 100) / P_1$ | d. $(P_1 \times 100) / P_0$ |

Answer: d.

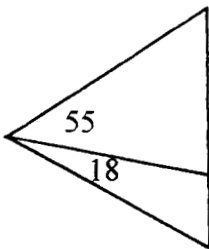
(ii) Comprehension:

According to Grounlund (1985), comprehension is the ability to grasp the meaning of material. This may be shown by translating the material from one form to another by interpreting the material and estimating future trends. These learning outcomes go one step beyond the simple remembering of material and represent the lowest level of understanding.

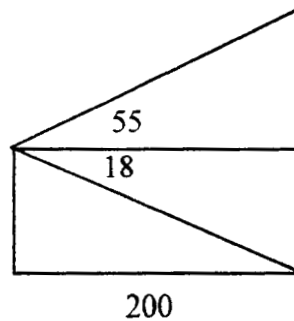
Example:

A man standing on the top of a building observes the top of a T.V. Tower at an angle of elevation of 55° and observes its foot at an angle of depression 18° . The building is 200 m away from the tower. Which is the correct figure to find the height of the tower.

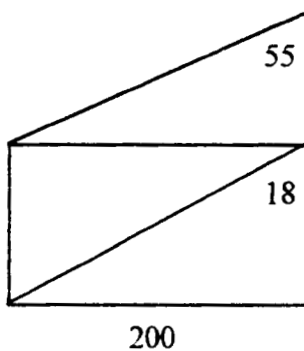
a.



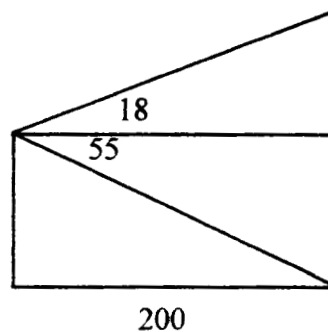
b.



c.



d.



Answer : b

(iii) Application:

Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.

Example:

If $P(x) = 2x^3 + 9x^2 - 5x + k$ and $P(1) = 0$, what is the value of k ?

- a. 16 b. -16 c. 6 d. -6

Answer: d.

(iv) Analysis:

Analysis refers to the ability to break down material into its component parts so that its organisational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts and recognition of the organisational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application.

Example:

A cone and a hemisphere have the same diameter and the same height. What is the ratio of their volumes?

- a. 2:1 b. 1:2 c. 1:1 d. 1:3.

Answer: c.

(v) Synthesis:

Synthesis is the ability to put parts together to form a new whole. This is the process of working with elements or parts and combining them in such a way as to constitute a pattern or structure, which was not clear before.

Example:

The algorithm to find the area of a triangle is given below.

1. Start
2. Write A
3. Stop
4. Calculate $[s(s-a)(s-b)(s-c)]^{1/2}$
5. Read a, b, c
6. Calculate $s = (a + b + c) / 2$

What is the proper order?

- a. 1,6,2,3,4,5
- b. 1,2,3,4,5,6
- c. 1,5,6,4,2,3
- d. 1,2,5,6,4,3

Answer: c.

(vi) Evaluation:

Evaluation is concerned with the ability to judge the value of material for a given purpose. The judgements are to be based on definite criteria. This may be internal criteria (organisation) or external criteria (relevance to the purpose) and the student may determine the criteria or be given him.

Example:

According to the price of some commodities in the years 1991 and 1995 the cost of living index number is 120.4. How do we interpret the situation if for each Rs 1000 in 1991, an average family spends Rs 1204 in 1995:

- a) maintain better standard
- b) maintain the same standard
- c) live in lower standard
- d) manage living

Answer: b.

Cognitive style (Group Embedded Figures Test – GEFT)

The group Embedded Figures Test developed by Oltman *et al.* (1971) was used to measure the cognitive style of the sample by employing a hidden figure format designed for group administration. The test requires a subject to identify certain basic shapes in 25 different items and are divided into three parts. Part I contains seven problems and part II & III contain nine problems each. The first section is for practice.

Scoring and interpretation

The subject's test score is obtained by finding the sum of the correct items found on the second and third parts of test. The scores range from 0-8 indicating a Field Dependent (FD) orientation, 9-13 Intermediate (INT) orientation and 14-18 Field Independent (FI) orientation.

Reliability and validity

The split half reliability of 0.82 is reported by the test manual when Embedded Figures Test (EFT) was used as a criteria. The validity is ranging between 0.63 and 0.82. (The 'r' is negative since EFT is scored in negative fashion).

(3) Letter cancellation test

This test is one of the sub test of the Preliminary design for a study of level of Aspiration by Muthayya (1960). The original test consisted of three performance tests namely, (i) Rotters level of aspiration board, (ii) Card sorting (iii) Finger dexterity, (iv) Symbol Digit substitution test (v) Letter cancellation test and (vi) Computation tests. The author has established reliability of all the sub tests independently and intercorrelations between the sub tests.

The general technique of Level of Aspiration tests requires the repeated performance of a task (usually a mechanical one) which can be carried out with varying degrees of speed and accuracy or goodness. The subject is made

acquainted with the task and asked to do it. He is then told of his actual score on the performance and asked to estimate how well he will do next time. This procedure is repeated 5 to 10 times. The mean score is derived from the discrepancy score (D. S.). This is based on the difference between actual performance on 'x' trial and aspiration for the trial (x+1).

The letter cancellation test has all the qualities of a good level of aspiration test. It is mechanical. It can be performed with varying degrees of speed.

Scoring procedure

The test consists of 41 rows of letters of the English Alphabet arranged at random in each row without any meaning. The subject has to cross out all the 'a' s and 'i' s by a horizontal stroke. There are 146 'a' s and 108 'i' s making a total of 254 letters. The time limit for this task was 120 seconds. The subject should proceed systematically row by row down the page. His score would be the number of letters he crosses out within the time limit. If he leaves out any letters ('a' s or 'i' s) within the rows he has completed, that will be deducted from his total score for the trial. He is then told, what his actual score on the performance was and asked to estimate how well he will do next time. Then the goal discrepancy scores were calculated from the actual score on the trial 'x' and aspired score for the (x+1)th trial. It is positive if the aspiration is higher than the preceding performance and negative if it is lower. The mean of discrepancy scores of all the trials was found out to measure the level of aspiration.

Reliability and validity of the test

The test-retest reliability was found to be 0.78 and the split half reliability 0.91. For another testing the split half reliability was obtained as 0.75.

The validity of the test was established by correlating it with other sub – tests. The correlation coefficients obtained with other sub-tests are

- | | | |
|-----|------------------------------------|--------|
| (1) | Rotter's level of aspiration board | = 0.49 |
| (2) | Card sorting | = 0.61 |
| (3) | Finger dexterity | = 0.76 |
| (4) | Symbol digit substitution test | = 0.44 |
| (5) | Computation test | = 0.21 |

Nancy (1994) had re-established the reliability of the scale. She obtained reliability coefficient of 0.69 with the ninth standard students (N=80)

These psychometric properties of the test show that it can yield valid and reliable measure of level of aspiration

(4) Scale of attitude towards Mathematics

This is a Likert type attitude scale, standardised by the investigator in collaboration with her supervising teacher, Santhamma Raju. The working definition set for the preparation of the scale is that attitude towards Mathematics is positive or negative feeling that a student of Mathematics hold about Mathematics.

For developing the test the investigator studied available Attitude tests (both general and specific). After this five Components of Attitude towards Mathematics were selected viz.;

- 1) Appreciation of the role of Mathematics
- 2) Preference for Mathematics
- 3) Devotion to Mathematical ideas and activities
- 4) Active involvement in related problems.
- 5) Commitment

This is a five -point scale. The draft scale consisted of 35 statements in which 20 statements are positive and 15 negative. The subjects have to

respond to each statement in terms of their own agreement or disagreement with the statement, by selecting any one of the five choices, viz.; Strongly agree, Agree, Undecided, Disagree, Strongly disagree. Agreements for positive statements were considered to indicate positive feeling towards Mathematics. Agreements for negative statements were considered indicative of negative feeling towards Mathematics.

Standardisation of the scale

The statements for the final scale were selected on the basis of the t-values, the ability of each statement to discriminate significantly between high scores and low scores. The draft scale was administered on a sample of 400 students of standard X, selected by stratified sampling method. From 370 response sheets selected by random rejection of 30, the answer sheets were arranged from the highest score to the lowest score to get the extreme groups. The upper 100 answer sheets and lower 100 were selected.

The t-values for each statement was found by the formula, (Edwards, 1957)

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}{N(N-1)}}$$

where

\bar{X}_H = the mean response score of a given statement for high group

\bar{X}_L = the mean response score of a given statement for low group

N = the number of subjects in high or low group.

A statement with $t \geq 2.58$ was selected for the final scale. The details of the items with respect to 't' values are presented in Table 8.

Table 8

Details of item analysis of the scale of Attitude towards Mathematics

Sl. No	\bar{X}_H	\bar{X}_L	$\Sigma(X_H - \bar{X}_H)^2$	$\Sigma(X_L - \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	t
1*	2.68	2.37	91.58	63.31	0.125	0.31	2.48
2	2.90	2.62	13	45.56	0.077	0.76	9.87
3	2.81	2.05	33.39	66.75	0.1005	0.76	7.56
4	2.90	1.96	15	61.84	0.088	0.94	10.68
5	2.90	1.96	31.4	69.84	0.101	0.94	9.31
6	2.49	1.94	64.70	71.73	0.117	0.55	4.7
7	2.90	2.15	31.4	68.75	0.1005	0.75	7.46
8	2.95	2.50	8.8	49	0.076	0.45	5.92
9	2.89	2.14	19.78	70.04	0.095	0.75	7.89
10	2.79	2.12	21.18	84.56	0.103	0.67	6.51
11	2.29	1.74	76.58	51.24	0.114	0.15	4.83
12	2.96	2.47	7.84	58.92	0.082	0.49	5.98
13	2.65	1.78	42.76	43.16	0.093	0.87	9.35
14	2.93	2.01	10.51	66.99	0.088	0.92	10.45
15	2.77	2.13	44.63	73.3	0.109	0.64	5.87
16*	2.71	2.50	36.81	47	0.092	0.21	2.28
17	2.63	1.86	51.31	58.04	0.105	0.77	7.33
18	2.82	2.50	24.76	47	0.085	0.32	3.76
19	2.74	2.18	37.70	68.28	0.103	0.56	5.44
20	2.65	1.81	52.75	62.57	0.108	0.84	7.78

Sl. No	\bar{X}_H	\bar{X}_L	$\Sigma(X_H - \bar{X}_H)^2$	$\Sigma(X_L - \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	t
21	2.67	1.75	46.11	58.75	0.103	0.92	8.93
22	2.75	1.75	35.44	56.75	0.096	0.10	10.42
23	2.84	1.76	23.44	54.24	0.089	1.08	12.13
24	2.93	2.34	12.50	70.44	0.092	0.59	6.41
25*	2.48	2.18	67.36	88.12	0.125	0.3	2.40
26	2.90	1.86	13	66.04	0.089	1.04	11.69
27	2.92	2.28	13.36	62.16	0.087	0.64	7.36
28	2.86	1.84	27.48	61.43	0.095	1.02	10.74
29	2.83	1.83	28.11	70.51	0.099	1	10.1
30	2.75	1.71	33.69	68.21	0.102	1.04	10.2
31	2.91	2.29	16.18	56.58	0.086	0.62	7.21
32	2.81	2.14	29.29	62.04	0.096	0.67	6.98
33	2.68	1.70	45.06	59	0.103	0.98	9.52
34	2.40	1.44	70	40.64	0.106	0.96	9.06
35	2.90	1.98	48.6	75.96	0.112	0.92	8.21

$$S_H = \sqrt{\frac{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}{N(N-1)}}$$

Note: * indicate the item rejected

The final scale thus consisted of 32 statements (18 positive and 14 negative).

Example for a positive statement

I am interested to take an active part in the Mathematics club activities.

Example for a negative statement:

After my schooling I don't like to go for any course of studies related to Mathematics

Scoring Procedure

As each statement of the scale is to be responded in either of the five ways, viz., Strongly agree, Agree, Undecided, Disagree and Strongly disagree, the scoring scheme accepted for the scale was as follows: For a positive statement assign scores, 1,2,3,4 & 5 to responses, Strongly agree, Agree,

Undecided, Disagree and Strongly disagree respectively. The sum of the scores of all the statements is the measure of one's attitude towards Mathematics.

Reliability of the test

The investigator established the reliability of the test by test-retest method with an interval of 10 days between the two testing. The sample taken was 40 pupils of Standard X. The reliability is 0.63 which shows that the scale is reliable to measure the attitude towards Mathematics. The reliability coefficient of the scale computed by split-half method was found to be 0.78 (N = 60) which shows that the scale is highly reliable to measure the attitude of the pupils towards Mathematics.

Validity of the test

The criterion-related validity was established. The external criterion taken was the average scores obtained in the terminal examinations. (on the assumption that cognitive behaviour and affective behaviour are inter related). The coefficient of correlation so obtained is 0.64 (N = 40) which is marked or substantial. This provides evidence that the scale is reasonably valid measure of attitude towards Mathematics of pupils of standard X.

The Draft scale, the final scales and the English version of the final scale and the response sheet are given as Appendices IX –XII.

Class Room Environment Inventory for Mathematics

This tool was constructed and standardised by the investigator in collaboration with her supervising teacher, Santhamma Raju.

A large number of researchers have attempted to describe how the overall climate or culture of a school affects learning. A good deal of work suggests that class room environments are very important in influencing the students attitudes towards school as well as their achievement (Moos 1979;

Cohen *et al.* 1989). In the present inventory the investigator selected only those dimensions of class room environment which are related to Mathematics (as a subject of study).

For developing the inventory the investigator studied the details of the available tests in this area and related theoretical literature concerning the construction of such tests. After this the investigator selected 5 components of class room environment of Mathematics, viz

- i) Conceptual approach
- ii) Pedagogical approach
- iii) Class room facilities
- iv) Innovative practices
- v) Interpersonal relationship

The inventory consisted of 46 statements in which 28 statements are positive and 18 negative.

Standardisation of the Inventory

Items for the final inventory were selected after doing item analysis for which the draft inventory was tried on a sample of 400 pupils of standard X. For calculating t-values, sample of 370 response sheets were used by random rejection of 30 cases. The discriminating power of each statement was calculated. A statement with $t \geq 2.58$ was selected for the final inventory. The details of the items with respect to the t- values are presented in Table 9.

TABLE 9
Details of item analysis of classroom environment
inventory for Mathematics

Sl. No	\bar{X}_H	\bar{X}_L	$\Sigma(X_H - \bar{X}_H)^2$	$\Sigma(X_L - \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	T
1	2.86	2.34	26.00	88.39	0.09	0.52	5.1
2	2.88	2.00	22.56	100	0.11	0.88	8
3*	2.62	2.32	64.04	81.89	0.121	0.30	2.48
4	2.72	1.76	48.16	226.48	0.166	0.96	5.74
5	2.32	1.62	85.92	85	0.13	0.70	5.38
6	2.72	1.52	48.16	82.72	0.13	1.2	9.23
7	2.7	1.80	51.00	96	0.123	0.9	7.31
8	2.62	1.52	61.56	82.72	0.12	1.1	9.17
9	2.66	1.68	56.44	89.76	0.12	0.98	8.17
10	2.70	1.7	51.00	91	0.12	1.00	8.33
11	2.70	1.52	51.00	76.96	0.12	1.18	9.83
12	2.84	1.72	29.44	92.16	0.11	1.12	10.18
13	2.32	1.52	85.92	82.72	0.13	0.8	6.15
14	2.74	1.62	45.24	85.56	0.12	1.12	9.33
15	2.82	2.12	32.76	98.56	0.12	0.70	5.83
16	2.34	1.46	88.43	70.83	0.13	0.88	6.77
17	2.34	1.26	88.43	45.23	0.12	1.08	9.00
18	2.92	2.36	16.36	87.04	0.10	0.56	5.6
19	2.8	2.1	36.00	99	0.12	0.7	5.83
20	2.74	1.76	45.54	95.22	0.12	0.98	8.17
21*	2.6	2.38	52.00	85.5	0.117	0.22	1.89
22	2.92	2.04	15.35	99.8	0.107	0.88	8.22

Sl. No.	\bar{X}_H	\bar{X}_L	$\Sigma(X_H - \bar{X}_H)^2$	$\Sigma(X_L - \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	T
23	2.76	1.36	19.81	59.02	0.9	1.44	15.56
24	2.94	2.10	8.02	95.45	0.103	84	8.16
25	2.96	2.50	14.9	75	0.095	0.46	4.84
26	2.72	1.68	48.15	89.75	0.118	1.04	8.81
27	2.76	1.42	42.23	66.35	0.104	1.34	12.88
28	2.76	1.60	42.23	84	0.113	1.16	10.27
29	2.22	1.60	95.14	84	0.134	0.62	4.77
30	2.82	2.44	32.75	89.42	0.11	0.42	3.82
31	2.44	1.46	89.42	70.79	0.127	0.98	7.72
32	2.64	1.52	68.21	82.71	0.123	1.12	9.11
33	2.86	2.54	26.03	94.55	0.11	0.32	2.91
34	2.8	1.72	36	92.15	0.113	1.08	9.56
35	2.26	1.48	103.19	72.91	0.55	0.78	14.18
36	2.5	1.34	75	94.76	0.31	1.16	8.85
37	2.1	1.96	51	99.83	0.123	0.74	6.02
38	2.66	1.52	56.43	79.95	0.117	1.14	9.74
39	2.68	1.60	53.75	80.8	0.117	1.08	9.23
40	2.66	1.82	78.55	96.75	0.133	0.84	6.32
41	2.84	2.36	29.43	87.03	0.108	0.48	4.44
42*	2.8	2.55	36	86.25	0.111	0.25	2.25
43	2.86	2.38	26.03	85.55	0.106	0.48	4.53
44*	2.16	1.86	97.43	94.23	0.139	0.3	2.16
45	2.44	1.30	89.42	51	0.119	1.14	9.58
46	2.84	2.18	29.35	96.75	0.113	0.66	5.84

$$S_H = \sqrt{\frac{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}{N(N-1)}}$$

Note : * indicate the item rejected.

The final inventory consists of 42 statements (25 positive and 17 negative).

Examples:

(i) positive statement

Teacher has made us aware that Mathematics is not a science to be studied by heart but one to be logically examined and studied.

(ii) negative statement

The teacher has not given practice to form Mathematical principles by observation and experimentation.

The draft inventory, the final inventory, the English version of the final inventory and the response sheet are given as Appendices XIII – XVI.

Scoring Procedure

To each statement, students are to respond in either of the three ways viz; Agree, Undecided or Disagree. For a positive statement, the scores assigned are 3,2 and 1, and for negative statement the scores assigned are 1,2 and 3 for response of Agree, Undecided and Disagree respectively. The sum of the score for all the items gives the total score on the inventory.

Reliability of the test

The reliability of the inventory was established by test- retest and split - half methods.

The reliability coefficient estimated by test- re-test method was 0.87(N=40) which shows high correlation. The split-half reliability was found to be 0.81(N=50).

The high values of correlation coefficient (r) is an indication that the inventory is highly reliable to measure the class room environment for Mathematics of standard X pupils.

Validity of the inventory

The concurrent validity was estimated to establish the validity. The concurrent validity refers to the usefulness of a test in closely relating to other

measures, such as present academic grades, teachers ratings or scores on another test of known validity. (Best and Khan, 1992). The investigator established the concurrent validity of the inventory, by finding out the correlation between the test score and an external criterion. The average marks of Mathematics obtained in the terminal examination was taken as external criterion. The coefficient of correlation was found to be 0.43 (N=40) which shows that the inventory is reasonably valid measure of class room environment for Mathematics.

6. Home Environment Inventory for Mathematics

This inventory was constructed and standardised by the investigator in collaboration with her supervising teacher Santhamma Raju.. This inventory is intended to measure the home environment of the pupils of standard X with regard to the learning of Mathematics.

The investigator studied the details of the available tests in this area and related theoretical literature concerning the construction of tests measuring the educational environment of the family. Moos & Moos, (1982): Shrivastava, (1991) Dev, (1963) identified a specific component which was leveled as educational environment of the family. The educational environment was defined as six press variables; achievement press, language models, academic guidance, activities of the family, intellectuality in home. The more cohesion, expressiveness, independence and achievement orientation, the students perceived in their family environments more advanced were they in decision making about the choice of occupation (Berne 1978). In this inventory the investigator selected only those dimensions of home environment which were related to Mathematics (as a subject of study).

The dimensions are:

1. Physical facilities

2. Cohesion
3. Parental behaviour
4. Achievement orientation
5. Intellectual and cultural orientation

The inventory consisted of 24 statements with equal number of positive and negative items to measure the extent of favourable/ unfavourable home environment for learning Mathematics.

Standardisation of the Inventory

The draft inventory was tried on a sample of 400 pupils of standard X. A sample of 370 response sheets were selected by random rejection of 30 subjects and the item analysis was done. The statements for the final inventory were selected on the basis of the t-values. Statements with $t \geq 2.58$ were selected. The details of the items with respect to the t-values are presented in Table 10.

Table 10
Details of item analysis of Home environment inventory for Mathematics

SL No	\bar{X}_H	\bar{X}_L	$\Sigma(X_H - \bar{X}_H)^2$	$\Sigma(X_L - \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	t
1	2.64	1.94	45.35	66.43	0.106	0.7	6.60
2	2.82	1.62	27.47	80.76	0.104	1.2	11.54
3*	2.9	2.42	19	70.52	0.095	0.48	5.05
4	2.94	2.02	11.64	87.47	0.1	0.92	9.2
5	2.84	1.72	24.08	84.23	0.105	1.12	10.7
6	2.41	1.52	58.51	78.78	0.118	0.89	7.5
7	2.78	1.68	34.15	83.27	0.109	1.1	10.09
8	2.68	1.4	39.60	68	0.104	1.28	12.30
9	2.82	1.7	24.84	83.04	0.104	1.12	10.77
10	2.98	1.78	3.96	83.96	0.094	1.2	12.77
11	2.9	2.0	13.4	90	0.102	0.9	8.82
12	2.88	1.44	11.04	73.48	0.096	1.44	15
13	2.9	1.82	13.4	83.96	0.099	1.08	10.91
14	2.92	1.4	15.36	68	0.091	1.52	16.70
15	2.68	1.52	39.60	78.78	0.109	1.16	10.64

Sl. No	\bar{X}_H	\bar{X}_L	$\Sigma(X_H \bar{X}_H)^2$	$\Sigma(X_L \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	t
16	2.78	1.62	34.15	80.76	0.108	1.16	10.74
17	2.24	1.36	82.4	64.64	0.121	0.88	7.74
18	2.9	1.88	13.4	89.43	0.102	1.02	10
19	2.9	1.72	30.4	85.11	0.10	1.18	11.8
20	2.62	1.3	52.6	59.8	0.106	1.32	12.45
21*	2.54	2.26	70.84	75	0.121	0.28	2.31
22	2.96	2.14	7.83	82.67	0.096	0.82	8.54
23	2.5	1.86	65	87.23	0.124	0.64	5.16
24	2.9	2.0	13.4	90	0.162	0.9	8.82

$$S_H = \sqrt{\frac{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}{N(N-1)}}$$

* indicates items rejected

The final inventory consisted of 22 statements. The draft inventory, the final inventory, the English version of the final inventory and the response sheet are given as Appendices XVII - XX.

Example of positive statement

My parents encourage me to listen to the Mathematics lessons in T.V and Radio.

Examples of a negative statement:

There is no convenience at home to study undisturbed.

Scoring Procedure

The students can select either of the responses, viz, agree, undecided or disagree, for each statement. For a positive statement the scores assigned are

3,2 and 1 and for a negative statement, 1,2 and 3 for the responses Agree, Undecided and Disagree respectively. The scores of the individual statements are summed to get the home environment score of a student.

Reliability of the test

The reliability of the inventory was established using test-retest method and split half method. The reliability coefficient of the inventory using the test-retest technique on a sample of 40 students with an interval of 10 days between the testing, was found to be 0.85 which shows high reliability. The split half technique of finding the reliability also was used for a sample of 40 students and the reliability coefficient was found to be 0.71. The reasonably high coefficients show that the inventory is a reliable instrument.

Validity of the test

The test scores were validated against the external criterion, viz: the marks obtained on achievement test in Mathematics and the correlation coefficient was found to be 0.65(N=40) which establishes the concurrent validity of the inventory.

These psychometric properties show that this tool can yield sufficiently reliable and valid measure of home environment for Mathematics.

(7) Home Practice Inventory

Home practice inventory is constructed and standardised by the investigator in collaboration with her supervising teacher Santhamma Raju. For developing the inventory, the investigator studied the details of the available tests in this area and the related theoretical literature concerning the construction of such tests. The dimensions of home practice which are related to Mathematics only were selected for the inventory. It consisted of 25 items covering four areas of home practice, viz.;

1. Programme orientation

2. Pattern of behaviour of Mathematics learning
3. Approach to learning of Mathematics
4. Interaction and exposure

Standardisation of the Inventory

The statements for the final inventory were selected on the basis of the ability of each statement to discriminate significantly between high and low scorers in home practice. A statement with $t \geq 2.58$ was selected for the final inventory. The details of items with t- values are presented in Table 11.

TABLE 11
Details of item Analysis of
Home practice inventory for Mathematics

SL No	\bar{X}_H	\bar{X}_L	$\Sigma(X_H - \bar{X}_H)^2$	$\Sigma(X_L - \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	t
1	2.66	1.64	56.59	67.04	.112	1.02	9.11
2	2.72	2.26	35.96	83.24	.1097	0.46	4.19
3	2.25	1.62	64.75	65.56	.115	.93	8.09
4	2.46	1.81	68.64	80.95	.123	.65	5.28
5	2.23	1.55	79.72	54.75	0.117	0.68	5.82
6	2.87	2.18	31.81	86.76	0.109	0.69	6.33
7	2.75	1.68	38.75	69.76	0.105	1.07	10.19
8	2.98	2.06	3.96	89.64	0.097	0.92	9.48
9	2.73	1.98	41.7	89.96	0.115	0.75	6.52
10	2.79	1.77	32.59	79.71	0.107	1.02	9.53
11	2.10	1.43	84.08	42.5	0.113	0.67	5.92
12	2.46	1.49	66.94	48.99	0.108	0.97	8.98
13	2.65	1.59	52.75	52.62	0.103	1.06	10.29
14	2.73	1.62	41.71	65.56	0.104	1.11	10.67
15	2.87	1.60	21.31	64	0.093	1.27	13.66
16	2.81	1.75	29.39	86.57	0.108	1.06	9.81

Sl. No	\bar{X}_H	\bar{X}_L	$\Sigma(X_H - \bar{X}_H)^2$	$\Sigma(X_L - \bar{X}_L)^2$	S_H	$\bar{X}_H - \bar{X}_L$	t
17	2.71	1.60	44.59	74	0.109	1.11	10.18
18	2.51	1.60	68.99	74	0.12	0.91	7.58
19	2.90	1.96	19.00	89.84	0.105	0.94	8.95
20	2.57	1.63	62.51	61.31	0.112	0.94	8.39
21	2.85	1.79	24.76	80.59	0.103	1.06	10.29
22	2.96	2.10	7.84	89	0.099	0.86	8.69
23	2.98	1.93	3.96	84.51	0.095	1.05	11.05
24	2.90	1.91	19	84.19	0.102	0.99	9.71
25*	2.68	2.38	75.52	75.56	0.123	0.3	2.43

$$S_H = \sqrt{\frac{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}{N(N-1)}}$$

* indicates items rejected.

The final inventory consists of 24 items. The draft inventory, the final inventory, English version of the final inventory and the response sheet are given as Appendices XXI – XXIV.

Example of a positive statement:

I make it a point to read articles relating to in the dailies.

Example of a negative statement

A fixed time for studying Mathematics is not included in my time table.

Scoring Procedure

The students are to respond to each statement in either of the three ways, viz: always, some times or never. In the case of an item showing good home

practice, a score of 3 is to be given for a response of “Always” a score of 2 and 1 are to be given for responses of ‘Some times’ and ‘Never’ respectively. In case of an item showing bad home practice, the score is to be assigned in the reverse order. That is 1,2 and 3 for Always, ‘Sometimes’ and ‘Never’ respectively.

The sum of the scores for all the items gives the total score of home practice for Mathematics, of a respondent. The scores can range from 24 to 72 as there are 24 items in the inventory.

Reliability

The reliability of the inventory was established by test-retest method and split-half method.

The reliability coefficient estimated using test-re-test method was 0.84 (N = 40). The split-half reliability was found to be 0.81 (N = 40). The reliability coefficient obtained, using both the methods are high which shows that the inventory is a highly reliable measure of home practice for Mathematics.

Validity

The criterion related validity of the inventory was established by using the marks obtained on the achievement test as the external criterion. The correlation coefficient was found to be 0.54 (N = 40) which indicates that the test is reasonably valid measure of home practice for Mathematics.

These psychometric properties show that this tool can yield sufficiently reliable and valid measure of home practice for Mathematics. The psychometric details of the tools used in the present study is presented in Table 12.

TABLE 12
Psychometric details of the tools used

Sl. No.	Name of the tool	Variable measured	Reliability		Concurrent Validity
			Test re-test	Split half	
1.	Group Embedded Figures Test (GEFT)	Cognitive style	0.82		-0.63 to -0.82
2.	Scale of attitude towards Mathematics	Attitude Towards Mathematics	0.63	0.78	0.63
3	Letter cancellation test	Level of aspiration	0.78		0.21 to 0.78
4	Class room Environment Inventory for Mathematics	Class room Environment for Mathematics	0.87	0.81	0.43
5.	Home Environment Inventory for Mathematics	Home Environment for Mathematics	0.85	0.71	0.65
6.	Home Practice Inventory for Mathematics	Home practice for Mathematics	0.84	0.81	0.54
7.	Achievement Test in Mathematics for Standard X	Achievement in Mathematics	0.88	0.86	0.76

The validity of the tools constructed and standardised by the investigator is further established by estimating the inter correlation between the measures of each of the inventories (N = 40). The correlation coefficients obtained are presented in Table 13.

TABLE 13

Inter correlation between the measures of the tools constructed

Sl. No	Tools	Achievement	Attitude	Classroom Environment	Home Environment	Home practice
1	Achievement Test in Mathematics for Standard X		0.64	0.43	0.65	0.54
2	Scale of Attitude Towards Mathematics			0.82	0.80	0.60
3	Classroom Environment Inventory for Mathematics				0.31	0.38
4	Home Environment Inventory for Mathematics					0.74
5	Home Practice Inventory for Mathematics					

The results provide evidence for the reasonable validity of the tools constructed and standardised.

SAMPLE FOR THE STUDY

The population meant for the study is the pupils of Standard X of Kerala state following state syllabus. Because of the huge size of the population, it is impossible and impractical to study the population characteristic as such. Therefore, it was decided to take a representative sample of the population. The validity and reliability of the findings of any study is determined to a great extent by the selection of the sample to which the tools for data collection are administered. The sample selected should represent the population in all its diversities.

Best (1989) defines the sample as a small proportion of a population selected for observation and analysis.

Technique of sampling

The method used for sampling was stratified sampling which is a method of ensuring representativeness of the population and avoids bias in sampling. According to Garrett (1966) when the population is composed of subgroups or strata of different sizes stratified sampling method is applicable.

Factors represented

The following factors or strata of the population were taken into consideration while selecting the sample.

- (i) Sex of the subjects (Boys / Girls)
- (ii) Locale of the school (Urban / Rural)
- (iii) Instructional efficiency of the schools (Superior / Average / Inferior)
- (iv) Type of management of the school (Government / Private)

(i) Sex of the Subjects

The investigator selected the schools in such a way that almost equal representation is given to both the sexes: Boys and Girls.

(ii) Locale of the school

Studies on variables in relation to locale of the school reveal that there is relation between locale of the school and performance. As more schools are in rural areas of our state, compared to urban areas, more weightage was given to rural schools. The ratio so proposed was Rural: Urban = 5:4.

(iii) Instructional efficiency of schools

The criterion taken by the investigator for classifying the schools based on instructional efficiency was the pass percentage in S.S.L.C Examination. Schools with pass percent 80 and above were considered superior; having pass

percent below 40 were considered inferior, and those with a pass percent between 40 and 80 were considered average. The investigator selected sample from all these categories of the schools.

(iv) Type of management of the schools

Based on the agencies which run the schools in Kerala, there are two types of schools government and private. As there are more private schools in Kerala, the investigator decided to give more weightage to such schools while selecting the sample.

Size of the sample

The size of the sample is another crucial factor for the validity of results. Krech & Crutchfield (1948) have observed that sample size of 500 would yield reasonably good results which would keep the error less than five percent. Further inferential statistics says as the size of the sample increases, the amount of sampling error will be reduced.

Considering all the above factors the investigator selected a sample of size 800 pupils of standard X from 14 schools of Kottayam District. Being a resident of Kottayam District and to ensure access to the schools the investigator selected the schools in Kottayam District only, which is also the middle region of the state.

DATA COLLECTION PROCEDURE

After making sufficient copies of the tools and response sheets to be used a schedule for testing was arranged by visiting the selected schools. The investigator contacted the Heads of the schools and the class teachers in person and their co-operation was sought in the process. According to the schedule, the tools were administered in the selected classes with the help of the teachers of those classes.

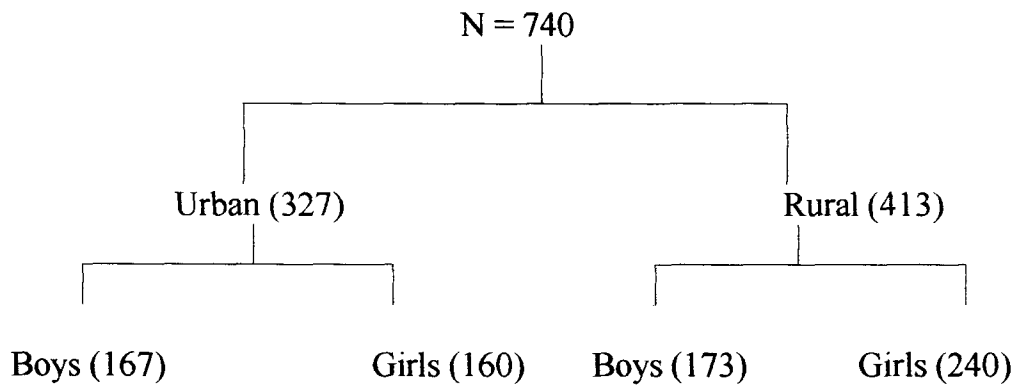
A uniform procedure was followed in administering the tools in the selected schools. At first, score sheets were distributed to each student. Then the investigator explained and demonstrated how the students are to fill up their personal details and also the method of making responses. Then the question test book lets were distributed. The general instructions given in each test were read out to the pupils to familiarise them with the test. Time limits were strictly kept wherever necessary. After answering the tests, score sheets along with the tests were collected from each student.

SCORING AND CONSOLIDATION

The response sheets of all the tests were scored as per the scoring scheme described earlier for the tests. Before doing this, incomplete answer sheets were rejected. Cases that were complete in all respects only were chosen for final statistical analysis. Thus, the size of the sample was reduced from 800 to 740.

Even though it was proposed to have a sample of equal number of boys and girls, the final sample consisted of 400 girls and 340 boys as in most of the co-education schools selected, there were more girls than boys. So also absentees and incomplete answers were more among boys than girls.

The break-up of the final sample of 740 students is given in Table 14.

Table 14**Break up of the final sample**

The break-up of the final sample according to the cognitive style orientations is presented in Table 15.

The details regarding the school-wise distribution of the final sample is given in Table 16.

TABLE 15
Break up of cognitive style for the final sample

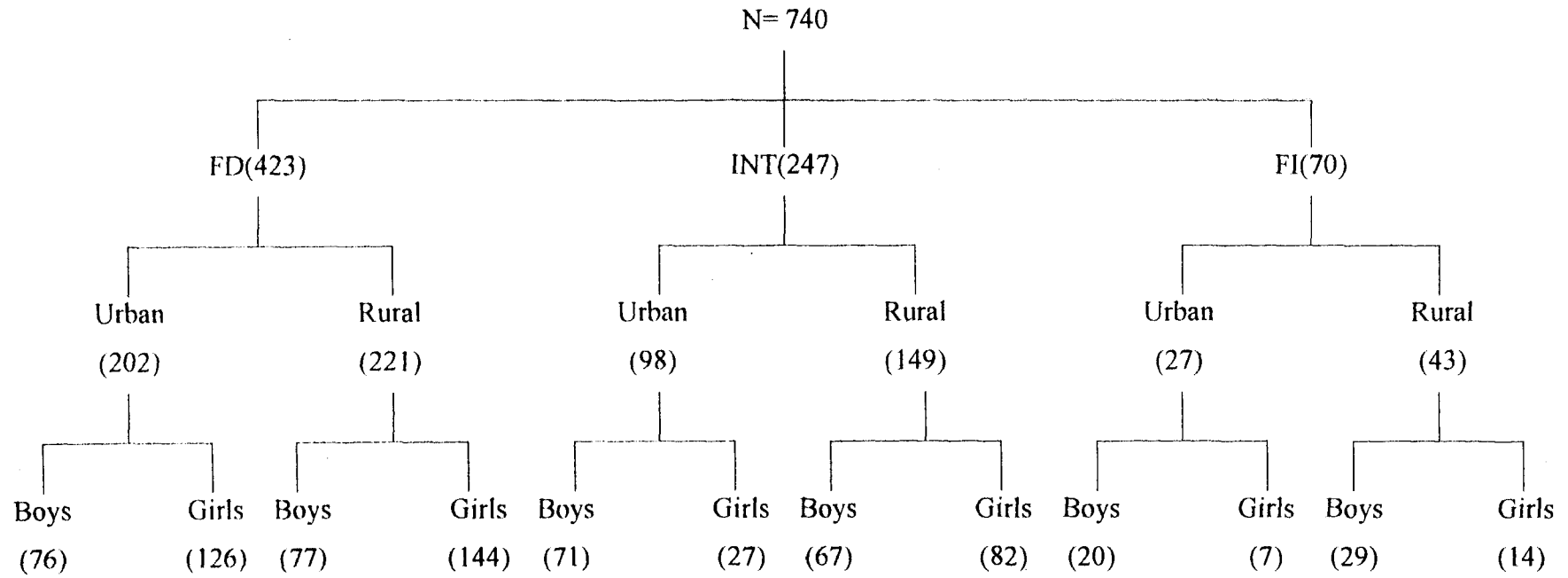


TABLE 16**Details of school-wise distribution of the sample**

Sl. No	Name of the school	Locale	Type of management	Efficiency level	Type of school Boys /Girls / Co-educational	No. of Boys	No. of Girls	Total
1.	St. Antony's H. S Poonjar	Rural	Private	Average	Co-ed	27	27	54
2.	L.F.H.S. Chemmalamattom	Rural	Private	Superior	Co-ed	31	20	51
3.	Govt. H.S. Pala	Urban	Govt.	Inferior	Co-ed	6	15	21
4.	Govt.H.S. Ettumannoor	Urban	Govt.	Average	Co-ed	22	40	62
5.	Holy Cross H.S. Cherpumkal	Urban	Private	Superior	Co-ed.		30	30
6.	St. George H.S. Kottickal	Rural	Private	Average	Co-ed.	33	50	83
7.	St. George H.S. Aruvithura	Rural	Private	Inferior	Co-ed	48	16	64

Sl. No	Name of the school	Locale	Type of management	Efficiency level	Type of school Boys /Girls/ Co-educational	No. of Boys	No. of Girls	Total
8.	St. Mary's G H.S. Pala.	Urban	Private	Superior	Girls		63	63
9.	S.H.G.H.S. Bharananganam	Rural	Private	Superior	Girls		33	33
10.	Govt. H.S. Erattupetta.	Rural	Govt.	Inferior	Co-ed.	10	18	28
11.	St. Thomas H.S. Pala.	Urban	Private	Superior	Boys	57		57
12.	Alphonsa G.H.S Vakakkad	Rural	Private	Average	Girls		76	76
13.	St. Vincent E.M.H.S Pala	Urban	Private	Superior	Co-ed.	82	12	94
14.	St. Augustine's H. S Ramapuram	Rural	Private	Average	Boys.	24		24

Scoring

The response sheets of the different tools were scored manually as per the procedure concerned and mentioned earlier.

Consolidation of data

The scores obtained in different tools of each student were tabulated for further analysis. The consolidation was done by keeping in view of the important sub samples to be obtained viz, the sex groups and urban-rural samples. Each student was given a serial number and the scores of all variables and other relevant data of him/her were entered in a single row. The tabulated data was used for all the analysis of the study.

STATISTICAL TECHNIQUES USED

For the preliminary analysis of the test scores, statistical indices like arithmetic mean, median, mode, standard deviation, quartile deviation, skewness and kurtosis were computed.

The skewness and kurtosis in the present study were computed using the formulae (Ferguson, 1981),

$$\text{skewness, } g_1 = \frac{m_3}{m_2 \sqrt{m_2}} \quad \text{and}$$

$$\text{kurtosis, } g_2 = \frac{m_4}{m_2^2} - 3$$

Where m_2 , m_3 , m_4 are second, third and fourth moments about the mean of the distribution (Ferguson, 1981).

If the distribution is positively skewed, ' g_1 ' is positive and when negatively skewed ' g_1 ' is negative. For a leptokurtic distribution ' g_2 ' is greater than zero and for a platykurtic distribution ' g_2 ' is less than zero.

The near the distribution approaches the normal form, the closer are the mean and median and less, the skewness and kurtosis.

The data for the present study has been analysed using the following techniques.

(a) Pearson's Product Moment Coefficient of Correlation 'r' (Best & Khan, 1989)

This was used to estimate the degree of association between the dependent variable (Achievement in Mathematics) and each of the independent variables for whole sample and relevant sub samples. The following formula was used for the calculation of 'r'.

$$r = \frac{N\Sigma xy - \Sigma x \Sigma y}{\sqrt{[N\Sigma x^2 - (\Sigma x)^2][N\Sigma y^2 - (\Sigma y)^2]}}$$

The correlation obtained are interpreted using:

(b) Statistical significance of correlation (Ferguson, 1971)

The significance of 'r' was tested by using Fisher's Test viz:

$$t = \frac{r \sqrt{N - 2}}{\sqrt{1 - r^2}}$$

t= the critical ratio

r= coefficient of correlation

N= size of the sample

If the critical ratio obtained exceeds tabled value of 't' for (N-2) degree of freedom for a particular level of significance the obtained 'r' is said to be significant at that level of significance of the test and for that degrees of freedom concerned.

(c) Verbal interpretation of 'r' (Garrett, 1979)

The correlation coefficient between two variables is described as 'high' 'marked' or 'substantial' 'low' or 'negligible' depending upon the numerical index of the 'r'.

In the psychological and educational testing, the following criteria are used for verbally interpreting the degree of relationship; between variables

'r' from 0.00 to ± 0.20 denotes indifferent or negligible relationship

'r' from ± 0.20 to ± 0.40 denotes low correlation percent, but slight

'r' from ± 0.40 to ± 0.70 denotes substantial or marked relationship

'r' from ± 0.70 to ± 1.00 denotes high to very high relationship

(d) The confidence interval of 'r' (Ferguson, 1976)

The confidence intervals of 'r' at 5 percent level of confidence and 1 percent level of confidence were estimated using the following formula

Interval at 5 percent level of confidence = $r \pm 1.96 \times SE_r$.

Interval at 1 percent level of confidence = $r \pm 2.58 \times SE_r$,

Where,

$$SE_r = \frac{1 - r^2}{\sqrt{N - 1}}$$

(e) Percentage Variance (Fox, 1969) / Common factor Variance or Shared variance (Kerlinger, 1983)

A correlation coefficient really implies the presence of a common factor that causes a common variance. The common factor variance is the variance shared by two or more variables (shared common variance). If coefficient of

correlation has been calculated, then the common factor variance is the coefficient of correlation squared (r^2). It may also be expressed as percentage overlaps ($r^2 \times 100$). Thus Percentage variance = $r^2 \times 100$, where 'r' is the correlation coefficient.

The percentage variance shared between the variables was calculated using the formula $r^2 \times 100$. The obtained value of the variance indicates the percentage of variation of the dependent variable that can be attributed to the variation in the independent variable.

(f) Test of significance of the difference between two r's (Guilford, 1956).

The test of significance of the difference between correlations obtained for sub groups within the sample was done by the two tailed test for difference between r's of large independent samples using the formula

$$C.R = \frac{Z_1 - Z_2}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}}$$

Where Z_1, Z_2 = the r's of the two samples converted into Fisher's Z.

N_1, N_2 = the size of two samples.

(g) Step wise Regression (Cohen, 1989)

This is a statistical techniques to select a set of variables that best predict the criterion variables and that eliminates superfluous predictor variables.

In stepwise regression, enter independent variables one by one on the basis of some pre-determined statistical criteria. This procedure is used to isolate a subset of available predictor variables that will yield an optional prediction equation with as few terms as possible. This include:

(i) Forward (step wise) inclusion:

Independent variables are entered only if they meet certain criteria. The order of inclusion is determined by the respective contribution of each variable to explain variance.

(ii) Backward elimination:

Predictors are eliminated one by one from a regression equation that initially includes all predictors.

(iii) Step wise solution:

Forward inclusion is combined with deletion of variables that no longer meet the pre-established criterion at each successive step.

(iv) Combinational solution: All possible combinations are examined.

The input data for stepwise regression analysis are means and standard deviations of all the variables (criterion and predictor) in the study and the correlation matrix of the criterion variable with the predictor variables. The predictor variables were entered one by one to see the extent of contribution of each variable in predicting the criterion variables. For this the predictor variables having the highest correlation with the criterion variable is entered first and the measures like sum of squares, mean sum of squares of Regression and Residual, Percentage variance, 'F' value, Percentage variance due to the variable entered 'B' coefficient and the respective Standard Error were calculated. A model of stepwise regression analysis is presented in Table below:

TABLE 17
Model of the Results of
Step wise Regression Analysis

Multiple R	Analysis of	DF	Sum of the	Mean Sum	F
Percentage	Regression	---	---	--	
Variance	Residual	----	---	---	
Standard error					
Variable entered	B	Variable in the Equation SEB			
X					
Constant A	---	----	--	----	

The 'F' value enables us to see whether the regressor (predictor variable entered) is significant or not. *ie.*, if the 'F' value thus calculated exceeds the tabled value of 'F' for a particular level of significance for appropriate degrees of freedom. When the regressor is significant with these quantities, the investigator can write down the equation to the regression line.

The predictor variable having the next largest correlation is entered in step II. If the percentage variance contributed by two variables is considerably higher than the percentage variance contributed by the first variable, then consider this variable also as a significant predictor. Along with this, the equation to the regression line and R can be calculated from the regression weights computed. If the 'R' also has increased considerably from the previous 'R', this is aⁿ evidence that the predictor variable second entered is also significant in predicting the criterion variable.

Predicting like this if we find that, in any of the succeeding steps, neither the percentage variance nor the 'R' has not increased it is an indication that the variable entered last is not a significant predictor of the criterion variable. The analysis can be stopped at this stage and can be concluded that the variables entered except the last are significant predictors.

CHAPTER IV

ANALYSIS AND INTERPRETATIONS

Preliminary analysis
Correlational analysis
Test of significance of the
difference between equivalent
correlations
Prediction of achievement in
Mathematics

ANALYSIS AND INTERPRETATIONS

The prime objective of the study is to find out the extent of relationship of cognitive style and selected non-cognitive variables with achievement in Mathematics and to identify the selected independent variables which are capable of predicting achievement in Mathematics. The objectives of the study are re-stated below so as to have a perspective of the statistical analysis described in this chapter.

- I. To find the extent of relationship between achievement in Mathematics and each of the selected independent variables, for the whole sample and relevant sub samples
- II. To examine whether equivalent correlations obtained for achievement in Mathematics with (i) cognitive style (ii) each of Field Dependent (FD), Intermediate (INT) and Field Independent (FI) orientations of cognitive style and (iii) selected non-cognitive variables for, sex groups (boys/girls) and locale (urban/rural), differ significantly.
- III. To predict 'Achievement in Mathematics' using a few selected independent variables, by means of step wise regression, by ANOVA approach.

The data for the present study were collected using standardised tests. The scores of these tests were subjected to statistical analysis.

PRELIMINARY ANALYSIS

As a prelude to analysis the important statistical constants such as mean, median, mode, standard deviation, quartile deviation, skewness and kurtosis of the dependent and independent variables were computed. The normality of the distributions was also checked using the statistical constants.

The summary of the statistical constants of the criterion variable for the whole sample (N=740) is presented in Table 18.

TABLE 18

**Summary of the statistical constants
of achievement in Mathematics**

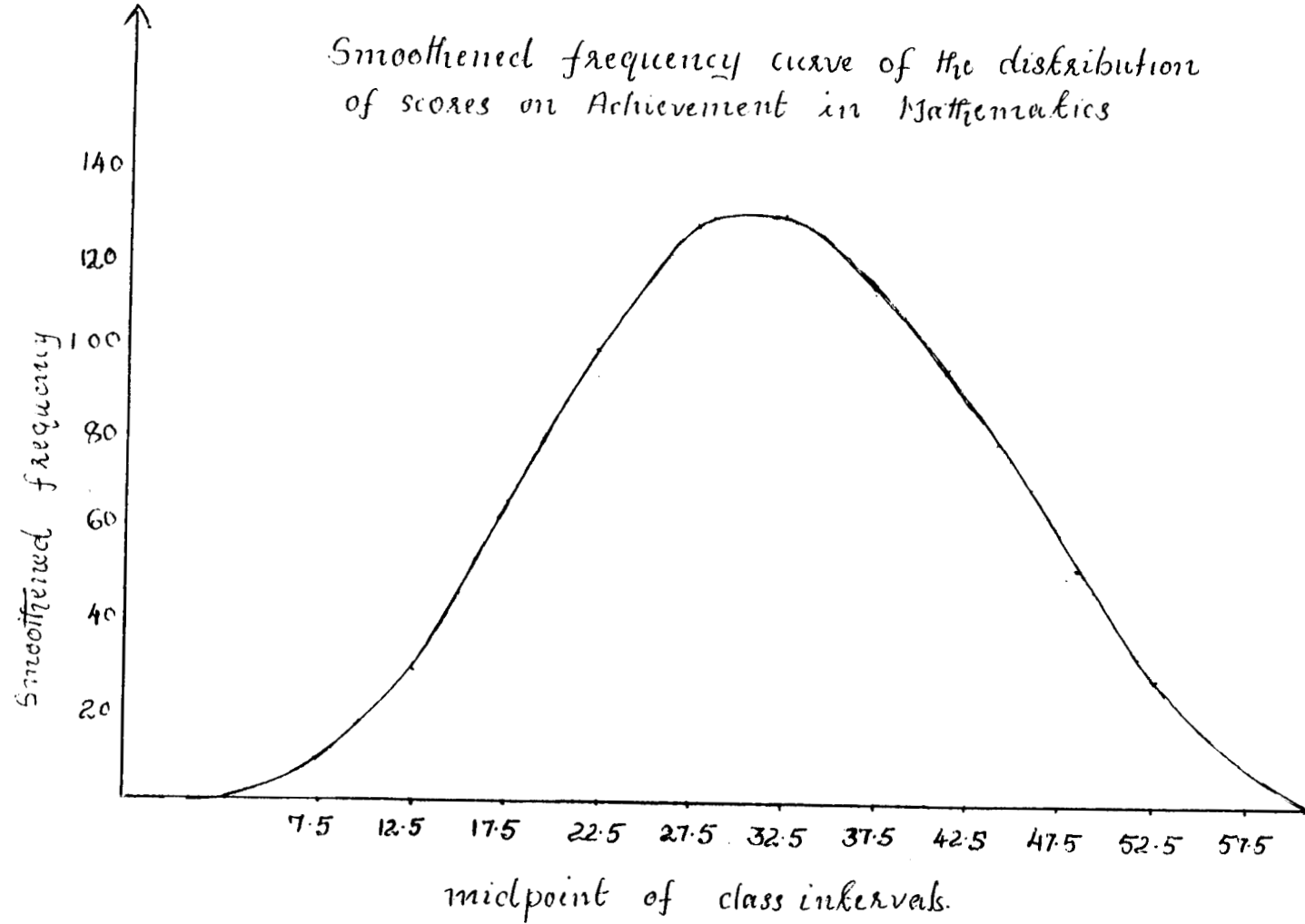
Mean	32.309
Median	32
Mode	31
Standard Deviation	9.847
Quartile Deviation	7.037
Skewness	0.085
Kurtosis	-0.525

The statistical constants show that the distribution of scores of the criterion variable (achievement in Mathematics) approximates normality. The positive value of skewness indicates that the distribution is skewed positively. The mean (32.309) is slightly greater than the median (32.00) which in turn is greater than the mode (31.00). The mean is pulled more towards the skewed end of the distribution. The skewness ($g_1=0.085$) is not significantly different from '0', which indicates that the distribution is symmetrical. (Ferguson, 1981). Since the kurtosis ($g_2 = -.525$) is less than zero, the distribution is platykurtic (Ferguson, 1981).

The shape of the distribution of the scores of achievement in Mathematics was examined by plotting the smoothed frequencies of the distribution against the midpoints of the class intervals. The smoothed frequency curve of the achievement in Mathematics is presented in Figure I.

The statistical constants and graphical representation reveal that the distribution approximates normality.

FIGURE - 1.



Percentile points

The percentile points of the scores of 'achievement in Mathematics' viz; P₁₀, P₂₀, P₃₀, P₄₀, P₅₀, P₆₀, P₇₀, P₈₀, P₉₀ were also calculated. The percentile points and values are given in Table 19.

TABLE 19
Details of percentile and percentile points
of scores of achievement in Mathematics

Percentile points	Percentile value
P ₁₀	19.00
P ₂₀	23.1
P ₃₀	26.3
P ₄₀	29.2
P ₅₀	32.00
P ₆₀	34.00
P ₇₀	37.3
P ₈₀	41
P ₉₀	46

The data in Table 12 reveals that 10 percent of the students scored less than 19, 20 percent of the students scored less than 23, 30 percent of the students scored less than 26 etc.

The statistical constants such as mean, median, mode, standard deviation, skewness and kurtosis estimated for the scores of the independent variables are presented in Table 20.

TABLE 20**Summary of the statistical constants of the scores of the selected independent variables.**

Sl. No	Variables	Mean	Median	Mode	Standard deviation	Quartile deviation	Skewness	Kurtosis
1	Cognitive style	7.951	7.771	7.00	3.925	3.188	0.172	-0.851
2	Level of Aspiration	7.473	8.00	9.72	16.916	7.953	-.284	3.840
3	Attitude towards Mathematics	71.723	72.00	76.57	13.446	10.85	-0.038	-0.843
4	Class room Environment for Mathematics	94.532	95.5	97.432	17.882	13.085	-0.331	0.036
5	Home Environment for Mathematics	53.186	53.327	53.40	9.818	7.88	-0.171	-0.780
6	Home Practice for Mathematics	51.589	51.50	50.00	10.085	7.44	0.043	-0.454

The statistical constants show that the distribution of scores of cognitive style approximates normality. The positive value of skewness ($g_1 = .172$) indicates that the distribution is skewed positively. The mean lies to the right of the median. Since kurtosis is less than '0' ($g_2 = -.851$), the distribution is platykurtic (Ferguson, 1981).

The statistical constants for the scores of level of aspiration presented in Table 20, shows that the values of skewness and kurtosis are $-.284$ and 3.890 respectively. The values indicate that the distribution is negatively skewed and leptokurtic.

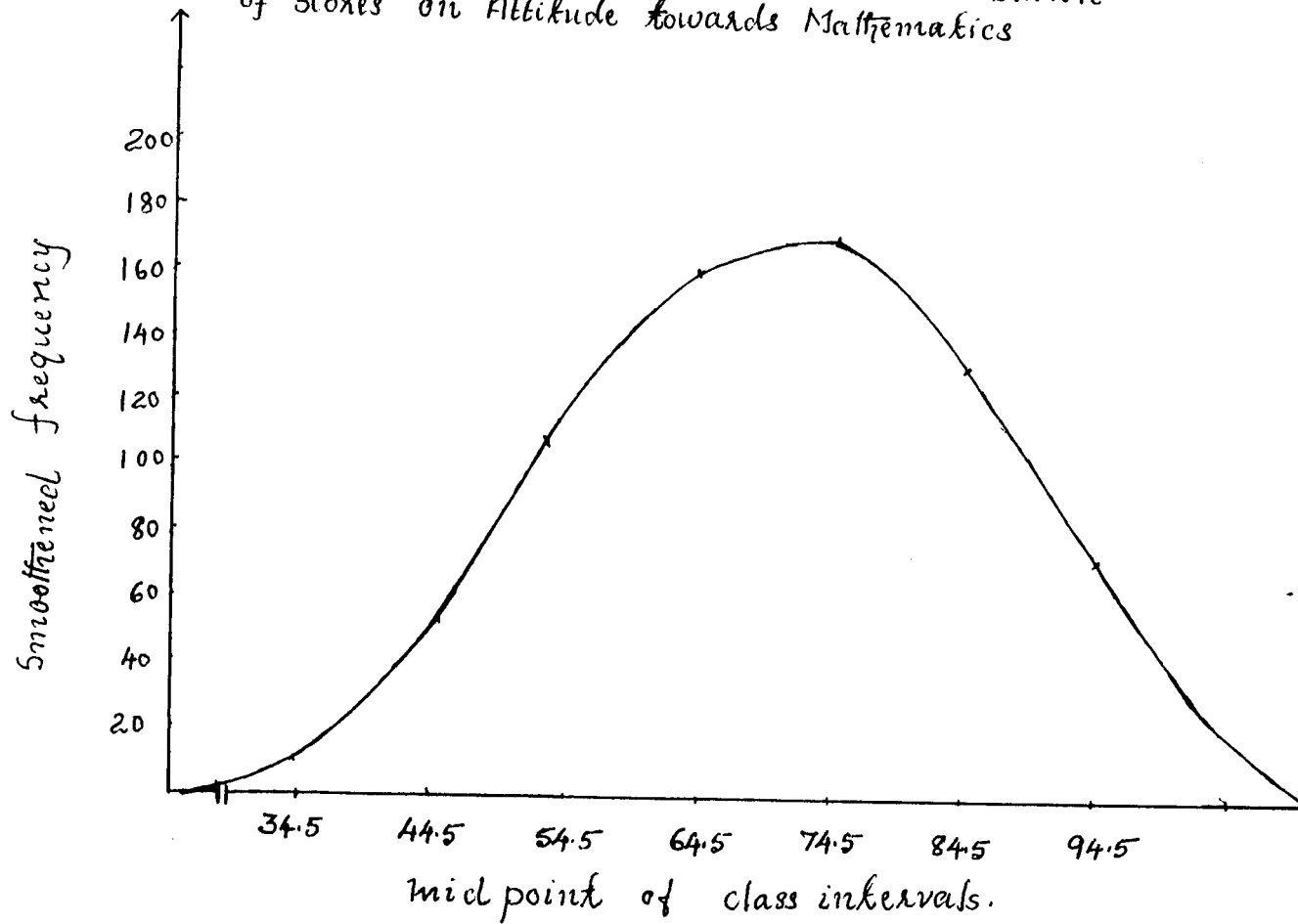
The statistical constants estimated for the scores of attitude towards Mathematics show that the distribution of scores of attitude towards Mathematics approximates normality. The negative value of skewness indicates that the distribution is skewed negatively. The mean lies to the left of the median. The skewness ($g_1 = -.038$) is not significantly different from '0'; which indicates that the distribution is symmetrical (Ferguson, 1981). Since the value of kurtosis ($g_2 = -.843$) is less than '0', the distribution is platykurtic.

The distribution of scores of 'attitude towards Mathematics' was also examined by plotting the smoothed frequencies of the distribution against the midpoints of the class intervals. The smoothed frequency curve of the attitude towards Mathematics is presented in Figure 2.

The statistical constants and the graphical representation reveal that the distribution approximates normality.

FIGURE II

Smoothened frequency curve of the distribution of scores on Attitude towards Mathematics



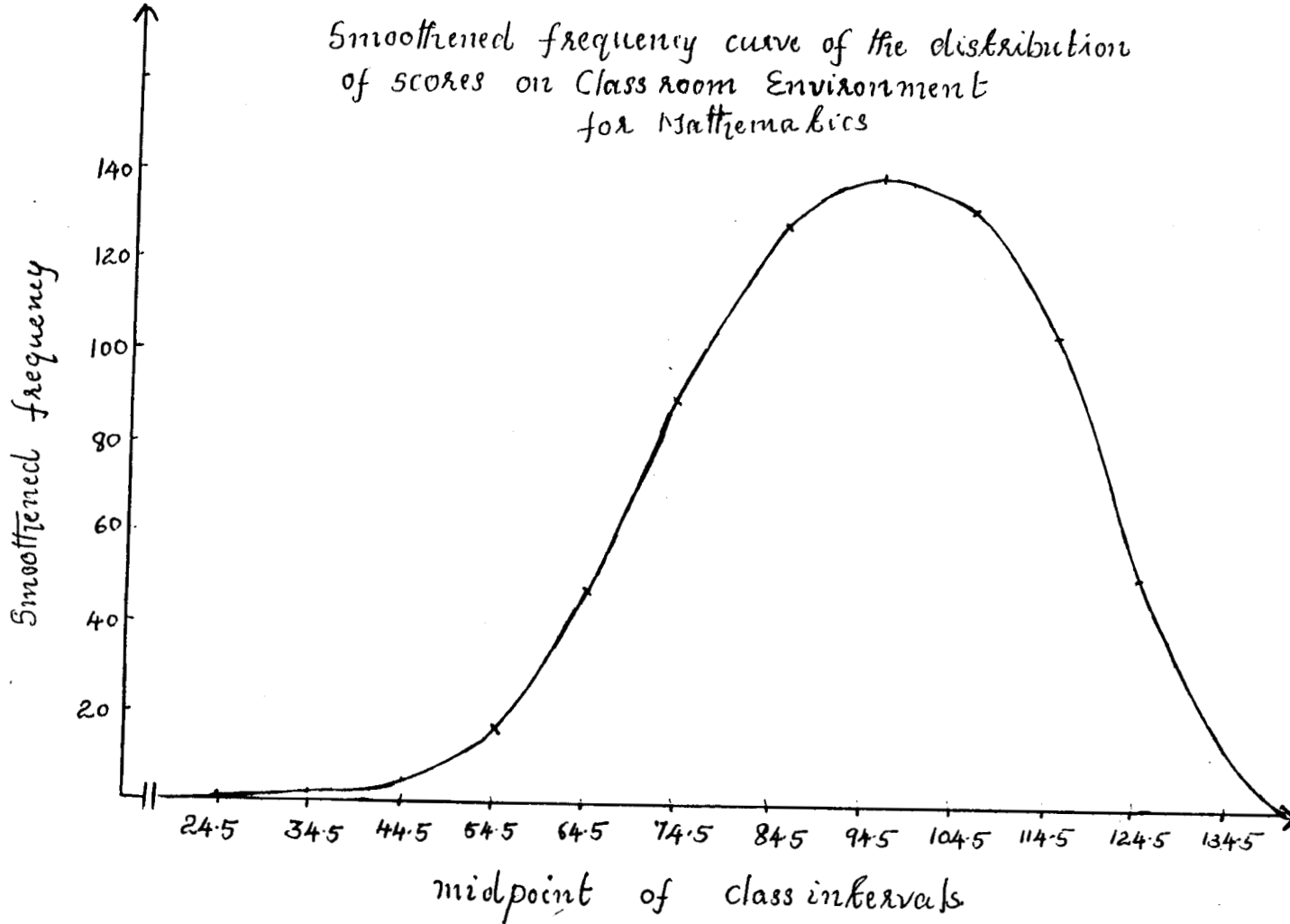
The details of the statistical constants for the scores of class room environment is given in Table 20. The negative value of skewness ($g_1 = -.331$) indicates that the distribution is skewed negatively. The value of kurtosis ($g_2 = .036$) is slightly greater than '0' showing that the distribution is leptokurtic.

The distribution of the scores of class room environment for Mathematics was also examined by plotting the smoothed frequencies of the distribution against the midpoints of the class interval. Thus smoothed frequency curve of the class room environment for Mathematics is presented in Figure 3.

The statistical constants and the graphical representation reveal that the distribution approximates normality.

FIGURE: III

Smoothened frequency curve of the distribution
of scores on Classroom Environment
for Mathematics



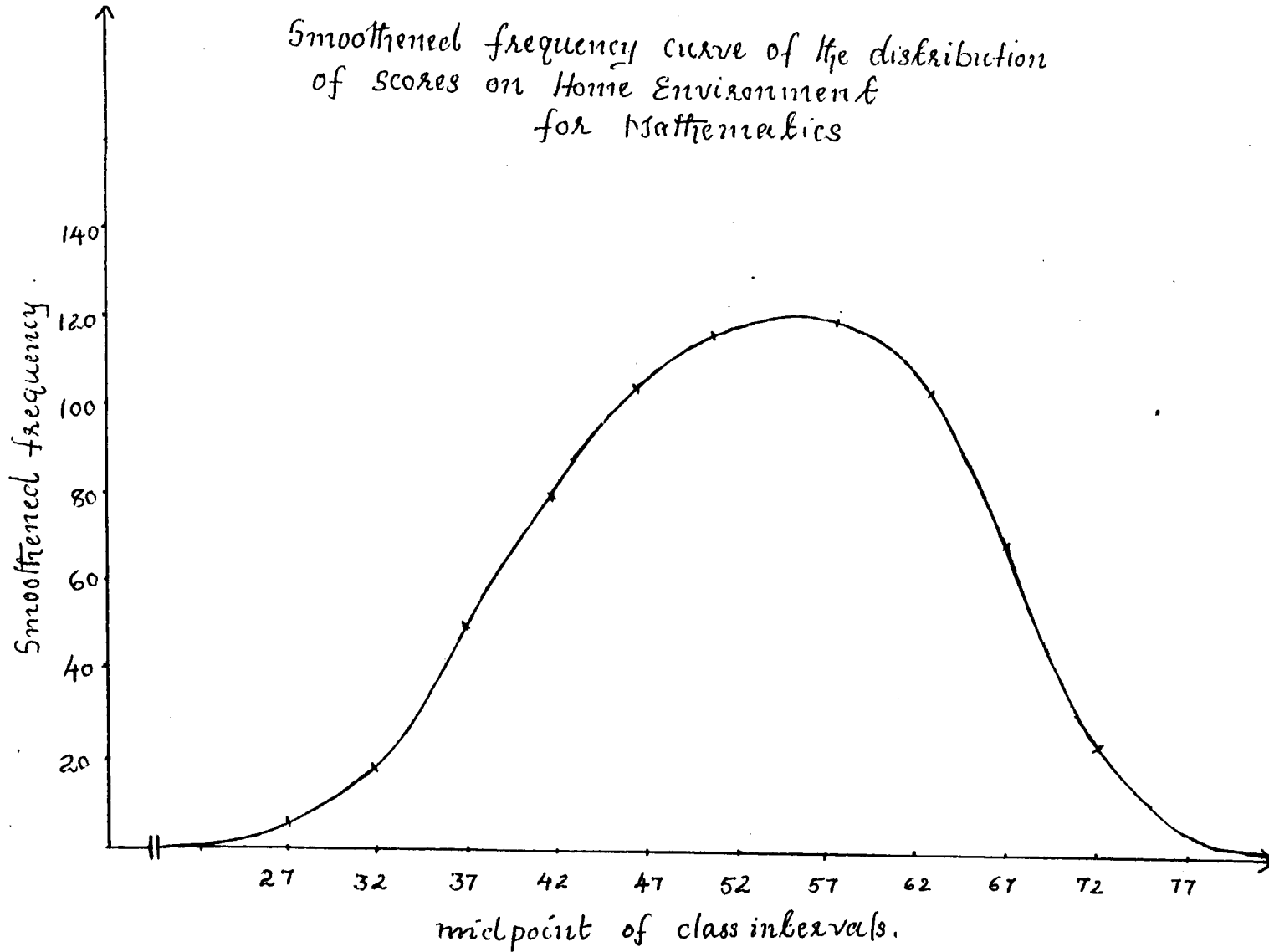
As shown in Table 20, for the distribution of the scores of home environment for Mathematics, the skewness ($g_1 = -.171$) is negative which indicates that the distribution is skewed negatively. The negative value of kurtosis ($g_2 = -.780$) indicates that the distribution is platykurtic.

The distribution of the scores of home environment for Mathematics was also examined by plotting the smoothed frequency curve. The smoothed frequency curve of home environment for Mathematics is presented in Figure 4.

The statistical constants and the graphical representation reveal that the distribution approximates normality.

FIGURE - IV

Smoothened frequency curve of the distribution
of scores on Home Environment
for Mathematics



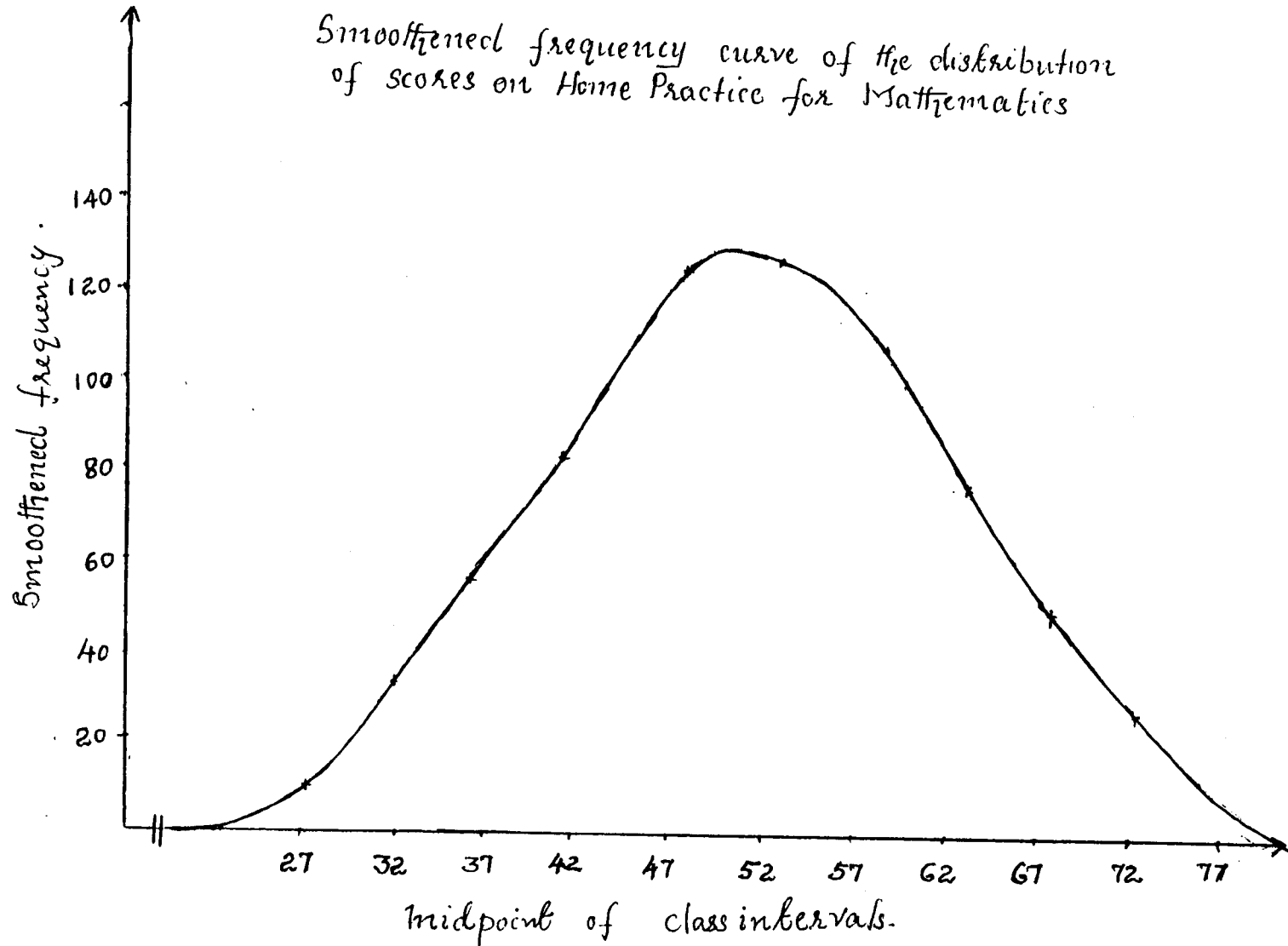
The statistical constants for the scores of home practice for Mathematics also were estimated. The value of skewness (.043) indicates that the distribution is skewed positively. The negative value (-.454) is an indication that the distribution is platykurtic. The distribution of scores of home practice for Mathematics was examined by plotting the smoothed frequency curve of the distribution. The smoothed frequency curve is presented in Figure 5.

The statistical constants and the graphical representation reveal that the distribution approximates normality.

The rest of the analysis has been taken up in the order of the objectives taken for the present study. Accordingly the analysis is presented in the following sequence.

FIGURE: V

Smoothed frequency curve of the distribution of scores on Home Practice for Mathematics



MAJOR STATISTICAL ANALYSIS

Correlational analysis

Correlational analysis attempts to estimate the relationship between achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub samples. For this, Pearson's Product Moment Coefficient of correlation 'r' was worked out for each pair. Besides 'r', standard error of 'r's, confidence interval at 0.05 level and the percentage overlap were also found out.

The extent of the correlation between 'achievement in Mathematics' and each of the selected independent variables separately for the whole sample, for the sample of boys and girls, urban and rural samples, urban boys and girls, and for rural boys and girls was examined. The criteria for assessing the influence of cognitive style and the selected non- cognitive variables on achievement in Mathematics was determined based on the magnitude and sign of 'r'. The correlation analysis is discussed separately for the selected variables.

1. Correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables.

The details of correlation obtained between 'achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub samples viz; boys, girls, urban sample, rural sample, urban boys, urban girls, rural boys and rural girls, the limits of 0.05 confidence interval and shared variance are summarised.

(i) *Correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables for the whole sample.*

The details of the correlation between achievement in Mathematics and the selected six independent variables for the whole sample are given in Table 21.

The correlations obtained for five of the six independent variables for the whole sample were well in excess of the level set for significance at 0.01 level as 't' values computed exceed 2.58. But the correlation between achievement in Mathematics and level of aspiration is not significant even at 0.05 level. Coefficient of correlation is positive except for 'level of aspiration' indicating that these variables and achievement in Mathematics increases or decreases together.

The confidence intervals at 0.05 level were calculated for each correlation coefficient. The values indicate that if the correlation is worked between the same variables for the whole population of the study, the resulting correlation will be between these values at the 0.05 level of probability.

TABLE 21
Details of correlation of achievement in Mathematics with cognitive style
and selected non -cognitive variables of the total sample (N=740)

Variable	Correlation with achievement	t	SEr	Confidence Interval		Percentage overlap
				Lower	Upper	
Cognitive style	.1230**	3.37	.0362	.0520	.1940	1.5129
Level of Aspiration	-.0110	-.30	.0368	-.0831	.0611	.01
Attitude towards Mathematics	.2320**	6.48	.0348	.1638	.3002	5.3824
Classroom Environment for Mathematics	.1388**	3.81	.0361	.0680	.2096	1.9265
Home Environment for Mathematics	.1120**	3.06	.0363	.0409	.1832	1.2544
Home Practice for Mathematics	.1180**	3.23	.0362	.0470	.1890	1.3924

** indicates significance at 0.01 level

* indicates significance at 0.05 level

The correlations were again interpreted using the descriptive categories suggested by Garrett (1979). The variables are classified as follows:

<i>'low' or slight correlation</i>	<i>r</i>
Attitude towards Mathematics	0.2320
<i>'Indifferent' or negligible correlation</i>	
1. Class room environment for Mathematics	0.1388
2. Cognitive style	0.1230
3. Home practice for Mathematics	0.1180
4. Home environment for Mathematics	0.1120
5. Level of aspiration	-0.0110

The percentage overlap of 'achievement in Mathematics' with each of the selected independent variables were calculated and are presented in descending order.

<i>Variable</i>	<i>Percentage overlap</i>
1. Attitude towards Mathematics	5.38
2. Class room environment for Mathematics	1.93
3. Cognitive style	1.51
4. Home practice for Mathematics	1.39
5. Home environment for Mathematics	1.25
6. Level of aspiration	0.01

This shows that 5.38 per cent of the variance (the highest shared variance) of achievement in Mathematics for the whole sample is to be

attributed to the variable, 'attitude towards Mathematics'. The lowest variance is noticed for 'level of aspiration' (0.01).

(ii) *Correlation of 'Achievement in Mathematics' with cognitive style and selected non-cognitive variables for Boys.*

The details of the correlation between 'achievement in Mathematics; and each of independent variables for boys are given in Table 22.

The correlation coefficients obtained for the variables, attitude towards Mathematics, classroom environment for Mathematics and home environment for Mathematics for boys were well in excess of the level set for significance at 0.01 level, as the t-values computed exceed 2.58. The correlation of achievement in Mathematics with cognitive style and home practice were significant at 0.05 level as the t-values computed exceed 1.96. But the correlation of achievement in Mathematics with 'level of aspiration' was not significant even at 0.05 level. This fact shows that for boys, there is a relationship between achievement in Mathematics and selected independent variables except for level of aspiration. Positive indices of correlations show that these variables and 'achievement in Mathematics' increase or decrease together.

The variable which does not show significant relationship with 'achievement in Mathematics' for boys is 'level of aspiration'.

TABLE 22
Details of correlation of achievement in Mathematics
with cognitive style and selected non-cognitive variables of Boys (N=340)

Sl. No	Variable	Correlation with Achievement	t	SE(r)	Confidence Interval		Percentage Overlap ($r^2 \times 100$)
					Lower	Upper	
1	Cognitive style	.1067*	1.9729	.0536	.0016	.2118	1.1385
2	Level of aspiration	-0.0016	-0.0294	.0543	.1078	.1046	.0256
3	Attitude towards Mathematics	.2486**	4.7186	.0569	.1371	.3601	6.1802
4	Classroom Environment for Mathematics	.1473**	2.7379	.0531	.0432	.2514	2.1680
5	Home Environment for Mathematics	.1725**	3.2196	.0526	.0694	.2756	2.9756
6	Home Practice for Mathematics	.1384*	2.5692	.0532	.0341	.2427	1.9154

** Indicates significance at 0.01 level

* Indicates significance at 0.05 level

The confidence intervals at 0.05 level were calculated for each correlation coefficient. The values show that 'r's of the same variables for the whole population of the study are expected to fall within the corresponding limits, at 0.05 level of probability.

The correlations were again interpreted using the description categories suggested by Garrett (1979). The classification is shown below.

<i>Low or slight correlation</i>	r
Attitude towards mathematics	0.2486

Indifferent or negligible correlation

1	Home environment for Mathematics	0.1725
2	Class room environment for Mathematics	0.1473
3	Home practice for Mathematics	0.1384
4	Cognitive style	0.1067
5	Level of aspiration	0.0016

The percentage overlap of 'achievement in Mathematics' with each of the selected independent variables were calculated and are given in descending order.

	<i>Variable</i>	<i>percentage overlaps</i>
1	Attitude towards Mathematics	6.18
2	Home environment for Mathematics	2.98
3	Class room environment for Mathematics	2.17
4	Home practice for Mathematics	1.92
5	Cognitive style	1.14
6	Level of aspiration	0.03

This reveals that 6.18 per cent of the variance of 'achievement in Mathematics' for boys of the sample is to be attributed to 'attitude towards Mathematics'. The lowest variance is noticed for 'level of aspiration'.

(iii) *Correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables for girls.*

The correlation between achievement in Mathematics and each of the selected independent variables for girls are given in Table 23.

The correlations of achievement in Mathematics with cognitive style, attitude towards Mathematics and class room environment for Mathematics were significant at 0.01 level. The correlation coefficient of achievement in Mathematics and home practice for Mathematics was significant at 0.05 level. The variables which do not show significant relationship with achievement in Mathematics for girls are level of aspiration and home environment for Mathematics.

The result shows that there is a relationship between achievement in Mathematics and the selected independent variables except for home environment and level of aspiration. Positive index of correlation coefficients indicates that these variables and achievement in Mathematics increase or decrease together. Home environment and level of aspiration do not show significant relationship with achievement in Mathematics for girls in the total sample.

TABLE 23
Details of correlation of achievement in Mathematics with
cognitive style and selected non – cognitive variables of Girls (N=400)

Sl. No	Variable	Correlation with Achievement	t	SEr	Confidence Interval		Percentage Overlap $r^2 \times 100$
					Lower	Upper	
1	Cognitive style	.1491**	3.0082	.0489	.0533	.2449	2.2231
2	Level of Aspiration	-.0291	-.5808	.0500	-.1173	.0591	.0846
3	Attitude towards Mathematics	.2213**	4.5272	.0476	.1280	.3146	4.8974
4	Classroom Environment for Mathematics	.1498**	3.0226	.0489	.0540	.2456	2.2440
5	Home Environment for Mathematics	.0560	1.1190	.0498	-.0416	.1536	.3136
6	Home Practice for Mathematics	.0997*	1.9990	.0495	.0027	.1967	.9940

**Indicates significance at 0.01 level

* Indicates significance at 0.05 level

The confidence intervals at 0.05 level were worked out for each correlation coefficient. The values show that, the 'r' of same variables for the whole population of the study are expected to fall within the corresponding limits at 0.05 level of probability.

The variables are classified according to the descriptive categories suggested by Garrett (1979).

'Low' or 'Slight' correlation:

	r
Attitude towards Mathematics	0.3132

'Indifferent' or negligible correlation

1 Class room environment for Mathematics	0.1498
2 Cognitive style	0.1491
3 Home practice for Mathematics	0.0997
4 Home environment for Mathematics	0.0560
5 Level of aspiration	- 0.0291

The percentage overlap of achievement in Mathematics with each of the independent variables selected were calculated and are given in the descending order.

<i>Variable</i>	<i>Percentage overlap</i>
1. Attitude towards Mathematics	4.90
2. Classroom environment for Mathematics	2.24
3. Cognitive style	2.22
4. Home Practice for Mathematics	1.00
5. Home environment for Mathematics	0.31
6. Level of aspiration	0.085

The result reveals that nearly 5 percent of the variance of achievement in Mathematics for total girls is to be attributed to 'Attitude towards Mathematics'. The lowest variance was observed for level of aspiration.

(iv) *Correlation of Achievement in Mathematics with cognitive style and selected non-cognitive variables for urban sample.*

The details of the correlations between achievement in Mathematics and each of the independent variables for urban samples in the total sample is given in Table 24.

The correlations obtained for the variables, cognitive style and attitude towards Mathematics for urban sample were in excess of the level set for significance at 0.01 level as the t-values exceed 2.58. The correlation of achievement in Mathematics with home environment was significant at 0.05 level as the t-value exceed 1.96. But the correlation for class room environment for Mathematics, home practice for Mathematics and level of aspiration were not significant even at 0.05 level.

TABLE 24
Details of correlation of achievement in Mathematics with
cognitive style and select non-cognitive variables of Urban sample (N= 327)

Sl. No	Variable	Correlation with Achievement	t	SEr	Confidence Interval		Percentage Overlap $r^2 \times 100$
					Lower	Upper	
1	Cognitive style	.2381**	4.4195	.0522	.1358	.3404	5.6692
2	Level of aspiration	.0050	.0901	.0553	-.1034	.1134	.0025
3	Attitude towards Mathematics	.1927**	3.5403	.0532	.0884	.2970	3.7133
4	Classroom Environment for Mathematics	.0057	.1028	.0553	-.1027	.1140	.0032
5	Home Environment for Mathematics	.1180*	2.1422	.0545	.0112	.2248	1.3924
6	Home Practice for Mathematics	.0495	.8935	.0552	-.0587	.1577	.2450

** Indicates significance at 0.01 level

* Indicates significance at 0.05 level

The result reveals that there is a relationship between achievement in Mathematics with the selected independent variables - cognitive style, attitude towards Mathematics and home environment for Mathematics. Positive indices of correlations show that these variables and achievement in Mathematics increase or decrease together. The variables which do not show significant relationship with achievement in Mathematics for urban sample were level of aspiration, class room environment for Mathematics and home practice for Mathematics.

The confidence intervals at 0.05 level were worked out for each correlation coefficient. The values show that the 'r's of the same variable for the whole population of the study are expected to fall within the corresponding limits at 0.05 level of probability.

The correlation coefficients were again interpreted using the descriptive categories suggested by Garrett (1979). The variables are classified as follows:

<i>'Low' or 'slight' correlation.</i>	r
Cognitive style	.2381
<i>'Indifferent' or 'negligible' correlation.</i>	
1 Attitude towards Mathematics	0.1927
2 Home environment for Mathematics	0.1180
3 Home practice for Mathematics	0.0495
4 Class room environment for Mathematics	0.0057
5 Level of aspiration	0.0050

The percentage overlap of achievement in Mathematics with each of the independent variables were calculated. They are presented in the descending order as follows:

<i>Variable</i>	<i>Percentage overlap</i>
Cognitive style	5.67
Attitude toward Mathematics	3.71
Home environment for Mathematics	1.40
Home practice for Mathematics	0.25
Class room environment for Mathematics	0.003
Level of aspiration	0.003

The result reveals that nearly 6 percent of the variance of achievement in Mathematics for urban sample is to be attributed to cognitive style. The lowest variance was observed for level of aspiration.

(v) *Correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables for Rural sample.*

The details of the correlation between achievement in Mathematics and each of the independent variables for the rural sample is given in Table 25.

TABLE 25
Details of correlation of achievement in Mathematics with
cognitive style and selected non-cognitive variables of Rural sample (N=413)

Sl. No	Variable	Correlation with Achievement	t	SEr	Confidence Interval		Percentage Overlap $r^2 \times 100$
					Lower	Upper	
1	Cognitive style	.1147*	2.3408	.0486	.0194	.2100	1.3156
2	Level of Aspiration	-.0057	-.1156	.0492	-.1023	.0907	.0032
3	Attitude towards Mathematics	.2391**	4.9921	.0464	.1482	.3300	5.7169
4	Classroom Environment for Mathematics	.2716**	7.212	.0456	.1822	.3610	7.3767
5	Home Environment for Mathematics	.1025*	2.0890	.0487	.0071	.1980	1.0506
6	Home Practice for Mathematics	.0926	1.8854	.0488	.0031	.1882	.8574

** Indicates significance at 0.01 level

* Indicates significance at 0.05 level

The correlation coefficients obtained for attitude towards Mathematics and class room environment for Mathematics for rural sample were significant at 0.01 level. The correlation of achievement in Mathematics with cognitive style and home environment for Mathematics were significant at 0.05 level. But the correlations for level of aspiration and home practice were not significant even at 0.05 level.

The result shows that for the rural sample, there is a relationship between achievement in Mathematics and the selected independent variables; cognitive style, attitude towards Mathematics, class room environment for Mathematics and home environment for Mathematics. The positive index of correlation shows that the variables and achievement in Mathematics increase or decrease together.

The variables, home practice for Mathematics and level of aspiration do not show significant relationship with achievement in Mathematics for rural sample.

The confidence intervals at 0.05 level were calculated for each correlation coefficient. The values show that the 'r' of the same variables for the whole population of the study are expected to fall within the corresponding limits at 0.05 level of probability.

The variables are classified according to the categorization suggested by Garrett (1979).

<i>'Low' or 'slight' correlation</i>	r
1 Class room environment for Mathematics	0.2716
2 Attitude towards Mathematics	0.2391
<i>'Indifferent' or negligible correlation</i>	
1. cognitive style	0.1147
2. Home environment for Mathematics	0.1025
3. Home practice for Mathematics	0.0926
4. Level of aspiration	-0.0057

The percentage overlap of achievement in Mathematics with each of the independent variables were calculated. These are given in descending order.

<i>Variable</i>	<i>Percentage overlap</i>
1 Class room environment for Mathematics	7.38
2 Attitude towards Mathematics	5.72
3 Cognitive style	1.32
4 Home environment for Mathematics	1.05
5 Home practice for Mathematics	0.86
6 Level of aspiration	0.003

This reveals that 7.38 percent of the variance of achievement in Mathematics for rural sample is to be attributed to class room environment for Mathematics. The lowest variance was observed for level of aspiration.

(vi) *Correlation of achievement in Mathematics with cognitive style and selected non-cognitive variables of Urban boys.*

The details of the correlation between Achievement in Mathematics and each of the selected independent variables of the Urban boys in the total sample is given in Table 26.

The correlation coefficients obtained for achievement in Mathematics with the variables, cognitive style, attitude towards Mathematics, home environment for Mathematics and home practice for Mathematics were found to be significant at 0.01 level. The correlation coefficient of achievement in Mathematics with class room environment is significant at 0.05 level. But achievement in Mathematics did not show significant relationship with level of aspiration.

This reveals that there is a significant relationship between achievement in Mathematics and each of the selected independent variables except for level of aspiration of urban boys. The positive sign of correlation coefficient shows that these variables and achievement in Mathematics increase or decrease together.

The confidence intervals at 0.05 level were worked out for each correlation coefficient. The values show that 'r' of the same variables for the population of the study are expected to fall within the corresponding limits at 0.05 level of probability.

TABLE 26
Details of correlation of achievement in Mathematics with
cognitive style and selected non-cognitive variables of Urban boys (N=167)

Sl. No	Variable	Correlation with Achievement	t	SEr	Confidence Interval		Percentage Overlap $r^2 \times 100$
					Lower	Upper	
1	Cognitive style	.1977**	2.5906	.0744	.0519	.3435	3.9085
2	Level of Aspiration	-.0441	-.5670	.0774	-.1954	.1072	.1945
3	Attitude towards Mathematics	.3253**	4.4189	.0694	.1897	.4609	10.5820
4	Classroom Environment for Mathematics	.1617*	2.1048	.0754	.0139	.3095	2.6146
5	Home Environment for Mathematics	.2833**	3.7945	.0712	.1437	.4229	8.0258
6	Home Practice for Mathematics	.2326**	3.0721	.0734	.0891	.3761	5.4103

** Indicates significance at 0.01 level

* Indicates significance at 0.05 level

The correlation coefficients were again interpreted using the descriptive categories suggested by Garrett (1979). The variables are classified according to these categories.

'Low' or 'slight' correlation

	<i>r</i>
1. Attitude towards Mathematics	0.3253
2. Home Environment for Mathematics	0.2833
3. Home practice for Mathematics	0.2326

'Indifferent' or 'negligible' correlation

1. Cognitive style	0.1977
2. Classroom environment for Mathematics	0.1617
3. Level of aspiration	-0.441

The percentage overlap of achievement in Mathematics with each of the independent variables were calculated. They are given in the descending order.

<i>Variable</i>	<i>Percentage overlap</i>
1. Attitude towards Mathematics	10.58
2. Home environment for Mathematics	8.03
3. Home practice for Mathematics	5.41
4. Cognitive style	3.91
5. Class room environment for Mathematics	2.61
6. Level of aspiration	0.19

This reveals that nearly 11 percent of the variance of achievement in Mathematics for urban boys is to be attributed to attitude towards Mathematics. The lowest variance was noticed for level of aspiration.

(vii) *Correlation of Achievement in Mathematics with cognitive style and non-cognitive variables of Urban girls.*

The details of the correlation between Achievement in Mathematics and each of cognitive style and selected non-cognitive variables of Urban girls in the total sample is given in Table 27.

The correlation coefficients obtained for achievement in Mathematics with each of the independent variables were found not significant for the urban girls.

The confidence intervals at 0.05 level were calculated for each correlation coefficient. The value 'r' for the population of the study is expected to fall within the corresponding limits at 0.05 level of probability.

The classification of the variables according to the descriptive categories suggested by Garrett (1979) showed that all of them had 'indifferent' or 'negligible' correlation.

The percentage overlap of achievement in Mathematics with each of the selected independent variables were calculated.

TABLE 27
Details of correlation of achievement in Mathematics with
cognitive style and selected non-cognitive variables of Urban girls (N=160)

Sl. No	Variable	Correlation with Achievement in mathematics	t	SEr	Confidence Interval		Percentage Overlap $r^2 \times 100$
					Lower	Upper	
1	Cognitive style	.1043	1.3182	.0784	-.0490	.2576	1.0878
2	Level of Aspiration	.1452	1.8447	.0776	-.0065	.2969	2.1083
3	Attitude towards Mathematics	.0853	1.0761	.0785	-.0686	.2392	.7276
4	Classroom Environment for Mathematics	-.0161	-.2024	.0790	-.1709	.1387	.0259
5	Home Environment for Mathematics	.0562	.7075	.0788	-.0982	.2106	.0316
6	Home Practice for Mathematics	-.0746	-.9403	.0788	-.2287	.0795	.5565

This shows that 2 per cent of the variance of achievement in Mathematics for urban girls is to be attributed to the level of aspiration. The lowest variance has been observed for class room environment.

(viii) *Correlation of Achievement in Mathematics with cognitive style and selected non-cognitive variables of Rural boys*

The details of the correlation between achievement in Mathematics and each of the independent variables of Rural boys in the total sample is given in Table 28.

The correlations obtained for Achievement in Mathematics with each of the selected independent variables of Rural boys were found to be not significant even at 0.05 level. The result reveals that there exists no significant relationship between achievement in Mathematics and the selected independent variables for Rural boys.

The confidence intervals at 0.05 level were computed for each of the correlation coefficient obtained. The population 'r' is expected to fall within the corresponding limits at the 0.05 level of probability.

The correlation coefficients were again interpreted using the descriptive categories suggested by Garrett (1979). The variables were classified according to these categories. All of them showed 'indifferent' or 'negligible' correlation.

TABLE 28
Details of Correlation of achievement in Mathematics with
cognitive style and selected non- cognitive variable of Rural boys (N=173)

Sl. No	Variable	Correlation with Achievement in Mathematics	t	SEr	Confidence Interval		Percentage Overlap $r^2 \times 100$
					Lower	Upper	
1	Cognitive style	.1080	1.4206	.0751	-.0392	.2552	1.1664
2	Level of Aspiration	.0873	1.1460	.0754	-.0605	.2351	.7621
3	Attitude towards Mathematics	.0439	.5746	.0759	-.1049	.1927	.1927
4	Classroom Environment for Mathematics	.1001	1.3156	.0753	-.0475	.2477	1.002
5	Home Environment for Mathematics	.0053	.0693	.0760	-.1437	.1543	.0025
6	Home Practice for Mathematics	-.0893	-1.1724	.0754	-.2371	.0585	.7974

The estimated values of percentage overlap of achievement in Mathematics with each of the independent variables shows that 1.2 per cent of the variance of achievement in mathematics for rural boys is attributable to cognitive style. The lowest variance has been observed for class room environment for Mathematics.

(ix) The correlation of Achievement in Mathematics with cognitive style and selected non-cognitive variables of Rural girls.

The details of the correlation between Achievement in Mathematics and each of the selected independent variables for the sub sample, Rural girls is given in Table 29.

The correlation coefficients obtained for achievement in Mathematics with each of the independent variables except home environment for Mathematics and level of aspiration were found to be significant at 0.01 level for the sub sample, rural girls, as the computed t-value exceeded the tabled t-value (2.58). The coefficients of correlation for home environment and level of aspiration were not significant even at 0.05 level, as the computed t-value did not reach the level of tabled t-value (1.96).

Table 29
Details of Correlation of achievement in Mathematics
with cognitive style and selected non- cognitive variable of Rural Girls (N=240)

Sl. No	Variable	Correlation with Achievement In Mathematics	t	SEr	Confidence Interval		Percentage Overlap $r^2 \times 100$
					Lower	Upper	
1	Cognitive style	.2502**	3.9867	.0605	.1316	.3688	6.26
2	Level of Aspiration	-.1281	-1.9926	.0635	-.2526	-.0036	1.641
3	Attitude towards Mathematics	.3210**	5.2289	.0579	.2075	.4345	10.3041
4	Classroom Environment for Mathematics	.2642**	4.2260	.0600	.1466	.3818	6.68
5	Home Environment for Mathematics	.0574	0.8870	.0643	-.0686	.1834	.329
6	Home Practice for Mathematics	.1827**	2.8668	.0624	.0604	.3050	3.338

** Indicates significance at 0.01 level

* Indicates significance at 0.05 level

The result indicates that there is a significant relationship between achievement in Mathematics and the selected independent variables, cognitive style, attitude towards Mathematics and class room environment for Mathematics, for the sub sample, rural girls. The positive coefficient of correlation shows that these variables and achievement in Mathematics increase or decrease together.

The confidence intervals at 0.05 level were computed for each correlation coefficient. The population 'r' is expected to be within the corresponding limits, at 0.05 level of probability.

The coefficients of correlation were again interpreted in terms of the verbal description as suggested by Garrett (1979). Accordingly the variables are classified as shown below.

<i>'low' or 'slight' correlation</i>	<i>r</i>
1 Attitude towards Mathematics	0.3210
2 Class room Environment for Mathematics	0.2642
3 Cognitive style	0.2502

<i>'Indifferent' or 'negligible' correlation</i>	<i>r</i>
1 Home practice for Mathematics	0.1827
2 Level of Aspiration	-0.1281
3 Home environment for Mathematics	0.0574

The percentage overlap of achievement in Mathematics with each of the selected independent variables were also computed. The variables are arranged in the descending order of shared variance.

<i>Variable</i>	<i>Percentage overlap</i>
1 Attitude towards Mathematics	10.30
2 Class room environment for Mathematics	6.68
3 Cognitive style	6.26
4 Home practice for Mathematics	3.34
5 Level of aspiration	1.64
6 Home environment for Mathematics	0.33

The result shows that 10.30 percent of the variance of achievement in Mathematics for rural girls is to be attributed to attitude towards Mathematics. The lowest variance is observed for home environment for Mathematics.

Discussion of the result of Correlational Analysis

The extent of relationship between achievement in Mathematics and each of the selected independent variables was determined by finding the coefficients of correlation for the whole sample and the sub samples. Viz; Boys, Girls, Urban sample, Rural sample, Urban boys, Urban girls, Rural boys and Rural girls. The significance of the correlation coefficients were tested by computing t-values and comparing them with tabled t-values.

The confidence intervals and shared variances were also computed. The confidence interval tells where the population 'r' would be and shared variance tells the amount of variance in the dependent variable which can be attributed to the effect of the independent variable. The results are consolidated and presented in Table 30.

Table 30
Summary of correlation of achievement in Mathematics with
cognitive style and selected non- cognitive variables of the whole sample and relevant sub- samples

Sl. No	Variable	r and its interpretation								
		Urban Boys	Urban Girls	Rural Boys	Rural Girls	Urban sample	Rural sample	Boys	Girls	Total sample
1	Cognitive style	.1977*	.1043	.1080	.2502**	.2381**	.1147*	.1067*	.1491**	.1230**
2	Level of Aspiration	-.0441	.1452	.0873	-.1281	.0050	-.0057	-.0016	-.0291	-.0110
3	Attitude towards Mathematics	.3253**	.0853	.0439	.3210**	.1927**	.2391**	.2486**	.2213**	.2320**
4	Classroom Environment for Mathematics	.1617*	-.0161	.1001	.2642**	.0057	.2716**	.1473**	.1498**	.1388**
5	Home Environment for mathematics	.2833**	.0562	.0053	.0574	.1180**	.1025*	.1725**	.0560	.1120**
6	Home Practice for Mathematics	.2326**	-.0746	-.0893	.1827**	.0495	.0926	.1384*	.0997*	.1180**

** Indicates significance at 0.01 level

* Indicates significance at 0.05 level

II. Test of significance of Difference between Equivalent correlations obtained for Equivalent groups.

The equivalent correlation obtained for the relevant sub samples based on sex and locale were compared. This part of the study was carried out with a view to find whether the relationship between the achievement in Mathematics with cognitive style and selected non-cognitive variables taken in pairs is identical or not for the sub samples based on sex and locale. Comparison was done by using the test of significance of difference between correlation coefficients. If the estimated critical ratio is greater than 1.96, the difference is considered to be significant at 0.05 level and if it is greater than 2.58, the difference is considered to be significant at 0.01 level. The details of the test of significance and the results are presented below:

(i) Comparison of 'r' s of achievement in Mathematics and cognitive style for equivalent groups.

The coefficient of correlation between achievement in Mathematics and cognitive style obtained for the equivalent samples based on sex of the subjects (boys and girls) and locale of the school (urban and rural) were compared. The results of the test of significance of the difference between 'r' s for the sub samples (equivalent groups) are given in Table 31.

TABLE 31
Data and results of test of significance of
difference between 'r's for the relevant sub samples
('r' of achievement in Mathematics with cognitive style)

Sl. No	Group pairs compared	N	r	Critical ratio
1	Urban boys	167	.1977	.8777
	Urban girls	160	.1043	
2	Rural boys	173	.1080	1.4427
	Rural girls	240	.2502	
3	Urban boys	167	.1977	.8497
	Rural boys	173	.1080	
4	Urban girls	160	.1043	1.4577
	Rural girls	240	.2502	
5	Total boys	340	.1067	.621
	Total girls	400	.1491	
6	Total Urban Sample	327	.2381	1.7354
	Total Rural Sample	413	.1147	

Note : Values of critical ratio are not significant

The data and results summarised in table 31 shows that the obtained critical ratio for all the sub samples is less than 1.96. This indicates that the relationship between 'achievement in Mathematics' and cognitive style does not change according to the sex or locale.

(ii) *Comparison of 'r's of achievement in Mathematics and each of Field dependent Intermediate and Field independent orientations of cognitive style for equivalent groups.*

The coefficient of correlation between achievement in Mathematics and field dependent (FD) cognitive style for the equivalent samples based on sex of the subject (boys and girls) and locale of the subject (urban and rural) were compared. The results of the tests of significance of difference between 'r's for the sub samples are given in Table 32.

TABLE 32

Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with FD cognitive style.

Sl. No	Groups compared	N	r	Critical ratio
1	Urban Boys	76	-.0509	2.139*
	Urban Girls	126	.2610	
2	Rural Boys	77	.1880	0.139
	Rural Girls	144	.1713	
3	Urban boys	76	-.0509	1.46
	Rural boys	77	.1880	
4	Urban girls	126	.2610	0.762
	Rural girls	144	.1713	
5	Boys	153	.1209	0.549
	Girls	270	.1728	
6	Urban	202	.1919	0.317
	Rural	221	.1610	

* indicates significance at 0.05 level

The data and results in table 32 shows that the obtained critical ratio for urban boys and urban girls is significant at 0.05 level. But the critical ratio for all the other sub samples is less than 1.96. This indicates that the relationship between achievement in Mathematics and FD cognitive style does not change according to the sex or locale of the subjects.

The correlation coefficient obtained for achievement in Mathematics and intermediate (INT) cognitive style for the equivalent samples based on sex and locale of the subjects were compared. The details of the test of significance of difference between 'r's for the relevant sub samples are given in Table 33.

TABLE 33

Data and results of test of significance of difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics and INT cognitive style)

Sl. No.	Groups compared	N	r	Critical ratio
1	Urban Boys	71	.2569	1.057
	Urban Girls	27	-.0093	
2	Rural Boys	67	-.2161	3.817**
	Rural Girls	82	.3996	
3	Urban boys	71	.2569	2.750**
	Rural boys	67	-.2161	
4	Urban girls	27	-.0093	1.776
	Rural girls	82	.3996	
5	Total boys	138	-.0275	2.319*
	Total girls	109	.3132	
6	Urban sample	98	.1632	0.679
	Rural sample	149	.0434	

** indicates significance at 0.01 level.

* indicates significance at 0.05 level

As shown in table 33, the critical ratio obtained for the comparison of rural boys and rural girls is significant at 0.01 level. The critical ratio obtained for the comparison of boys and girls is significant at 0.05 level. The obtained critical ratio for the comparison of urban boys and rural boys is significant at 0.01 level. The critical ratio for the other pairs compared are not significant even at 0.05 level. Therefore it may be concluded that the relationship between achievement in Mathematics and INT cognitive style change according to the sex of the subjects, but it does not change according to the locale.

The correlation coefficient obtained for achievement in Mathematics and field independent (FI) cognitive style for equivalent samples based on sex and locale of the subjects were compared. The details of the tests of significance of difference between 'r's for the relevant sub samples are given in Table 34.

TABLE 34

Data and results of test of significance of difference between 'r's for relevant sub samples ('r' of achievement in Mathematics with FI cognitive style).

Sl No	Group compared	N	r	Critical ratio
1	Urban Boys	20	.0008	.6262
	Urban Girls	7	-.3346	
2	Rural Boys	29	.3387	1.938
	Rural Girls	14	-.3301	
3	Urban boys	20	.0008	1.135
	Rural boys	29	.3387	
4	Urban girls	7	-.3346	1.18
	Rural girls	14	-.3301	
5	Total Boys	49	.0710	1.115
	Total Girls	21	-.2310	
6	Urban sample	27	-.0282	.740
	Rural sample	43	.1602	

The data and results summarised in Table 34, reveals that the obtained critical ratio for all the pairs of sub samples is less than 1.96. This indicates that the relationship between achievement in Mathematics and FI cognitive style does not change according to the sex or locale of the subjects.

The results of the test of significance of the difference between 'r's of achievement in Mathematics and each of the field dependent, intermediate and

field independent orientations of cognitive style for the relevant sub samples are summarised and presented in Table 35.

TABLE 35

Summary of the results of test of significance of the difference between 'r's for the relevant sub samples ('r' of achievement in Mathematics with FD/INT/FI cognitive styles)

SI No	Groups compared	Critical ratio		
		FD	INT	FI
1	Urban boys Urban girls	2.319*	1.057	0.626
2	Rural boys Rural girls	0.139	3.817**	1.938
3	Urban boys Rural boys	1.460	2.750**	1.135
4	Urban girls Rural girls	0.762	1.776	1.18
5	Total boys Total girls	0.549	2.319*	1.115
6	Urban sample Rural sample	0.317	0.679	0.740

** indicates significance at 0.01 level.

* indicates significance at 0.05 level

(iii) *Comparison of 'r's of achievement in Mathematics and level of aspiration for equivalent groups.*

The correlation coefficient obtained for the equivalent samples based on sex and locale of the subjects were compared. The data and results of the test of significance of difference between 'r's for the relevant sub samples are presented in Table 36.

TABLE 36
Data and results of test of significance of
Difference between 'r's for the relevant sub samples
('r' of achievement in Mathematics with level of aspiration)

Sl. No	Group pairs compared	N	r	Critical ratio
1	Urban boys	167	-.0441	1.7106
	Urban girls	160	.1452	
2	Rural boys	173	.0873	2.1491*
	Rural girls	240	-.1281	
3	Urban boys	167	-.0441	1.2334
	Rural boys	173	.0873	
4	Urban girls	160	.1452	2.6918**
	Rural girls	240	-.1281	
5	Total boys	340	-.0016	.405
	Total girls	400	-.0291	
6	Total Urban sample	327	.0050	.1345
	Total Rural sample	413	-.0057	

** Indicates significance at 0.01 level

* indicates significance at 0.05 level.

The data and results summarised in Table 36 reveals that the critical ratio obtained for the comparison of rural boys and rural girls is significant at 0.05 level. But the critical ratio for the sub samples urban boys and urban girls and total boys and total girls are not significant even at 0.05 level. Hence it may be concluded that the variables are similarly distributed for both boys and girls in the sample and the relation between the variables, achievement in Mathematics and level of aspiration do not change according to the sex of the subjects.

The critical ratio obtained for the comparison of urban girls and rural girls is significant at 0.01 level. But the critical ratio for the sub samples, urban boys and rural boys and total urban sample and total rural sample are not significant even at 0.05 level. Hence it may be concluded that the variables are similarly distributed for both urban and rural samples, and the relation between the variables, achievement in Mathematics and level of aspiration do not change according to the locale of the subjects.

(iv) *Comparison of 'r's of achievement in Mathematics and attitude towards Mathematics for equivalent groups.*

The correlation coefficient obtained for the equivalent samples based on sex and locale of the subjects were compared. The details of the test of significance of difference between 'r's for the relevant sub samples are given in Table 37.

TABLE 37
Data and results of test of significance of
difference between r's for the relevant sub samples
('r' of achievement in Mathematics with attitude towards
Mathematics)

Sl. No	Group pairs compared	N	r	Critical ratio
1	Urban boys	167	.3253	2.2569*
	Urban girls	160	.0853	
2	Rural boys	173	.0439	2.8555**
	Rural girls	240	.3210	
3	Urban boys	167	.3253	2.6678**
	Rural boys	173	.0439	
4	Urban girls	160	.0853	2.4003*
	Rural girls	240	.3210	
5	Total boys	340	.2486	.4815
	Total girls	400	.2213	
6	Total Urban Sample	327	.1927	.6323
	Total Rural Sample	413	.2391	

** Indicates significance at 0.01 level

* Indicates significance at 0.05 level

Table 37 shows that the critical ratio obtained for the comparison of rural boys and rural girls is significant at 0.01 level and for urban boys and urban girls is significant at 0.05 level. But the critical ratio obtained for the comparison of the total boys total girls is not significant even at 0.05 level.

The critical ratio obtained for the comparison of urban boys and rural boys is significant at 0.01 level and for urban girls and rural girls is significant at 0.05 level. But the critical ratio for total urban sample and total rural sample is not significant even at 0.05 level.

(v). *Comparison of 'r's of achievement in Mathematics and class room environment for Mathematics for equivalent groups.*

The coefficient of correlation obtained for the equivalent samples based on sex and local of the subjects were compared. The details of the test of significance of the difference between 'r's for the relevant sub samples are presented in Table 38.

TABLE 38
Data and results of test of significance of
difference between r's for the relevant sub samples
('r' of achievement in Mathematics with class room environment for
Mathematics)

Sl. No	Group pairs compared	N	r	Critical ratio
1	Urban boys	167	.1617	1.5763
	Urban girls	160	-.0161	
2	Rural boys	173	.1001	1.7014
	Rural girls	240	.2642	
3	Urban boys	167	.1617	.5573
	Rural boys	173	.1001	
4	Urban girls	160	-.0161	2.779**
	Rural girls	240	.2642	
5	Total boys	340	.1473	.0675
	Total girls	400	.1498	
6	Total Urban Sample	327	.0057	3.7265**
	Total Rural Sample	413	.2716	

** Indicates significance at 0.01 level

Table 38 shows that the critical ratio obtained for the comparison of urban girls and rural girls and for total urban sample and total rural sample are significant at 0.01 level. Therefore it may be concluded that the variables achievement in Mathematics and 'class room environment for Mathematics' are not similarly distributed for urban and rural samples. The relation between

the variables change according to the locale of the subjects. All the other critical ratios are not significant even at 0.05 level. This indicates that the relationship between achievement in Mathematics and class room environment for Mathematics do not change according to the sex of the subjects.

(vi) *Comparison of 'r's of achievement in Mathematics and Home environment for Mathematics for equivalent groups.*

The correlation coefficients obtained for the equivalent samples based on sex and locale of the subject were compared. The results of the test of significance of the difference between 'r's for the sub sample are presented in Table 39.

TABLE 39
Data and results of test of significance of
difference between r's for the relevant sub samples
('r' of achievement in Mathematics with home environment for
Mathematics)

Sl. No	Group pairs compared	N	r	Critical ratio
1	Urban Boys Urban Girls	167 160	.2833 .0562	2.1316*
2	Rural Boys Rural Girls	173 240	.0053 .0574	.4975
3	Urban Boys Rural Boys	167 173	.2833 .0053	2.6313**
4	Urban Girls Rural Girls	160 240	.0562 .0574	.0486
5	Total Boys Total Girls	340 400	.1725 .0560	1.6471
6	Total Urban Sample Total Rural Sample	327 413	.1180 .1025	.2152

** Indicates significance at 0.01 level

The data and results summarised in Table 39 reveal that the critical ratio obtained for the comparison of urban boys and urban girls is significant at 0.05 level. But the critical ratio for the sub samples, rural boys versus rural girls and total boys versus total girls are not significant even at 0.05 level. Hence it may be concluded that the variables are similarly distributed for both boys and girls and that the relation between achievement in Mathematics and Home

Environment for Mathematics does not change according to the sex of the subjects.

The critical ratio obtained for the comparison of urban boys and rural boys is significant at 0.01 level. But critical ratio obtained for urban girls and rural girls and for total urban sample and total rural sample are not significant even at 0.05 level. Hence it may be concluded that the relation between the variables, Achievement in Mathematics and Home Environment for Mathematics are similar for both urban and rural subjects.

(vii) *Comparison of 'r's of achievement in Mathematics and home Practice for Mathematics for equivalent groups.*

The coefficients of correlation obtained for the equivalent samples based on sex and locale of the subjects were compared. The data and results of the test of significance of difference between 'r's for the sub samples are presented in Table 40.

TABLE 40

**Data and results of test of significance of
difference between r's for the relevant sub samples
(‘r’ of achievement in Mathematics with home practice for
Mathematics)**

Sl. No	Group pairs compared	N	r	Critical ratio
1	Urban boys	167	.2326	2.8122**
	Urban girls	160	-.0746	
2	Rural boys	173	-.0893	2.7062**
	Rural girls	240	.1827	
3	Urban boys	167	.2326	3.0059**
	Rural boys	173	-.0893	
4	Urban girls	160	-.0746	2.5461*
	Rural girls	240	.1827	
5	Total boys	340	.1384	1.7686
	Total girls	400	.0997	
6	Total Urban Sample	327	.0495	.6054
	Total Rural Sample	413	.0926	

** indicates significance at 0.01 level

* indicates significance at 0.05 level

As shown in Table 40, the critical ratio obtained for the comparison of ‘r’s for the urban boys and urban girls and for rural boys and rural girls is significant at 0.01 level. But the critical ratio obtained for the comparison of total boys and total girls is not significant even at 0.05 level.

From the correlation coefficients obtained for the equivalent samples based on locale, it was found that the critical ratio for the comparison of urban boys and rural boys is significant at 0.01 level, and that of urban girls and rural girls is significant at 0.05 level. But the critical ratio is not significant for the total urban sample and total rural sample.

Conclusion of comparison of 'r's

The relationship between 'Achievement in Mathematics' and 'Cognitive style and selected non-cognitive variables' taken to pairs were compared for the relevant sub samples based on sex and locale of the subjects. The results of the test of significance of the difference between 'r's for the relevant sub samples are summarised and presented in Table 41.

Table: 41
Summary of test of significance of difference between 'r's for the relevant samples
('r' of achievement in Mathematics with cognitive style and selected non-cognitive variables)

Sl. No	Group pairs compared	N	Variables					
			Cognitive style (CR)	Level of aspiration (CR)	Attitude towards Mathematics (CR)	Classroom Environment (CR)	Home Environment (CR)	Home Practice (CR)
1	Urban Boys	167	.8777	1.7106	2.2569*	1.5763	2.1316*	2.8122**
	Urban Girls	160						
2	Rural Boys	173	1.4427	2.1491*	2.8555**	1.7014	.4975	1.9601
	Rural Girls	240						
3	Urban Boys	167	.8497	1.2334	2.6678**	.5573	2.6313**	3.0059**
	Rural Boys	173						
4	Urban Girls	160	1.4577	2.6918**	2.4003*	2.779**	.0486	2.5461*
	Rural Girls	240						
5	Total Boys	340	.621	.405	.4815	.0675	1.6471	1.7686
	Total Girls	400						
6	Total Urban Sample	327	1.7354	.1345	.6323	3.7265**	.2152	.6054
	Total Rural Sample	413						

** indicates significance at 0.01 level

* Indicates significance at 0.05 level

III Prediction of 'Achievement in Mathematics'. using selected independent variables.

This part of the analysis was taken up with a view to predict the influence of 'cognitive style and selected non-cognitive variables' on 'achievement in Mathematics'. Finding out the relative efficiency of a set of independent variables in predicting the dependent variable is significant only in cases where the indices of correlation between the set of independent variables and the dependent variables (taken in pairs) exceed 0.40 (Cohen and Manion, 1989). This shows that relationship is marked or substantial. Even though in the present study, the coefficients of correlation were found to be around 0.40, the investigator attempted to find out the relative efficiency of the selected independent variables by means of step wise regression by ANOVA approach.

Step wise regression is a method of selecting the best set of regressor variables for a regression equation (Bandey and Shah, 1989). This method not only helps to select the set of variables that best predicts the criterion variable but also to eliminate superfluous predictor variables. It also helps to discover the independent variables which are related to the criterion (dependent) variable and to rate the independent variables in the order of their importance (Snedeco and Cochran, 1968). The analysis has been done with the help of computer and the details of the results at each step are presented in the following pages.

Step wise Regression for the selected independent variables in the prediction of Achievement

Criterion variable : Achievement in Mathematics
(*Dependent variable*)

Predictor variables 1) Cognitive style
(*Independent variables*) 2) Level of Aspiration
3) Attitude towards Mathematics
4) Class room Environment for
Mathematics
5) Home Environment for Mathematics
6) Home Practice for Mathematics.

The input data to the above analysis, namely, means and standard deviations (of the criterion and predictor variables) and the correlation matrix of the criterion variable with the predictor variables are presented in Tables 42 and 43 respectively.

TABLE 42
Means and Standard deviations of Achievement in Mathematics (criterion variable) and 'cognitive style and selected non-cognitive variables.'
(Predictor variables)

Sl. No.	Variables	Mean	Standard Deviation
	<i>Criterion Variable</i>		
Y	Achievement in Mathematics	32.31	9.85
	<i>Predictor variables</i>		
X ₁	Cognitive style	7.95	3.93
X ₂	Level of Aspiration	7.47	16.92
X ₃	Attitude towards Mathematics	71.72	13.45
X ₄	Class room Environment for Mathematics	94.53	17.82
X ₅	Home Environment for Mathematics	53.19	9.82
X ₆	Home practice for Mathematics	51.59	10.09

The coefficients of correlation presented in Tables 43 indicate that the predictor variable, Attitude towards Mathematics (X₃) has the highest correlation ($r = .2320$) with the criterion variable (y) and therefore it was selected to enter first in the analysis.

TABLE 43
Correlation matrix of cognitive style and selected
non-cognitive variables for the total sample (N=740)

Sl.No.	Variables	Y	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
Y	Achievement in Mathematics	1.000						
X ₁	Cognitive style	.1230	1.000					
X ₂	Level of aspiration	-.0110	.0643	1.000				
X ₃	Attitude towards Mathematics	.2320	.1290	.0145	1.000			
X ₄	Classroom Environment for Mathematics	.1388	.0327	.0898	1.000			
X ₅	Home Environment for Mathematics	.1120	.0200	-.0149	.5483	.4956	1.000	
X ₆	Home Practice for Mathematics	.1180	.0678	.0141	.6586	.4720	.5534	1.000

The results of the step I analysis is given in Table 44.

TABLE 44

Result of Step I Analysis

Dependent variable	:	Achievement in Mathematics		
Variable entered on Step I	:	Attitude towards Mathematics		
Multiple R	=	.23195		$R^2 = .05380$
Standard Error	=	9.58454		$R^2 \times 100 = 5.380$
Analysis of Variance	Degree of freedom	Sum of the squares	Mean squares	F value
Regression	1	3854.9502	3854.9502	41.9639
Residual	738	67795.1836	91.8634	

Variable in the Equation

Variable	B	SEB
Attitude towards Mathematics (X_3)	.169863	.026222
Constant	20.126365	1.913419

The results of step I analysis given in Table 44 show that the percentage variance accounted by the variable, attitude towards Mathematics (X_3) in predicting achievement in Mathematics is 5.38. The obtained 'F' value is much higher than the 'F' value of the table and hence treated as significant at 0.01 level.

The B coefficient of the variable 'Attitude towards Mathematics', in developing the regression equation is 0.16986 and the standard error of B coefficient is 0.02622.

The equation to the regression line in this case is written as

$$\begin{aligned} Y &= A + B_3 X_3 \\ &= 20.1264 + 0.16986 X_3 \\ &= 0.16986 X_3 + 20.1264 \end{aligned}$$

Using this equation it is possible to predict the criterion variable by knowing the predictor variable.

A second step analysis was taken up to see whether there is any increment in the percentage variation accounted by the predictor variables in the second step analysis.

Step II

In the second step the variable which contributes most to the variance of 'Y' is selected to enter in the analysis. By examining the regression statistics of variables not in the equation, the next predictor variable to be entered in the analysis is cognitive style (X_1). The results are shown in Table 45.

TABLE 45

Result of Step II Analysis

Dependent variable	:	Achievement in Mathematics		
Variable entered	:	Cognitive style		
Multiple R	:	0.25023		
R square	:	0.06262		
Standard error	:	9.54626		
Analysis of Variance	Degree of freedom	Sum of the squares	Mean squares	F value
Regression	2	4486.5161	2243.2580	24.6157
Residual	737	67163.6177	91.1311	

Variables in the Equation

Variables	B	SE _B
Attitude towards Mathematics(X_3)	0.160916	0.026337
Cognitive style (X_1)	0.237501	0.090217
Constant	18.879613	1.963740

The B Coefficient of the variables X_3 and X_1 are 0.160916 and 0.237501 respectively.

The regression equation can be written as

$$Y = A + B_3 X_3 + B_1 X_1$$

$$Y = 18.8796 + 0.1609 X_3 + 0.2375 X_1$$

$$Y = 0.1609 X_3 + 0.2375 X_1 + 18.8796.$$

The results after step II show that the percentage variance has been raised to 6.26 from 5.38, the increment in percentage variance being 0.88.

The increment in percentage variance after step II analysis is presented in Table 46.

TABLE 46

Increment in percentage variations after step II analysis

Step	Variable entered	R	Percentage variance	Increase in percentage Variance
I	X ₃	0.23195	5.38	0.88
II	X ₁	0.25032	6.26	

After step II, by entering X₃ and X₁, it is noted that further addition of predictor variables does not contribute the percentage variation. The details regarding the increase in correlation and percentage variances are summarised in Table 47

TABLE 47

Details regarding increase in correlation and percentage variation after step II analysis.

Step	Variables entered	R	Increase in R	Percentage variance R ² x100	Increase in percentage variance
I	X ₃ - Attitude towards Mathematics	0.23195	0.01837	5.38	0.88
II	X ₁ - Cognitive style	0.25032		6.26	

The data summarised and presented in Table 47, reveals that the asymptote of predictive accuracy is reached using two predictive variables and further addition of predictor variables has not much to contribute to the percentage variance or to 'R'

From the results obtained, it can be observed that, out of the six predictor variables two of them predict the achievement in Mathematics. They are given below in the order of importance

X_3 - Attitude towards Mathematics .

X_1 - Cognitive Style.

The equation to the regression line predicting 'Achievement in Mathematics' by means of X_3 and X_1 is,

$$Y = X + B_3 X_3 + B_1 X_1$$

$$Y = 0.1609 X_3 + 0.2375 X_1 + 18.8796.$$

This equation will help us to find the individual predictor values of 'Y' knowing the individual value of X_3 and X_1 .

From the equation predicting 'achievement in Mathematics', it may be noted that for every unit increase in X_3 and X_1 (attitude towards Mathematics and cognitive style), 'Y' (achievement in Mathematics) is increasing by 0.1609 and 0.2375. It may also be inferred that, attitude towards Mathematics has the highest weight for predicting the achievement in Mathematics . Hence better attitude towards Mathematics and cognitive style can improve the achievement in Mathematics of the pupils of standard X.

CHAPTER V

SUMMARY, CONCLUSIONS AND SUGGESTIONS

Restatement of the problem
Objectives, Hypotheses, Variables
Methodology
Major conclusions
Tenability of Hypotheses
Educational implications
Suggestions for further Research

12705
124

SUMMARY OF PROCEDURE CONCLUSIONS AND SUGGESTIONS

This chapter gives an overview of the summary of the procedure, the important findings of the study, tenability of the hypotheses, educational implications and suggestions for further research.

Statement of the problem

The present study is entitled as **“Cognitive style and selected non-cognitive variables in relation to achievement in Mathematics of pupils of standard X”**.

Objectives of the study

- I. To find the extent of relationship between achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub samples.
- II. To examine whether equivalent correlations obtained for achievement in Mathematics with (i) cognitive style (ii) each of Field Dependent (FD), Intermediate (INT) and Field Independent (FI) orientations of cognitive style and (iii) selected non- cognitive variables for, sex groups (boys/girls) and locale (urban/rural), differ significantly.
- III. To predict ‘achievement in Mathematics’ using a few selected independent variables, by means of step wise regression, by ANOVA approach.

Hypothesis of the study

- I. There will be significant and positive relationship between achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub samples.
- II. There will be significant differences in the correlation between achievement in Mathematics and (i) cognitive style (ii) each of Field Dependent (FD), Intermediate (INT) and Field Independent (FI) orientations of cognitive style and (iii) selected non-cognitive variables for, sex groups (boys/girls) and locale (urban/rural).
- III. Achievement in Mathematics can be predicted with the help of a few selected independent variables.

Variables of the study

(a) Dependent variable

Achievement in Mathematics

(b) Independent variable

1. Cognitive style
2. Level of aspiration
3. Attitude towards Mathematics
4. Class room environment for Mathematics
5. Home environment for Mathematics
6. Home practice for Mathematics

Methodology

Sample

The study was conducted on a representative sample of 740 students of standard X, selected by proportionate stratified sampling method. While selecting the sample, due weightage was given to the sex, locale, type of management and efficiency level of schools. The sample covered three educational districts of Kottayam revenue district of Kerala state.

Tools

The dependent and independent variables were measured using standardised tests of acceptable validity and reliability.

The tools used are,

- (1) Achievement test in Mathematics for standard X
- (2) Group Embedded Figures Test
- (3) Letter Cancellation Test
- (4) Scale of attitude towards Mathematics
- (5) Class room Environment Inventory for Mathematics
- (6) Home environment Inventory for Mathematics
- (7) Home Practice Inventory for Mathematics

Of the above seven tools, Group Embedded Figure Test developed by Oltman *et al.* (1971), Letter Cancellation Test by B. C. Muthayya (1960) were adapted. The remaining five tools, viz. Achievement Test in Mathematics for standard X, Scale of Attitude towards Mathematics, Class room Environment Inventory for Mathematics, Home Environment Inventory for Mathematics and Home Practice Inventory for Mathematics were constructed and standardised

by the investigator, in collaboration with her supervising teacher, Santhamma Raju.

Statistical techniques

The following statistical techniques were used for the analysis of the data

- (i) Pearson's Product Moment correlation coefficient
- (ii) Fisher's test of significance for correlation coefficient
- (iii) Shared variance of correlated variables
- (iv) Test of significance of difference between correlations
- (v) Step wise regression by ANOVA approach.

MAJOR CONCLUSIONS

The major findings emerged from the three types of analysis of the study viz; the correlational analysis, test of significance of difference between correlations and step wise regression analysis are summarised and given below:

I. Correlational analysis

The relationship between Achievement in Mathematics and each of the selected independent variables was studied for the whole sample and the relevant sub samples.

(i) Whole sample

The relationship between achievement in Mathematics and the independent variables under study was significant and positive except for level of aspiration. Level of aspiration is not significantly correlated with

Achievement in Mathematics. The correlations are given below in the descending order of magnitude of correlation coefficient.

Attitude towards Mathematics	$r = 0.2320$
Class room environment for Mathematics	$r = 0.1388$
Cognitive style	$r = 0.1230$
Home practice for Mathematics	$r = 0.1180$
Home environment for Mathematics	$r = 0.1120$
Level of aspiration	$r = -0.011$

The study helps to explore the extent of influence that the selected independent variables have on 'achievement in Mathematics'. Using the correlations for nine sub samples it is possible to make a ranking of the variables according to the extent of relationship of the total sample by noting the magnitude of 'r' and the verbal illustration. Variables ranked in the descending order of importance is presented below:

Attitude towards Mathematics
 Class room Environment for Mathematics
 Cognitive style
 Home practice for Mathematics
 Home environment for Mathematics
 Level of aspiration

The results reveal that, of the six independent variables selected for the study, 'attitude towards Mathematics' influences the academic achievement of the pupils maximum. The value of 'r' ranged from 0.0439 to 0.3253 for the given nine sub samples studied. Classroom environment for Mathematics, cognitive style, home practice for Mathematics and home environment for Mathematics also influence the academic achievement of the pupils.

The least influencing factor affecting 'achievement in Mathematics' of pupils in the sample was found to be level of aspiration. It indicates that whatever may be the level of aspiration, they have only little influence on the achievement of pupils.

(ii) Boys

In the case of boys, each of the selected independent variables; cognitive style, attitude towards Mathematics, class room environment for Mathematics, home environment for Mathematics and home practice for Mathematics have significant relationship with achievement in Mathematics. Level of aspiration has no significant relationship with achievement in Mathematics, for boys. The ranking of the variables according to the extent of relationship with achievement in Mathematics, by noting the magnitude of 'r' and the verbal illustration is presented below:

Attitude towards Mathematics	$r =$	0.2486
Home environment for Mathematics	$r =$	0.1725
Class room environment for Mathematics	$r =$	0.1473
Home practice for Mathematics	$r =$	0.1384
Cognitive style	$r =$	0.1067
Level of aspiration	$r =$	-0.0016

(iii) Girls

For girls, out of the six independent variables, cognitive style, attitude towards Mathematics, class room environment for Mathematics and home practice for Mathematics show significant relationship with achievement in Mathematics. Level of aspiration and home environment for Mathematics have

no significant relationship with achievement in Mathematics. The correlations are given below in the descending order of magnitude of 'r's

Attitude towards Mathematics	$r = 0.3132$
Class room environment for Mathematics	$r = 0.1498$
Cognitive style	$r = 0.1491$
Home practice for Mathematics	$r = 0.0997$
Home environment for Mathematics	$r = 0.0560$
Level of aspiration	$r = -0.0291$

(iv) *Urban sample*

In the case of urban sample, cognitive style, attitude towards Mathematics and home environment for Mathematics show significant and positive relationship with achievement in Mathematics. The other three variables, viz: class room environment for Mathematics, home practice for Mathematics and level of aspiration have no significant relationship with achievement in Mathematics. The correlations are given below in the descending order of magnitude of 'r's

Cognitive style	$r = 0.2381$
Attitude towards Mathematics	$r = 0.1927$
Home environment for Mathematics	$r = 0.1180$
Home practice for Mathematics	$r = 0.0495$
Class room environment for Mathematics	$r = 0.0057$
Level of aspiration	$r = 0.0050$

(v) *Rural sample*

For rural sample, cognitive style, attitude towards Mathematics, class room environment for Mathematics and home environment for Mathematics

show significant and positive relationship with achievement in Mathematics. Home practice for Mathematics and level of aspiration have no significant relationship with achievement in Mathematics. The correlations are given below in the descending order of magnitude of 'r's

Class room environment for Mathematics	$r = 0.2716$
Attitude towards Mathematics	$r = 0.2391$
Cognitive style	$r = 0.1147$
Home environment for Mathematics	$r = 0.1025$
Home practice for Mathematics	$r = 0.0926$
Level of aspiration	$r = -0.0057$

(vi) *Urban boys*

In the case of urban boys, all the selected independent variables, except level of aspiration show significant and positive relationship with achievement in Mathematics. The relationship of level of aspiration with achievement in Mathematics is not significant. The correlations are given below in the descending order of magnitude of 'r's

Attitude towards Mathematics	$r = 0.3253$
Home environment for Mathematics	$r = 0.2833$
Home practice for Mathematics	$r = 0.2326$
Cognitive style	$r = 0.1977$
Class room environment for Mathematics	$r = 0.1617$
Level of aspiration	$r = -0.0441$

(vii) *Urban girls*

For urban girls, none of the independent variables have significant relationship with achievement in Mathematics. The correlations obtained for

all the variables are 'indifferent' or 'negligible', varying from 0.1452 to -0.0161. The highest percentage variance is with level of aspiration.

(viii) *Rural boys*

The relationship between achievement in Mathematics and each of the six independent variables under study were found to be not significant for rural boys. The correlations obtained are all 'negligible' or 'indifferent,' varying from 0.1080 to 0.0053. The highest percentage variance is with cognitive style.

(ix) *Rural girls*

In the case of rural girls, out of the six selected independent variables, cognitive style, attitude towards Mathematics, class room environment for Mathematics and home practice for Mathematics show significant and positive relationship with achievement in Mathematics. Level of aspiration and home environment for Mathematics have no significant influence on achievement in Mathematics. The correlations of achievement in Mathematics with each of the independent variables are given below in the descending order of magnitude of 'r's.

Attitude towards Mathematics	$r = 0.3210$
Class room environment for Mathematics	$r = 0.2642$
Cognitive style	$r = 0.2502$
Home practice for Mathematics	$r = 0.1827$
Level of aspiration	$r = -0.1281$
Home environment for Mathematics	$r = 0.0574$

II. Test of significance of the difference between correlations

(i) Comparison of 'r's with respect to the sex groups

The correlations between achievement in Mathematics and each of the selected independent variables based on sex, viz: boys and girls, urban boys and urban girls, rural boys and rural girls were compared and no significant sex difference was found.

(ii) Comparison of 'r's with respect to the urban-rural groups

The correlations between achievement in Mathematics and each of the selected independent variables based on locale, viz; urban and rural, urban boys and rural boys, urban girls and rural girls were compared. No significant urban-rural difference was noticed in the correlation between achievement in Mathematics and each of the independent variables, viz; cognitive style, level of aspiration, attitude towards Mathematics, home environment for Mathematics and home practice for Mathematics. But urban-rural difference was significant for the correlation of achievement in Mathematics with class room environment.

III. Predictors of achievement in Mathematics from the selected independent variables.

Step wise regression analysis by ANOVA approach was done for predicting 'Achievement in Mathematics' using a group of selected independent variables for the whole sample (N=740).

Pearson's correlation coefficient (r) of six selected independent variables with 'achievement in Mathematics' are as follows

Cognitive style	(X_1)	$r = 0.1230$
Level of aspiration	(X_2)	$r = -0.0110$
Attitude towards Mathematics	(X_3)	$r = 0.2320$
Class room environment for Mathematics	(X_4)	$r = 0.1388$
Home environment for Mathematics	(X_5)	$r = 0.1120$
Home practice for Mathematics	(X_6)	$r = 0.1180$

Details regarding increase in percentage variation of the independent variables are given below:

Step	Independent variables	R	Percentage variation ($R^2 \times 100$)	Increment in percentage variation	Increment in R
I	Attitude towards Mathematics (X_3)	.23195	5.38	0.88	.01837
II	Cognitive style (X_1)	.25032	6.26		

When the predictor variable, Attitude towards Mathematics (X_3) was introduced first, the percentage variance was found to be 5.38. When cognitive style (X_1) was combined with Attitude towards Mathematics (X_3) an increment in percentage variance was found to be 0.88 and increment in R of 0.01837. The value being negligible further addition of predictor variables was stopped.

From the obtained results it can be observed that, out of the six predictor variables, two of them predict the 'achievement in Mathematics'. They are

1. Attitude towards Mathematics
2. Cognitive style

Equation to the regression line to predict achievement in Mathematics by means of X_3 and X_1 is ,

$$Y = 0.1609X_3 + 0.2375 X_1 + 18.8796$$

TENABILITY OF HYPOTHESES

The tenability of the hypotheses set for the study are examined in the light of the findings.

- I. The First hypothesis states that "there will be significant and positive relationship between achievement in Mathematics and each of the selected independent variables for the whole sample and relevant sub samples". The findings reveal that, there exists significant and positive relationship between 'achievement in Mathematics' and each of the selected independent variables for the whole sample and for the sub sample-boys, except for level of aspiration. In the case of girls, there exists significant and positive relationship between 'achievement in Mathematics' and each of the selected independent variables except for level of aspiration and home environment for Mathematics.

For urban sample, achievement in Mathematics has significant and positive relationship with cognitive style, attitude towards Mathematics and home environment for Mathematics. In the case of rural sample, there exists significant and positive relationship between achievement in

Mathematics and each of the independent variables except for level of aspiration and home practice for Mathematics. Thus majority of the relations are significant and hypothesis I is substantiated to a great extent.

- II. The second hypothesis states that “there will be significant differences in the correlation between achievement in Mathematics and (i) cognitive style (ii) each of field dependent, intermediate and field independent orientations of cognitive style and (iii) selected non-cognitive variables for, sex groups and locale”.

The analysis revealed that, no significant sex difference or urban-rural difference exists in the correlations between achievement in Mathematics and cognitive style. Also it was found that the difference in the correlations of achievement in Mathematics with Field dependent and Field independent cognitive styles are not significant for sex groups or locale groups. No significant urban-rural difference was found for the correlations of achievement in Mathematics and Intermediate cognitive style. But there exists significant sex difference in the correlations between achievement in Mathematics and intermediate cognitive style.

The study found no significant sex difference in the correlations between achievement in Mathematics and each of the selected non-cognitive variables. Also it was found that no significant urban-rural difference exists in the correlations between achievement in Mathematics and each of the selected non-cognitive variables except for class room environment for Mathematics. Hence it can be concluded that the second hypothesis is not substantiated.

III. The third hypothesis states that “Achievement in Mathematics can be predicted with the help of a few selected independent variables”. Findings reveal that, out of the six independent variables selected for the study two variables viz; attitude towards Mathematics and cognitive style are capable of predicting the achievement in Mathematics. This indicates that the third hypothesis is partially substantiated.

EDUCATIONAL IMPLICATIONS

Practical suggestions offered on the basis of the conclusions derived from the study could be used to improve or rather modify the current practices. Some of the suggestions for improving certain existing procedures are given below:

I. The study revealed the close association of cognitive style and different non-cognitive factors viz; attitude towards Mathematics, classroom environment for Mathematics, home environment for Mathematics and home practice for Mathematics with achievement in Mathematics. Hence the teachers must be aware of these relationships while designing the learning experiences and evaluation techniques. The parents’ role also is very crucial in the child's development. They should provide their children with a conducive home environment to bloom their abilities. They should create an atmosphere of systematic study habits and provide them with necessary learning facilities. Some of the specific implications of the findings are as follows:

The significant and positive correlation between achievement in Mathematics and cognitive style, implies that cognitive style influences the academic achievement in Mathematics. The higher the score in cognitive style, the better will be the achievement in Mathematics of the students. Therefore the teachers should learn to recognise and respect the different

cognitive style orientations to build on students strengths and to avoid letting stylistic differences leading to discriminatory practices on personality clashes. Teachers should be able to identify students' learning styles by observing and interacting with them and develop instructional strategies for the different cognitive style groups.

The present study has revealed that there is positive and significant correlation between achievement in Mathematics and attitude towards the subject. A positive attitude towards Mathematics is usually evident in the students, who are interested in solving Mathematical problems and who eagerly wait for the Mathematics class. These students always prefer to solve problems without the help of the teacher and they are also interested in reading books on Mathematics related topics and they even collect and keep cuttings of interesting problems and their solutions, puzzles etc.

A positive attitude towards Mathematics in students can be developed by encouraging them to discuss various problems with their peers. As is evident from the present study, interest in learning Mathematics can be developed in students by encouraging them to read the interesting articles about Mathematics published in various newspapers, journals, magazines etc. They can also be encouraged to collect paper cuts regarding easy solutions to different problems, draw and colour geometric figures etc. All these can be effective in developing a positive attitude towards Mathematics which is a necessary component for the achievement in the subject as is evident from the present study.

The study has also revealed that the role of the teacher is very significant in making the learning process a success. The teacher who checks the previous knowledge of the students and imparts it to those who lack it before starting a new lesson contributes tremendously for the

success of a Mathematics lesson. The students understand better and grasp the matter taught when they are made to think what, how and why- while solving problems in Mathematics. The class tests after the completion of each unit is helpful in fixing the ideas in mind. The teacher should make sure that each student comes to know about the mistakes committed by him/her so that they can avoid the same mistakes in future.

The equipments in the class room should be sufficient and also there should be sufficient models and other apparatus needed for Mathematics lessons. There should be a good library with books that make Mathematics learning interesting. Students should be encouraged in taking good books from library and also to watch quiz programmes and other Mathematics programmes that come in T.V, Radio etc.

A Mathematics club can be formed in the school and other co-curricular activities related to Mathematics can be conducted. The students should be encouraged to participate actively in the programmes like Mathematics exhibitions, quiz, seminars, discussions etc. All these have been found to have a positive influence on learning of Mathematics. Above all, the teacher's attitude towards each student also has a role in making Mathematics learning easy and effective. Hence the teacher should always encourage students who come up with different ways of solving problems, he should take care that he never discourage any student even when he comes up with wrong answers.

The involvement of the teacher in the class room and his personal interest in all curricular and co-curricular activities related to Mathematics will encourage the students to learn Mathematics more effectively.

As the learning of the child is very much related to the home environment, the parents and other members of the family should create an

atmosphere of encouragement and approval at home and children should be appreciated for their successful activities. Parents can give training to their children to do independent work and provide them with magazines, journals, books, etc. Children should be encouraged for the maximum utilisation of Mathematics programmes in television and radio. Parents should find time and effort to clear children's doubts in Mathematics and discuss recent developments in Mathematics. Parents who are busy and those who are unable to help their children may seek help from others if their children's achievement is low. If necessary, tuitions should be arranged. Parents should call on teachers concerned, at least once in a term to enquire about their children's progress in studies. They should see that the instructions of the teachers regarding the child's development in learning are put into practice.

The amount of practice done at home after the class hours is yet another factor that contributes to the achievement in Mathematics, as is shown by the present study. Apart from other aspects of home environment, the facilities for study is very important. A systematic study is necessary for achievement in Mathematics. A systematic study habit involves following a fixed time table which sets apart time for each subject, taking down important points while studying, discussing doubts with others and getting it clarified. Repeating and memorising equations, formulae etc., repeatedly working out difficult problems, doing exercises given at the end of each lesson are very helpful for students to ensure better performance in Mathematics. All these have to be done at home, preferably under the supervision and guidance of parents and elders and this in turn will help each student to be successful in the learning of Mathematics.

- II. The study revealed that no significant sex difference exists in the relationship between achievement in Mathematics and each of the selected

variables viz, cognitive style, level of aspiration, attitude towards Mathematics, class room environment for Mathematics, home environment for Mathematics and home practice for mathematics. Also no significant urban-rural difference was found in the relationship between achievement in Mathematics and each of these selected variables except for class room environment for Mathematics. This demands that every child irrespective of sex or locale should be helped to enjoy achievement related factors. Parents and teachers can do a lot to maximise the influence of these factors.

The present study is pointed to those teachers, parents and educational planners who unscientifically believe that the boys are better achievers, develop better attitude towards Mathematics and enjoy stable styles of thinking and perceiving than girls, that, they should not discriminate between the two sexes while allotting educational facilities.

The study indicated that the relationship between achievement in Mathematics and classroom environment for mathematics change according to the locality. So the teachers, parents, curriculum constructors, educational planners and all those who are concerned with the education of the children must be aware of the urban-rural difference while designing the instructional strategies. Exposure programmes related to the learning of Mathematics viz; Mathematics exhibitions, field trips to important centres of Mathematical importance, participation in quiz programmes, seminars etc. must be planned and arranged in view of the locality of the school and the facilities there of.

III. The present study revealed that attitude towards Mathematics and cognitive style are predictors of achievement in Mathematics. Thus it is obvious that these variables have considerable influence over achievement in Mathematics. Hence in trying to develop achievement in Mathematics

either as an objective of Mathematics teaching or as general objective of instruction, it is essential that the teacher should give due importance to these variables.

As is revealed from the study, measures should be taken to develop positive attitude among students in the learning of Mathematics, as it is one of the major contributing factors towards the achievement of mathematics. There should be properly trained teachers and there should be sufficient amenities in the classrooms, as these also influence the students' learning of Mathematics. Parents also should be made aware of their role in determining high achievement of their children and they should actively participate and contribute to their children's achievement. If proper attention is given to all these aspects, students in future will definitely become successful in the learning of, and achievement in Mathematics.

SUGGESTIONS FOR FURTHER RESEARCH

The present study has been limited to some selected variables and educational levels and as such the full implications of the study can be understood only if it is supplemented by other studies which would make its meaning more clear. The investigator would like to suggest the following areas for further research.

1. The relationship investigated in the present study may be extended to other subject areas, like science, social science and languages.
2. Study can be conducted to identify the predictor variables of achievement in Mathematics of different educational levels such as primary, secondary and higher secondary education.

3. Factorial comparison of 'achievement in Mathematics' with different dimensions of relevant cognitive and non-cognitive factors with a view to obtain a broad picture of the factors which determine achievement in Mathematics.
4. A study can be conducted to investigate the effect of learning environment and socio-economic status on achievement in Mathematics.
5. A study can be conducted to identify the cognitive, affective and environmental correlates of attitude towards Mathematics.
6. The present study can be extended using more cognitive and non-cognitive variables.
7. The study can be replicated by taking other independent variables and different social groups.
8. Replication of the study on the Tribal and Non-tribal pupils of secondary schools.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Allport, G.W. (1935). *A hand book of social psychology*. New York: Clark University Press.

Allport, G.W. (1937). *Personality: A psychological Interpretation*. New York: Holt, Rinehart & Winston.

Anderson, L.W. (1981). *Assessing Affective Characteristic in the Schools*. Boston: Allyn & Winston.

Augoustinos and Walker, (1995). *Social cognition*. London: SAGE Publications Ltd. Bonhill.

Bandey, S.H. and Shah, M.A. (Ed.) (1989). *Dictionary of Statistics*. New Delhi: Anmole Publications.

Best, John, W. & Khan, James, V. (1992). *Research in Education (Sixth Edition.)* New Delhi: Prentice Hall of India Private Ltd.

Bloom, B.S. et al. (Ed.) *Taxonomy of educational objectives: The classification of educational goals. Handbook I. Cognitive domain*. New York: Mckay, 1956.

Bloom, B.S., Hastings, J.T. & Madaus, G.F. (1971). *Hand book on Formative and Summative Evaluation of Student Learning*. New York: McGraw Hill.

Brookover, et al. (1979). *The school social system and Students Achievement*. New York: J.F. Bergin.

Brophy, J. E. & Good, T.L. (1986). *Teacher behavior and student acheivement*. In M.C. Wittrock Handbook of Research on Training.

Buch, M.B. (1991). *Fourth Survey of Research in Education*. New Delhi: NCERT.

Caims, C.J. (1931). *An analytical study of mathematical abilities*. Washington D.C: The Catholic Education Press.

Christian, Jyothi. (1984). *Classroom group dynamic concept and its implications*. Meerut: Abu Books.

Cohen, L. and Manion. L. (1989). *Research Methods in Education*. (2nd Ed.) New York: Routledge.

Cronbach, J. Lee. (1970). *Essentials of psychological testing*. (3rd Ed.) Harper & Row Publishers, New York: Evanston and London.

Cropley, A. J. (1967). *Creativity*. London: Longman Group Limited.

Dembo, M.H. (1977). *Teaching for learning*. Good Year Publishing Company.

Diggory, S.F. (1972). *Cognitive Process in Education. A psychological preparation for teaching and curriculum development*. New York: Harper & Row.

Draper, W. (1990). *Father's role in development. The Encyclopadia of Hyman Development and Education, Theory, Research and Studies*. New York: Prentice Hall, Inc.

Ebel, R.L. (1972). *Essentials of Educational Measurement*. New Jersey: Prentice Hall, Inc.

Edwards, A.L. (1957). *Techniques of attitude scale construction*. Bombay: Vakils, Feffer & Simon Ltd.

Entwistle, N.J. (1987). *Understanding class room learning*. London: Hodder & Straughton.

Federico, P.A. (1980). Adapting instruction. Trends and issues. In R.E. Snow, P.A. Federico & W.E. Montaguem, (Eds.) *Aptitude, Learning and Instruction*. Hillsdale, New Jersey: Lawrence Elbaum associates.

Ferguson, George, A. (1976). *Statistical Analysis in psychology and Education. International Student Education*. Kogakusha: McGraw Hill Publishing Co. Ltd.

Fox, D.J. (1969). *The research process in education*. New York: Holt, Reinholt & Winston.

Freeman, Frank, S. (1976). *Theory and Practice of psychological testing*. (3rd Ed.) New Delhi: Oxford & IBH publishing company.

Garrett, E.H. (1979). *Statistics in Psychological and Education*. Bombay: Peffer & Simons (P) Ltd.

Gronlund, N. E. (1985). *Stating Objectives for Class room Instruction*. (3rd Ed.) New York: Macmillan.

Gronlund, Norman, E. & Linn, Robert, L. (1990). *Measurement and Evaluation in Teaching* (6th Ed.) New York: McMillan Publishing Company, 506-510.

Grover, S. (1979). *Parental aspiration as related to personality and school achievement of children*, Ph. D. Psychology, Pan. U., In M. B. Buch (Ed.) (1991). *Fourth Survey of Research in Education*. New Delhi: NCERT, 823.

Guilford, J.P. (1956). *Fundamental Statistics in Psychology and Education*. New York: McGraw Hill.

Harper, Edwin, A. & Harper, Erika, S. (1990). *Preparing Objective Examination*. New Delhi: Prentice Hall of India Pvt. Ltd.

Hilgard, Ernest, R (1957). *Introduction to Psychology*. (2nd Ed.) Harcourt, Brace & company, New York: 519-540.

Hoppe, F. Erfolg and Misserfold, P.F. (1930). In R.K. Sharma (1992). *Reinforcing educational Performance and aspiration of Adolescents*. New Delhi: Anupama Publications.

Hudson, L. (1966). *Contrary imagination*. London: Mathuen.

Humphrey, G. & Argyle, M.(1962). *Social Psychology Through Experiment*. Bombay: Asia Publishing House.

Hurlock, E.B. (1991). *Personality development*. New Delhi: Tata McGraw Hill Publishing Co., 1- 443.

Husen, T. & Postleth Waite, T.(1985). *The International Encyclopedia of Education*. New York: Pergamon Press.

James, R.K. & Kurtz, V.R. (1985). *Science and Mathematics Education for the year 2000 and beyond*. Bowling green, O.H., School Science & Maths Association.

Keeves, J.P.(1972). *Educational environment and student achievement*. Melbourn: Australian Council for Educational Reesearch .

Kerlinger, N. Fred. (1983). *Foundations of Behavioural Research. II Indian Reprint*. New York: Holt, Rinehart & Winston Inc.

Kilpatrick, Jeremy. (1976). (Ed.) *The Psychology of Mathematical Abilities in School children*. London: The University of Chicago Press, Ltd.

Kogan, N. (1971). *Educational implication of cognitive styles*. In G.S. Lesser (Ed.) *Psychology and educational practice*. Glenview, III: Scott Freshman.

Kogan, N. (1976). *Cognitive style in Infancy Early Childhood*. New Jersey: Lawrence Erlbaum.

Krawthwohl, David, R., Bloom, B. S. & Masia, B.B. (1964). *Taxonomy of Educational Objectives*.(1964). *The Classification of Educational Goals: Hand Book II. Affective domain*. New York: David Mckay Company, INC.

Krech, David and Crutchfield, R.S. (1948). *Theory and problem of social psychology*. New York: McGraw Hill Book Company.

Mc.Dili, E.L, L.C. Rigsby. (1973). *Structure and process in secondary schools*. Balcimore: John Hopkins University Press.

Mc. Leod, D.B. (1992). *Research on affect in Mathematic Education: A reconceptualisation. A handbook of Research on Mathematics teaching and learning*. New York: Macmillan, 575-596.

Messick, S. (1976). *Individuality in learning*. San Francisco, Jossey-Bass.

Mohanty, Jagnath, (1988). *Modern trends in Indian Education*. New Delhi: Deep & Deep Publication.

Moos, R.H. (1979). *Evaluating Educational Environments*. San Francisco: Jossey-Bass.

Murnane, R.J. (1975). *Impact of School Resources of the Learning of Inner City Children*. Cambridge, M.A: Ballinger.

Page, et al. (1977). *International Dictionary of Education*. New York: Harper.

Pascual-Leon, J. (1977). *Cognitive development and cognitive style: A psychological integration*. Indiana Polis: Health Lexington Books.

Rosenshine, B.V. (1971). *Teaching behaviours and Student Achievement*. London: National Foundation of Educational Research.

Sharma, R.K. (1992). *Reinforcing Educational Performance and Aspiration of Adolascents*. New Delhi: Anupama Publications.

Snedeco, George and Cochran, William, G. (1968). *Statistical methods*. Oxford IBH Publishing company, Pvt. Ltd.

Stockard, Jean & Mayberry, Maralee, (1992). *Effective Educational Environments*. California: Sage Publications Company.

Tennat, M. (1988). *Psychology and Adult learning*. London: Routledge.

Thurston, L.L.(1953). *Application of Psychology*. New York: Harper & Row.

Vernon, P.E. (1973). Multivariate approach to the study of cognitive style. In T. Hussen & Postlethwate. (Eds.) *The International Encyclopediadia of Education*. New York: Pergamon Press.

Wallach, M.A. & Kogan, N. (1965). *Modes of Thinking in Young children*. New York: Holt & Rinehart & winston.

Weissberg, P., Roger and Hampton, I. Robert, (1995). *Child and Family Agency of Southeastern Connecticut*. University of Illinois.

Witkin, H.A., Lewis, H.B., Hertzman, M. Machover, K. Meissner, P.B. & Wapner, S. (1954). *Personality through perception*. New York: Harper.

Young, P.T. (1961). *Motivation and Emotion*. New York: Wiley.

Zanna, M.P. & Rempel, J.K. (1988). Attitudes: A new look at an old concept. In D. Bartal, *Psychology of knowledge*. Cambridge: Cambridge University Press. pp. 316-334.

DISSERTATIONS

Agarwal, K.L. (1986). *A study of the effect of parental encouragement upon the Educational Development of the students*. Unpublished doctoral disseration, Garhwal University.

Baby, A.V. (1987). *The relationship between attitude towards education and achievement in Malayalam of high average and low intelligent in secondary school pupils*. Unpublished M.Ed. dissertation, University of Calicut.

Bandyo, Padhyay, J. (1984). *Environmental influence, Aacademic achievement and scientific attitude as Determinants of Adolescents' Attitude towards science stream*. Ph. D. Psy. Calicut University.

Basheer, Mohammed. (1995). *Effect of home practice and Science learning environment on achievement in Chemistry*. Unpublished Masters dissertation, University of Calicut

Bhargava, V.P. (1972). *A study of level of Aspiration and need for Achievement*. Unpublished doctoral dissertation, Agra University.

Bisht, G.S. (1972). *A study of level of educational aspiration in relation to socio-economic condition and educational attainment*. Agra University.

Das, U.C. (1985). Effects of certain Non-intellective variables upon cognitive learning among Elementary school children. Doctoral dissertation, Utkal University.

Dave, B. (1978). *Identification and measurement of environment process variables related to educational environment in educational achievement and effects*. New York: Wolberg.

Dayer, P.B. (1967). *Home environment and achievement in Trinidad*. Unpublished dissertation, University of Alberta.

Desai, S.D. (1979). *A study of classroom ethos, pupils motivation and academic achievement*. Unpublished doctoral dissertation, M.S. University, Baroda.

Doctor, Z.N. (1984). *A study of classroom climate and the psyche of pupils and their achievement*. Ph. D. Education, SGU.

Draper, J. (1977). *Specific aspects of family environment as they relate to a child performance*. Masters Thesis. Department of Psychology, George Deahody College for teachers Nashville.

Hussain, M.Q. (1977). *A study of academic attainment in relation to level of aspiration and anxiety*. Aligarh University.

Indira, I.M. (1989). *The relation between attitude towards science and achievement in Physics of high average and low intelligence secondary school pupils*. Unpublished M.Phil. dissertation, University of Calicut.

Jaganathan, K. (1985). *The effects of certain soci-psychological factors on the academic achievement of children studying in classes V to VII*. Ph. D. Education, SVU.

Jain, D.K.(1979). *A study of the significant correlates of High School failures in Mathematics and English with special reference to Jammu Division.* Unpublished Doctoral dissertation, Jammu University.

Jayasree, C.(1991). *The influence of attitude towards science and science learning environment on Biology achievement of secondary school pupils in Kerala.* Masters dissertation, Calicut University.

Joseph, Molly. (1975). *A study of the relation between the home environment and achievement of the pupils in English as by their S.S.L.C. Examination marks.* Unpublished Masters dissertation, University of Kerala.

Joseph, T.T.(1979). *A study of some predictors of achievement in Chemistry at the pre-degree level.* Unpublished Doctoral dissertation, University of Kerala.

Kumar, K.(1972). *Social Climate in school and characteristic of pupils.* Unpublished Ph.D. Thesis, Psychology, MSU, Baroda.

Kumari, K.(1985). *Experimental study of interaction effects of deductive, inductive, strategies, creativity and learning objectives on achievement.* Doctoral dissertation, Meerut University.

Leenadevi, V.K.(1995). *Interaction effect of attitude towards English and Home environment on achievement in English of Std. IX pupils.* Unpublished Masters dissertation, University of Calicut.

Madhavan, N.M.(1990). *An investigation into some factors related to achievement in Malayalam language of secondary school pupils of Kerala State.* Unpublished Doctoral dissertation, University of Calicut

Maitra, K.(1985). *Affective correlation of the gifted underachievers.* Ph.D. Education, Delhi University.

Malini, P.M.(1995). *A study of gender differences in certain Psychological variables of the Mathematical domain at secondary school level.* Unpublished Doctoral dissertation, University of Calicut.

Mehra, M.(1980). *The influence of home environment on school children.* Unpublished Doctoral dissertation, Delhi University.

Mohanty, G. (1972). *Level of aspiration as a function of sex, SES and class performance.* Utkal University.

Moore, David. M. & Dwyer, Francis, M. (1991). *Effect of color coded information on students levels of field dependence*. Virginia Poly Technic Institution & State University.

Mumthas, (1993). *Interaction effect of parental education and tutoring at home on the achievement in Mathematics*. Unpublished M.Ed. dissertation, University of Calicut.

Nagose, C.K. (1984). *A factorial study of divergent abilities, aptitudes, level of aspiration and scholastic achievement*. Ph. D. Nag. University.

Nair, C. K. S. (1984). *Factors related to under achievement in Biology in secondary school students*. Unpublished Doctoral dissertation, University of Calicut .

Nambiar, C.N. B.(1990). *A comparative study of the relation between some psychological variables and academic achievement of institutionalised juvenile delinquents and normal children*. Unpublished M.Phil. dissertation, University of Calicut.

Nancy, Ida, K. (1994). *The relationship of some selected correlates of achievement motivation with different dimensions of cognitive ability of IX standard students in Chemistry*. Unpublished Doctoral dissertation, University of calicut.

Noushad, A. (1989). *Effect of sex, locale and attitude towards problem solving on process outcomes in Biology*. Unpublished M. Ed. dissertation, University of Calicut.

Padmakumari, R.(1990). *A comparative study of achievement in Mathematics and attitude towards Mathematics Of socially advantaged and disadvantaged secondary school pupils*. Masters dissertation, Department of Education, Calicut University.

Panda, N.(1985). *Effects of Cognitive Style and Adjunct Questions on learning from connect discourse*. Doctoral dissertation, Utkal University.

Paramo, Marca, F. & Tinajero, Carolina, (1990). *Field dependence/ independence and performance in school*. CU. Santiago de compostela, Spain.

Patel, N.R.(1984). *An investigation into. The Mathematical Ability of pupils of classes IX & X in the content of some Cognitive & Affective Variables*. Ph.D. Education, SPU.

Pillai, G.S. (1974). *Effect of coaching and practice on intelligence test Scores*. Unpublished Masters dissertation, University of Kerala.

Pillai, K. S.(1981). *Sex difference in certain personality and aptitudinal dimensions related to science achievement*. Unpublished Doctoral dissertation, University of Calicut.

Puri, Madhu, (1977). *A study of classroom climate and academic motivation of pupils of Gujarathi medium schools of Baroda*; Masters' dissertation, M.S. University of Baroda.

Puthenpurayil, Prabha, (1994). *Achievement in Basic concepts in Biological Science in relation to classroom climate of secondary school in Backward region of Malappuram Dt*. Masters dissertation, University of Calicut.

Reddy, V.N.L. (1973). *A study of certain factors associated with academic achievement in the first degree examination*. Unpublished Doctoral dissertation, M.S. University, Baroda.

Salunke, R.B.(1979). *A study of the home environment, socio-economic status and economic management in relation to the academic achievement of the first year college students of M.S. University, Baroda*. Unpublished Doctoral dissertation, M.S. University, Baroda, New Delhi: NCERT, 849.

Sandeep, P. (1979). *Classroom interaction and cognitive development in primary school children*. Unpublished Doctoral dissertation, Osmania University.

Santhoshkumar, V.K.(1995). *Effect of cognitive style and classroom environment on achievement in social science of standard X students*. Unpublished Masters dissertation, University of Calicut.

Saxena, S.(1981). *A study of need achievement in relation to creativity, values, level of aspiration and anxiety*. Agra University.

Sharma, R.R. (1979). *Level of aspiration and mental health as factors in academic achievement*. Banarus Hindu University.

Shivappa, O.(1980). *Factors affecting the academic achievement in high school pupils*. University of Karnataka.

Shivaprasad, K. (1988). *An investigation of the classroom environment for learning science in secondary schools of Kerala*. Unpublished Masters dissertation , Calicut University.

Sudheeshkumar, P.K. (1993). *Interaction effect of intelligence cognitive style and approaches to students on achievement in Biology of secondary school pupils*. Unpublished Doctoral dissertation, Calicut University.

Thampuratty, G.R.N. (1994). *Interaction effect of creativity, attitude towards problem solving and school position on achievement in Mathematics of secondary school pupils*. Doctoral dissertation, University of Calicut.

Trivedi, V. (1987). *A study of the relationship of parental Attitude, socio-economic Background and Feeling of Secondary among the Intermediate students and their academic achievement*. Ph.D. Education, LUC. University

Upadhyana, S.N.(1984). *Analysis of class room environments in tribal setting with a view to study its effects on learning and attainment*. Department of Psychology, RSU.

Varghese, P.J. (1989). *Affective correlates of process outcomes in Biology*. Unpublished M.Ed. dissertation, University of Calicut.

Warrier, P.R.B.(1966). *A study of the correlation between the socio-economic status & scholastic achievement of tenth std. Pupils of Trivandrum taluk*. Unpublished Masters dissertation, University of Kerala.

Zacharia, T. (1977). *Impact of attitudes and interest on achievement in secondary school pupils in social studies*. Unpublished Doctoral dissertation, University of Kerala.

JOURNALS AND ABSTRACTS

Aiken, Jr. L.R. (1970). Attitude towards Mathematics. *Review of Educational Research*, 40: 551-556.

Anderson, G.J.(1970). Effects of classroom social climate in individual learning. *American Educational Research Journal*, 7(2): 135-152.

Arrington, H.J. (1987). An investigation of the relationship between cognitive style visualisation and problem solving in eighth grades: males & females. *Dissertation Abstract International*, 49: 2141 A.

Bachman, M.E. (1979). The relationship between Cognitive Style and Concept Attainment Efficiency, success and strategy in college undergraduates Abstract. *Dissertation Abstract International*. 36: 1955 A..

Backer, J.C. (1971). The importance of certain schools, Home and attitude factors for junior school pupil's academic success with different social classes, attitude and achievement. *Journal of Educational Research*, 14: 61-64.

Backer & Seigal, (1957). Reference groups, Membership groups and Attitude change. *Journal of abnormal and social psychology*. 55: 360-364.

Ballard, L.D. (1985). The interaction of cognitive style and achievement of selected students of English as a second language. *Dissertation Abstracts International*, 46: 3312A.

Basavayya, D. & Patnaik, S.P.(1989). A study of the factors related to students liking Mathematics at secondary school levels. *Journal of Educational Research and Extension*, 25: 143-153.

Bauch, J.P.(1988). "Is Parent Involvement Different in Private schools"?. *Educational Horizons*. 66: 78-82.

Behr, (1973). Update on attitudes and other affective variables in learning Mathematics. *Review of Educational Research*, 46: 293.

Boyd, G.F. (1952). The level of aspiration of white and Negro children in a non-segregated Elementary school. *Journal of Social psychology*, 36:191-196.

Brennan, P.K.(1984). An analysis of the relationship among Hemispheric preference & Analytic/Global cognitive style, two elements of learning style, medium of Instruction, Gender and Mathematics Achievement of Tenth grade geometry students. Abstracts. *Dissertation abstracts International*.45:3271 A.

Broverman, D.M.(1960). Dimension of cognitive style. *Journal of Personality*, 28: 167-185.

Budhev, P.V.(1990). A study of the effect of cognitive variables on achievement in Mathematics of secondary school students. *Journal of educational Research and Extension*, 26(3): 140.

Buriel, R. (1978.) Relationship of Three field Dependence measures to Reading and Mathematics achievement of Angle-American and Mexican-American children. *Journal of Educational Psychology*. 70:167-170.

Byrne, D. B., Haltic, J.C. & Fraser, B.J.(1986). Student perception of preferred classroom learning environment. *Journal of Educational Research*, 80: 10-17.

Centra, J. A & Potter, D. A. (1980). "School and Teacher Effects: An International model." *Review of Educational Research*, 50: 273-291.

Chatterjea, R.G., Paul, B. (1982). Effect of adjustment extraversion and field independence on academic achievement. *Journal of Psychological Researches*, 25(2):72-78.

Chatterjea, R.G., & Paul, Bhaskar, (1984). A study of Field independence in relation to science achievement, Urban-Rural Habitant and intelligence. *Indian Journal of Psychology*, 59: No.3&4.

Chaudhury, Roy, & Basu, Jayanthi, (1998). Parent child relationship, school achievement and adjustment of adolescent boys. *Journal of Community Guidance and Research*, 15: 215-226.

Cohen, E.G., Flotan, R.A., Leechor, C. (1989). "Can Classrooms Learn?" *Sociology of Education*, 62:75-94.

Coop, R.H. & sigel, I.E. (1971). Cognitive style Implications for learning and instruction. *Psychology in the shools*, 8:152-161.

Cooper, Stewart, E. & Robinson, Debra A. (1991). The relationship of Mathematics self efficiency beliefs to mathematics anxiety and performance. *Measurement and Evaluation in Counselling and Development*, 24(1): 4-11.

Davis, W.M. (1972). The social climate of the American Roman Catholic High School Seminary work special reference to the generation of group value orientation (University Pacific). *Dissertation Abstract International*, 3(4).

Despande, S.W & Lodhi, P.H. (1986). Academic achievement and some psychological variables. *Journal of the Institute of Educational Research*, 5:13.

Diaz, Soto, Lourdes. (1989). Relationship between home environment and intrinsic versus extrinsic orientation of higher achieving and lower achieving Puerto Riean Children. *Educational Research Quarterly*, 131(1):22-36.

Feldman, S. Shirley & Wentzel, K.R. (1990). Relation among family interaction patterns. Classroom self restraint, and academic achievement in preadolescent boys. *Journals of Educational Psychology*, 1990 December 82(4), 813-819.

Ferguson, D.M., Lloyed, M. & Harood, L.H. (1991). Family ethnicity, socialbackground and scholastic achievement: An eleven year longitudinal study. *Newzealand Journal of Educational Studies*, 26(1):49-63.

Flescher, I. (1963). Anxiety and achievement of intellectually and creatively gifted children. *Journal of psychology*, 56:251-268.

Fraser, Barrj, J. & Rentoul, A. John, (1980). Person Environment fit in open classrooms. *Journal of Educational Research*, 1980 (January-February), 73(3):374-377.

Fraser, B.J. & Fisher, D.L. (1985). Effects of classroom psychological environment on student learning. *British Journal of Educational Psychology*. 52(3): 374-377.

Fraser, B.J., Welch, W.W. Walberg, H.J. (1986). "Using secondary Analysis of National Assessment Data to identify predictors of Jr. High School Students' Outcomes". *Alberta Journal of Educational Research*, 32:37-50.

Fraser, S.J. & Fisher, D. C. (1980). Effect of classroom psycho-social environment on students learning. *Journal of Experimental Education*. 52:374-377.

Fry, P.S and Coe, K.J. (1980). Interaction among dimensions of academic motivation and classroom, social climate, a study of the perception of junior high school and high school pupils. *British Journal of Educational Psychology*, 50:33-42.

Gardner, R.W., Holzman, P.S., Klein, G.S., Linton, H.B., Spance, D.B. (1959). Cognitive control: A study of individual consistencies in cognitive behaviour. *Psychological Issues*, 1(4):1959.

Georges, Tode, C. & Elliot, Stephen, N. (1995). Home work: parent and students involvement and their effects on academic performance. *Canadian Journal of school psychology*, V.II(1), 18-31.

Globerson, T., Weintein, E. & Sharabany, R. (1985). Tracing out cognitive development from cognitive style: A training study of Developmental psychology Abstract. *Psychological Abstracts*, 72: 30435.

Gobriyal, S.Z. (1984). The effect of Colour Mode and Levelling Sharpening cognitive style on Pictorial Recognition Memory. Abstract. *Dissertation Abstract International*, 45: 3330 A.

Hacker, J.O. (1989). The relationship of cognitive style to instructional conditions and academic achievement in second language learness Abstract, *Dissertational Abstract International*.

Hadfield, Oakay, D., Martin Jeanette, V. & wooden, Sharma (1992). Mathematics anxiety and learning style of the Navajo Middle school Student. *School science and Mathematics*, 92(4):171.

Harmon, B.J. (1984). A correlated study of the correspondence between achievement in calculus and complementary Cognitive style, Abstracts. *Dissertation Abstract International*, 45:738A.

Hellmandollar, Curtis, Ben, Jr. (1992). How parents can effect High school student performance by what they do at home? *Dissertation Abstracts International*, 53: 84.

Henderson, A.T. (1988). "Good New: An Ecologically Balanced Approach to Academic Improvement". *Educational Horizons*, 66:60-62.

Hildebrand & Patricia, J. (1979). Relationship between family environment and eighth grade mathematics achievement: An axploratory study using prediction analysis. *Disseration Abstract*, 39(10): 6005.

House, J.Daniel, (1995). Cognitive predictors of Achievement in introductory college chemistry. *Research in Higher Education*, 36(4):473-490.

Joshi, M.C. (1963). Intelligence and level of vocational aspiration. *Journal of Vocational and Educational Guidance*, 9: 129-130.

Kaaya, Mathias, Ismail, (1987). Identifying variables supportive to achievement in Mathematics: A comparison of African- American High school students in San Francisco Bay area. *Dissertation abstract international*, 50(1): 92 A.

Kagan, J., Moss, H. A & Sigel, I.E. (!960). Conceptual style and the use of affect labels. *Merrill-Palmer Quarterly*, No.6, 261-278.

Kagan, J., Moss, H. A & Sigel, I.E. (!963). Psychological significance of styles of conceptualisation in Wright, J. C., Kagan, J. (eds.), Basic cognitive process in children. *Monographs of the Society in Child development*, (2) No 86.

Karp, Silliman, Karen. (1991). Elementary school teachers' attitude towards Mathematics. The impact on students' autonomous learning skills. *School Science and Mathematics*, 91(6): 265.

Keith, Patricia, B. & Lichtman, Marilyn, V. (1995). "Does Parental involvement influence the academic achievement of Mexican American eighth grades." *Psychological Abstract*,. Vol: 82 (9).

Kellaghan, T. (1977). Relationship between and scholastic behaviour in a disadvantaged population. *Journal of Educational Psychology*, 69: 754-760.

Kloosterman, Peter & Cougan, Monica, Clapp, (1994). Students' beliefs about learning school Mathematics. *Elementary School Journal*, 94(4): 375-388.

Lack & Lizi, (1993). A quantitative study of social education, classroom environment and achievement. *Psychological Abstract*, 7: 31343.

Lamka, E. (1983). A study if the relationship between Field Dependence-Independence and language achievement in High school students. *Dissertation Abstracts International*, 43, 3499 A..

Lee, Rita, S. (1993). Effect of classroom guidance on student achievement. *Elementary school guidance and counselling*, 27(3): 163-71, February 1993.

Mc Dill, E.L. E.D. Meyers, Jr.; and L.C. Rigsby. (1967). Institutional effects of academic behaviour of High school students. *Sociology of Education*, 40; 81-99.

McKenney, J. L. & Keen, P.G.W. (1974). How managers' minds work? *Harvard Business Review*, May-June, 19: 79-90.

Mintzes, J.J. (1982). Relationship between student perception of teaching behaviour and learning outcomes in collage biology. *Journal of research in Science teaching*, 19: 789-794.

Moore, David, M. & Dwyer, Francis, M. (1991). Effect of colour coded information on students' levels of field dependence. *Perceptual and Motor skills*. 72(2): 611-616.

Morison, T.L. (1979). Classroom structure work environment and social climate in elementary school classroom. *Journal of Education Psychology*. 71 (4): 471-477.

Nagpal, Sakunthala, (1996). Development of cognitive learning through integrated behaviour and Genevan strategies in the class room. *Prespectives in Education*, 12(4):212.

Nah, Kwi-ok. Lane, David, S. & Fuqua, Dale, R. (1990). The relationship of cognitive style and academic achievement in a Korean sample. *Journal of instructional Psychology*, 64 (4): 1038.

Nowaczyk, Czeslaw, (1982). Life plans and aspiration level in rural adolescents. *Psychological Abstracts*, 64(4): 1038.

O'Brien, Terrance, P. (1991). Relationship among selected characteristics of collage students and cognitive style preferences. *College Student Journal*, 25: 492-500.

O'Connell, Susan, R.(1992). Math pairs : Parents as partners. *Arithmetic Teacher*, 40(1): 10-12.

Ogunyemi, Lanre, E.(1973). Cognitive styles and student science achievement in Nigeria. *The journal of experimental education*, 42(1): 59-62.

Onyejiaku, Okeke, Felix,(1982). Cognitive styles, instructional strategies and academic performance. *Journal of Experimental education*, 51(1): 31-36.

Padhi, J.S.(1992). Relationship among the class room environment creative academic self concept and academic achievement. *Asian journal of Psychology and Education*, 25(3&4): 25-30.

Paramesh, C.R.(1973). Creativity, intelligence and academic achievement. *The educational trends*, 8: 126-137.

Paramo, Maria, F. & Tinajero, Carolina, F.(1990). Field dependence/ Independence and performance in school : An argument against neutrality of cognitive style. *Perceptual and Motor skills*, 1990 January, 70(3),2, 1079-1087.

Patel, N. R.(1995). Mathematical ability as a function of affective correlation. *The progress of Education*, 70(5): 118.

Pillai, K.S. (1987). Interactive effect of science aptitude and attitude towards science on Biology achievement. *Journal of the Institute of Educational Research*, 112: 12-15.

Pillai, N. P.(1965). An investigation into the organisational and administrative factors which affect secondary-schools. *Studies in Education*. January, 113.

Portes, Pedro, R.(1991). Assessing children cognitive environment through parent child interactions. *Journal of research and development in Educational*, 24(3):30-37.

Randhawa, Bikkar, S. *et al.*(1993). Role of Mathematics self efficiency in structural model of Mathematics Achievement. *Journal of Educational Psychology*, 85(1): 41-48.

Rech, Janet, F.(1994). A Comparison of Mathematics attitude of Black students. According to grade level, gender and academic achievement, *Journal of Negro- Educational*, 63(2): 212-220.

Reynolds, Arthur, J.(1992). Comparing measures of parental involvement and their effect on academic achievement. *Early Childhood Research Quarterly*, 7(3): 441-462.

Reynolds, Arthur, J. & Walberg, Herbert, J.(1992). A process model of Mathematics achievement and attitude. *Journal for research in Mathematics Education*, 23(4): 306-328.

Riding, R.and Douglas, G.(1993). The effect of cognitive style and mode of presentation on learning performance. *British Journal of educational Psychology*, 63: 297-307.

Riding-Richard, Mathias David,(1991). Cognitive style and preferred learning mode, reading attainment and cognitive ability in 11-year old children. *Educational Psychology: An International Journal of Experimental Educational Psychology*, 7: 3-4.

Ritchey, P.A. & Lashier, W.S. Jr.(1981). The relationship between cognitive style, intelligence and instructional mode to achievement to college science students. *Journal of Research on Science and Teaching*, 18: 41-45.

Russel, E.L.(1992). The effects on learning when using a lecture advance organiser on Field Dependent & Field Independent Nursing students. *Abstract Dissertation Abstract International*, 53: 379 A..

Saracho, Olivia, N.(1984). Young children's academic achievement as a function of their cognitive styles. *Journal of Research and Development in Education* , 18(1): 44-49.

Schofield, Hilary, L.(1982). Sex grade level and the relationship between Mathematics attitude and achievement in children. *Journal of Educational Research*, 75: 280-284.

Shrivastava, Usha,(1991). A study of effect of family environment on students achievements. *Journal of Psychological research*, 36(2): 87-91.

Silbergeld, S., Manderschied, R.W. and Koering, G.R.(1975). Class room Psychological environment. *Journal of Experimental Education*, 69: 151-155.

Singh, R.D.(1993). Attitude of school students towards Mathematics.. *The Progress of Education*, 1993, 67(12).

Singhal, Shobha,(1991). A study of academic achievement in relation to academic motivation and class room social climate. *Journal of Psychological Research*, 36(2):120-124.

Span, P.D.(1973). Structuring lendentie abs cognitivestives tij laspect, utrecht. *The Netherland; University van Utricht* (1973).

Stage, Frances, K. And Kloosterman, Peter,(1995). Gender, beliefs and achievement in remedial college-level Mathematics. *Journal of Higher Education*, 66(3): 294-311.

Starkly, D. J.(1976). Cognitive style, spatial ability and school achievement. *Journal of Education Psychology*, 68: 36-42.

Stykowski, Berndette, Frances,(1993). Factors influencing 8th grade students' Mathematics achievement and attitudes: secondary analysis. *Dissertation Abstracts International*, 54, 192.

Subramoniyam, S. & Remadevi, M.(1991). Some differential characteristics of high and low achieve in secondary schools. *Experiments in Education*, 19:228-232.

Sundararajam, S. & Rajasekar, S.(1993) Higher secondary students perceptions and attitude towards mathematics. *The progress of Education*, 67(12).

Tiwari, Govind, Morbhatt, Kiran and Morbhatt, Prem, L. (1980). The effect of anxiety and aspiration on academic achievement of adolescent boys and girls. *Asian Journal of Psychology & Education*, 6(1): 35-38.

Tocci, C.M. & Engalhard, G.(1991). Achievement, parental support and gender difference in attitudes towards Mathematics. *Journal of Education research*, 84(5): 280-286.

Tortman, F.K.(1976) Race, I. Q. Of the middle class. *Journal of research Psychology*, 69(3): 266-273.

Vaidya, S. & Chansky, N. (1980). Cognitive development & cognitive style as factors in Mathematics achievement. *Journal of Education Psychology*, 72:326-330.

Varma, B.P. & Sheikh, Gulam, Quadr.(1992). Relationship among cognitive style, creative functioning and academic performance. *Journal of Psychological Reserach*, 36: 78-84.

Watkin, D. & Astilla, E.(1980). Relationship between field independence, intelligence and school achievement of Phillipine girls. *Perceptual and Motor Skills*, 51:593-594.

Watkins, David & Akandi, Adebowale,(1993). Preferred and actual learning environments and approaches to learning of Nigerian students. *Journal of social Psychology*, 133(1):105-107.

Weighened, G.(1957). Adaptiveness and role of parents in academic success. *Personal Guidance Journal*, 35:518-522.

Wheat, John, Tunnell, James & Munday, Robert,(1991).(East Texas State University). Predicting success in college Algebra: student attitude and prior achievement. *College Student Journal*, 25(2):240-244.

White, K.R.(1982). The relationship between socio-economic status and academic achievement. *Journal of Experimental Education*, 5(3).

Williams, Clive.(1975). A study of cognitive preferences. *The journal of Experimental Education*, 43(3).

Witkin, Dyk, Faterson, Goodenough & Karp. (1974). Psychological differentiation. In Olivia N, Saracho Young children's academic achievement as a function of their cognitive styles. *Journals of Research and Development in Education*, 18(1).

Witkin, H.A.(1950). Individual differences in East of perception of Embedded figures. *Journal of Personality*, 19:1-15.

Witking, H.A., Moore, C.A., Goodenough, D.R. & Cox, P.W.(1975). Field dependent and field independent cognitive style and their educational implication. *Research Bulletin, Princeton, Educational Testing Service*, 1975.

Witkin, K.A. (1977). Cognitive styles in the educational setting. *New York: University Education*, quarterly, 8:14-20.

Wong, Ngai-Ying, (1992). The relationship among Mathematics achievement, Affective variables and Home Background. *Mathematics Education Research Journal*, 4(3):32-42.

Yadev, M.(1988). Classroom learning behavior of pupils of different socio-economic strata and their achievements in Science. *Indian Educational Review*, 23:93-97.

REPORTS

Collins, C.H., Moles, O.C., Cross, M. (1982) *The Home-School Connection : Selected Partnership Programmes in Large Cities*. Boston: Institute for response Education.

Demmick-Jack, Koerbee-Heather, J. (1993). Relations among cognitive styles and reading readiness in pre-schools. *Speeches/Meeting Papers* (150)

James, C. & Hersel brock, V.(1976). Perceived family environment and school adjustment of children. Paper presented at the *American Psychological Association Convention*, Washington.

Kalt, Sounis, Bill,(1974). Creative behaviour and achievement in Mathematics. *Psychological Reports*, 34, 886.

Kunnunkal, T.V., Nair, S. and Desai, D. B.(1991) School education in 1990's: Problems and perspectives. *Report of the National Seminar, NCERT*.

Madsen, Anne, L., Lanier, Perry, E.(1992). The effect of conceptually oriented instruction on students' computational competencies . *Reports–Research, Research Series*, 214.

National Policy on Education.(1986). Ministry of Human Resource Development. New Delhi, Govt. of India. pp. 23.

National research council (1989). *Everybody Counts, A Report to The Nation on The Future of Mathematics Education* Washington D.C., National Academy press.

Thorndike, Chirst, Tracy, (1991). Attitudes towards Mathematics: Relationships to Mathematics Achievement, Gender, Mathematics course taking plans and career interests. *Research Reports, U.S.*, Washington.

Weber, G. (1971). Inner city children can be taught to read: Four successful schools. *Occasional Paper* 18, Washington D.C. Council for Basic education.

Wolf, D. (1964). Who goes to collage? *American Resources of Specialised Talent*. New York : Harpers.

Tools

Karp, S.A & Konstadt, N.L. (1971). *A Manual for the Embedded Figures Tests*. California: Consulting Psychologists Press Inc.

Moos,R.H., & Moos, B.S. (1982). *A social climate scale*. California: Consulting Psychologists Press.

Muthayya, B.C. (1960). *Letter Cancellation Test*. Madras: Madras University.

Oltman, P.K., Raskin, E. & Witkin, H. A.(1971). *Group embedded Figure Test*. USA, Consulting Press Inc.

Raju, Santhamma and Maria, Ancel. (1996). *Scale of Attitude towards Mathematics*. University of Calicut.

Raju, Santhamma and Maria, Ancel. (1996). *Home Environment Inventory for Mathematics*. University of Calicut.

Raju, Santhamma and Maria, Ancel. (1996). *Achievement test in Mathematics for standard X*. University of Calicut.

Raju, Santhamma and Maria, Ancel. (1996). *Home Practice Inventory for Mathematics*. University of Calicut.

Raju, Santhamma and Maria, Ancel. (1996).). *Class room Environment Inventory for Mathematics*. University of Calicut.

APPENDICES

APPENDIX I

**ACHIEVEMENT TEST IN MATHEMATICS
FOR STANDARD X**

Dr. Santhamma Raju
Professor in Education
University of Calicut

Ancel Maria

- ✳ ഇത് ഗണിതശാസ്ത്രത്തിന്റെ ഒരു ടെസ്റ്റാണ്. ചോദ്യങ്ങൾ 6 സെക്ഷനുകളായി കൊടുത്തിരിക്കുന്നു.
 - ✳ ഓരോ ചോദ്യത്തിനും A, B, C, D. എന്നിങ്ങനെ നാല് ഉത്തരങ്ങൾ കൊടുത്തിരിക്കുന്നു.
 - ✳ തന്നിരിക്കുന്ന ഉത്തരക്കടലാസിൽ ചോദ്യങ്ങളുടെ നമ്പർ ക്രമത്തിൽ എഴുതിയിട്ടുണ്ട്.
 - ✳ ഓരോ നമ്പറിനും നേരെ A, B, C, D. എന്നീ അക്ഷരങ്ങൾ ഉണ്ട്. ശരിയായ ഉത്തരങ്ങൾ കണ്ടുപിടിച്ച് ചോദ്യനമ്പറിന് എതിരെയുള്ള ശരിയായ ഉത്തരത്തെക്കുറിക്കുന്ന അക്ഷരത്തിനു ചുറ്റും ഒരു വൃത്തം വരയ്ക്കുക.
 - ✳ നിങ്ങൾ ആദ്യം അടയാളപ്പെടുത്തിയ ചിഹ്നം തെറ്റായ സ്ഥാനത്താണെന്നു കണ്ടാൽ ആ വൃത്തത്തിനു ചുറ്റും വരയ്ക്കുകയും ശരിയായ സ്ഥാനത്ത് വൃത്തം വരയ്ക്കുകയും ചെയ്യുക.
 - ✳ എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
-

SECTION A

1. താഴെപ്പറയുന്നതിൽ ശരിയായ പ്രസ്താവന ഏത്?
 - (a) എല്ലാ ബന്ധങ്ങളും ഏകദങ്ങളാണ്
 - (b) എല്ലാ ഏകദങ്ങളും ബന്ധങ്ങളാണ്
 - (c) ബന്ധമെന്നത് ഒരു പ്രത്യേക തരത്തിലുള്ള ഏകദമാണ്.
 - (d) ഏകദമെന്നത് ഒരു ബന്ധത്തിന്റെ ഉപഗണമാണ്.
2. ഒരു പോളിനോമിയൽ $P(x)$ ൽ $P(5) = 0$ ആയാൽ $(x-5)$, $P(x)$ ന്റെ ഒരു ഘടകമായിരിക്കും. ഇവിടെ ഉപയോഗിച്ചിരിക്കുന്ന തത്വം
 - (a) ശിഷ്യസിദ്ധാന്തം. (b) ആരോപസിദ്ധാന്തം.
 - (c) ഘടകസിദ്ധാന്തം. (d) ഘടകസിദ്ധാന്തത്തിന്റെ വിപരീതം.
3. താഴെക്കൊടുത്തിരിക്കുന്നവയിൽ കൃതി 4 ആയ പോളിനോമിയൽ ഏത്?
 - (a) $2x^3 + 4$ (b) $2x_3 + 0x^4 + 5x^2$ (c) $4x^5 + 7x + 5$ (d) $4x^2 + 2x - 7x^4$
4. 6-ാം കൃതിയിലുള്ള ഒരു പോളിനോമിയലിനെ 2-ാം കൃതിയിലുള്ള ഒരു പോളിനോമിയൽ കൊണ്ട് ഹരിച്ചാൽ ഹരണഫലമായ പോളിനോമിയലിന്റെ കൃതി
 - (a) 2 (b) 3 (c) 4 (d) 6
5. ഒരു A.P. യുടെ പൊതു വ്യത്യാസത്തെ സംബന്ധിച്ച് ശരിയായത്
 - (a) A.P. യുടെ ഏതെങ്കിലും പദങ്ങൾ തമ്മിലുള്ള വ്യത്യാസം.
 - (b) എല്ലായ്പ്പോഴും ഒരു പോസിറ്റീവ് സംഖ്യ
 - (c) അടുത്തപദം കിട്ടുന്നതിനുവേണ്ടി ഒരു പദത്തെ ഗുണിക്കാൻ ഉപയോഗിക്കുന്ന നിശ്ചിത സംഖ്യ.
 - (d) അടുത്ത പദം കിട്ടുന്നതിനുവേണ്ടി ഒരു പദത്തോട് കൂട്ടുന്ന സ്ഥിരസംഖ്യ
6. താഴെ തന്നിട്ടുള്ളവയിൽ ഏതു ഘനരൂപത്തിന്റെ നേർഖണ്ഡം ഒരു വൃത്തക്ഷേത്രം അല്ല.
 - (a) ഗോളം (b) പൈപ്പ് (c) അർദ്ധഗോളം (d) വൃത്തസ്തൂപിക
7. ഒരു ലഘുചാപത്തിന്റെ ഡിഗ്രിഅളവ് ആകാവുന്നത് ഏത്?
 - (a) 120° (b) 180° (c) 210° (d) 270°
8. ഒരു ത്രികോണത്തിന്റെ മൂന്നു ശീർഷങ്ങളും ഉൾപ്പെടുന്ന വൃത്തം ആണ്.
 - (a) ഏകകേന്ദ്രവൃത്തങ്ങൾ (b) അന്തർവൃത്തം (c) പരിവൃത്തം (d) യൂണിറ്റ് വൃത്തം
9. ABCD ഒരു ചക്രിയ ചതുർഭുജമാണ്. $LA = 112^\circ$ ആയാൽ LC യുടെ അളവ്
 - (a) 68° (b) 90° (c) 112° (d) 248°
10. $\text{Cos } A \cdot \text{Cosec } A$ - യുടെ ലഘുകരിച്ച രൂപം
 - (a) 0 (b) 1 (c) $\tan A$ (d) $\cot A$
11. $\log \sqrt{8}$ - ന് തുല്യമായത്
 - (a) $\log \frac{8}{2}$ (b) $\log 8 - 2$ (c) $2 \log 8$ (d) $\frac{1}{2} \log 8$
12. $(1 + a), (1 - a^2)$ ഇവയുടെ ല.സാ.ഗു
 - (a) $(1 + a)(1 - a^2)$ (b) $(1 - a^2)$ (c) $(1 + a^2)$ (d) $(1 - a^2)$
13. A യുടെ ഏതുവിലയ്ക്കാണ് $\text{Sin } A = \text{Cos } A$ ആകുന്നത്
 - (a) 30° (b) 45° (c) 60° (d) 90°

1.2

14. വിവ സൂചിക കാണുന്നതിനുള്ള സൂത്രവാക്യം ഏത് ?

- (a) $\frac{P_0}{P_1}$ (b) $\frac{P_1}{P_0}$ (c) $\frac{P^0}{P_1} \times 100$ (d) $\frac{P_1}{P_0} \times 100$

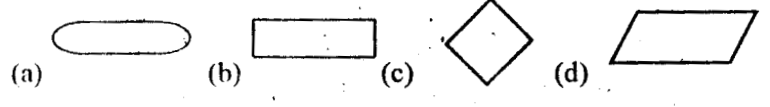
15. 3214 അഞ്ച് എന്ന സ്കൂററിൽ 4-ന്റെ സ്ഥാനവില ഏത്?

- (a) 5^0 (b) 5^1 (c) 5^2 (d) 5^4

16. ഒരു പ്രശ്നം നിർദ്ധാരണം ചെയ്യുന്നതിന് ക്രമമായി എഴുതുന്ന നിർദ്ദേശങ്ങളെ സൂചിപ്പിക്കുന്നത് ഏത്?

- (a) ഫ്ലോ ചാർട്ട് (b) അൽഗോരിതം (c) ബീറ്റുകൾ (d) ബൈറ്റുകൾ

17. താഴെ തന്നിട്ടുള്ളവയിൽ ഏത്, ഒരു ഡിസിഷൻ ബോക്സിനെ സൂചിപ്പിക്കുന്നു.



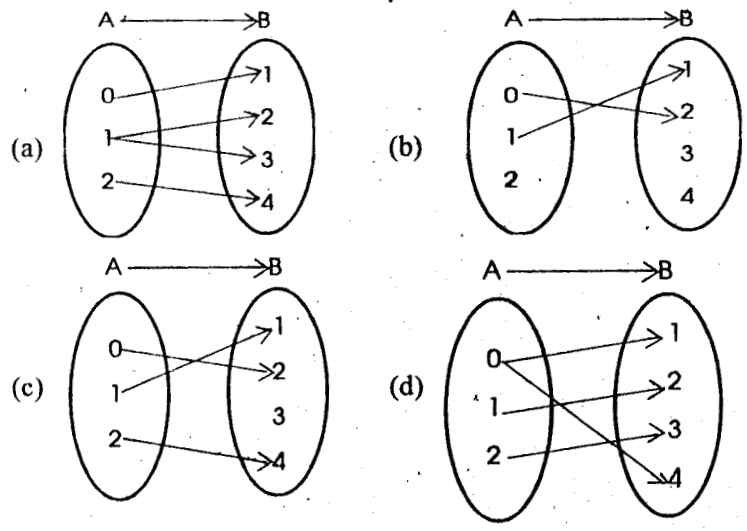
18. $\log 3275.7$ ന്റെ ഏർണ്ണാംശം ഏത്?

- (a) 1 (b) 2 (c) 3 (d) 4

19. $n(A) = 3$ $n(B) = 4$ ആയാൽ B യിൽ നിന്നും A യിലേക്കുള്ള ഏകദത്തിലെ ക്രമജോഡികളുടെ എണ്ണം എത്ര?

- (a) 3 (b) 4 (c) 7 (d) 12

20. താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ഏകദത്തെ സൂചിപ്പിക്കുന്ന ബന്ധം ഏത്?



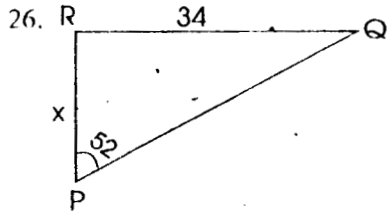
21. താഴെ കൊടുത്തിരിക്കുന്നവയിൽ $a^2 - 7a + 6$ ന്റെ ഘടകം ഏത്?

- (a) $(a-1)$ (b) $(a+1)$ (c) $(a+2)$ (d) $(a-3)$

22. ഒരു സമാന്തര പ്രോഗ്രഷന്റെ രണ്ടാം പദം 1 ഉം മൂന്നാം പദം 5 ഉം ആയാൽ ഒന്നാം പദം ഏത്?

- (a) -4 (b) -3 (c) 3 (d) 4

23. 4 മുഖങ്ങളുള്ളതും ഗിർജങ്ങളില്ലാത്തതുമായ ഘനരൂപം ഏത്?
 (a) അർദ്ധഗോളം (b) ത്രികോണസ്തൂപിക (c) സമചതുര സ്തൂപിക (d) പൈപ്പ്
24. ഒരു ചാപത്തിന്റെ അന്തർവേദനം ചെയ്ത കോൺ ന്യൂനകോണായാൽ ആ ചാപത്തിന് യോജിച്ച പേര്
 (a) വാസ്തവചാപം (b) ദീർഘവചാപം (c) അർദ്ധവൃത്തം (d) ഞാൺ
25. ഒരു ദ്വിമാന സമവാക്യത്തിന്റെ മൂല്യഗണം ഏകാംഗ ഗണമായിരുന്നാൽ അതിന്റെ വിവേചകം
 (a) പൂജ്യത്തെക്കാൾ പെരുത് (b) പൂജ്യത്തെക്കാൾ വലുത്
 (c) പൂജ്യം (d) പൂജ്യത്തെക്കാൾ ചെറുതോ തുല്യമോ



ചിത്രത്തിൽ x-ന്റെ വില കണ്ടുപിടിക്കുന്നതിന് ഉപയോഗിക്കാവുന്ന തത്വം.

- (a) $\tan 52 = \frac{RQ}{x}$ (b) $\sin 52 = \frac{RQ}{PQ}$ (c) $\cos 52 = \frac{x}{PQ}$ (d) $\sec 52 = \frac{PQ}{x}$

27. ഒരു ആവൃത്തി പട്ടികയുടെ മാധ്യം കണ്ടുപിടിക്കുന്നതിന് ഉപയോഗിക്കുന്ന സൂത്രവാക്യം ഏത്?

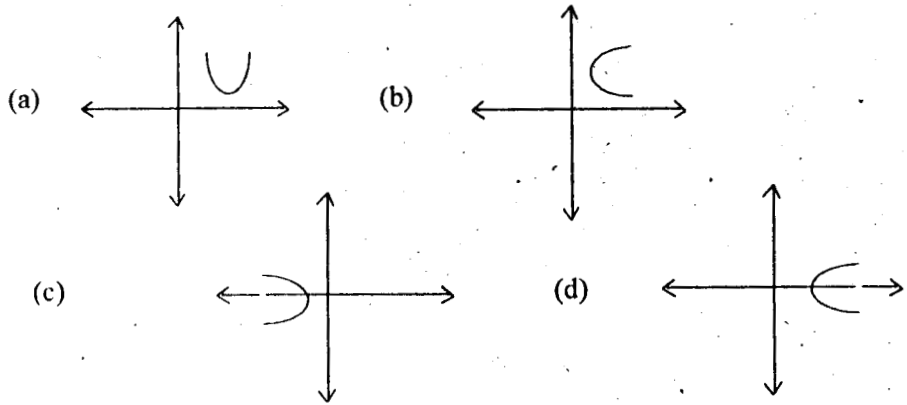
- (a) $A + \frac{\sum D}{N}$ (b) $A + \frac{\sum fD}{N}$ (c) $\frac{A + \sum D}{N}$ (d) $\frac{A + \sum fD}{N}$

28. 1994 ൽ സാധനങ്ങളുടെ ആപേക്ഷിക വില 1990 ലേതുമായി താരതമ്യം ചെയ്യുമ്പോൾ $1 \frac{3}{7}$ ആണെന്ന് കണ്ടാൽ താഴെ തന്നിട്ടുള്ളവയിൽ ഏതായിരിക്കും വില സൂചിക?

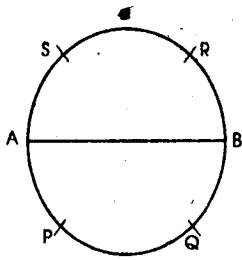
- (a) $\frac{1000}{7}$ (b) $\frac{7}{1000}$ (c) $\frac{10}{700}$ (d) $\frac{700}{3}$

Section B

29. താഴെക്കൊടുത്തിരിക്കുന്നവയിൽ ഒരു ഏകദത്തെ സൂചിപ്പിക്കുന്ന ഗ്രാഫ് ഫോട്ട്?



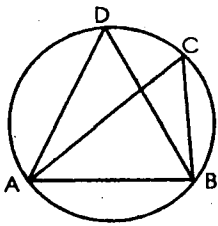
30. $f(x) = ax^2$ എന്ന ഏകദത്തിന്റെ ഗ്രാഫ് മുകളറ്റം തുറന്നതായാൽ a യുടെ വില
 (a) പോസിറ്റീവ് രേഖീയ സംഖ്യ (b) നെഗറ്റീവ് രേഖീയസംഖ്യ
 (c) പൂജ്യം (d) മേൽപ്പറഞ്ഞവ ഒന്നുമല്ല.
31. $Lx^2 + Mx - N = 0$ എന്ന ദ്വിമാനസമവാക്യത്തിന്റെ വിവേചകം
 (a) $M^2 - 4LN$ (b) $M^2 + 4LN$ (c) $-M^2 - 4LN$ (d) $-M^2 + 4LN$
32. $(x + 2), (x - 1)$ ഇവ ഘടകങ്ങളായി വരുന്ന പോളിനോമിയലാണ്
 (a) $x^2 + 2x + 2$ (b) $x^2 - 2x - 2$ (c) $x^2 + x - 2$ (d) $x^2 - x - 2$
33. $P(x)$ എന്ന പോളിനോമിയലിനെ $Q(x)$ എന്ന പോളിനോമിയൽ കൊണ്ട് ഹരിക്കുമ്പോൾ കിട്ടുന്ന ശിഷ്യം $P(3)$ ആയാൽ $Q(x)$
 (a) $x - 3$ (b) $x + 3$ (c) $x - 1$ (d) $x + 1$
34. $5, -1, -7$ എന്നിവ ഒരു സമാന്തരപ്രോഗ്രഷന്റെ ആദ്യത്തെ മൂന്നു പദങ്ങൾ ആയാൽ നാലാമത്തെ പദം ഏത്?
 (a) -1 (b) -6 (c) -13 (d) 1
35. ഒരു സ്തൂപികയുടെ നേർലബന്ധം പഞ്ചഭുജക്ഷേത്രമായാൽ അതിന്റെ ശീർഷങ്ങളുടെ എണ്ണമെത്ര?
 (a) 5 (b) 6 (c) 10 (d) 15
36. AB വൃത്തത്തിന്റെ വ്യാസം ആയാൽ താഴെതന്നിട്ടുള്ളവയിൽ ദീർഘചാപം ഏത്?



- (a) \widehat{APQ} (b) \widehat{APR} (c) \widehat{BRS} (d) \widehat{ASR}

37. $\widehat{ABC}^\circ = 145$ ആയാൽ \widehat{ABC} യെ സംബന്ധിച്ച് ശരിയായത് ഏത്?
 (a) ദീർഘചാപം (b) അർദ്ധവൃത്തം (c) ലഘുചാപം (d) ഞാൺ

38. \widehat{ADB} യിൽ അന്തർലേഖനം ചെയ്തിരിക്കുന്ന കോൺ ഏത്?



- (a) $\angle ABC$ (b) $\angle ABD$ (c) $\angle ACB$ (d) $\angle BAD$

39. $\sin A = \frac{5}{13}$ ആയാൽ $\cos A$ യുടെ വില
 (a) $8/13$ (b) $18/13$ (c) $12/13$ (d) $5/12$

40. ΔABC യുടെ വിസ്തീർണ്ണത്തെ സൂചിപ്പിക്കുന്നത് ഏത്?

- (a) $\frac{1}{2} AB \times BC \sin A$ (b) $\frac{1}{2} BC \times CA \sin B$ (c) $\frac{1}{2} AC \times AB \sin C$ (d) $\frac{1}{2} AB \times BC \sin B$

41. $\log A + \log B - \log C$ യോട് തുല്യമായത് ഏത്?

- (a) $\log abc$ (b) $\frac{ab}{c}$ (c) $\frac{c}{ab}$ (d) $\log(a + b - c)$

42. താഴെ തന്നിട്ടുള്ളവയിൽ ഏത് ഒരു പഞ്ചസംഖ്യാന ന്യൂമെറൽ അല്ല?

- (a) 124 (b) 134 (c) 144 (d) 154

43. 'y' ആളുകൾ ഉള്ള ഒരു പട്ടണത്തിലെ ഒരു വർഷത്തെ മരണം 'x' ആയാൽ താഴെതന്നിട്ടുള്ളവയിൽ ഏതായിരിക്കും ആ പട്ടണത്തിലെ CDR?

- (a) $\frac{y}{x} \times 100$ (b) $\frac{y}{x} \times 1000$ (c) $\frac{x}{y} \times 100$ (d) $\frac{x}{y} \times 1000$

44. $x^2 - 4x + k = 0$ എന്ന സമവാക്യത്തിന്റെ മൂല്യഗണം ഏകാംഗഗണമായാൽ k യുടെ വില

- (a) -2 (b) -4 (c) 4 (d) 2

45. ഒരു സമഗുണിത പ്രോഗ്രഷന്റെ ഒന്നാം പദം 8 ഉം പൊതുഗുണകം $\frac{1}{2}$ ഉം ആയാൽ അതിന്റെ n-ാം പദം ഏത്?

- (a) 2^{1-n} (b) 2^{4-n} (c) 2^{2-n} (d) 2^{n-4}

46. ഒരു പൈപ്പിന്റെ ബാഹ്യവ്യാസം 'a' cm. ഉം അതിന്റെ കനം 't' cm. ഉം ആയാൽ ആന്തര ആരം എത്ര സെ.മീ?

- (a) $a - 2t$ (b) $2(a - t)$ (c) $\frac{1}{2}(a - t)$ (d) $\frac{1}{2}(a - 2t)$

47. ഒരു ദീർഘചതുരത്തിന്റെ ഡിഗ്രി അളവ് 'x' ആയാൽ താഴെതന്നിട്ടുള്ളവയിൽ ശരിയായ പ്രസ്താവന ഏത്?

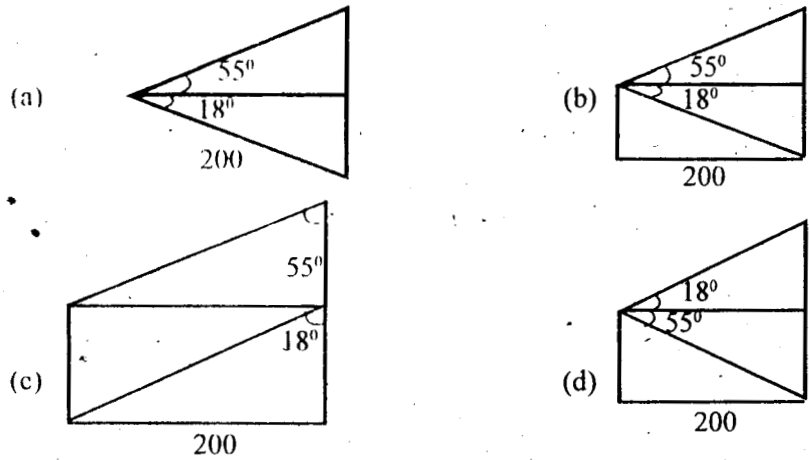
- (a) $0 < x < 90$ (b) $90 < x < 180$ (c) $0 < x < 180$ (d) $180 < x < 360$

48. $\sin \theta$ യുടെ വില ആകാത്തത് ഏത്?

- (a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) 1 (d) $\frac{3}{2}$

49. ഒരു കെട്ടിടത്തിന്റെ മുകളിൽ നിൽക്കുന്ന ഒരാൾ ഒരു ടി.വി. സ്ക്രീന്റെ മുകൾ ഭാഗം 55° മേൽക്കോണിലും സ്ക്രീന്റെ കീഴ്ഭാഗം 18° കീഴ്ക്കോണിലും കാണുന്നു. കെട്ടിടം സ്ക്രീനിൽനിന്നും 200 മീറ്റർ അകലെയാണെങ്കിൽ സ്ക്രീന്റെ ഉയരം കാണുക.

ഈ പ്രശ്നം നിർദ്ധാരണം ചെയ്യുന്നതിന് അനുയോജ്യമായ ചിത്രം ഏത്?



50. $\frac{x^2}{x+y} - \frac{y^2}{x-y}$ ഇവയുടെ തുകയിൽ നിന്ന് $\frac{2xy}{x^2 - y^2}$ കുറച്ചാൽ കിട്ടുന്ന ഫലം എന്ത്?
- (a) $\frac{x-y}{x+y}$ (b) $\frac{x+y}{x-y}$ (c) $\frac{2xy}{x^2 - y^2}$ (d) $\frac{2xy}{x-y}$
51. ഒരു ഫ്ലോചാർട്ടിന് എത്ര ആരംഭബിന്ദുവും എത്ര അന്തിമബിന്ദുവും ഉണ്ട്?
- (a) രണ്ടിനും അനേകം (b) രണ്ടിനും ഒന്നുവീതം
 (c) ആരംഭബിന്ദു അനേകം, അന്തിമബിന്ദു ഒന്ന് (d) ഒരു ആരംഭബിന്ദു, അനേകം അന്തിമബിന്ദുക്കൾ
52. 1234 എന്ന ന്യൂമെറലിൽ 2 ന്റെ സ്ഥാനവില ഏത്?
- (a) 5^0 (b) 5^1 (c) 5^2 (d) 5^4
53. 'n' പ്രാപ്തകങ്ങളുടെ അഭ്യുഹഗരാശി 'x' ഉം വൃതിയാനങ്ങളുടെ തുക 'y' യും ആയാൽ യഥാർത്ഥ താല്യം
- (a) $x + \frac{y}{n}$ (b) $x - \frac{y}{n}$ (c) $\frac{y+x}{n}$ (d) $\frac{y-x}{n}$
54. ആദ്യത്തെ 20 എണ്ണൽ സംഖ്യകളുടെ തുക കണ്ടുപിടിക്കുന്നതിനുള്ള അൽഗോരിതത്തിൽ ആരംഭ തുക
- (a) 1 (b) 2 (c) 0 (d) 20
55. $\log P = 2.3701$ എങ്കിൽ $\log \sqrt[3]{P}$ യ്ക്ക് തുല്യമായത് ഏത്?
- (a) 0.79003 (b) 1.1233 (c) 1.79003 (d) 1.4567

SECTION C

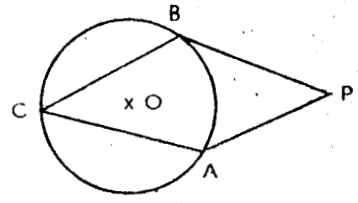
56. $y = 2x^2 - 1$ എന്ന ഏകദത്തിന്റെ $x = 0$ ആകുമ്പോഴുള്ള വില എത്ര?
- (a) 1 (b) -1 (c) 3 (d) -3
57. ഒരു ദിനാനസമവാക്യത്തിലെ മൂല്യഗണത്തിലെ അംഗങ്ങളുടെ തുക 10 ഉം ഗുണനഫലം 16 ഉം ആയാൽ സമവാക്യം ഏത്?
- (a) $x^2 - 10x + 16 = 0$ (b) $x^2 + 10x + 16 = 0$
 (c) $x^2 + 10x - 16 = 0$ (d) $-x^2 + 10x + 16 = 0$

56. $P(x) = 2x^3 + 9x^2 - 5x + k$ ഉം $P(1) = 0$ ഉം ആയാൽ k യുടെ വില എന്ത്?
 (a) 16 (b) -16 (c) 6 (d) -6

57. ഒരു G.P. യുടെ റെക്കോമനേഷനും മൂന്നാമത്തെയും പദങ്ങൾ യഥാക്രമം 0.01, 0.00001 ഇവയാണ്. എങ്കിൽ ആദ്യപദമേന്ത്?
 (a) 100 (b) 10 (c) 1 (d) 0.1

60. ഒരു സമചതുരസ്തുപികയുടെ പാർശ്വമുഖങ്ങൾ ഓരോന്നും സമഭുജത്രികോണക്ഷേത്രങ്ങളാണ്. ഒരു പാർശ്വവക്കിന്റെ നീളം x cm ആയാൽ അതിന്റെ ഉന്നതി എത്ര?
 (a) $2x$ cm. (b) $\frac{1}{2}x$ cm. (c) $\frac{\sqrt{3}}{2}x$ cm. (d) $\frac{1}{\sqrt{2}}x$ cm.

61. \widehat{PSQ} ഒരു ലഘുചാപവും $\angle PSQ = 115^\circ$ യും ആയാൽ ചുവടെ ചേർത്തിട്ടുള്ളവയിൽ ഏതായിരിക്കും \widehat{PSQ} ?
 (a) 245° (b) 230° (c) 130° (d) 65°



O കേന്ദ്രമായ വൃത്തത്തിലെ സ്പർശരേഖാഖണ്ഡങ്ങളാണ് PA, PB. $\angle APB = 70^\circ$ ആയാൽ $\angle ACB$ യുടെ അളവ്

(a) 140° (b) 110° (c) 70° (d) 55°

63. $\frac{1}{\cos 40}$ യ്ക്ക് തുല്യമായത് എന്ത്?
 (a) $\sin 50$ (b) $\operatorname{cosec} 50$ (c) $\sec 50$ (d) $\cos 50$

64. $\frac{\sqrt{1 + \cot^2 A}}{1 + \tan^2 A}$ യ്ക്ക് തുല്യമായത്
 (a) $\cot A$ (b) $\tan A$ (c) $\tan^2 A$ (d) 1

65. $\frac{1}{1 + x/y}$ യ്ക്ക് തുല്യമായത്
 (a) $\frac{y}{1+x}$ (b) $\frac{y}{x+y}$ (c) $\frac{1}{x+y}$ (d) $\frac{x}{1+y}$

66. 100 പ്രാപ്തകങ്ങളുടെ അഭ്യുഹശരാശരി 45. അഭ്യുഹശരാശരിയിൽ നിന്നുള്ള വ്യതിയാനങ്ങളുടെ തുക 32 ആയാൽ യഥാർത്ഥ മാധ്യം.
 (a) 44.68 (b) 45.32 (c) 32.45 (d) 31.55

67. 1994-ൽ അരിയുടെ വില 1986 ലേതിന്റെ 2 മടങ്ങ് ആയാൽ താഴെത്തന്നിട്ടുള്ളവയിൽ ഏതായിരിക്കും അരിയുടെ വിലസൂചിക
 (a) 500 (b) 100 (c) 200 (d) 400

68. 24 ബില്ലുകളുള്ള ഒരു കമ്പ്യൂട്ടർ വാക്കിലെ ബൈറ്റുകളുടെ എണ്ണം

- (a) 24 (b) 8 (c) 6 (d) 3

69. ഒരു വൃത്തസ്തുപികയുടെ ആരവും ഉയരവും രണ്ട് മടങ്ങായി വർദ്ധിച്ചാൽ വ്യാപ്തം എത്ര മടങ്ങായി വർദ്ധിക്കും?

- (a) 2 (b) 3 (c) 5 (d) 8

70. 11 അഞ്ച് + 34 അഞ്ച് ന് സമാനമായ ഡീനറി ന്യൂനമെൽ. ഏത്?

- (a) 6 (b) 19 (c) 25 (d) 45

71. $x^2 + 10x + k = 0$ എന്ന സമവാക്യത്തിന്റെ മൂല്യഗണത്തിലെ ഒരംഗം 4 ആയാൽ മൂല്യഗണം ഏത്?

- (a) {4,14} (b) {4,-14} (c) {-4,-12} (d) {4,10}

72. ഒരു മട്ടത്രികോണത്തിലെ ഏറ്റവും നീളം കൂടിയവശം $x + 5$. മറ്റു വശങ്ങൾ x , $2x - 5$. എങ്കിൽ താഴെക്കൊടുത്തിരിക്കുന്നവയിൽ ശരിയായ സമവാക്യം ഏത്?

- (a) $2x^2 + 15x + 50 = 0$ (b) $x^2 - 30x = 0$
 (c) $2x^2 - 15x = 0$ (d) $2x^2 - 15x - 50 = 0$

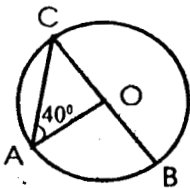
73. $P(x)$ എന്ന പോളിനോമിയലിൽ $P(-3) = 0$, $P(4) = 0$, $P(5) = 0$ ആയാൽ $P(x)$ ന്റെ ഘടകമല്ലാത്തത് ഏത്?

- (a) $x-4$ (b) $x+3$ (c) $x-5$ (d) $x+4$

74. ഒരു A.P. യുടെ n-ാം പദം $2n - 15$ ആയാൽ അതിലെ ആദ്യത്തെ പദങ്ങളുടെ തുക എന്ത്?

- (a) 120 (b) 380 (c) 25 (d) 325

75.



O വൃത്തകേന്ദ്രവും BC വൃത്തത്തിന്റെ വ്യാസവുമാണ്. $\angle OAC = 40^\circ$ എങ്കിൽ $\angle ACB$ യുടെ ഡിഗ്രി അളവ് ഏത്?

- (a) 80° (b) 100° (c) 260° (d) 280°

76. PA, PB എന്നിവ കേന്ദ്രമായ വൃത്തത്തിന്റെ സ്पर्ശരേഖാഖണ്ഡങ്ങൾ ആകുന്നു. $OA = 5$ cm., $OP = 13$ cm ആയാൽ ചതുർഭുജം OAPB യുടെ വിസ്തീർണ്ണം.

- (a) 60 cm^2 (b) 65 cm^2 (c) 78 cm^2 (d) 30 cm^2

77. ΔPQR ൽ $PR = 40$ cm, $QR = 35$ cm, $\angle R = 30^\circ$. ΔPQR ന്റെ വിസ്തീർണ്ണം.

- (a) 700 cm^2 (b) 671 cm^2 (c) 350 cm^2 (d) 1600 cm^2

78. താഴെക്കൊടുത്തിരിക്കുന്നവയിൽ ഏതിന്റെ ലോഗരിതമാണ്

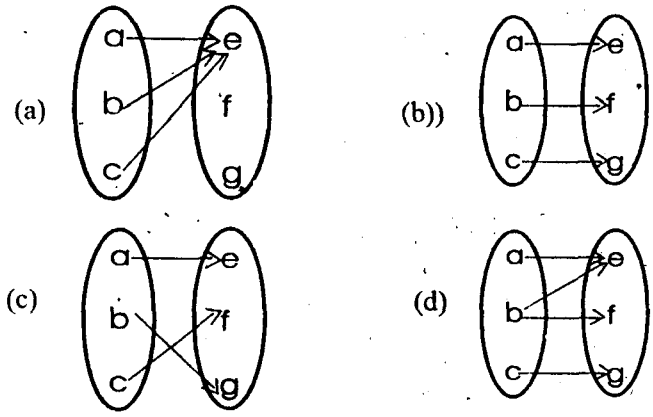
$\frac{1}{2} \log_2 24 + \log_2 75 - \log_2 101$ ന് തുല്യമായത്?

- (a) $\sqrt{\frac{24 \times 75}{101}}$ (b) $\sqrt{\frac{24 \times 75}{2 \times 101}}$ (c) $\sqrt{24 \times \frac{75}{101}}$ (d) $\frac{24 \times 75}{2 \times 101}$

79. 1110 രണ്ട് ന് സമാനമായ പഞ്ചസംഖ്യാന സ്യമെറൽ ഏത്?
 (a) 24 അഞ്ച് (b) 20 അഞ്ച് (c) 14 അഞ്ച് (d) 140 അഞ്ച്
80. കുറെ പുഷ്പങ്ങൾ 15 ഏകകേന്ദ്രവൃത്തങ്ങളിൽ നിരത്തിയിരിക്കുന്നു. ഓരോ വൃത്തത്തിലും അതിനു തൊട്ടുമുമ്പിലത്തെ വൃത്തത്തിൽ ഉള്ളതിനേക്കാൾ 10 പുഷ്പങ്ങൾ അധികമുണ്ട്. ഏറ്റവും ഉള്ളിലെ വൃത്തത്തിൽ 75 പുഷ്പങ്ങൾ ഉണ്ടെങ്കിൽ ഏറ്റവും പുറമെയുള്ള വൃത്തത്തിൽ എത്ര പുഷ്പങ്ങൾ ഉണ്ടായിരിക്കും?
 (a) 225 (b) 215 (c) 150 (d) 90
81. ഒരു അർദ്ധഗോളത്തിന്റെ വക്രമുഖവിസ്തീർണ്ണം $450 \pi \text{ cm}^2$ ആയാൽ അതിന്റെ വ്യാപ്തം
 (a) 4500π (b) 2250π (c) 1125π (d) 450π

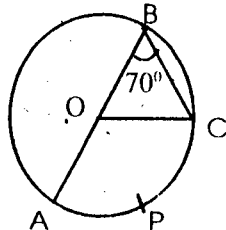
SECTION D

82. താഴെക്കൊടുത്തിരിക്കുന്ന ബന്ധങ്ങളിൽ ഏകദത്തെ സൂചിപ്പിക്കാത്തത്



83. മണ്ഡലം $\{-1, 0\}$ ആകുമ്പോൾ $f(x) = 2x - 5$ എന്ന ഏകദത്തിന്റെ രംഗം.
 (a) $\{3, -5\}$ (b) $\{-2, 0\}$ (c) $\{-7, -5\}$ (d) $\{-7, -3\}$
84. ഏത് സമവാക്യങ്ങളുടെ ഗ്രാഫ് വരച്ചാൽ $x^2 = 4x - 3$ എന്ന സമവാക്യത്തിന്റെ മൂല്യഗണം കിട്ടും?
 (a) $y = x^2; y = 4x + 3$ (b) $y = x^2; y = 4x$
 (c) $y = x^2; y = 4x - 3$ (d) $y = 2x^2; y = 8x - 3$
85. $P(x)$ എന്ന പോളിനോമിയലിനെ $x + 1$ കൊണ്ട് ഹരിച്ചാൽ ശിഷ്യം 7 ഉം $x - 2$ കൊണ്ട് ഹരിച്ചാൽ ശിഷ്യം 19 ഉം കിട്ടും. എങ്കിൽ $P(x)$ നെ സംബന്ധിച്ച് താഴെക്കൊടുത്തിരിക്കുന്ന പ്രസ്താവനകളിൽ ശരിയായത് ഏത്?
 (a) $P(1) = 0; P(-2) = 0$ (b) $P(-1) = 7; P(2) = 19$
 (c) $P(-1) = 0; P(-2) = 0$ (d) $P(1) = 7; P(2) = 19$
86. $b^2 = ac$ ആകത്തക്കവിധത്തിലുള്ള മൂന്ന് സംഖ്യകളാണ് a, b, c . $abc = 27$ എങ്കിൽ b യുടെ വില
 (a) 9 (b) 27 (c) $\sqrt{27}$ (d) 3
87. ഒരു കട്ടിയായഗോളത്തിന്റെ ഉപരിതലവിസ്തീർണ്ണം 120 cm^2 . അതിനെ മുറിച്ച് രണ്ട് അർദ്ധഗോളങ്ങളാക്കിയാൽ ഓരോന്നിന്റെയും ഉപരിതലവിസ്തീർണ്ണത്തെ സൂചിപ്പിക്കുന്ന സംഖ്യ ഏത്?
 (a) 40 (b) 60 (c) 80 (d) 90

88.



AB വൃത്തത്തിന്റെ വ്യാസവും O വൃത്തകേന്ദ്രവും ആകുന്നു. $\angle OBC = 70^\circ$ എങ്കിൽ \widehat{APC} യുടെ ഡിഗ്രി അളവ് ഏത്?

- (a) 70° (b) 110° (c) 140° (d) 220°

89. 20cm. ആരമുള്ള ഒരു വൃത്തത്തിൽ വരയ്ക്കാവുന്ന ഏറ്റവും വലിയ ഞാണിന്റെ നീളം

- (a) 20cm. (b) 30cm. (c) 40cm (d) 80cm.

90. കോൺ A യുടെ അളവ് 0° മുതൽ 90° വരെ വർദ്ധിക്കുമ്പോൾ $\sin A$ യുടെ വില

- (a) കുറയുന്നു (b) വർദ്ധിക്കുന്നു (c) മാറ്റം വരുന്നില്ല (d) നിശ്ചയിക്കുവാൻ സാധിക്കുകയില്ല

91. $\log \sqrt[3]{312}$ ന്റെ വില കണ്ടുപിടിക്കുന്നതിന് ഏറ്റവും യോജിച്ച തത്വം.

- (a) $\log(a \times b) = \log a + \log b$ (b) $\log a/b = \log a - \log b$

- (c) $\log am = m \log a$ (d) $\log \frac{a \times b}{c} = \log a + \log b - \log c$

92. $4 * 1$ അർത്ഥം $= 121$ പത്ത് എങ്കിൽ x ന്റെ വില ആകാവുന്നത് ഏത്?

- (a) 0 (b) 1 (c) 2 (d) 4

93. ഒരു ക്രിയ നിർവഹിക്കുന്നതിനുള്ള നിർദ്ദേശങ്ങൾ ക്രമമായി ചുവടെ ചേർത്തിരിക്കുന്നു.

- (i) തുടങ്ങുക (ii) a, b എന്നീ വിലകൾ സ്വീകരിക്കുക
 (iii) $A = \frac{a+b}{2}$ കണ്ടു പിടിക്കുക (iv) A എഴുതുക (v) നിറുത്തുക

ഈ നിർദ്ദേശങ്ങൾ സൂചിപ്പിക്കുന്ന ക്രിയ

- (a) രണ്ടു സംഖ്യകളെ താരതമ്യം ചെയ്യുന്നു (b) രണ്ടു സംഖ്യകളുടെ മാധ്യം കണക്കാക്കുന്നു.
 (c) രണ്ടു സംഖ്യകളുടെ തുക കണക്കാക്കുന്നു (d) മേൽപ്പറഞ്ഞവ ഒന്നുമല്ല.

94. ഒരു G.P. യുടെ n-ാം പദം $5 \times (3/2)^{n-2}$ ആയാൽ $(n+2)$ -ാം പദം

- (a) $5 \times (3/2)^n$ (b) $5 \times (3/2)^{n-4}$ (c) $5^2 \times (3/2)^{2(n-4)}$ (d) $5 \times (3/2)^{n+2}$

95. ഒരു മുറിയിൽ 'x' പുരുഷന്മാർ ഉണ്ട്. ഓരോ പുരുഷനും മറ്റുള്ളവർക്കും പറസ്പദാനം നൽകുന്നു. (ഒരാൾക്ക് ഒരിക്കൽ മാത്രം) പുരുഷന്മാരുടെ എണ്ണവും ആകെ പറസ്പദാനങ്ങളുടെ എണ്ണം (y) യും തമ്മിലുള്ള ബന്ധം എന്ത്?

- (a) $x^2 + x = 2$ (b) $x^2 = 2y$ (c) $x^2 - x = 2y$ (d) $x^2 - x = -2y$

96. $(2x - 3); (3x - 1); (5x + 2)$ എന്നിവ കൃതി 3 ആയ ഒരു പോളിനോമിയലിന്റെ ഘടകങ്ങൾ ആയാൽ താഴെത്തന്നിട്ടുള്ളവയിൽ $P(0)$ യ്ക്ക് തുല്യമായത് ഏത്?

- (a) 6 (b) -6 (c) 30 (d) -30

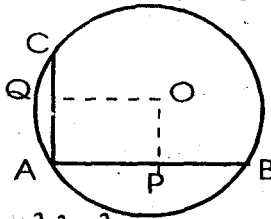
97. k, പൂജ്യമല്ലാത്ത ഒരു രേഖീയ സംഖ്യ ആയാൽ k, 5k, 9k ഇവ ഏതു പ്രോഗ്രഷനിൽ ആയിരിക്കും?

- (a) A.P. (b) G.P. (c) A.P. യും G.P. യും (d) A.P. യോ G.P. യോ അല്ല

98. ഒരു വൃത്തസ്തുപികയ്ക്കും ഒരു അർദ്ധഗോളത്തിനും തുല്യവ്യാസവും തുല്യപൊക്കവും ഉണ്ട്. അവയുടെ വ്യാപ്തങ്ങൾ തമ്മിലുള്ള അംശബന്ധം.

- (a) 2:1 (b) 1:2 (c) 1:1 (d) 1:3

99. AB, AC എന്നിവ ലംബങ്ങളായ ഞാണുകളും O വൃത്തകേന്ദ്രവും ആകുന്നു. P, Q എന്നിവ AB, AC എന്നിവയുടെ മധ്യബിന്ദുക്കളാണ്. ചതുർഭുജം APOQ ഒരു ചതുരമാണ്. എന്ത് തെളിയിക്കുന്നതിനുള്ള ഏറ്റവും ഉചിതമായ തത്വമേത്?

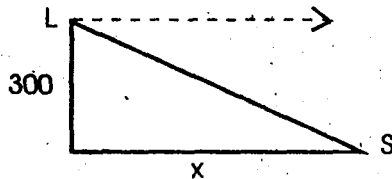


- (a) തുല്യനീളമുള്ള ഞാണുകൾ കേന്ദ്രത്തിൽ നിന്നും തുല്യഅകലത്തിലായിരിക്കും.
- (b) ഒരു വൃത്തത്തിന്റെ കേന്ദ്രത്തിൽനിന്നും അതിന്റെ ഒരു ഞാണിലേയ്ക്കുള്ള ലംബം ഞാണിനെ സമഭാഗം ചെയ്യും.
- (c) ഒരു വൃത്തത്തിന്റെ കേന്ദ്രവും എതിന്റേ ഒരു ഞാണിന്റെ മധ്യബിന്ദുവും ഉൾക്കൊള്ളുന്ന രേഖാഖണ്ഡം ഞാണിന് ലംബമായിരിക്കും.
- (d) ഒരു രേഖാഖണ്ഡത്തിന്റെ മധ്യബിന്ദു അതിനെ രണ്ട് തുല്യഭാഗങ്ങളായി വിഭജിക്കുന്നു.

100. $\frac{\tan x}{\cot 25} = 1$ ആയാൽ x ന്റെ വില

- (a) 25 (b) 45 (c) 75 (d) 65

101. ചിത്രത്തിൽ 'S' കടലിൽ നങ്കൂരമിട്ടിരിക്കുന്ന ഒരു കപ്പലും 'L' 300 മീറ്റർ ഉയരമുള്ള ഒരു ലൈറ്റ് ഹൗസിന്റെ മുകൾ ഭാഗവും ആണ്. ലൈറ്റ് ഹൗസിന്റെ മുകളിൽ നിൽക്കുന്ന ഒരാൾ ഈ കപ്പൽ 10° കീഴ്ക്കോണിൽ കാണുന്നു. ലൈറ്റ് ഹൗസിൽ നിന്നും കപ്പലിലേയ്ക്കുള്ള അകലം 'x' യൂണിറ്റായാൽ താഴെക്കൊടുത്തിരിക്കുന്നവയിൽ ശരിയായത്.



- (a) $x = 300 \times \tan 10$ (b) $x = 300 / \tan 10$ (c) $x = 300 \times \sin 10$ (d) $x = 300 / \sin 10$

102. താഴെക്കൊടുത്തിരിക്കുന്നവയിൽ LCM $(x-4)^2$ ആയിരിക്കുന്നത്

- (a) $(x - 4), (x + 4)$ (b) $(x - 4), x^2 - 8x + 16$ (c) $(x - 2), (x - 2)$

103. ഒരു വൃത്തസ്തൂപികയുടെ പാദവിസ്തീർണ്ണം $64\pi\text{cm}^2$. അതിന്റെ പാദശേഷനതി 17cm. ആയാൽ വ്യാപ്തം കാണുക.

ഈ പ്രശ്നം പരിഹരിക്കുന്നതിന് കുട്ടികൾ താഴെക്കൊടുത്തിരിക്കുന്ന ചോദ്യങ്ങൾക്ക് ഉത്തരം നൽകുന്നു.

അദ്ധ്യാപകൻ

ഇവിടെ എന്താണ് കണ്ടുപിടിക്കേണ്ടത്?
 കോണിന്റെ വ്യാപ്തം എങ്ങനെ കണ്ടുപിടിക്കാം?
 ഇതിന് ആവശ്യമായ ഘടകങ്ങളേവ?
 ഇവ തന്നിട്ടുണ്ടോ?
 ആരും എങ്ങനെ കണ്ടുപിടിക്കാം?

കുട്ടി

ഒരു കോണിന്റെ വ്യാപ്തം
 $v = 1/3 \pi r^2 h$ എന്ന സൂത്രവാക്യം ഉപയോഗിച്ച്.
 കോണിന്റെ ആരവും ഉയരവും
 ആരം തന്നിട്ടില്ല
 വൃത്തസ്തൂപികയുടെ പാദവിസ്തീർണ്ണം
 $\pi r^2 = 64\pi$ ഉപയോഗിച്ച്

ഇവിടെ ഉപയോഗിച്ചിരിക്കുന്ന രീതി

- (a) തന്നിരിക്കുന്നവയിൽ നിന്ന് അപഗ്രഥനം നടത്തുന്നു.
- (b) കണ്ടുപിടിക്കേണ്ടതിനെ അപഗ്രഥിക്കുന്നു.
- (c) പ്രശ്നപരിഹാരത്തിന് ആവശ്യമായ ഘടകങ്ങൾ പരിശോധിക്കുന്നു.
- (d) പ്രശ്നം വിശദീകരിക്കുന്നു.

104. $\frac{1}{x+4} + \frac{8}{x^2-16}$ ഇവയുടെ തുക കാണുന്നതിന്റെ വിവിധ ഘട്ടങ്ങൾ താഴെ തന്നിരിക്കുന്നു

- (a) $\frac{x+4}{x^2-16}$ (b) $\frac{x-4+8}{x^2-16}$
 (c) $x+4, x^2-16$ ഇവയുടെ ല.സ.ഗു. x^2-16 ആണ്
 (d) $\frac{x+4}{(x+4)(x-4)}$ (e) $\frac{1}{x-4}$

ഇവയുടെ ശരിയായ ക്രമം ഏത്?

- (a) a,b,c,d,e (b) b,c,d,e,a (c) c,a,b,d,e (d) c,b,a,d,e

105. 143 അഞ്ച്, 144 അഞ്ച് എന്നിവയെ തുടർന്നു വരുന്ന പഞ്ചസംഖ്യയായ ന്യൂമറൽ ഏത്?

- (a) 145 അഞ്ച് (b) 200 അഞ്ച് (c) 1440 അഞ്ച് (d) 1441 അഞ്ച്

106. അഭ്യൂഹഗരാശരി 55 ആകുമ്പോൾ വ്യതിയാനങ്ങൾ -4, k, 5, 8, -2 ആകുന്നു. മാധ്യവും അഭ്യൂഹഗരാശരിയും തുല്യമായാൽ k എത്ര?

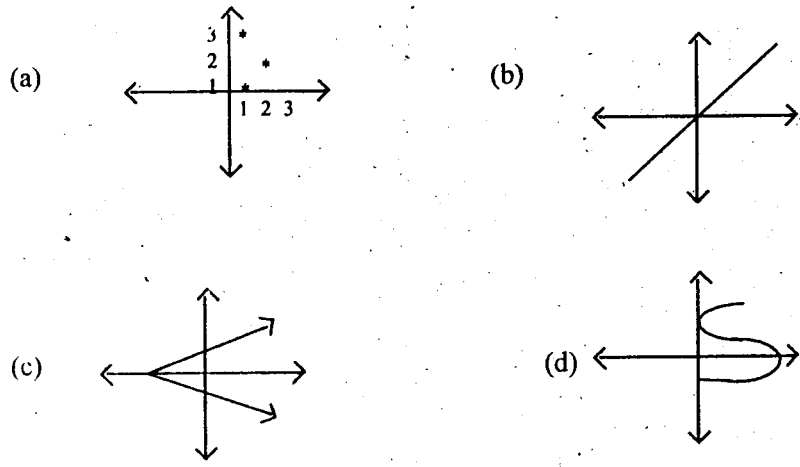
- (a) -6 (b) -7 (c) 7 (d) 13

107. $y = x^2$ ന്റെ ഗ്രാഫ് തന്നിരിക്കുന്നു. ഏത് സമവാക്യത്തിന്റെ കൂടി ഗ്രാഫ് വരച്ചാൽ $x^2 - 2x - 1 = 0$ എന്ന സമവാക്യത്തിന്റെ മൂല്യഗണം കണ്ടുപിടിക്കാം.

- (a) $y = 2x + 1$ (b) $2y = 2x + 1$ (c) $y = 1 - 2x$ (d) $y = -2x - 1$

SECTION E

108. താഴെക്കൊടുത്തിരിക്കുന്നവയിൽ ഏകദത്തെ സൂചിപ്പിക്കുന്നതേത്



109. ഒരു A.P. യുടെ n-ാം പദം $t_n = 3n + 20$ ആണ്. ഇതിലെ ആദ്യത്തെ 20 പദങ്ങളുടെ തുക കാണുന്നതിനുള്ള വിവിധ ഘട്ടങ്ങൾ ചുവടെ ചേർക്കുന്നു.

- (a) $t_1 = 3 + 20 = 23$ (b) $10 [23 + 80]$
 (c) $10 \times 103 = 1030$ (d) $t_{20} = 3 \times 20 + 20 = 80$
 ഇവയുടെ ശരിയായ ക്രമം ഏത്?
 (a) a,d,c,b (b) a,d,b,c (c) b,c,a,d (d) b,a,d,c

- 110 ഒരു ശ്രീകോണത്തിന്റെ പരിവൃത്തം നിർമ്മിക്കുന്നതിനുള്ള വിവിധ ഘട്ടങ്ങൾ താഴെ കൊടുത്തിരിക്കുന്നു.
- ശ്രീകോണത്തിന്റെ ഏതെങ്കിലും രണ്ടു വശങ്ങളുടെ മദ്ധ്യലംബങ്ങൾ വരയ്ക്കുക
 - പരിവൃത്തകേന്ദ്രത്തിൽനിന്നു ശ്രീകോണത്തിന്റെ ഏതൊരു ശീർഷത്തിലേക്കുമുള്ള ദൂരം - ആരം കണ്ടുപിടിക്കുക.
 - തന്നിരിക്കുന്ന അളവുകളിൽ ശ്രീകോണം നിർമ്മിക്കുക
 - പരിവൃത്തം നിർമ്മിക്കുക

ഇവയുടെ ശരിയായ ക്രമം ഏത്?

- (a) a,b,c,d (b) a,c,b,d (c) d,c,b,a (d) c,a,b,d

111. $\frac{7}{y^2 + y - 2} - \frac{6}{y^2 + 2y - 8}$ ന്റെ ലഘൂകരണത്തിൽ ഉൾപ്പെടാത്തത്

- ചേരങ്ങളെ ഘടകക്രിയ ചെയ്യുക
- ചേരങ്ങളുടെ ല.സ.ഗു. കാണുക
- അംശങ്ങളുടെ ല.സ.ഗു. കാണുക
- പൊതുചേരം കാണുക

112. $\frac{\sin \theta}{1 - \cos \theta} + \frac{\sin \theta}{1 + \cos \theta} = 2 \operatorname{Cosec} \theta$

ഇത് തെളിയിക്കുന്നതിനുള്ള വിവിധ ഘട്ടങ്ങൾ താഴെ കൊടുത്തിരിക്കുന്നു.

(a) $\frac{\sin \theta + \sin \theta \cos \theta + \sin \theta - \sin \theta \cos \theta}{1 - \cos^2 \theta}$

(b) $\frac{2 \sin \theta}{1 - \cos^2 \theta}$

(c) $1 - \cos \theta, 1 + \cos \theta$ ഇവയുടെ ല.സ.ഗു. $1 - \cos^2 \theta$ ആകുന്നു

(d) $\frac{2 \sin \theta}{\sin^2 \theta}$

(e) $\frac{2}{\sin \theta}$

ഇവയുടെ ശരിയായ ക്രമം ഏത്?

- (a) c,a,b,d,e (b) a,b,c,d,e (c) a,b,d,e,c (d) d,e,a,b,c

113. ഒരു ശ്രീകോണത്തിന്റെ വിസ്തീർണ്ണം കണ്ടുപിടിക്കുന്നതിനുള്ള അൽഗോരിതം ചുവടെ ചേർക്കുന്നു

- ആരംഭിക്കുക
- A എഴുതുക
- നിറുത്തുക
- $A = \sqrt{s(s-a)(s-b)(s-c)}$ കാണുക
- a, b, c വിലകൾ സ്വീകരിക്കുക
 $a + b + c$
- $s = \frac{\quad}{2}$ കണ്ടുപിടിക്കുക

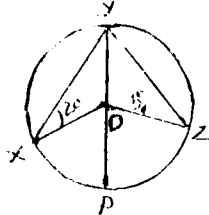
ഇവയുടെ ശരിയായ ക്രമം ഏത്?

- (a) 1,6,2,3,4,5 (b) 1,2,3,4,5,6 (c) 1,5,6,4,2,3 (d) 1,2,5,6,4,3

114. p,q,r ഇവ G.P. യിൽ ആയാൽ എല്ലായ്പ്പോഴും ശരിയേത്?
 (a) $q = (pr)^{1/2}$ (b) $q = \frac{1}{2}(p+q)$ (c) $q = 2pr$ (d) $q = \frac{1}{3}(p+q+r)$
115. രണ്ട് വൃത്തസ്തുപികളുടെ വ്യാസങ്ങൾ തുല്യമാണ്. അവയുടെ ആരങ്ങൾ തമ്മിലുള്ള അംശബന്ധം 5:2 ആയാൽ ഉയരങ്ങൾ തമ്മിലുള്ള അംശബന്ധം എന്ത്?
 (a) 25:4 (b) 4:25 (c) $\sqrt{5}:\sqrt{2}$ (d) $\sqrt{2}:\sqrt{5}$
116. 16, 21, 23, 24, 12, x എന്നീ ഘടകങ്ങളുടെ മാധ്യം 19 ആയാൽ x-ന്റെ വില എന്ത്?
 (a) 18 (b) 19 (c) 3 (d) 25
117. $\log 15.5 = 1.1903$ ആയാൽ $\log 155^2$ എത്ര?
 (a) 2.3806 (b) 1.3806 (c) 4.1903 (d) 4.3806
118. $y = x^2$ എന്ന സമവാക്യത്തിന്റെയും $y = x + 2$ എന്ന സമവാക്യത്തിന്റെയും ഗ്രാഫുകൾ ഉപയോഗിച്ച് താഴെത്തന്നിട്ടുള്ളവയിൽ ഏതു സമവാക്യത്തിന്റെ മൂല്യഗണം കണ്ടുപിടിക്കാം.
 (a) $x^2 + x - 2 = 0$ (b) $x^2 + x + 2 = 0$ (c) $x^2 - x + 2 = 0$ (d) $x^2 - x - 2 = 0$
119. ആകെയുള്ളതിന്റെ പകുതി അമ്പുകൾകൊണ്ട് അർജ്ജുനൻ കർണ്ണൻ എഴുതുന്ന ശരവർഷങ്ങളെ തടഞ്ഞു നിറുത്തി. ആകെയുണ്ടായിരുന്ന അമ്പുകളുടെ വർഗ്ഗമൂലത്തിന്റെ 4 മടങ്ങുകൊണ്ട് രഥാശങ്ങളെ കൊന്നു വിഴ്ത്തി. ശല്യരുടെ ശരീരത്തിൽ 6 അമ്പുകൾ തറച്ചു. 3 അമ്പുകൾ കൊണ്ട് കൂട, കൊടി, ചാമരങ്ങൾ എന്നിവയെ മുറിച്ചു. ശേഷിച്ച ഒരമ്പുകൊണ്ട് അർജ്ജുനൻ കർണ്ണനെ വധിച്ചു. എന്താൽ അർജ്ജുനന്റെ ആവനാഴിയിൽ ആകെയുണ്ടായിരുന്ന അമ്പുകളുടെ എണ്ണമെത്ര?
 (a) 50 (b) 100 (c) 200 (d) 10
120. $P(x) = x^3 + Px^2 + qx - 6$ ന്റെ ഘടകങ്ങളാണ് $(x - 2), (x - 1)$ എന്നിവ. p,q എന്നിവയുടെ വില കാണുന്നതിനുള്ള വിവിധ ഘട്ടങ്ങൾ താഴെ തന്നിരിക്കുന്നു.
 a) p,q എന്നിവ ചരങ്ങളായിട്ടുള്ള ഏകകാലസമവാക്യങ്ങൾ രൂപീകരിക്കുക
 b) ഏകകാലസമവാക്യങ്ങൾ നിർദ്ധാരണം ചെയ്യുക.
 c) ഘടകസിദ്ധാന്തം ഉപയോഗിച്ച് $P(2) = 0, P(1) = 0$ ഇവ നിർണ്ണയിക്കുക.
 ഇവയുടെ ശരിയായ ക്രമം ഏത്?
 (a) a,b,c (b) b,a,c (c) c,b,a (d) c,a,b
121. കട്ടിയായ ഒരു ചെമ്പ് ഗോളത്തിന്റെ വ്യാസം 18 cm. ഇതിനെ ഉരുക്കി പരമാവധി വലിപ്പമുള്ള ഒരു വൃത്തസ്തുപിക നിർമ്മിക്കുന്നു. വൃത്തസ്തുപികയുടെ വ്യാസം 12 cm. ആയാൽ അതിന്റെ ഉന്നതി കണ്ടുപിടിക്കുന്നതിനുള്ള ഘട്ടങ്ങളുടെ ശരിയായ ക്രമീകരണം ഏത്?
 (a) 12 cm. വ്യാസമുള്ള കോണിന്റെ പരമാവധി വ്യാപ്തം $= \frac{1}{3}\pi r^2 h$
 (b) വൃത്തസ്തുപികയുടെ ഉന്നതി 'h' എന്നിരിക്കട്ടെ.
 (c) $h = 81$ cm.
 (d) 18 cm. വ്യാസമുള്ള ഗോളത്തിന്റെ വ്യാപ്തം $= \frac{4}{3}\pi x 9^3$
 (e) $h = \frac{1}{3}\pi x 6^3$
 (a) a,b,c,d,e (b) d,c,a,b,e (c) d,b,a,e,c (d) d,a,e,c,b
122. ഒരു സമചതുരസ്തുപികയുടെ ആകെ വകുക്കളുടെ നീളം a cm. അതിന്റെ പാദചുറ്റളവ് b cm. ആയാൽ ഒരു പാർശ്വവക്രിയുടെ നീളം എത്ര cm ?
 (a) a - b (b) $\frac{1}{4}a - b$ (c) $a - \frac{1}{4}b$ (d) $\frac{1}{4}(a-b)$

123. ഒരു വൃത്തിന്റെ ചാപം തന്നിരുന്നാൽ അതിന്റെ കേന്ദ്രം കണ്ടുപിടിക്കുന്നതിന് ആദ്യം ചെയ്യേണ്ടത്
- (a) സമാന്തരങ്ങളായ രണ്ട് ഞാണുകൾ വരയ്ക്കുക
 - (b) ഏതെങ്കിലും രണ്ട് ഞാണുകൾ വരയ്ക്കുക
 - (c) സമാന്തരങ്ങളല്ലാത്ത രണ്ട് ഞാണുകൾ വരയ്ക്കുക.
 - (d) ചാപങ്ങളുടെ മധ്യബിന്ദുക്കൾ കണ്ടുപിടിക്കുക.

124. ചിത്രത്തിൽ O വൃത്തകേന്ദ്രമാണ്. $\angle X = 20^\circ$, $\angle Z = 30^\circ$. \widehat{XPZ} കണ്ടുപിടിക്കുന്നതിനുള്ള വിവിധ ലഭ്യങ്ങൾ താഴെക്കൊടുത്തിരിക്കുന്നു.



- (a) $\angle XOZ = 40^\circ$
 - (b) ΔXOZ ഒരു സമപാർശ്വത്രികോണമായതിനാൽ $\angle X = \angle Z$
 - (c) $\angle XOZ = 100^\circ$
 - (d) $\widehat{XPZ} = 100^\circ$
 - (e) $\angle ZOP = 60^\circ$
- ഇവയുടെ ശരിയായ ക്രമം എന്ത്?
- (a) b,a,c,e,d (b) a,b,d,c,e (c) c,b,a,e,d (d) b,a,e,c,d

125. 3000 മീറ്റർ ഉയരത്തിൽ പറക്കുന്ന ഒരു വിമാനത്തെ ഒരു നിരീക്ഷണകേന്ദ്രത്തിൽ നിന്നും 35° മേൽക്കോണിൽ കാണുന്ന വിമാനത്തിൽനിന്നും താഴേയ്ക്കിടുന്ന ഭക്ഷണപായ്ക്കുറ്റുകൾ നിരീക്ഷണ കേന്ദ്രത്തിൽ നിന്നും എന്തകലത്തിൽ തറയിൽവീഴും എന്ന് കണ്ടുപിടിക്കുന്നതിന് ഉപയോഗിക്കേണ്ട ബന്ധം.

- (a) $\tan 35 = x / 3000$ (b) $\tan 35 = 3000 / x$ (c) $\sin 35 = x / 3000$ (d) $\cos 35 = 3000/x$

126. അംശം '1' വരുന്ന എന്തെങ്കിലും രണ്ട് ഭിന്നസംഖ്യകളുടെ തുക മനക്കണക്കായി കണ്ടുപിടിക്കുന്നതിന് കുട്ടികൾ വിവിധ മാർഗ്ഗങ്ങൾ നിർദ്ദേശിക്കുന്നു. ഏറ്റവും ശരിയായത് ഏത്?

- (a) തന്നിരിക്കുന്ന ചോദ്യങ്ങളുടെ ലഘുഗുണിതം പൊതുചേരമായി സ്വീകരിച്ച് തുല്യമായ ഭിന്നസംഖ്യ കാണുക.
- (b) അംശങ്ങളുടെ തുകയും ചേരങ്ങളുടെ തുകയും വെറുതെ കണ്ടുപിടിച്ച് ഭിന്നസംഖ്യയായി എഴുതുക.
- (c) ചേരത്തിന്റെ തുക ചേരമായും '1' അംശമായും വരുന്ന ഭിന്നസംഖ്യ എഴുതുക.
- (d) അംശങ്ങളുടെ തുകയും ചേരങ്ങളുടെ ഗുണനഫലവും കണ്ടുപിടിച്ച് ഭിന്നസംഖ്യരൂപത്തിൽ എഴുതുക.

127. പഞ്ചസംഖ്യാനസമ്പ്രദായത്തിൽ ഒറ്റയുടെ സ്ഥാനത്തെ അക്കം x ഉം അഞ്ചിന്റെ സ്ഥാനത്തെ അക്കം y യും ഇരുപത്തിയഞ്ചിന്റെ സ്ഥാനത്തെ അക്കം z ഉം ആയാൽ ഇതിന് തുല്യമായ ഡിനറി ന്യൂമെറൽ

- (a) $25x + 5y + z$ (b) $25z + 5y + x$ (c) $25xyz$ (d) $125xyz$

128. മുല്യഗണം ശൂന്യഗണമായ സമവാക്യം

- (a) $x^2 - 1 = 0$ (b) $x^2 + 1 = 0$ (c) $x^2 - 6x + 9 = 0$ (d) $x^2 + x + 1/4 = 0$

129. ഒരു A.P. യുടെ ഒന്നാം പദം p ഉം 10-ാം പദം q ഉം ആയാൽ രണ്ടാം പദം എന്ത്?

- (a) $p + \frac{p-q}{11}$ (b) $p + q - p$ (c) $p + \frac{q-p}{9}$ (d) $p + \frac{p-q}{9}$

130. $f(x) = -x^2$ എന്നു ഏകദത്തിന്റെ മണ്ഡലം രേഖീയസംഖ്യാഗണം ആയിരുന്നാൽ അതിന്റെ രംഗം ആകാവുന്നത് എന്ത്?

- (a) രേഖീയ സംഖ്യാഗണം.
- (b) പോസിറ്റീവ് എല്ലാത്ത രേഖീയസംഖ്യകളുടെ ഗണം.

119

56

- (c) നെഗറ്റീവ് അല്ലാത്ത രേഖീയസംഖ്യകളുടെ ഗണം
- (d) നെഗറ്റീവ് രേഖീയസംഖ്യഗണം.

131. $\log 2 = 0.3010$ എങ്കിൽ 2^{15} ന്റെ വിപുലീകരിച്ച രൂപത്തിൽ എത്ര അക്കങ്ങൾ ഉണ്ടായിരിക്കും?

- (a) 15 (b) 5 (c) 4 (d) 3

132. ഒരു ക്രിയ നിർവഹിക്കുന്നതിനുള്ള നിർദ്ദേശങ്ങൾ ക്രമമായി ചുവടെ ചേർത്തിരിക്കുന്നു. ഇവ ഏതു ക്രിയയെ സൂചിപ്പിക്കുന്നു?

- (1) തുടങ്ങുക (2) a, b എന്നീ വിലകൾ സ്വീകരിക്കുക (3) $D = a - b$ കാണുക
- (4) $D = 0$ ആണോ?
- (i) ഉത്തരം അതെ എങ്കിൽ $a = b$ എഴുതുക, നിറുത്തുക
- (ii) ഉത്തരം അല്ല എങ്കിൽ $D > 0$ ആണോ?
- (iii) അതേ എങ്കിൽ $a > b$ എഴുതുക, നിറുത്തുക
- (iv) അല്ല എങ്കിൽ $a < b$ എഴുതുക നിറുത്തുക

- (a) രണ്ടു സംഖ്യകളുടെ വ്യത്യാസം കാണുന്നതിന് (b) രണ്ടു സംഖ്യകളുടെ തുക കാണുന്നതിന്
- (c) രണ്ടു സംഖ്യകൾ താരതമ്യം ചെയ്യുന്നതിന് (d) രണ്ടു സംഖ്യകളുടെ ശരാശരി കാണുന്നതിന്

133. $\log 0.201 = \bar{1}.3032$ എങ്കിൽ $\sqrt{\log 0.201}$ എത്ര?

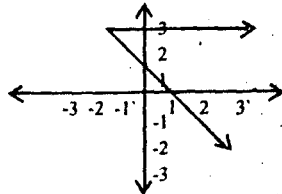
- (a) 1.6516 (b) 2.6516 (c) 1.3032 (d) 1.1516

SECTION F

134. $x^2 -$ തുക $(x) +$ ഗുണനഫലം $= 0$ എന്ന രീതിയിൽ ദ്വിമാനസമവാക്യം രൂപീകരിക്കുന്നതിന് ആ ദ്വിമാനസമവാക്യത്തെ സംബന്ധിച്ച് അറിഞ്ഞിരിക്കേണ്ടത്

- (a) x^2 ന്റെ ഗുണോത്തരം (b) വിവേചകം
- (c) മൂല്യഗണത്തിലെ അംഗങ്ങൾ (d) മൂല്യഗണത്തിലെ ഒരംഗം

135. ഒരു ബന്ധത്തിന്റെ ഗ്രാഫാണ് താഴെ കൊടുത്തിരിക്കുന്നത്. മണ്ഡലത്തിലെ എല്ലാ അംഗങ്ങൾക്കും പ്രതിബിംബം ഉള്ളതുകൊണ്ട് ഇത് ഒരു ഏകദത്ത പ്രതിനിധാനം ചെയ്യുന്നുവെന്ന് ഒരു കുട്ടി പറയുന്നു. ഇത് ഒരു തെറ്റായ നിഗമനമാണ്. കാരണം



- (a) ഒരു ചിത്രം മാത്രം ഉപയോഗപ്പെടുത്തി ഒരു നിഗമനത്തിൽ എത്തിയിരിക്കുന്നു.
- (b) മണ്ഡലത്തിലെ 2 അംഗങ്ങൾക്ക് ഒരേ പ്രതിബിംബം ഉണ്ട്.
- (c) ഗ്രാഫ്, y അക്ഷത്തെ 2 ബിന്ദുക്കളിൽ ഖണ്ഡിക്കുന്നു.
- (d) ഗ്രാഫ് 'പരാബോള'യെ പ്രതിനിധാനം ചെയ്യുന്നില്ല.

136. $ax^2 + bx + c = 0$ ന്റെ മൂല്യഗണത്തിലെ അംഗങ്ങളുടെ തുക പൂജ്യമാണ്. ഈ സമവാക്യത്തെ സംബന്ധിച്ച് ശരിയായത്

- (a) $b = 0$ (b) $c = 0$ (c) $a = b = c$ (d) $b = c = 0$

137 $P(x)$ എന്ന മൂന്നാം കൃതിയിലുള്ള ഒരു പോളിനോമിയലിൽ $P(-1) = 0, P(2) = 0, P(-3) = 0$ എങ്കിൽ $P(x)$ ന്റെ ഘടകം ആകാൻ സാധ്യതയില്ലാത്തത്

- (a) $x + 1$ (b) $x - 1$ (c) $x - 2$ (d) $x + 3$

138. താഴെപ്പറയുന്നവയിൽ ഏതു മാർഗ്ഗം ഉപയോഗിച്ച് $\frac{1}{x - 5} + \frac{1}{x - 4}$ ലഘൂകരിക്കാം?

(a) $\frac{1+1}{x-5+x-4} = \frac{2}{2x-9}$ (b) $\frac{1+1}{(x-5)(x-4)} = \frac{2}{(x-5)(x-4)}$ (c) $\frac{x-4+x-5}{(x-5)(x-4)} = \frac{2x-9}{(x-5)(x-4)}$
 (d) $\frac{1}{x} - \frac{1}{5} + \frac{1}{x} - \frac{1}{4} = \frac{2}{x} - \frac{9}{20}$

139. ഒരു G.P. യിലെ പദം ആകാൻ സാധ്യതയില്ലാത്ത രേഖീയ സംഖ്യ

- (a) -1 (b) 0 (c) +1 (d) 1/10

140. 4 മുഖങ്ങൾ ഉള്ള ഒരു സ്പർഷികയുടെ പാദത്തിന്റെ ആകൃതി ആകാവുന്നത് ഏത്?

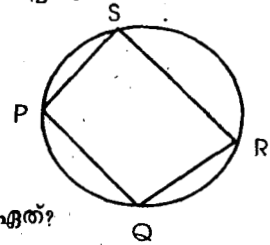
- (a) ത്രികോണം (b) സമചതുരം (c) പഞ്ചഭുജം (d) ഷഡ്ഭുജം

141. APB ഒരു ദീർഘചതുരമാണ്. APB = x ആയാൽ താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ശരിയായത് ഏത്?

- (a) $0 < x < 90$ (b) $90 < x < 180$ (c) $0 < x < 180$ (d) $180 < x < 360$

142. PQRS ഒരു ചക്രിയ ചതുർഭുജമാണ്. PQRS നെ സംബന്ധിച്ച് എല്ലായ്പ്പോഴും ശരിയായത് ഏത്?

- (a) $\angle P = \angle R$
 (b) $PQ = RS$
 (c) PQ, QS ഇവ പരസ്പരം സമഭാഗം ചെയ്യുന്നു
 (d) $\angle P + \angle R = 180^\circ$

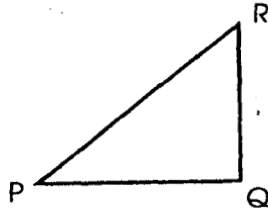


143. ΔABC യുടെ വിസതീർണ്ണം കാണുന്നതിന് പര്യാപ്തമല്ലാത്ത അളവ് ഏത്?

- (a) AB, BC എന്നീ വശങ്ങളും $\angle A$ ഉം
 (b) AB, AC എന്നീ വശങ്ങളും $\angle A$ ഉം
 (c) AC, BC എന്നീ വശങ്ങളും $\angle C$ ഉം
 (d) AB, BC എന്നീ വശങ്ങളും $\angle B$ ഉം

144. താഴെ കൊടുത്തിരിക്കുന്നവയിൽ PQ വിന് തുല്യമല്ലാത്തത് ഏത്?

- (a) $PR \cos P$
 (b) $QR \tan R$
 (c) $PR \sin R$
 (d) $PR \cos R$



145. 35-55 എന്ന പ്രായപരിധിയിൽ ഒരു ഗ്രാമത്തിലെയും ഒരു പട്ടണത്തിലെയും SDR യഥാക്രമം 13.41, 13.50 ഇവയാണ്. എങ്കിൽ താഴെത്തന്നിരിക്കുന്നവയിൽ ശരിയായ പ്രസ്താവന ഏത്?

- (a) ഗ്രാമത്തിലെ ആരോഗ്യസ്ഥിതിയാണ് കൂടുതൽ മെച്ചം
 (b) പട്ടണത്തിലെ ആരോഗ്യസ്ഥിതിയാണ് കൂടുതൽ മെച്ചം
 (c) ഗ്രാമത്തിലെയും പട്ടണത്തിലെയും ആരോഗ്യസ്ഥിതി തുല്യമാണ്
 (d) മുൻകൂട്ടി പറയാൻ സാധ്യമല്ല

146. താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ഏറ്റവും വലിയ പഞ്ചസംഖ്യയെ ന്യൂമെറൽ ഏത്?

- (a) 40 (b) 41 (c) 11 (d) 44

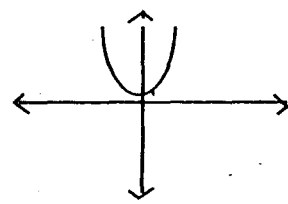
147. 25, 2x, x-7 ഇവ സമാന്തര ശ്രേണിയിലെ തുടർച്ചയായ പദങ്ങളായാൽ താഴെപ്പറയുന്നവയിൽ ശരിയായ പ്രസ്താവന ഏത്?

- (a) $4x = x + 18$ (b) $2x = x + 18$ (c) $4x^2 = 25(x-7)$ (d) $2x = 2x(x-7)$

148. ആദ്യത്തെ 20 എണ്ണൽസംഖ്യകളുടെ തുക കണ്ടുപിടിക്കുന്നതിനുള്ള അൽഗോരിതം തയ്യാറാക്കുമ്പോൾ ആരംഭതുക ഏത്?
 (a) 1 (b) 2 (c) 3 (d) 4

149. ചിത്രം $y = 3x^2$ എന്ന് ദ്വിമാനസമവാക്യത്തിന്റെ ഗ്രാഫിനെ സൂചിപ്പിക്കുന്നു. ഈ ഗ്രാഫിന് ഒരു കൂട്ടി നൽകിയ വ്യത്യസ്ത വ്യാഖ്യാനങ്ങൾ താഴെ കൊടുത്തിരിക്കുന്നു ശരിയായത് ഏത്?

- (a) ഗ്രാഫ് പരാബൊള ആയതുകൊണ്ട് സമവാക്യത്തിന്റെ നിർദ്ധാരണം കണ്ടുപിടിക്കുക സാദ്ധ്യമല്ല
- (b) ഗ്രാഫ് അപൂർണ്ണമാണ്
- (c) ഗ്രാഫ് x അക്ഷത്തെ ഖണ്ഡിക്കുകയില്ലാത്തതുകൊണ്ട് നിർദ്ധാരണമുല്യം കണ്ടുപിടിക്കുക സാദ്ധ്യമല്ല.
- (d) നിർദ്ധാരണമുല്യം കണ്ടുപിടിക്കാം



150. $P(x)$ എന്ന പോളിനോമിയലിൽ $P(3) = 5$. ഒരു കൂട്ടി താഴെകൊടുത്തിരിക്കുന്ന നിഗമനങ്ങളിൽ എത്തിച്ചേരുന്നു. ഇതിൽ ശരിയായത് ഏത്?

- (a) $P(x)$ ന്റെ ഒരു ഘടകമാണ് $x + 3$
- (b) $P(x)$ നെ $x + 3$ കൊണ്ട് ഹരിക്കുമ്പോൾ ശിഷ്ടം കിട്ടുന്നു.
- (c) $P(x)$ ന്റെ ഒരു ഘടകമാണ് $x - 3$
- (d) $P(x)$ നെ $x - 3$ കൊണ്ട് ഹരിക്കുമ്പോൾ ശിഷ്ടം 5 കിട്ടുന്നു

151. 128, 124, 120..... ഈ AP യിലെ പദം ആകാൻ സാദ്ധ്യതയുള്ളത്

- (a) 10 (b) -6 (c) -12 (d) 118

152. ഒരു സമചതുരസ്തുപികയുടെ പാദവക്ടർ, പാർശ്വവക്ടർ, പാർശ്വോന്നതി ഇവ യഥാക്രമം a, e, l ഇവ ആയാൽ താഴെകൊടുത്തിരിക്കുന്നവയിൽ എല്ലായ്പ്പോഴും ശരിയായത്

- (a) $a < e < l$ (b) $a < l < e$ (c) $a/2 < l < e$ (d) $a/2 < e < l$

153. ഒരു സമചതുരസ്തുപികയുടെ വ്യാപ്തം 64cm^3 ആയാൽ പാദവക്ടറിന്റെ നീളവും ഉന്നതിയും പകുതി വീതമുള്ള മറ്റൊരു സമചതുരസ്തുപികയുടെ വ്യാപ്തം ഏതായിരിക്കും?

- (a) 32 cm^3 (b) 16 cm^3 (c) $32/3\text{ cm}^3$ (d) 8 cm^3

154. $Y\text{ cm}$. ആരമുള്ള ഒരു വൃത്തത്തിലെ നീളമുള്ള ഞാണിന് വൃത്തകേന്ദ്രത്തിൽ നിന്നുള്ള അകലമെന്ത്?

- (a) $\sqrt{y^2 - x^2}$ (b) $\sqrt{y^2 + x^2}$ (c) $\sqrt{y^2 - x^2/4}$ (d) $\sqrt{y^2 + x^2/4}$

155. 'r' ആരമുള്ള ഒരു വൃത്തത്തിലെ ഒരു സ്പർശരേഖാഖണ്ഡത്തിന്റെ നീളം 't' ഉം ബാഹ്യബിന്ദുവിൽ നിന്ന് വൃത്തകേന്ദ്രത്തിലേക്കുള്ള ദൂരം 'd' ഉം ആയാൽ താഴെത്തന്നിരിക്കുന്നവയിൽ ശരിയല്ലാത്തത് ഏത്?

- (a) $r < d$ (b) $r = t$ (c) $r < t$ (d) $r = d$

156. ഒരു മട്ടത്രികോണം ശരിയായി അളന്ന് $\frac{\sin 45}{\cos 45} = 1$ എന്ന് കണ്ടുപിടിച്ചു. അതുകൊണ്ട് $\frac{\sin A}{\cos A} = 1$

എന്ന് ഒരാൾ പ്രസ്താവിക്കുന്നു. ഈ നിഗമനത്തിലെ പിശക് എന്ത് ?

- (a) ഒരേ ഒരു ഫലം മാത്രം വെച്ച് ഒരു നിഗമനത്തിൽ എത്തിച്ചേരുന്നു.
- (b) അളന്നുകൊണ്ട് നിഗമനത്തിൽ എത്തിച്ചേർന്നു.
- (c) $\frac{\sin 45}{\cos 45} = 1$ എന്നുള്ള നിഗമനം
- (d) അളവിന് കൃത്യതയില്ല

157. ഒരു സാധനത്തിന്റെ 1995 ബെ വിവ 1991 ലേതുമായി താരതമ്യം ചെയ്യുമ്പോൾ വിലസൂചിക 120.4 ആണ്. 1991 ബെ 100 വുമായുടെ സഹനത്ത് 1995 ൽ 120.4 രൂപ ചെലവാക്കുന്ന ഒരു കൂട്ടംബത്തെ സംബന്ധിച്ച് താഴെകൊടുത്തിരിക്കുന്നവയിൽ ശരിയായ നിഗമനം ഏത്?

- (a) 1995-ൽമെച്ചമായ ജീവിതനിവാരം പുലർത്തുന്നു
- (c) ജീവിതനിവാരത്തിൽ മാറ്റമില്ല
- (c) മോശമായ ജീവിതനിവാരമാണ്
- (d) ജീവിതവൃത്തി സാധ്യമാകുന്നു.

158. 11011 രണ്ട്, 314 അഞ്ച് ഈ ന്യൂനോദ്യകൾ താരതമ്യം ചെയ്യുമ്പോൾ 11011 രണ്ട് നെ സംബന്ധിച്ച് ശരിയായത് ഏത്?

- (a) 314 അഞ്ച് നേക്കാൾ ചെറുതാണ്
- (b) 314 അഞ്ച് നേക്കാൾ വലുതാണ്
- (c) രണ്ടും തുല്യമാണ്
- (d) കൃത്യമായി പറയാൻ സാധ്യമല്ല

159. $3\sqrt{2}, 6\sqrt{2}, 12\sqrt{2}$ എന്ന സംഖ്യാശ്രേണിയെ സംബന്ധിച്ച് ശരിയായ പ്രസ്താവന ഏത്?

- (a) $3\sqrt{2}$ പൊതുവ്യത്യാസം ആയിട്ടുള്ള സമാന്തര പ്രോഗ്രഷൻ
- (b) 3 പൊതുവ്യത്യാസം ആയിട്ടുള്ള സമാന്തര പ്രോഗ്രഷൻ
- (c) 2 പൊതുഗുണകമായ സമഗുണിതപ്രോഗ്രഷൻ
- (d) $2\sqrt{2}$ പൊതുഗുണകമായ സമഗുണിതപ്രോഗ്രഷൻ

160. $A < \dots$ എന്നാൽ അർത്ഥമാക്കുന്നത്

- (a) A പഴയത് = A പുതിയത് + 2
- (b) A പുതിയത് = പഴയത് + 2
- (c) A യുടെയും $A + 2$ ന്റെയും വ്യത്യാസം
- (d) 2

APPENDIX II

ACHIEVEMENT TEST IN MATHEMATICS - STANDARD X

Dr. Santhamma Raju
Professor in Education
University of Calicut

Ancel Maria
Lecturer
St. Thomas Training College
Pala

INSTRUCTIONS

- * This is a test in Mathematics. There are 160 questions given in six selection.
- * Each question has 4 responses as a,b,c,d.
- * In the answer sheet given, the question numbers are given written in order.
- * In the answer sheet, A,B,C,D are written against each number. Find out the correct answer and put a circle around the letter showing the correct answer against the question number.
- * If you find that you are marked wrongly draw around the circle and put the circle in the correct place.
- * Answer all the questions.

Section A

- 1) Which of the following is a correct statement ?

a) all relations are functions	b) all functions are relations
c) a relation is special type of function	d) a function is a subset of relation

- 2) In a polynomial $P(x)$, $P(5) = 0$ implies $(x-5)$ is a factor of $p(x)$. The principle applied here is,

a) Remainder theorem	b) principle of substitution
c) factor theorem	d) converse of factor theorem

- 3) Which of the following polynomial has a degree 4,

a) $2x^3 + 4$	b) $2x^3 + 0x^4 + 5x^2$	c) $4x^3 + 7x + 5$	d) $4x^2 + 2x + 7x^2$
---------------	-------------------------	--------------------	-----------------------

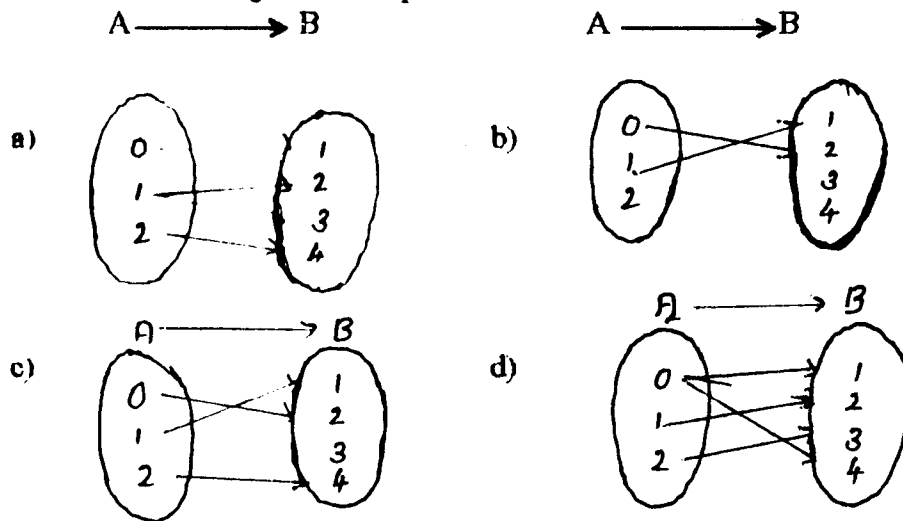
- 4) When a 6th degree polynomial is divided by a 2nd degree polynomial, the quotient will be a polynomial of degree

a) 2	b) 3	c) 4	d) 6
------	------	------	------

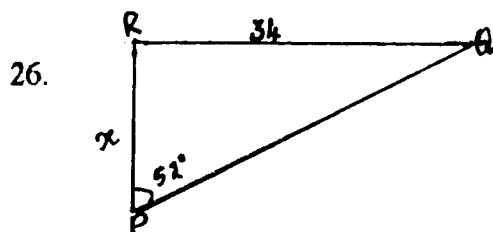
5. The statement true about the common difference of A.P is,
 a) difference between any two terms of A.P
 b) always a positive quantity
 c) a constant number with which each term is multiplied to get the next term
 d) Any constant number added to a term to get the succeeding one.
6. In which of the following solids, the cross section is not the region of a circle,
 a) sphere b) pipe c) hemisphere d) cone
7. Which of the following is the degree measure of a minor arc
 a) 120° b) 180° c) 210° d) 270°
8. The circle containing all the vertices of a triangle is,
 a) concentric circle b) incircle c) circum circle d) unit circle.
9. ABCD is a cyclic quadrilateral. If $\angle A = 112^\circ$, the measure of $\angle C$ is
 a) 68° b) 90° c) 112° d) 248°
10. The simplified form of $\cos A \cdot \operatorname{cosec} A$ is
 a) 0 b) 1 c) $\tan A$ d) $\cot A$
11. Which of the following is equal to $\log \sqrt{8}$
 a) $\log 8/2$ b) $\log (8-2)$ c) $2 \log 8$ d) $1/2 \log 8$
12. The L.C.M of $(1+a)$ and $1-a^2$ is
 a) $(1+a)(1-a^2)$ b) $1-a^2$ c) $(1+a)^2$ d) $(1-a)^2$
13. The value of A for which $\sin A = \cos A$ is
 a) 30° b) 45° c) 60° d) 90°
14. The formula for calculating the price index number is,
 a) $\frac{P_0}{P_1}$ b) $\frac{P_1}{P_0}$ c) $\frac{P_0 \times 100}{P_1}$ d) $\frac{P_1 \times 100}{P_0}$
15. The place value of '4' in the numeral 3214 is five,
 a) 50 b) 51 c) 52 d) 54
16. Which of the following represents a sequence of instructions in step by step form written to solve a problem.
 a) Flow chart b) Algorithm c) bits d) bytes

17. Which of the following is used in a decision box
 a) b) c) d)
18. Which of the following is the characteristic of $\log 3275.7$
 a) 1 b) 2 c) 3 d) 4
19. If $n(A) = 3$ and $n(B) = 4$, the number of ordered pairs in a function from B to A is
 a) 3 b) 4 c) 7 d) 12

20. Which of the following relation represents a function



21. Which of the following is a factor of $a^3 - 7a + 6$
 a) $a - 1$ b) $a + 1$ c) $a + 2$ d) $a - 2$
22. Which second and third terms of A.P are 1 and 5 respectively, the first term is,
 a) -4 b) -3 c) 3 d) 4
23. Which of the solid has 4 faces, but no vertex
 a) hemisphere b) triangular pyramid
 c) square pyramid d) Pipe
24. The inscribed angle of an arc is an acute angle, then the arc is called
 a) minor arc b) major arc
 c) semi circle d) chord
25. The truth set of a quadratic equation is a singleton set, when the discriminant is
 a) less than zero b) greater than zero
 c) equal to zero d) less than or equal to zero



The principle to be used for finding the value of x in the figure is,

a) $\tan 52 = \frac{RQ}{x}$

b) $\sin 52 = \frac{RQ}{PQ}$

c) $\cos 52 = \frac{x}{PQ}$

d) $\sec 52 = \frac{PQ}{x}$

27) Which of the following is used to compute the Arithmetic mean of classified data in the short-cut method.

a) $\frac{A + \sum D}{N}$

b) $\frac{A + \sum fd}{N}$

c) $\frac{A + \sum D}{N}$

d) $\frac{A + \sum fd}{N}$

28) If the price relative of cereals is $13/7$ in 1994 when compared with 1990, the price index number is,

a) $\frac{1000}{7}$

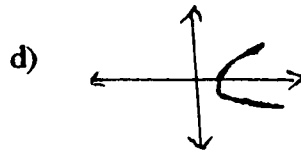
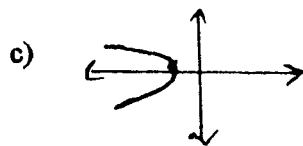
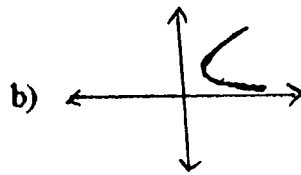
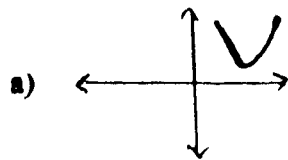
b) $\frac{7}{1000}$

c) $\frac{10}{700}$

d) $\frac{700}{3}$

Section B

29) Which of the following graph represents a function.



30) If the graph $f(x) = ax^2$ is opened upwards then 'a' is

a) positive real number

b) negative real number

c) zero

d) none of the above

31) The quadratic equation $Lx^2 + mx - N = 0$ has its discriminant

a) $m^2 - 4LN$

b) $m^2 + 4LN$

c) $-m^2 - 4LN$

d) $-m^2 + 4LN$

32) The polynomial formed by the combination of the factors $(x+2)$ and $(x-1)$ is,

a) $x^2 + 2x + 2$

b) $x^2 - 2x - 2$

c) $x^2 + x - 2$

d) $x^2 - x - 2$

33) If the remainder on dividing a polynomial by $P(x)$ by another polynomial $a(x)$ is $P(3)$, then what is $Q(x)$

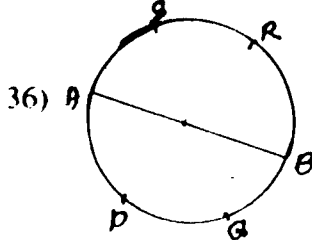
- a) $x-3$ b) $x+3$ c) $x-1$ d) $x+1$

34) If 5, -1, -7 are in A.P, the fourth term is

- a) -1 b) -6 c) -13 d) 1

35) The cross section of a pyramid is the region of a pentagon. How many vertices will it have

- a) 5 b) 6 c) 10 d) 15



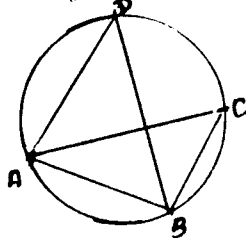
If AB is the diameter of the circle in the given figure, which of the following is the major arc.

- a) \widehat{APQ} b) \widehat{APR} c) \widehat{BRS} d) \widehat{ASR}

37) If $\angle ABC = 145^\circ$, which of the following is true of ABC

- a) major arc b) semi circle c) minor arc d) chord

38)



In the figure which of the following is an inscribed angle of ADB

- a) $\angle ABC$ b) $\angle ABD$ c) $\angle ACD$ d) $\angle BAD$

39) If $\sin A = 5/13$, which of the following can be the value of $\cos A$

- a) $\frac{8}{13}$ b) $\frac{18}{13}$ c) $\frac{12}{13}$ d) $\frac{5}{12}$

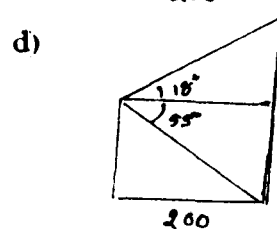
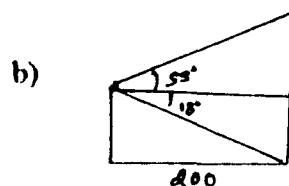
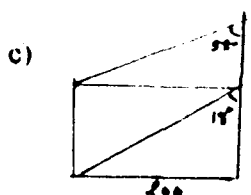
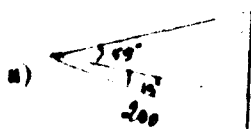
40) Which of the following represents the area of $\triangle ABC$,

- a) $\frac{1}{2} AB \times BC \sin A$ b) $\frac{1}{2} AB \times CA \sin B$
 c) $\frac{1}{2} AC \times AB \sin B$ d) $\frac{1}{2} AB \times BC \sin B$

41) Which of the following is equal to $\log a + \log b - \log c$

- a) $\log abc$ b) $\log \frac{ab}{c}$ c) $\log \frac{c}{ab}$ d) $\log (a + b - c)$

- 42) Which of the following cannot be a base-five numeral
 a) 124 b) 134 c) 144 d) 154
- 43) The number of deaths in a village is estimated as 'x'. If the population of the village is 'y' which of the following represents CDR
 a) $\frac{y}{x} \times 100$ b) $\frac{y \times 1000}{x}$ c) $\frac{x}{y} \times 100$ d) $\frac{x}{y} \times 1000$
- 44) If the truthset of the equation $x^2 - 4x + k = 0$ is a Singleton set, the value of k is
 a) -2 b) -4 c) 4 d) 2
- 45) The first term and common ratio of a G.P are 8 and $1/2$ respectively. What will be the n^{th} term?
 a) 2^{1-n} b) 2^{4-n} c) 2^{2-n} d) 2^{n-4}
- 46) If the outer diameter of a pipe is 'a' cm and its thickness is 't' cm, the inner radius is
 a) $a-2t$ b) $2(a-t)$ c) $\frac{1}{2}(a-t)$ d) $\frac{1}{2}(a-2t)$
- 47) If the degree measure of a major arc is 'x' which of the following statement is true of x
 a) $0 < x < 90$ b) $90 < x < 180$ c) $0 < x < 180$ d) $180 < x < 360$
- 48) Which of the following cannot be the value of $\sin \theta$
 a) $\frac{1}{2}$ b) $\frac{3}{4}$ c) 1 d) $\frac{3}{2}$
- 49) A man standing on the top of a building observes the top of a T.V tower at an angle of elevation of 55° and observes its foot at an angle of depression 18° . If the building is 200 metres away from the tower, find the height of the tower. The correct figure to solve the above problem is,



- 50) When $\frac{2xy}{x^2-y^2}$ is subtracted from the sum of $\frac{x^2}{x+y}$ and $\frac{y^2}{x-y}$ the result is,
 a) $\frac{x-y}{x+y}$ b) $\frac{x+y}{x-y}$ c) $\frac{2xy}{x^2-y^2}$ d) $\frac{2xy}{x-y}$
- 51) How many starting and ending points can a flow chart have
 a) multiple for both
 b) one each for both
 c) multiple starting points and one ending point
 d) one starting point and multiple ending point
- 52) Which of the following is the place value of the digit '2' in the numeral 1234 five
 a) 5^0 b) 5^1 c) 5^2 d) 5^3
- 53) The assumed mean of n scores is 'x' and the sum of the deviations from 'x' is y, the actual mean is,
 a) $\frac{x+y}{n}$ b) $\frac{x-y}{n}$ c) $\frac{y+x}{n}$ d) $\frac{y-x}{n}$
- 54) While preparing an algorithm to find the sum of the first 20 natural numbers, the initial sum should be,
 a) 1 b) 2 c) 0 d) 20
- 55) If $\log P = 2.370$, which of the following is equal to $\log 3\sqrt{P}$,
 a) 0.79003 b) 1.1233 c) $\bar{1}.79003$ d) $\bar{1}.4567$

Section C

- 56) The value of the function $y = 2x^2 - 1$ at $x = 0$ is
 a) 1 b) -1 c) 3 d) -3
- 57) The sum of the element of the truth set is 10 and their product is 16. What would be the equation
 a) $x^2 - 10x + 16 = 0$ b) $x^2 + 10x + 16 = 0$
 c) $x^2 + 10x - 16 = 0$ d) $-x^2 + 10x + 16 = 0$
- 58) If $P(x) = 2x^3 + 9x^2 - 5x + k$ and $P(1) = 0$ the value K is
 a) 16 b) -16 c) 6 d) -6
- 59) The second and third terms of a G.P are 0.01 and 0.00001 respectively. Then the first term is
 a) 100 b) 10 c) 1 d) 0.1

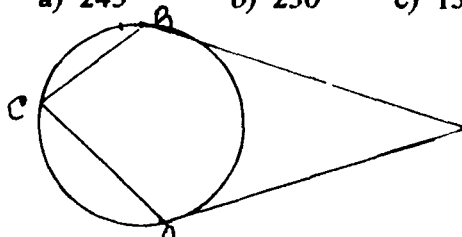
60) The lateral faces a square pyramid are all regions of equilateral triangles. If the lateral edge is x cm, what will be height.

- a) $2x$ cms b) $\frac{1}{2}x$ cm c) $\frac{3}{2}x$ cms d) $\frac{1}{2}x$ cm

61) PSQ is a minor arc of a circle. If $\angle LPSQ = 115^\circ$, which of the following is the degree measure of $\angle PSQ$.

- a) 245° b) 230° c) 130° d) 65°

62)



'O' is the centre of a circle and PA, PB are the tangents. If $\angle APB = 70^\circ$ which of the following is equal to the measure of $\angle ACB$

- a) 140° b) 110° c) 70° d) 55°

63) Which of the following is equal to $\frac{1}{\cos 40}$

- a) $\sin 50$ b) $\operatorname{cosec} 50$ c) $\operatorname{see} 50$ d) $\cos 50$

64) $\sqrt{\frac{1 + \cot^2 A}{1 + \tan^2 A}}$ is equal to

- a) $\cot A$ b) $\tan A$ c) \tan^2 d) 1

65) What is the value of $\frac{1}{1 + \frac{y}{x}}$

- a) $\frac{y}{1+x}$ b) $\frac{y}{x+y}$ c) $\frac{1}{x+y}$ d) $\frac{x}{1+y}$

66) The assumed mean of 100 scores is 45. If the sum the deviations is 32, what is the actual Arithmetic mean

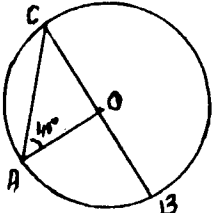
- a) 44.68 c) 45.32 c) 32.45 d) 31.55

67) The cost paddy Kg in 1994 is the double of the cost in 1986. The price index number is

- a) 500 b) 100 c) 200 d) 400

68) How many bytes do a 24 bit computer word consist

- a) 24 b) 8 c) 6 d) 3

- 69) The radius and height of a cone are both doubled the volume becomes
 a) doubled b) 3 times c) 5 times d) 8 times
- 70) The binary numeral equivalent to $11_5 + 34_5$ is,
 a) 6 b) 19 c) 25 d) 45
- 71) What would be the truthset of the equation $x^2 + 10x + k = 0$, if one of the elements is 4,
 a) {4, 14} b) {4, -14} c) {-4, -10} d) {4, 10}
- 72) If the largest side of a right triangle is $x + 5$ and the other sides are x^2 and $2x - 5$, the corresponding equation is,
 a) $2x^2 + 15x + 50 = 0$ b) $x^2 - 30x = 0$
 c) $2x^2 - 15x = 0$ d) $2x^2 - 15x - 50 = 0$
- 73) In a 3rd degree polynomial $P(x)$, $P(-3) = 0$, $P(4) = 0$ and $P(5) = 0$ which of the following is not a factor of $P(x)$
 a) $x - 4$ b) $x + 3$ c) $x - 5$ d) $x + 4$
- 74) What is the sum of the first 20 terms of an A.P whose n^{th} term is $2n - 15$
 a) 120 b) 380 c) 25 d) 325
- 75)  'O' is the centre of a circle and BC the diameter. If $\angle OAB = 40^\circ$ which of the following is the degree measure of \widehat{ACB}
 a) 80° b) 100° c) 260° d) 280°
- 76) PA and PB are tangents of a circle with centre 'O'. If $OA = 5$ cm, $OP = 13$ cm, the area of the quadrilateral OAPB is,
 a) 60 cm^2 b) 65 cm^2 c) 78 cm^2 d) 30 cm^2
- 77) In a triangle PQR, $PR = 40$ cm, $QR = 35$ cm, $R = 30^\circ$ what is its area
 a) 700 cm^2 b) 671 cm^2 c) 350 cm^2 d) 1600 cm^2
- 78) $\frac{1}{2} \log 24 + \log 75 - \log 101$ is the logarithm of,
 a) $\sqrt{\frac{24 \times 75}{101}}$ b) $\frac{24 \times 75}{2 \times 101}$ c) $24 \times \frac{75}{101}$ d) $\frac{24 \times 75}{2 \times 101}$

79) which of the base five numeral is equal 1110

- a) 24_{five} b) 20_{five} c) 14_{five} d) 140_{five}

80) Flowers are arranged in 15 concentric circles. In each circle, there are 10 flowers more than the number of flowers in the inner circle. If the inner most circle contains 75 flowers, find the number of flowers in the outer most circle.

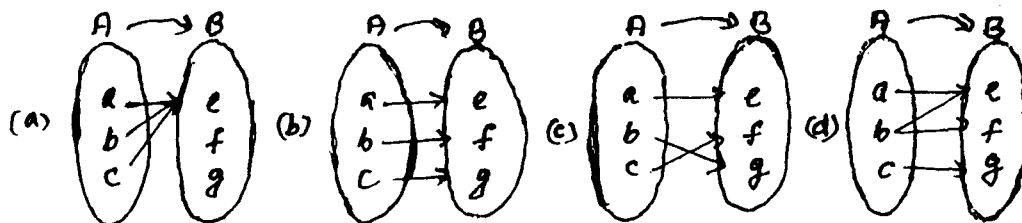
- a) 225 b) 215 c) 150 d) 90

81) The curved surface area of a hemisphere is 450π . Find the volume of the hemisphere

- a) 4500π b) 2250π c) 1125π d) 450π

Section D

82) Which of the following doesnot represent a function



83) The range of $f(x) = 2x - 5$, when the domain is $\{-1, 0\}$ will be

- a) $\{3, -5\}$ b) $\{-2, 0\}$ c) $\{-7, 5\}$ d) $\{-7, -3\}$

84) The quadratic equation $x^2 = 4x - 3$ can be solved by drawing the graph of

- a) $y = x^2, y = 4x + 3$ b) $y = x^2, y = 4x$
 c) $y = x^2, y = 4x - 3$ d) $y = 8x - 3$

85) When a polynomial $p(x)$ is divided by $x + 1$, the remainder is 7 and on dividing it by $x - 2$ the remainder is 19 Which of the following statement is true.

- a) $P(1) = 0, P(-2) = 0$ b) $P(-1) = 7, P(2) = 19$
 c) $P(-1) = 0, P(-2) = 0$ d) $P(1) = 7, P(2) = 19$

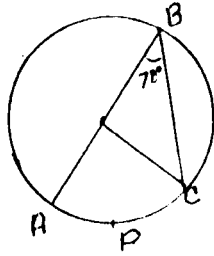
86) a, b, c , are 3 numbers such that $b^2 = ac$. If $abc = 27$ what is the value of b

- a) 9 b) $\sqrt[3]{27}$ c) 27 d) 3

87) The total surface area of a solid sphere is 120 cm^2 . If this is split into two hemispheres what will be the surface area of each part.

- a) 40 cm^2 b) 60 cm^2 c) 80 cm^2 d) 90 cm^2

88)



AB is the diameter of the circle and 'O' is the centre. If $\angle OBC = 70^\circ$ which of the following is the degree measure of \widehat{APC}

- a) 70° b) 110° c) 140° d) 220°

89) The length of the largest chord that can be drawn in a circle of radius 20 cm is,

- a) 20 cm b) 30 cm c) 40 cm d) 80 cm

90) Where A increases from 0° to 90° , the value of $\sin A$ is

- a) decreases b) increases c) doesnot change d) cannot be predicted

91) Which of the following principle is best suited to estimate the value of \log

- a) $\log (a \times b) = \log a + \log b$ b) $\log (a/b) = \log a - \log b$
 c) $\log (a^m) = m \log a$ d) $\log \frac{a \times b}{c} = \log a + \log b - \log c$

92) If $4 * 1 \text{ five} = 121 \text{ ten}$, which of the following is the value of $*$

- a) 0 b) 1 c) 2 d) 4

93) Given below are the step by step procedure to perform a certain operation.

- 1) start 2) Read a and b 3) Calculate $A = \frac{a+b}{2}$

4) Write A 5) stop

What is the operation explained

- a) to compare two numbers
 b) to compute the Arithmetic mean of two given numbers.
 c) to find the sum of two numbers
 d) none of the above

94) If the n^{th} term of a G.P is $5 \times (3/2)^{n-2}$ its $(n+2)^{\text{th}}$ term is

- a) $5 \times (3/2)^n$ b) $5 \times (3/2)^{n-4}$ c) $5^2 \times (3/2)^{2(n-4)}$ d) $5 \times (3/2)^{n+2}$

95) Suppose there are 'x' men in a room. If each man shakes hand with all others men only once, what is the relation between the number of men (x) and the total number of hand shakes (y).

- a) $x^2 + x = 2$ b) $x^2 = 2y$ c) $x^2 - x = 2y$ d) $x^2 - x = -2y$

96) If $(2x - 3)$, $(3x - 1)$ and $(5x + 2)$ are the factors of a 3rd degree polynomial $P(x)$, what is the value of $P(0)$

- a) 6 b) -6 c) 30 d) -30

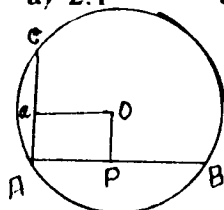
97) If K is a non-zero real number, K , $5k$, $9k$ are in

- a) A.P b) G.P c) A.P and G.P d) neither A.P nor G.P

98) A cone and hemisphere have the same diameter and the same height. The ratio of their volumes will be

- a) 2:1 b) 1:2 c) 1:1 d) 1:3

99)

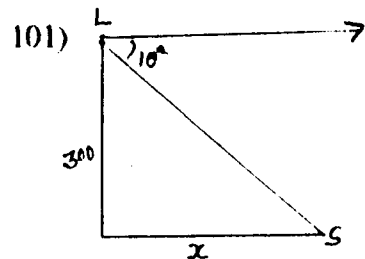


AB and AC are two perpendicular chords of a circle with its centre at 'O'. If P and Q are the midpoints of AB and AC, to prove that APOQ is a rectangle, which of the following principles is the most appropriate one.

- a) equal chords are equidistant from the centre
 b) the perpendicular from the centre of a circle to a chord bisects the chord
 c) the line joining the centre and the midpoint of a chord is perpendicular to the chord.
 d) the midpoint of a line segment divides into two equal parts.

100) If $\frac{\tan x}{\cot 25} = 1$, the value of x is

- a) 25 b) 45 c) 75 d) 65



In the figure 's' is the ship anchored in the sea and 'L' the top of the light house 300 m above the sea level. A man standing at the top of the light house observes the ship at an angle of depression 10° . Let x be the distance of the ship from the light house. Which of the following relation is most appropriate.

- a) $x = 300 \times \tan 10$
 b) $x = \frac{300}{\tan 10}$
 c) $x = 300 \times \sin 10$
 d) $x = \frac{300}{\sin 10}$

102) $(x-4)^2$ is the L.C.M of

- a) $x - 4$ and $x + 4$
 b) $x - 4$ and $x^2 - 8x + 16$
 c) $x - 2$ and $x^2 - 4x - 2$
 d) $x - 2$ and $x - 2$

- 103) The base area of a conical vessel is 64 cm^2 . The slant height is 17 cm. Find its volume. In solving the problems, the following questions were answered by the students. Find the process involved.

Teacher

Pupils

- | | |
|----------------------------------------------------|--------------------------------------------------------|
| 1. Here what is to be found out | Volume of a cone |
| 2. How do you find the volume of a cone | Using the formula $V = \frac{1}{3} \pi r^2 h$. |
| 3. What are the required facts ? | Radius and height of the cone |
| 4. Are they known | Radius is not given |
| 5. How can radius be calculated | From the base area of the cone, $r^2 = \frac{64}{\pi}$ |
| a) analysing from the known | b) analysing the unknown |
| c) examining the requirements to find the unknown. | |
| d) explaining the question in simpler form | |

- 104) Given below are the steps to find the sum of $\frac{1}{x+4}$ and $\frac{8}{x^2-16}$

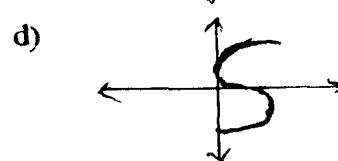
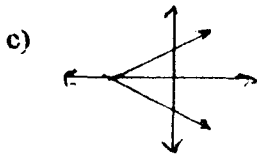
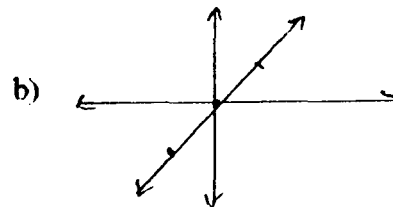
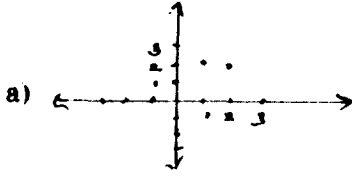
- | | |
|---------------------------------------------|---------------------------|
| a) $\frac{x+4}{x^2-16}$ | b) $\frac{x-4+8}{x^2-16}$ |
| c) L.C. M of $x+4$ and x^2-16 is x^2-16 | |
| d) $\frac{x+4}{(x+4)(x-4)}$ | e) $\frac{1}{x-4}$ |

Arrange the steps in the correct order

- | | |
|------------------|------------------|
| a) a, b, c, d, e | b) b, c, d, e, a |
| c) c, a, b, d, e | d) c, b, a, d, e |
- 105) If 143, 144 are two consecutive base five numerals, which of the following is the 3rd.
- a) 145 five b) 200 five c) 14440 five d) 1441 five
- 106) When the assumed mean of 5 scores is 55, the deviations are found to be -4, k, 5, 8, -2. If the assumed mean is equal to the actual mean, then k is.
- a) -6 b) -7 c) 7 d) 13
- 107) The graph of $y = x^2$ is drawn. Select the equation whose graph will provide the solution of $x^2 - 2x - 1 = 0$
- a) $y = 2x + 1$ b) $2y = 2x - 1$ c) $y = 1 - 2x$ d) $y = -2x - 1$

Section E

108) Which of the following graphs represent a function



109) The different steps to find the sum of the first 20 terms of an AP whose n^{th} term is $t_n = 3n + 20$ are given below.

a) $1 - 3 + 20 = 23$ b) $10 [23 + 80]$ c) $10 \times 103 = 1030$ d) $t_{20} = 3 \times 20 + 20 = 80$

Arrange the steps in the correct order

a) a, d, c, b b) a, d, b, c c) b, c, a, d d) b, a, d, c

110) Re-arrange the steps in the sequential order for constructing the circumcircle of a triangle.

- Draw the bisectors of any two sides of the given triangle.
- Find the distance from the circumcentre to any vertex of the triangle
- Construct the triangle according to the given measurement.
- draw the circumcircle.

The order is,

a) a, b, c, d b) a, c, b, d c) d, c, b, a d) c, a, b, d

111) Which of the following is not a step involved in the simplification of

$$y^2 \frac{7}{y^2 + y - 12} - \frac{6}{y^2 + 2y - 8}$$

- factorisation of the denominators
- find the L.C.M of the denominators
- find the L.C.M of numerators
- find a common denominator

112) $\frac{\sin \theta}{1 - \cos \theta} + \frac{\sin \theta}{1 + \cos \theta} = 2 \operatorname{cosec} \theta$ to prove this, what is the correct arrangement

$$\frac{\sin \theta}{1 - \cos \theta} + \frac{\sin \theta}{1 + \cos \theta}$$

a) $\frac{\sin \theta + \sin \theta \cos \theta + \sin \theta - \sin \theta \cos \theta}{1 - \cos^2 \theta}$

b) $\frac{2 \sin \theta}{1 - \cos^2 \theta}$

c) L.C.M. of $1 - \cos \theta$ and $1 + \cos \theta$ is $1 - \cos^2 \theta$

d) $\frac{2 \sin \theta}{\sin^2 \theta}$ e) $\frac{2}{\sin \theta} = 2 \operatorname{Cosec} \theta$

The correct order is

a) c, a, b, d, e

b) a, b, c, d, e

c) a, b, d, e, c

d) d, e, a, b, c

113) The proper order of the algorithm to find the area of a triangle is

1. Start 2. Write Δ
3. Stop 4. Calculate $\sqrt{s(s-a)(s-b)(s-c)}$
5. Read a, b, c 6. calculate $s = \frac{a+b+c}{2}$

The order is,

a) 1, 6, 2, 3, 4, 5

b) 1, 2, 3, 4, 5, 6

c) 1, 5, 6, 4, 2, 3

d) 1, 2, 5, 6, 4, 3

114) If P, Q, r are in G.P which of the following is always true

- a) $q = (Pr)^{1/2}$ b) $q = 1/2 (P + r)$
 c) $q = 2pr$ d) $q = 1/3 (P + q + r)$

115) Two cones have equal volume. If their ratio are in the ratio 5 : 2, what will be the ratio of their heights

- a) 25 : 4 b) 4 : 25 c) 5 : 2 d) 2 : 5

116) The Arithmetic mean of 16, 21, 23, 24, 12 and x is 19. Which of the following is value of x.

- a) 18 b) 19 c) 3 d) 25

117) $\log 15.5 = 1.1903$, then $\log 155^2$ is.

- a) 2.3806 b) 1.3806 c) 4.1903 d) 4.3806

118) The graphs of $y = x^2$ and $y = x + 2$ are given. The situation set of which of the following equation can be found using these graphs.

- a) $x^2 + x - 2 = 0$ b) $x^2 - x + 2 = 0$
 c) $x^2 + x - 2 = 0$ d) $x^2 - x - 2 = 0$.

- 119) By sending half the number of arrows, Arjuna stopped the flow of the cluster of arrows sent by Karna, by using arrows equal to four times the square root of the total numbers with him, the horses of the chariot were killed. Salya was hit by six; the royal umbrella, flag and bow were broken using three; with the one that remained Karna was killed. What was the total number of arrows.
 a) 50 b) 100 c) 200 d) 10
- 120) $(x-2)$ and $(x-1)$ are factors of $x^3 + px^2 + qx - 6$. To find the values of p & q the following steps are given.
 a) form simultaneous equation with p and q as variables
 b) solve the simultaneous equation
 c) Apply factor theorem to get $p(2) = 0$, $p(1) = 0$
 Arrange the steps in the correct order
 a) a, b, c b) b, a, c c) c, b, a d) c, a, b
- 121) The diameter of a solid copper sphere is 18 cm. It is melted and converted into a cone of maximum volume. The diameter of the cone is 12 cm. you may arrange the following steps to find the height
 a) The maximum volume of the cone of diameter 12 cm = $\frac{1}{3} \pi 6^2 \times h$
 b) Let 'L' be the height of the cone
 c) $h = 81$ cm
 d) volume of the sphere = $\frac{4}{3} \pi \times 9^3$
 e) $h = \frac{\frac{4}{3} \pi \times 9^3}{\frac{1}{3} \pi \times 6^2}$
 The arrangement should be,
 a) a, b, c, d, e b) d, c, a, b, e c) d, b, a, e, c d) d, a, e, c, b
- 122) The total length of all edges of a square pyramid is 'a' cm and the perimeter of the base is 'b' cm. What will be the length in cms. of the lateral edge
 a) $a - b$ b) $\frac{1}{4} a - b$ c) $a - \frac{1}{4} b$ d) $\frac{1}{4} (a - b)$
- 123) Given the areas of circle, to find out its centre. To start with the procedure, what is to be done.
 a) draw two parallel chords
 b) draw any two chords
 c) draw two non parallel chords
 d) find the midpoints of the areas.
- 124) In the figure given below, 'O' is the centre of the circle. $LX = 20$, $LZ = 30^\circ$
 Arrange the following steps to find \widehat{XPZ}
 a) $\angle XOP = 40^\circ$ b) Since $\triangle XOY$ is isosceles $LX = Lxyo$

- c) $LXOI = 100^\circ$
 d) $\widehat{XPZ} = 100$
 e) $LZOP = 60$

The proper arrangements is,

- a) b, a, c, e, d b) a, b, d, e, c c) c, b, a, e, d d) b, a, e, c, d

125) An aeroplane flying a height of 3000 metres was observed at an angle of elevation 35° . Food packets are dropped from the plane. If 'x' is the distance they will touch the ground from the points of observation, which of the following relation can be applied to find the distance.

- a) $\tan 35 = \frac{x}{3000}$ b) $\tan 35 = \frac{3000}{x}$
 c) $\sin 35 = \frac{x}{3000}$ d) $\cos 35 = \frac{3000}{x}$

126) Different students suggest the following methods for mental calculations of the sum of any two fractions each with numerator '1', which among them is the correct one.

- a) Find the equivalent fraction with their common denominator as the L.C.M of the given denominators.
 b) add the numerators and denominators separately and write the fraction
 c) Write '1' as the numerator and sum of the denominators as the new denominator
 d) find the sum of the numerators and product of the denominators and write the fraction

127) In a base-five numeral, the digit in the units' place is x, five's place is y and twenty five's place is Z, what is the corresponding dinary numeral,

- a) $25x + 5y + z$ b) $25z + 5y + x$ c) $25xyz$ d) $125xyz$

128) Which of the following equation has its truthset empty

- a) $x^2 - 1 = 0$ b) $x^2 + 1 = 0$ c) $x^2 - 6x + 9 = 0$ d) $x^2 + x + \frac{1}{4} = 0$

129) The first term of an A.P is P and its 10th term is q. What is the second term

- a) $p + \frac{p-q}{11}$ b) $p + \frac{q-p}{11}$ c) $p + \frac{q-p}{9}$ d) $p + \frac{p-q}{9}$

130) What is the range of the function $f(x) = -x^2$ whose domain is the set of real numbers

- a) the set of real numbers b) the set of non-positive real numbers
 c) the set of non-negative real numbers d) the set of negative real numbers

131) If $\log 2 = 0.3010$ how many digits will be there in the expansion of 2^{15}

- a) 15 b) 5 c) 4 d) 3

132) The following is a step by step procedure to perform an operation. What is the operation

1. Start 2. Read 'a' and 'b' 3. Calculate $D = a - b$ 4. Is $D = 0$

i) If yes write a and b are equal; stop ii) If no; Is $D > 0$

iii) If yes write $a > b$; stop iv) If no; write $a < b$; stop

133) If $\log 0.201 = 1.3032$ then $\log \sqrt{0.201}$ is

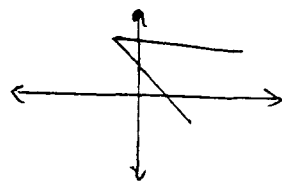
- a) $\bar{1}.6516$ b) $\bar{2}.6516$ c) $\bar{2}.3032$ d) $\bar{1}.1516$

Section F

134) The statement $x^2 - (\text{sum})x + \text{product} = 0$ is helpful to derive a quadratic equation in general form if given,

- a) coefficient of x^2 b) discriminant
c) elements of the truth set d) one of the elements of the truth set

135) The following is a graph of a relation. In this figure every element of the domain has an image and hence



one stated that this graph represents a function. It is wrong conclusion because,

- a) the conclusion is arrived on the basis of one figure only
b) two elements in the domain have the same image
c) the graph intersects the y-axis at two points
d) the graph doesnot represent a parabola

136) The sum of the elements of a truthset of $ax^2 + bx + c = 0$ is zero. Which of the following can be true about the equation.

- a) $b = 0$ b) $c = 0$ c) $a = b = c$ d) $b = c = 0$

137) In a 3rd degree polynomial $P(x)$, if $p(-1) = 0$ $P(2) = 0$, and $P(-3) = 0$, which of the following cannot be its factor

- a) $x + 1$ b) $x - 1$ c) $x - 2$ d) $x + 3$

138) What is the method to be followed to simplify $\frac{1}{x-5} + \frac{1}{x-4}$

- a) $\frac{1+1}{x-5+x-4} = \frac{2}{2x-9}$
 b) $\frac{1+1}{(x-5)(x-4)} = \frac{2}{(x-5)(x-4)}$
 c) $\frac{x-4+x-5}{(x-5)(x-4)} = \frac{2x-9}{(x-5)(x-4)}$
 d) $\frac{1}{x} - \frac{1}{5} + \frac{1}{x} - \frac{1}{4} = \frac{2}{x} - \frac{9}{20}$

139) The real number that cannot be a term in G.P is,

- a) -1 b) 0 c) +1 d) 1/10

140). a pyramid has 4 faces. The region of which of the following can be its base

- a) triangle b) square c) pentagon d) hexagon

141) \widehat{APB} is a major arc. If $\widehat{APB}^\circ = x$, which of the following is true,

- a) $0 < x < 90$ b) $90 < x < 180$ c) $0 < x < 180$ d) $180 < x < 360$

142). PQRS is a cyclic quadrilateral, which of the following is always true of PQRS.

- a) $LP = LR$ b) $PQ = RS$
 c) PQ and QS bisect each other d) $LP + LR = 180^\circ$

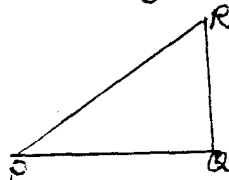


143) Different sets of measurements are given to find the area of $\triangle ABC$. Which among them is not a sufficient set,

- a) the sides AB, BC and $\angle A$ b) the sides AB, AC and $\angle A$
 c) the sides AC, BC and $\angle C$ d) the sides AB, BC and $\angle B$

144) In the figure which of the following cannot be equal to PQ

- a) $PR \cos P$
 b) $QR \tan R$
 c) $PR \sin R$
 d) $PR \cos R$



145) The SDR of the age group 35 - 55 of a village and city are 13.41 and 13.50 respectively. Which of the following statement is true ?

- a) health condition of the village is better
 b) health condition of the city is better
 c) health conditions are same in the city and village
 d) cannot be predicted

146) Which of the following is the largest base -five numeral with two digits
 a) 40 five b) 41 five c) 11 five d) 44 five

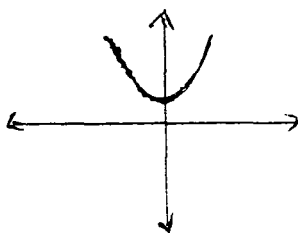
147) 25, $2x$, $x - 7$ are in A.P. select the correct statement from the following

- a) $4x = x + 18$ b) $2x = x + 18$
 c) $4x^2 = 25(x - 7)$ d) $2x = 25(x - 7)$

148) While preparing an algorithm to find the sum of the first 20 natural numbers, the initial sum is taken as.

- a) 1 b) 2 c) 0 d) 20

149)



The graph of a quadratic equation $y = 3x^2$ is given. Different pupils interpreted the graph as below. Which among them is your interpretation.

- a) This is a parabola and therefore it does not give a solution of the equation
 b) The figure is incomplete
 c) The graph does not give the solution as it does not intersect the x - axis
 d) The graph gives a solution set.

150) $P(3)$ of a polynomial $P(x)$ is 5. A pupil arrives at the following conclusions. Which among them are correct.

- a) $(x + 3)$ is a factor of $P(x)$
 b) when $p(x)$ divided by $(x + 3)$, the remainder is 5
 c) $(x - 3)$ is a factor of $P(x)$
 d) $P(x)$ divided by $(x - 3)$ gives a remainder 5.

151) Which among the following can be term of A.P 128, 124, 120

- a) 10 b) -6 c) -12 d) 118

152) If a , e , l are respectively, the base, lateral edge and slant height of a square pyramid, which among the following is true.

- a) $a < e < l$ b) $a < l < e$
 c) $a/2 < l < e$ d) $a/2 < e < l$

153) The volume of a square pyramid is 64 cm^3 . What will be the volume of another square pyramid having half of its base edge and half of its height

- a) 32 cm^3 b) 16 cm^3 c) $32/3 \text{ cm}^3$ d) 8 cm^3

- 154) Which of the following is the distance of a chord 'x' cm long from the centre of the circle of radius 'y' cm
- a) $\sqrt{y^2 - x^2}$ b) $\sqrt{y^2 + x^2}$ c) $\sqrt{\frac{y^2 - x^2}{4}}$ d) $\sqrt{\frac{y^2 + x^2}{4}}$
- 155) In a circle, 'r' is the radius, 't' the length of a tangent segment and 'd' the distance of the external point from the centre. Which of the following cannot be a true relation.
- a) $r < d$ b) $r = t$ c) $r < t$ d) $r = d$
- 156) In a right triangle, by actual measurement of the sides, it was found that $\frac{\sin 45}{\cos 45} = 1$ and hence one stated that $\frac{\sin A}{\cos A} = 1$ what is the mistake in the conclusion
- a) arriving at conclusion using only one result
 b) concluding by measurement
 c) the conclusion that $\frac{\sin 45}{\cos 45} = 1$
 d) the measurement were not accurate
- 157) According to the price of some commodities in the years 1991 and 1995, the cost of living index number is 120.4. we can interpret the situation as follows. For each Rs 100 in 1991, an average family spends Rs 120.4
- a) to maintain the same standard b) to maintain the better standard
 c) to live in a lower standard d) to manage living
- 158) The numeral 11011 two, when compared with 314 five is,
- a) less than b) greater than c) equal to d) cannot predict.
- 159) The statement true of $3\sqrt{2}$, $6\sqrt{2}$, $12\sqrt{2}$ is,
- a) an AP with common differences $3\sqrt{2}$
 b) an AP with common differences 3
 c) a GP with common ratio 2
 d) a GP with common ratio $2\sqrt{2}$
- 160) What is the meaning of $A \leftarrow A + 2$ in computation
- a) $A_{old} = A_{new} + 2$
 b) $A_{new} = A_{old} + 2$
 c) the difference between A and A + 2
 d) 2

ACHIEVEMENT TEST IN MATHEMATICS - STANDARD X

SCORE SHEET

പേര്.....

വയസ്സ്.....

സ്കൂൾ.....

ആൺകുട്ടി /പെൺകുട്ടി

1	a	b	c	d	54	a	b	c	d	107	a	b	c	d
2	a	b	c	d	55	a	b	c	d	108	a	b	c	d
3	a	b	c	d	56	a	b	c	d	109	a	b	c	d
4	a	b	c	d	57	a	b	c	d	110	a	b	c	d
5	a	b	c	d	58	a	b	c	d	111	a	b	c	d
6	a	b	c	d	59	a	b	c	d	112	a	b	c	d
7	a	b	c	d	60	a	b	c	d	113	a	b	c	d
8	a	b	c	d	61	a	b	c	d	114	a	b	c	d
9	a	b	c	d	62	a	b	c	d	115	a	b	c	d
10	a	b	c	d	63	a	b	c	d	116	a	b	c	d
11	a	b	c	d	64	a	b	c	d	117	a	b	c	d
12	a	b	c	d	65	a	b	c	d	118	a	b	c	d
13	a	b	c	d	66	a	b	c	d	119	a	b	c	d
14	a	b	c	d	67	a	b	c	d	120	a	b	c	d
15	a	b	c	d	68	a	b	c	d	121	a	b	c	d
16	a	b	c	d	69	a	b	c	d	122	a	b	c	d
17	a	b	c	d	70	a	b	c	d	123	a	b	c	d
18	a	b	c	d	71	a	b	c	d	124	a	b	c	d
19	a	b	c	d	72	a	b	c	d	125	a	b	c	d
20	a	b	c	d	73	a	b	c	d	126	a	b	c	d
21	a	b	c	d	74	a	b	c	d	127	a	b	c	d
22	a	b	c	d	75	a	b	c	d	128	a	b	c	d
23	a	b	c	d	76	a	b	c	d	129	a	b	c	d
24	a	b	c	d	77	a	b	c	d	130	a	b	c	d
25	a	b	c	d	78	a	b	c	d	131	a	b	c	d
26	a	b	c	d	79	a	b	c	d	132	a	b	c	d
27	a	b	c	d	80	a	b	c	d	133	a	b	c	d
28	a	b	c	d	81	a	b	c	d	134	a	b	c	d
29	a	b	c	d	82	a	b	c	d	135	a	b	c	d
30	a	b	c	d	83	a	b	c	d	136	a	b	c	d
31	a	b	c	d	84	a	b	c	d	137	a	b	c	d
32	a	b	c	d	85	a	b	c	d	138	a	b	c	d
33	a	b	c	d	86	a	b	c	d	139	a	b	c	d
34	a	b	c	d	87	a	b	c	d	140	a	b	c	d
35	a	b	c	d	88	a	b	c	d	141	a	b	c	d
36	a	b	c	d	89	a	b	c	d	142	a	b	c	d
37	a	b	c	d	90	a	b	c	d	143	a	b	c	d
38	a	b	c	d	91	a	b	c	d	144	a	b	c	d
39	a	b	c	d	92	a	b	c	d	145	a	b	c	d
40	a	b	c	d	93	a	b	c	d	146	a	b	c	d
41	a	b	c	d	94	a	b	c	d	147	a	b	c	d
42	a	b	c	d	95	a	b	c	d	148	a	b	c	d
43	a	b	c	d	96	a	b	c	d	149	a	b	c	d
44	a	b	c	d	97	a	b	c	d	150	a	b	c	d
45	a	b	c	d	98	a	b	c	d	151	a	b	c	d
46	a	b	c	d	99	a	b	c	d	152	a	b	c	d
47	a	b	c	d	100	a	b	c	d	153	a	b	c	d
48	a	b	c	d	101	a	b	c	d	154	a	b	c	d
49	a	b	c	d	102	a	b	c	d	155	a	b	c	d
50	a	b	c	d	103	a	b	c	d	156	a	b	c	d
51	a	b	c	d	104	a	b	c	d	157	a	b	c	d
52	a	b	c	d	105	a	b	c	d	158	a	b	c	d
53	a	b	c	d	106	a	b	c	d	159	a	b	c	d
										160	a	b	c	d

ACHIEVEMENT TEST IN MATHEMATICS - STANDARD X
SCORING KEY

നമ്പർ.....
സ്കൂൾ.....

വകുപ്പ്.....
ആൺകുട്ടി / പെൺകുട്ടി

1	a	(b)	c	d	51	a	b	(c)	d	107	(a)	b	c	d
2	a	b	(c)	(d)	55	a	b	c	(d)	108	a	(b)	c	d
3	a	b	c	(d)	56	a	(b)	c	d	109	a	(b)	c	d
4	a	b	(c)	(d)	57	(a)	b	c	d	110	a	b	c	(d)
5	a	b	c	(d)	58	a	b	c	(d)	111	a	b	(c)	d
6	a	(b)	c	d	59	a	(b)	c	d	112	(a)	b	c	d
7	(a)	b	c	d	60	a	b	c	(d)	113	a	b	(c)	d
8	a	b	(c)	d	61	a	b	(c)	d	114	(a)	b	c	d
9	(a)	b	c	d	62	a	b	c	(d)	115	a	(b)	c	d
10	a	b	c	(d)	63	a	(b)	c	d	116	(a)	b	c	d
11	a	b	c	(d)	64	(a)	b	c	d	117	a	b	c	(d)
12	a	(b)	c	d	65	a	(b)	c	d	118	a	b	c	(d)
13	a	a	(b)	(d)	66	a	(b)	c	d	119	a	(b)	c	d
14	a	a	b	(d)	67	a	a	(c)	d	120	a	a	b	(d)
15	(a)	b	c	d	68	a	a	b	(d)	121	a	a	(c)	d
16	a	(b)	c	d	69	a	b	c	(d)	122	a	a	b	(d)
17	a	b	(c)	d	70	a	b	(c)	d	123	a	b	(c)	d
18	a	a	(b)	(d)	71	a	(b)	c	d	124	a	a	b	(d)
19	a	a	(b)	(d)	72	a	a	(c)	d	125	a	a	(b)	d
20	a	a	b	(d)	73	a	a	b	(d)	126	a	a	b	(d)
21	(a)	b	c	d	74	(a)	b	c	d	127	a	a	(b)	d
22	a	(b)	c	d	75	a	a	b	(d)	128	a	a	(b)	d
23	a	a	(b)	(d)	76	(a)	b	c	d	129	a	a	b	(c)
24	a	a	(b)	(d)	77	a	a	(c)	d	130	a	a	(b)	d
25	a	a	b	(d)	78	a	a	b	(c)	131	a	a	(b)	d
26	(a)	b	c	d	79	(a)	b	c	d	132	a	a	b	(c)
27	a	(b)	c	d	80	a	(b)	c	d	133	(a)	b	c	d
28	(a)	b	c	d	81	a	(b)	c	d	134	a	a	(c)	d
29	(a)	b	c	d	82	a	b	(c)	d	135	a	a	(c)	d
30	(a)	b	c	d	83	a	b	(c)	d	136	(a)	b	c	d
31	a	(b)	c	d	84	a	a	(c)	d	137	a	(b)	c	d
32	a	a	(c)	d	85	a	(b)	c	d	138	a	a	(c)	d
33	(a)	b	c	d	86	a	a	b	(d)	139	a	(b)	c	d
34	a	a	(c)	d	87	a	a	b	(d)	140	(a)	b	c	d
35	a	a	(b)	d	88	a	a	(c)	d	141	a	a	b	(d)
36	a	(b)	c	d	89	a	a	(c)	d	142	a	a	b	(c)
37	a	a	(c)	d	90	a	(b)	c	d	143	(a)	b	c	d
38	a	a	(c)	d	91	a	a	(c)	d	144	a	a	b	(d)
39	a	a	b	(d)	92	a	a	b	(d)	145	(a)	b	c	d
40	a	a	b	(d)	93	a	(b)	c	d	146	a	a	b	(d)
41	a	(b)	c	d	94	(a)	b	c	d	147	(a)	b	c	d
42	a	a	b	(d)	95	a	a	(c)	d	148	a	a	(c)	d
43	a	a	b	(d)	96	(a)	b	c	d	149	a	a	(c)	d
44	a	a	(c)	d	97	(a)	(b)	c	d	150	a	a	b	(d)
45	a	(b)	c	d	98	a	(b)	c	d	151	a	a	(c)	d
46	a	a	b	(d)	99	a	a	(c)	d	152	a	a	(c)	d
47	a	a	b	(d)	100	a	a	b	(d)	153	a	a	b	(d)
48	a	a	b	(d)	101	a	(b)	c	d	154	a	a	(c)	d
49	a	(b)	c	d	102	a	(b)	c	d	155	a	a	b	(d)
50	(a)	b	c	d	103	a	a	(c)	d	156	(a)	b	c	d
51	a	(b)	c	d	104	a	a	b	(d)	157	(a)	b	c	d
52	a	a	(c)	d	105	a	(b)	c	d	158	(a)	b	b	d
53	(a)	b	c	d	106	a	(b)	c	d	159	a	a	(c)	d
										160	a	(b)	c	d

ACHIEVEMENT TEST IN MATHEMATICS FOR STANDARD X

Dr. Santhamma Raju
Professor in Education
University of Calicut

Ansel Maria
Lecturer
St. Thomas Training College
Pala

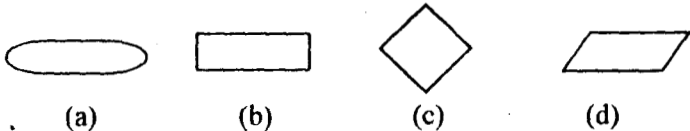
- * ഇത് ഗണിതശാസ്ത്രത്തിന്റെ ഒരു ടെസ്റ്റാണ്
- * ഓരോ ചോദ്യത്തിനും a, b, c, d എന്നിങ്ങനെ നാല് ഉത്തരങ്ങൾ കൊടുത്തിരിക്കുന്നു.
- * തന്നിരിക്കുന്ന ഉത്തരക്കടലാസിൽ ചോദ്യങ്ങളുടെ നമ്പർ ക്രമത്തിൽ എഴുതിയിട്ടുണ്ട്.
- * ഓരോ നമ്പരിനും നേരെ A, B, C, D. എന്നീ അക്ഷരങ്ങൾ ഉണ്ട്. ശരിയായ ഉത്തരങ്ങൾ കണ്ടുപിടിച്ച് ചോദ്യനമ്പറിന് എതിരെയുള്ള ശരിയുത്തരത്തെക്കുറിക്കുന്ന അക്ഷരത്തിനുചുറ്റും ഒരു വൃത്തം വരയ്ക്കുക.
- * നിങ്ങൾ ആദ്യം അടയാളപ്പെടുത്തിയ ചിഹ്നം തെറ്റായ സ്ഥാനത്താണെന്നു കണ്ടാൽ ആ വൃത്തത്തിനുചുറ്റും വരയ്ക്കുകയും ശരിയായ സ്ഥാനത്ത് വൃത്തം വരയ്ക്കുകയും ചെയ്യുക.
- * എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.

6.

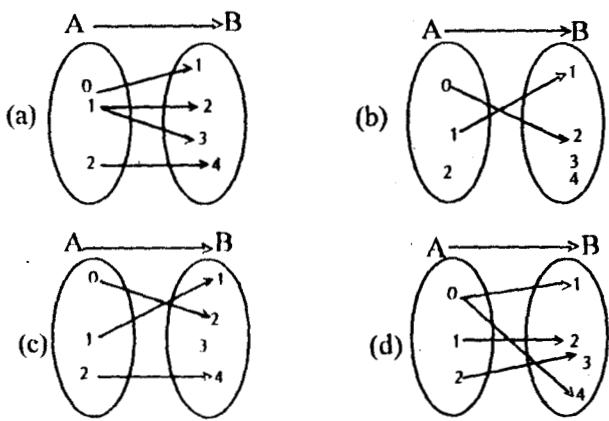
84

II
SECTION A

- താഴെ തന്നിട്ടുള്ളവയിൽ ഏതു ഘനരൂപത്തിന്റെ നേർഖണ്ഡം ഒരു വൃത്തക്ഷേത്രം അല്ല ?
(a) ഗോളം (b) പൈപ്പ് (c) അർദ്ധഗോളം (d) വൃത്തസ്തൂപിക
- ABCD ഒരു ചക്രിയ ചതുർഭുജമാണ്. $\angle A = 112^\circ$ ആയാൽ $\angle C$ യുടെ അളവ്
(a) 68° (b) 90° (c) 112° (d) 248°
- $\text{Log } \sqrt{8}$ -ന് തുല്യമായത്
(a) $\log 8/2$ (b) $\log 8-2$ (c) $2\log 8$ (d) $1/2 \log 8$
- വിലസൂചിക കാണുന്നതിനുള്ള സൂത്രവാക്യം ഏത് ?
(a) $\frac{P_0}{P_1}$ (b) $\frac{P_1}{P_0}$ (c) $\frac{P_0 \times 100}{P_1}$ (d) $\frac{P_1 \times 100}{P_0}$
- 3214 അഞ്ച് എന്ന ന്യൂമാറിൽ 4-ന്റെ സ്ഥാനവില ഏത് ?
(a) 5^0 (b) 5^1 (c) 5^2 (d) 5^4
- ഒരു ഘർഷം നിർദ്ധാരണം ചെയ്യുന്നതിന് ക്രമമായി എഴുതുന്ന നിർദ്ദേശങ്ങളെ സൂചിപ്പിക്കുന്നത് ഏത്?
(a) ഫ്ലോ ചാർട്ട് (b) അൽഗോരിതം (c) ബീറ്റുകൾ (d) ബൈറ്റുകൾ
- താഴെ തന്നിട്ടുള്ളവയിൽ ഏത് ഒരു ഡിസിഷൻ ബോക്സിനെ സൂചിപ്പിക്കുന്നു ?



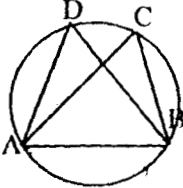
- $\log 3275.7$ ന്റെ പൂർണ്ണാംശം ഏത് ?
(a) 1 (b) 2 (c) 3 (d) 4
- $n(A) = 3, n(B) = 4$ ആയാൽ Aയിൽനിന്നും Bയിലേക്കുള്ള ഏകദത്തിലെ ക്രമജോഡികളുടെ എണ്ണം എത്ര ?
(a) 3 (b) 4 (c) 7 (d) 12
- താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ഏകദത്തെ സൂചിപ്പിക്കുന്ന ബന്ധം ഏത് ?



- താഴെ കൊടുത്തിരിക്കുന്നവയിൽ $a^3 - 7a + 6$ ന്റെ ഘടകം ഏത് ?
(a) $(a-1)$ (b) $(a+1)$ (c) $(a+2)$ (d) $(a-3)$
- ഒരു സമാന്തര ഘോശകന്റെ രണ്ടാം പദം 1ഉം മൂന്നാം പദം 5ഉം ആയാൽ ഒന്നാം പദം ഏത് ?
(a) -4 (b) -3 (c) 3 (d) 4
- 4 മുഖങ്ങളുള്ളതും ശീർഷങ്ങളില്ലാത്തതുമായ ഘനരൂപം ഏത് ?
(a) അർദ്ധഗോളം (b) ത്രികോണസ്തൂപിക (c) സമചതുരസ്തൂപിക (d) പൈപ്പ്
- ഒരു ചാപത്തിന്റെ അന്തർലേഖനം ചെയ്ത കോൺ ന്യൂനകോൺ ആയാൽ ആ ചാപത്തിന് യോജിച്ച പേര്
(a) ലഘുചാപം (b) ദീർഘചാപം (c) അർദ്ധവൃത്തം (d) ഞാൺ
- ഒരു ദ്വിമാന സമവാക്യത്തിന്റെ മൂല്യഗണം ഏകാംഗഗണമായിരുന്നാൽ അതിന്റെ വിവേചകം
(a) പൂജ്യത്തേക്കാൾ ചെറുത് (b) പൂജ്യത്തേക്കാൾ വലുത് (c) പൂജ്യം (d) പൂജ്യത്തേക്കാൾ വലുതോ തുല്യമോ.

16. $(x + 2)$, $(x - 1)$ ഇവ ഘടകങ്ങളായി വരുന്ന പോളിനോമിയലാണ്
 (a) $x^2 + 2x + 2$ (b) $x^2 - 2x - 2$ (c) $x^2 + x - 2$ (d) $x^2 - x - 2$
17. $P(x)$ എന്ന പോളിനോമിയലിനെ $Q(x)$ എന്ന പോളിനോമിയൽ കൊണ്ടു ഹരിക്കുമ്പോൾ കിട്ടുന്ന ശിഷ്യം $P(3)$ ആയാൽ $Q(x)$
 (a) $x-3$ (b) $x+3$ (c) $x-1$ (d) $x+1$
18. $5, -1, -7$ എന്നിവ ഒരു സമാന്തര പ്രോഗ്രഷന്റെ ആദ്യത്തെ മൂന്നു പദങ്ങൾ ആയാൽ നാലാമത്തെ പദം എന്ത് ?
 (a) -1 (b) -6 (c) -13 (d) 1

19. $\widehat{ABC} = 145$ ആയാൽ \widehat{ACB} യെ സംബന്ധിച്ച് ശരിയായത് എന്ത് ?
 (a) ദീർഘചാപം (b) അർദ്ധവൃത്തം (c) ലഘുചാപം (d) ഞാൺ

20.  \widehat{ABD} യിൽ അന്തർലേഖനം ചെയ്തിരിക്കുന്ന കോൺ എന്ത് ?
 (a) $\angle ABC$ (b) $\angle ABD$ (c) $\angle ACB$ (d) $\angle BAD$

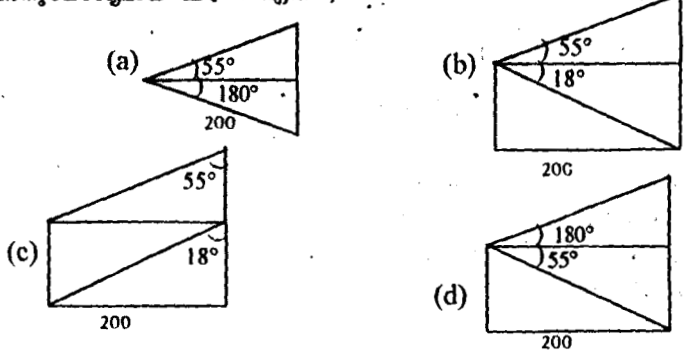
21. $\sin A = 5/13$ ആയാൽ $\cos A$ യുടെ വില ?
 (a) $8/13$ (b) $18/13$ (c) $12/13$ (d) $5/12$
22. ΔABC യുടെ വിസ്തീർണ്ണത്തെ സൂചിപ്പിക്കുന്നത് എന്ത് ?
 (a) $1/2 AB \times BC \sin A$ (b) $1/2 BC \times CA \sin B$ (c) $1/2 AC \times AB \sin B$
 (d) $1/2 AB \times BC \sin B$

23. $\log A + \log B - \log C$ യോട് തുല്യമായത് എന്ത് ?
 (a) $\log \frac{ab}{c}$ (b) $\frac{ab}{c}$ (c) $\frac{c}{ab}$ (d) $\log(a+b-c)$

24. താഴെ തന്നിട്ടുള്ളവയിൽ എന്ത് ഒരു പഞ്ചസംഖ്യാന ന്യൂമെറൽ അല്ല ?
 (a) 124 (b) 134 (c) 144 (d) 154
25. 'y' ആളുകൾ ഉള്ള ഒരു പട്ടണത്തിലെ ഒരു വർഷത്തെ മരണം 'x' ആയാൽ താഴെ തന്നിട്ടുള്ളവയിൽ ഏതായിരിക്കും ആ പട്ടണത്തിലെ CDR ?
 (a) $\frac{y}{x} \times 100$ (b) $\frac{y}{x} \times 1000$ (c) $\frac{x}{y} \times 100$ (d) $\frac{x}{y} \times 1000$

26. $x^2 - 4x + k = 0$ എന്ന സമവാക്യത്തിന്റെ മൂല്യഗണം ഏകാംഗഗണമായാൽ k യുടെ വില
 (a) -2 (b) -4 (c) 4 (d) 2
27. ഒരു സമഗുണിത പ്രോഗ്രഷന്റെ ഒന്നാം പദം 8ഉം പൊതുഗുണകം $1/2$ ഉം ആയാൽ അതിന്റെ n-ാം പദം എന്ത് ?
 (a) 2^{1-n} (b) 2^{4-n} (c) 2^{2-n} (d) 2^{n-4}

28. ഒരു കെട്ടിടത്തിന്റെ മുകളിൽ നിൽക്കുന്ന ഒരാൾ ഒരു ടി.വി. സ്ക്രീന്റെ മുകൾഭാഗം 55° മേൽക്കോണിലും സ്ക്രീന്റെ കീഴ്ഭാഗം 18° കീഴ്കോണിലും കാണുന്നു. കെട്ടിടം സ്ക്രീൽനിന്നും 200 മീറ്റർ അകലെയാണെങ്കിൽ സ്ക്രീന്റെ ഉയരം കാണുക. ഈ പ്രശ്നം നിർദ്ധാരണം ചെയ്യുന്നതിന് അനുയോജ്യമായ ചിത്രം എന്ത് ?



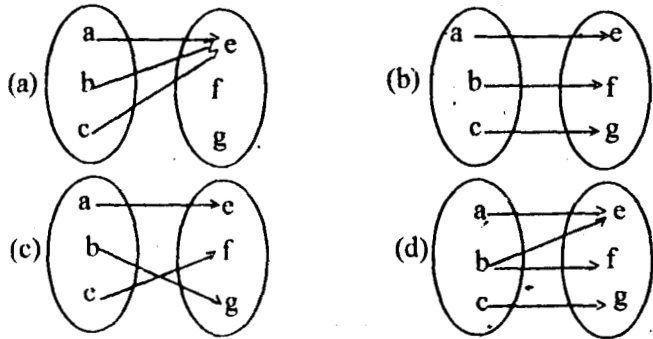
IV

29. ഒരു ഫ്ലോചാർട്ടിന് എത്ര ആരംഭബിന്ദുവും എത്ര അന്തിമബിന്ദുവും ഉണ്ട് ?
 (a) രണ്ടിനും അനേകം (b) രണ്ടിനും ഒന്നുവീതം
 (c) ആരംഭബിന്ദു അനേകം, അന്തിമബിന്ദു ഒന്ന് (d) ഒരു ആരംഭബിന്ദു, അനേകം അന്തിമബിന്ദു.
30. 1234 എന്ന ന്യൂനൈലിൽ 2ന്റെ സ്ഥാനവില എന്ത് ?
 (a) 5^0 (b) 5^1 (c) 5^2 (d) 5^4
31. 'n' പ്രാപ്തകങ്ങളുടെ അഭ്യുഹഗരാശരി 'x'ഉം വ്യതിയാനങ്ങളുടെ തുക 'y' യും ആയാൽ യഥാർത്ഥ മാധ്യം
 (a) $x + \frac{y}{n}$ (b) $x - \frac{y}{n}$ (c) $\frac{y+x}{n}$ (d) $\frac{y-x}{n}$
32. $y = 2x^2 - 1$ എന്ന ഏകദത്തിന്റെ $x = 0$ ആകുമ്പോഴുള്ള വില എത്ര ?
 (a) 1 (b) -1 (c) 3 (d) -3
33. ഒരു ദ്വിമാന സമവാക്യത്തിലെ മൂല്യഗണത്തിലെ അംഗങ്ങളുടെ തുക 10 ഉം ഗുണനഫലം 16 ഉം ആയാൽ സമവാക്യം എന്ത് ?
 (a) $x^2 - 10x + 16 = 0$ (b) $x^2 + 10x + 16 = 0$
 (c) $x^2 + 10x - 16 = 0$ (d) $-x^2 + 10x + 16 = 0$
34. $P(x) = 2x^3 + 9x^2 - 5x + k$ ഉം $P(1) = 0$ ഉം ആയാൽ k യുടെ വില എന്ത് ?
 (a) 16 (b) -16 (c) 6 (d) -6

35. \widehat{PSQ} ഒരു ലഘുചാപവും $\angle PSQ = 115^\circ$ യും ആയാൽ ചുവടെ ചേർത്തിട്ടുള്ളവയിൽ ഏതായിരിക്കും \widehat{PSQ} ?
 (a) 245° (b) 230° (c) 130° (d) 65°

36. $\frac{1}{1 + x/y}$ യ്ക്ക് തുല്യമായത്
 (a) $\frac{y}{1+x}$ (b) $\frac{y}{x+y}$ (c) $\frac{1}{x+y}$ (d) $\frac{x}{1+y}$

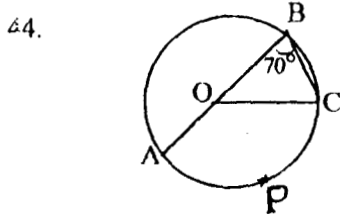
37. 100 പ്രാപ്തകങ്ങളുടെ അഭ്യുഹഗരാശരി 45. അഭ്യുഹഗരാശരിയിൽനിന്നുള്ള വ്യതിയാനങ്ങളുടെ തുക 32 ആയാൽ യഥാർത്ഥ മാധ്യം
 (a) 44.68 (b) 45.32 (c) 32.45 (d) 31.55
38. 1994-ൽ അരിയുടെ വില 1986 ലേതിന്റെ 2 മടങ്ങ് ആയാൽ താഴെത്തന്നിട്ടുള്ളവയിൽ ഏതായിരിക്കും അതിന്റെ വിലസൂചിക ?
 (a) 500 (b) 100 (c) 200 (d) 400
39. $x^2 + 10x + k = 0$ എന്ന സമവാക്യത്തിന്റെ മൂല്യഗണത്തിലെ ഒരംഗം 4 ആയാൽ മൂല്യഗണം എന്ത് ?
 (a) {4, 14} (b) {4, -14} (c) {-4, -12} (d) {4, 10}
40. താഴെക്കൊടുത്തിരിക്കുന്ന ബന്ധങ്ങളിൽ ഏകദത്തെ സൂചിപ്പിക്കാത്തത്



41. മണ്ഡലം $\{-1, 0\}$ ആകുമ്പോൾ $f(x) = 2x - 5$ എന്ന ഏകദത്തിന്റെ രംഗം
 (a) $\{-3, -5\}$ (b) $\{-2, 0\}$ (c) $\{-7, -5\}$ (d) $\{-7, -3\}$
42. $P(x)$ എന്ന പോളിനോമിയലിനെ $x + 1$ കൊണ്ട് ഹരിച്ചാൽ ശിഷ്യം 7 ഉം $x - 2$ കൊണ്ട് ഹരിച്ചാൽ ശിഷ്യം 19 ഉം കിട്ടും. എങ്കിൽ $P(x)$ നെ സംബന്ധിച്ച് താഴെക്കൊടുത്തിരിക്കുന്ന പ്രസ്താവനകളിൽ ശരിയായത് എന്ത് ?

- (a) $P(1) = 0; P(-2) = 0$ (b) $P(-1) = 7; P(2) = 19$
- (c) $P(-1) = 0; P(-2) = 0$ (d) $P(1) = 7; P(2) = 19$

43. ഒരു കട്ടിനായ ഗോളത്തിന്റെ ഉപരിതലവിസ്തീർണ്ണം 120 cm^2 . അതിനെ മുറിച്ച് രണ്ട് അർദ്ധഗോളങ്ങളാക്കിയാൽ ഓരോന്നിന്റേയും ഉപരിതലവിസ്തീർണ്ണത്തെ സൂചിപ്പിക്കുന്ന സംഖ്യ ഏത് ?
 (a) 40 (b) 60 (c) 80 (d) 90



44. AB വൃത്തത്തിന്റെ വ്യാസവും O വൃത്തകേന്ദ്രവും ആകുന്നു. $\angle OBC = 70^\circ$ എങ്കിൽ \widehat{APC} യുടെ ഡിഗ്രി അളവ് ഏത് ?
 (a) 70° (b) 110° (c) 140° (d) 220°

45. കോൺ A യുടെ അളവ് 0° മുതൽ 90° വരെ വർദ്ധിക്കുമ്പോൾ $\sin A$ യുടെ വില
 (a) കുറയുന്നു. (b) വർദ്ധിക്കുന്നു (c) മാറ്റം വരുന്നില്ല (d) നിശ്ചയിക്കുവാൻ സാധിക്കുകയില്ല.

46. $\log 3\sqrt{3}12$ ന്റെ വില കണ്ടുപിടിക്കുന്നതിന് ഏറ്റവും യോജിച്ച തത്വം
 (a) $\log(a \times b) = \log a + \log b$ (b) $\log a/b = \log a - \log b$
 (c) $\log a^m = m \log a$ (d) $\log a \times b = \log a + \log b - \log c$

47. ഒരു ക്രിയ നിർവ്വഹിക്കുന്നതിനുള്ള നിർദ്ദേശങ്ങൾ ക്രമമായി ചുവടെ ചേർത്തിരിക്കുന്നു.
 (i) തുടങ്ങുക (ii) a, b എന്നീ വിലകൾ സീകരിക്കുക (iii) $A = \frac{a+b}{2}$ കണ്ടുപിടിക്കുക
 (iv) A എഴുതുക (v) നിറുത്തുക.

ഈ നിർദ്ദേശങ്ങൾ സൂചിപ്പിക്കുന്ന ക്രിയ
 (a) രണ്ടു സംഖ്യകളെ താരതമ്യം ചെയ്യുന്നു. (b) രണ്ടു സംഖ്യകളുടെ മാധ്യം കണക്കാക്കുന്നു
 (c) രണ്ടു സംഖ്യകളുടെ തുക കണക്കാക്കുന്നു (d) മേൽപ്പറഞ്ഞവ ഒന്നുമല്ല.

48. k ഹൃദയസ്ഥിത ഒരു രേഖീയസംഖ്യ ആയാൽ k, 5k, 9k ഇവ ഏതു പ്രോഗ്രഷനിൽ ആയിരിക്കും ?
 (a) A.P. (b) G.P. (c) A.P.യും G.P.യും (d) A.P.യോ G.P. യോ അല്ല.

49. ഒരു വൃത്തസ്തുപികയ്ക്കും ഒരു അർദ്ധഗോളത്തിനും തുല്യവ്യാസവും തുല്യപൊക്കവും ഉണ്ട്. അവയുടെ വ്യാപ്തങ്ങൾ തമ്മിലുള്ള അംശബന്ധം
 (a) 2:1 (b) 1:2 (c) 1:1 (d) 1:3

50. $\frac{\tan x}{\cot 25} = 1$ ആയാൽ x ന്റെ വില
 (a) 25 (b) 45 (c) 75 (d) 65

51. ഒരു A.P. യുടെ n-ാം പദം $t_n = 3n + 20$ ആണ്. ഇതിലെ ആദ്യത്തെ 20 പദങ്ങളുടെ തുക കാണുന്നതിനുള്ള വിവിധ ഘട്ടങ്ങൾ ചുവടെ ചേർക്കുന്നു.
 (a) $t_1 = 3 + 20 = 23$ (b) $10 [23 + 80]$ (c) $10 \times 103 = 1030$ (d) $t_{20} = 3 \times 20 + 20 = 80$
 ഇവയുടെ ശരിയായ ക്രമം ഏത്
 (a) a,d,c,b (b) a,d,b,c (c) b,c,a,d (d) b,a,d,c

52. $\frac{\sin \theta}{1 - \cos \theta} + \frac{\sin \theta}{1 + \cos \theta} = 2 \operatorname{Cosec} \theta$
 ഇത് തെളിയിക്കുന്നതിനുള്ള വിവിധ ഘട്ടങ്ങൾ താഴെ കൊടുത്തിരിക്കുന്നു.
 (a) $\frac{\sin \theta + \sin \theta \cos \theta + \sin \theta - \sin \theta \cos \theta}{1 - \cos^2 \theta}$
 (b) $\frac{2 \sin \theta}{1 - \cos^2 \theta}$ (c) $1 - \cos \theta, 1 + \cos \theta$ ഇവയുടെ ല.സ.ഗു.. $1 - \cos^2 \theta$ ആകുന്നു.

VI

(d) $\frac{2 \sin \theta}{\sin^2 \theta}$ (e) $\frac{2}{\sin \theta}$

ഇവയുടെ ശരിയായ ക്രമം ഏത് ?

- (a) c,a,b,d,e (b) a,b,c,d,e (c) a,b,d,e,c (d) d,e,a,b,c

53. ഒരു ത്രികോണത്തിന്റെ വിസ്തീർണ്ണം കണ്ടുപിടിക്കുന്നതിനുള്ള അൽഗോരിതം ചുവടെ ചേർക്കുന്നു.

- (1) ആരംഭിക്കുക (2) A എഴുതുക (3) നിറുത്തുക
 (4) $A = \sqrt{s(s-a)(s-b)(s-c)}$ കാണുക. (5) a,b,c വിലകൾ സ്വീകരിക്കുക
 (6) $s = \frac{a+b+c}{2}$ കണ്ടുപിടിക്കുക

ഇവയുടെ ശരിയായ ക്രമം ഏത് ?

- (a) 1,6,2,3,4,5 (b) 1,2,3,4,5,6 (c) 1,5,6,4,2,3 (d) 1,2,5,6,4,3

54. മൂല്യഗണം ശൂന്യഗണമായ സമവാക്യം

- (a) $x^2 - 1 = 0$ (b) $x^2 + 1 = 0$ (c) $x^2 - 6x + 9 = 0$ (d) $x^2 + x + 1/4 = 0$

55. $x^2 - 1$ തുക (x) + ഗുണനഫലം = 0 എന്ന രീതിയിൽ ദ്വിമാന സമവാക്യം രൂപീകരിക്കുന്നതിന് ആ ദ്വിമാന സമവാക്യത്തെ സംബന്ധിച്ച് അറിഞ്ഞിരിക്കേണ്ടത്

- (a) x^2 ന്റെ ഗുണനാത്തരം (b) വിവേചകം
 (c) മൂല്യഗണത്തിലെ അംഗങ്ങൾ (d) മൂല്യഗണത്തിലെ ഒരംഗം

56. ഒരു G.P യിലെ പദം ആകാൻ സാധ്യതയില്ലാത്ത ദശമീയസംഖ്യ

- (a) -1 (b) 0 (c) +1 (d) 1/10

57. PQRS ഒരു ചക്രീയ ചതുർഭുജമാണ്. PQRS നെ സംബന്ധിച്ച് എല്ലായ്പ്പോഴും ശരിയായത് ഏത് ?

- (a) $\angle P = \angle R$ (b) $PQ = RS$ (c) PQ, QS ഇവ പരസ്പരം സമഭാഗം ചെയ്യുന്നു.
 (d) $\angle P + \angle R = 180^\circ$

58. താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ഏറ്റവും വലിയ പഞ്ചസംഖ്യാനസംഖ്യ ഏത് ?

- (a) 40 (b) 41 (c) 11 (d) 44

59. ഒരു സാധനത്തിന്റെ 1995 ലെ വില 1991 ലേതുമായി താരതമ്യം ചെയ്യുമ്പോൾ വിലസുചിക 120.4 ആണ്. 1991 ലെ 100 രൂപയുടെ സ്ഥാനത്ത് 1995ൽ 120.40 രൂപ ചെലവാക്കുന്ന ഒരു കുടുംബത്തെ സംബന്ധിച്ച് താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ശരിയായ നിഗമനം ഏത് ?

- (a) 1995-ൽ മെച്ചമായ ജീവിതനിലവാരം പുലർത്തുന്നു. (b) ജീവിതനിലവാരത്തിൽ മാറ്റമില്ല
 (c) മോശമായ ജീവിത നിലവാരമാണ് (d) ജീവിതവ്യത്തി സാധ്യമാകുന്നു.

60. $3\sqrt{2}, 6\sqrt{2}, 12\sqrt{2}, \dots$ എന്ന സംഖ്യാശ്രേണിയെ സംബന്ധിച്ച് ശരിയായ പ്രസ്താവന ഏത്?

- (a) $3\sqrt{2}$ പൊതുവ്യത്യാസം ആയിട്ടുള്ള സമാന്തര പ്രോഗ്രഷൻ
 (b) 3 പൊതുവ്യത്യാസം ആയിട്ടുള്ള സമാന്തര പ്രോഗ്രഷൻ
 (c) 2 പൊതുഗുണകമായ സമഗുണിത പ്രോഗ്രഷൻ
 (d) $2\sqrt{2}$ പൊതുഗുണകമായ സമഗുണിത പ്രോഗ്രഷൻ

APPENDIX VI

ACHIEVEMENT TEST IN MATHEMATICS FOR STANDARD X

Dr. Santhamma Raju
Professor in Education
University Of Calicut.

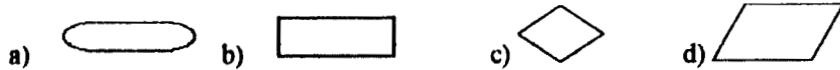
Ancel Maria
Lecturer
St.Thomas Training College, Pala.

INSTRUCTIONS

- * This is a test in Mathematics.
- * Each question has 4 responses as a, b, c, d.
- * In the response sheet given, the question numbers are written in order, with a,b,c,d against each number. Find out the correct answer and put a circle around the letter showing the correct answer against the question number.
- * If you find that you have marked wrongly draw around the circle and put the circle in the correct place.
- * Answer all the questions.

- 1) In which of the following solids, the cross section is not the region of a circle ?
 a) Sphere b) Pipe c) Hemisphere d) Cone
- 2) ABCD is a cyclic quadrilateral. IF $\angle A = 112^\circ$, what is the measure of $\angle C$?
 a) 68° b) 90° c) 112° d) 248°
- 3) Which of the following is equal to $\log \sqrt{8}$?
 a) $\log 8/2$ b) $\log (8-2)$ c) $2 \log 8$ d) $\frac{1}{2} \log 8$
- 4) What is the formula for calculating the price index number?
 a) $\frac{P_0}{P_1}$ b) $\frac{P_1}{P_0}$ c) $\frac{P_0}{P_1} \times 100$ d) $\frac{P_1}{P_0}$
- 5) What is the place value of '4' in the numeral 3214_{five}?
 a) 5^0 b) 5^1 c) 5^2 d) 5^4
- 6) Which of the following represents a sequence of instructions in step by step form written to solve a problem?
 a) flow chart b) algorithm c) bits d) bytes

7) Which of the following is used in a decision box?



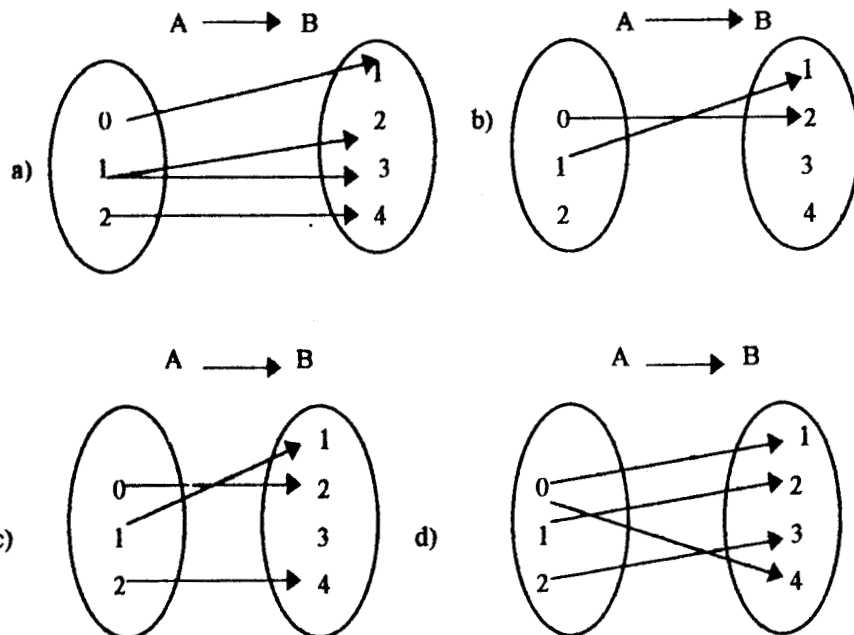
8) What is the characteristic of $\log 3275.7$?

- a) 1 b) 2 c) 3 d) 4

9) If $n(A) = 3$ and $n(B) = 4$ what is the number of ordered pairs in a function from B to A?

- A) 3 b) 4 c) 7 d) 12

10) Which of the following relation represents a function?



11) Which of the following is a factor of $a^3 - 7a + 6$?

- a) $a - 1$ b) $a + 1$ c) $a + 2$ d) $a - 3$

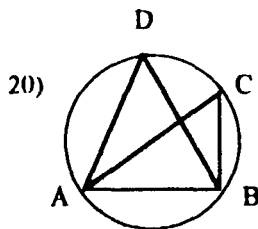
12) The second and third terms of A.P are 1 and 5 respectively. What is the first term?

- a) -4 b) -3 c) 3 d) 4

13) Which of the solid has 4 faces, but no vertex ?

- a) hemisphere b) triangular pyramid c) Square pyramid d) Pipe

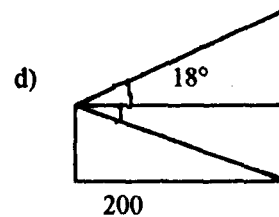
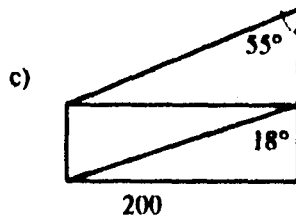
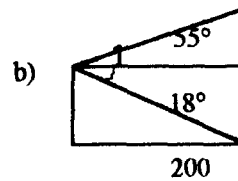
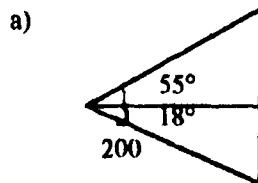
- 14) The inscribed angle of an arc is an acute angle, what is it called ?
 a) minor arc b) major arc c) semicircle d) chord
- 15) The truthset of a quadratic equation is a singleton set. What is the nature of the discriminant ?
 a) less than zero b) greater than zero
 c) equal to zero d) less than or equal to zero.
- 16) Which of the following is a polynomial formed by the combination of the factors $(x+2)$ and $(x-1)$
 a) x^2+2x+2 b) x^2-2x-2 c) x^2+x-2 d) x^2-x-2
- 17) If the remainder on dividing a polynomial by $P(x)$ by another polynomial $Q(x)$ is $P(3)$ then what is $Q(x)$?
 a) $x-3$ b) $x+3$ c) $x-1$ d) $x+1$
- 18) If 5, -1, -7 are in A.P what is the next term ?
 a) -1 b) -6 c) -13 d) 1
- 19) If $\widehat{ABC}^\circ = 145^\circ$ which of the following is true of \widehat{ABC} ?
 a) major arc b) semi circle c) minor arc d) chord



In the figure which of the following is an inscribed angle of \widehat{ADB} ?

- a) $\angle ABC$ b) $\angle ABD$ c) $\angle ACB$ d) $\angle BAD$
- 21) If $\sin A = \frac{5}{13}$ which of the following is the value of $\cos A$?
 a) $\frac{8}{13}$ b) $\frac{18}{13}$ c) $\frac{12}{13}$ d) $\frac{5}{12}$
- 22) Which of the following represents the area of $\triangle ABC$?
 a) $\frac{1}{2} AB \times BC \sin A$ b) $\frac{1}{2} BC \times CA \sin B$
 c) $\frac{1}{2} AC \times AB \sin B$ d) $\frac{1}{2} AB \times BC \sin B$

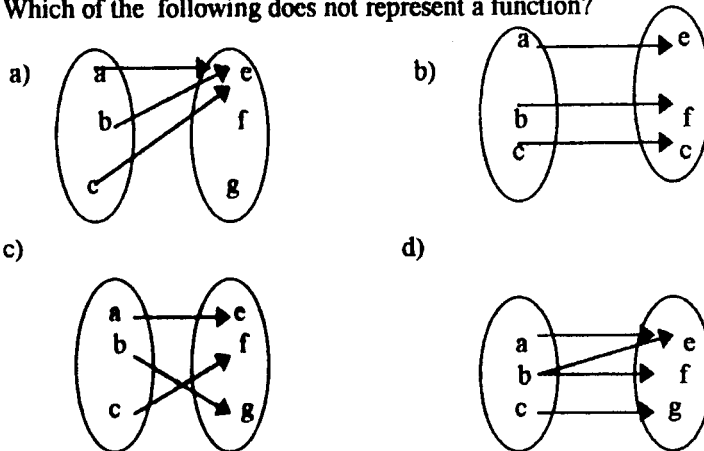
- 23) Which of the following is equal to $\log a + \log b - \log c$?
 a) $\log abc$ b) $\log ab/c$ c) $\log c/ab$ d) $\log (a+b-c)$
- 24) Which of the following cannot be a base five numeral?
 a) 124 b) 134 c) 144 d) 154
- 25) The number of deaths in a village is estimated as 'X'. If the population of the village is 'Y' which of the following represents CDR?
 a) $\frac{Y}{X} \times 100$ b) $\frac{Y}{X} \times 1000$ c) $\frac{X}{Y} \times 100$ d) $X \times 1000$
- 26) If the truthset of the equation $x^2 - 4x + k = 0$ is a singleton set, find the value of k
 a) -2 b) -4 c) 4 d) 2
- 27) The 1st term and common ratio of a G.P are 8 and $\frac{1}{2}$ respectively, what is the n^{th} term?
 a) 2^{1-n} b) 2^{4-n} c) 2^{2-n} d) 2^{n-4}
- 28) A man standing on the top of a building observes the top of a T.V. tower at an angle of elevation of 55° and observes its foot at an angle of depression 18° . The building is 200m away from the tower. Which is the correct figure to find the height of the tower. ?



- 29) How many starting and ending points can a flow chart have ?
 a) multiple for both b) one each for both c) multiple starting points and one ending point
 d) one starting point and multiple ending point.
- 30) Which of the following is the place value of the digit '2' in the numeral 1234_{five} ?
 a) 5^0 b) 5^1 c) 5^2 d) 5^3
- 31) The assumed mean of n scores is 'x' and the sum of the deviations from x is y, find the actual mean
 a) $x + \frac{y}{n}$ b) $x - \frac{y}{n}$ c) $\frac{y+x}{n}$ d) $\frac{y-x}{n}$

- 32) Find value of the function $y = 2X^2 - 1$ at $X = 0$
 a) 1 b) -1 c) 3 d) -3
- 33) The sum of the elements of the truthset is 10 and their product is 16. What is the equation?
 a) $x^2 - 10x + 16 = 0$ b) $x^2 + 10x + 16 = 0$
 c) $x^2 + 10x - 16 = 0$ d) $-x^2 + 10x + 16 = 0$
- 34) If $P(x) = 2x^3 + 9x^2 - 5x + k$ and $P(1) = 0$ find the value of K
 a) 16 b) -16 c) 6 d) -6
- 35) \widehat{PSQ} in a minor arc of a circle. If $\angle PSQ = 115^\circ$, which of the following is the degree measure of \widehat{PSQ} ?
 a) 245° b) 230° c) 130° d) 65°
- 36) What is the value of $\frac{1}{\frac{1+x}{y}}$
 a) $\frac{y}{1+x}$ b) $\frac{y}{x+y}$ c) $\frac{1}{x+y}$ d) $\frac{x}{1+y}$
- 37) The assumed mean of 100 scores is 45. If the sum of the deviations is 32, what is the actual arithmetic mean?
 a) 44.68 b) 45.32 c) 32.45 d) 31.55
- 38) The cost of paddy per kg. In 1994 is the double of the cost in 1986. What is the price index number?
 a) 500 b) 100 c) 200 d) 400
- 39) What would be truth of the equation $x^2 + 10x + k = 0$ if one of the elements is 4?
 a) {4, 14} b) {4, -14} c) {-4, -10} d) {4, 10}.

40) Which of the following does not represent a function?



41) Find range of $f(x) = 2x - 5$ when the domain is $\{-1, 0\}$?

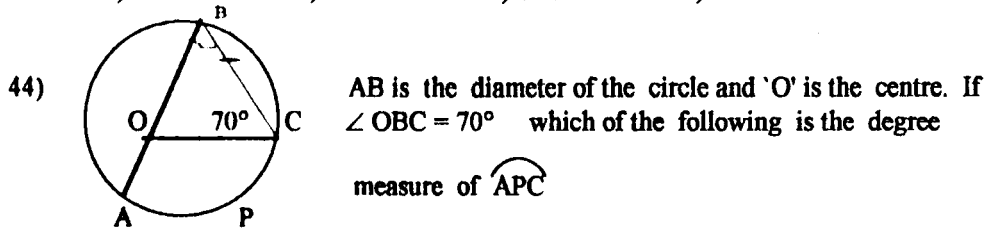
- a) $\{3, -5\}$ b) $\{-2, 0\}$
 c) $\{-7, -5\}$ d) $\{-7, -3\}$

42) When a polynomial $P(x)$ is divided by $x + 1$, the remainder is 7 and on dividing it $x - 2$ the remainder is 19, then which of the following statement is true?

- a) $P(1) = 0, P(-2) = 0$ b) $P(-1) = 7, P(2) = 19$
 c) $P(-1) = 0, P(-2) = 0$ d) $P(1) = 7, P(2) = 19$

43) The total surface area of a solid sphere is 120 cm^2 . If this is split into two hemispheres what will be the surface area of each part?

- a) 40 cm^2 b) 60 cm^2 c) 80 cm^2 d) 90 cm^2



- a) 70° b) 110° c) 140° d) 220°

45) When A increases from 0° to 90° the value of $\sin A$

- a) decreases b) increases c) does not change d) cannot be predicted

46) Which of the following principle is best suited to estimate the value of $\log 3 \sqrt{312}$?

- a) $\log(a \times b) = \log a + \log b$ b) $\log(a/b) = \log a - \log b$
 c) $\log a^m = m \log a$ d) $\log a \times b / c = \log a + \log b - \log c$

47) Given below are the step by step procedure to perform a certain operation.

- 1) Start 2) Read a and b 3) Calculate $A = (a + b) / 2$
 4) Write A 5) Stop

What is the operation explained?

- a) to compare two numbers b) to compute arithmetic mean of two numbers
c) to find the sum of two numbers d) none of the above.

- 48) If K is a non - zero real number, K, 5K, 9K are in
a) A.P b) G.P c) A.P and G.P d) neither A.P nor G.P
- 49) A cone and a hemisphere have the same diameter and the same height. What is the ratio of their volumes ?
a) 2:1 b) 1:2 c) 1:1 d) 1:3
- 50) If $\tan x/\cot 25 = 1$ what the value of x ?
a) 25 b) 45 c) 75 d) 65
- 51) The different steps to find the sum of the first 20 terms of an A.P whose n^{th} term is $t_n = 3n+20$ are given below
a) $t_1 = 3 + 20 = 23$ b) $10 [23 + 80]$
c) $10 \times 103 = 1030$ d) $t_{20} = 3 \times 20 + 20 = 80$

Arrange the steps in correct order

- a) a, d, c, b b) a, d, b, c c) b, c, a, d d) b, a, d, c.

- 52) $\frac{\sin \theta}{1 - \cos \theta} + \frac{\sin \theta}{1 + \cos \theta} = 2 \operatorname{cosec} \theta$ to prove this, what is the correct arrangement

a)
$$\frac{\sin \theta + \sin \theta \cos \theta + \sin \theta - \sin \theta \cos \theta}{1 - \cos^2 \theta}$$

- b) $\frac{2 \sin \theta}{1 - \cos^2 \theta}$ c) L.C.M of $1 - \cos \theta$ and $1 + \cos \theta$ is $1 - \cos^2 \theta$

d) $\frac{2 \sin \theta}{\sin^2 \theta}$ e) $\frac{2}{\sin \theta} = 2 \operatorname{Cosec} \theta$

The correct order is

- a) c, a, b, d, e b) a, b, c, d, e c) a, b, d, e, c d) d, e, a, b, c

- 53) The algorithm to find the area of a triangle is given below
1. Start 2. Write A 3. Stop
4. Calculate $\sqrt{s(s-a)(s-b)(s-c)}$ 5. Read a, b, c 6. Calculate $s = \frac{a+b+c}{2}$

What is the correct order of the algorithm ?

- a) 1, 6, 2, 3, 4, 5 b) 1, 2, 3, 4, 5, 6 c) 1, 5, 6, 4, 2, 3 d) 1, 2, 5, 6, 4, 3

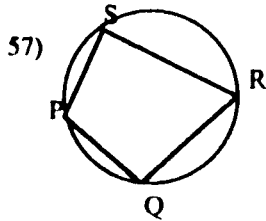
- 54) Which of the following equation has its truth set empty ?

a) $x^2 - 1 = 0$ b) $x^2 + 1 = 0$ c) $x^2 - 6x + 9 = 0$ d) $x^2 + x + \frac{1}{4} = 0$

- 55) The statement $x^2 - (\text{Sum})x + \text{Product} = 0$ is helpful to derive a quadrative equation in general form if given - ,

- a) Coefficient of x^2 b) Discriminant
 c) Elements of the truth set d) one of the elements of truth set

- 56) Which is the real number that cannot be a term in G.P. ?
 a) -1 b) 0 c) +1 d) $1/10$



PQRS is a cyclic quadrilateral. Which of the following is always true of P Q R S ?

- a) $\angle P = \angle R$ b) $PQ = RS$
 c) PQ and QS bisect each other d) $\angle P + \angle R = 180^\circ$
- 58) Which of the following is the largest base - five numeral with two digits ?
 a) 40_{five} b) 41_{five} c) 11_{five} d) 44_{five}
- 59) According to the price of some commodities in the years 1991 and 1995 the cost of living index number is 120.4. Which of the following is the correct interpretation of the situation, if, for each Rs. 1000 in 1991, an average family spends Rs. 1204 in 1995.
 a) maintain better standard b) maintain the same standard
 c) live in a lower standard d) manage living.
- 60) Which of the following statement is true of $3\sqrt{2}, 6\sqrt{2}, 12\sqrt{2}$?
 a) an A.P with common difference $3\sqrt{2}$ b) an A.P with common difference 3
 c) a G.P with common ratio 2 d) a G.P with common ratio $2\sqrt{2}$

APPENDIX VII

ACHIEVEMENT TEST IN MATHEMATICS - STANDARD X
SCORE SHEET

പേര് വയസ്സ്

സ്കൂൾ അണുകൂട്ടി/പെണുകൂട്ടി

1	a	b	c	d		31	a	b	c	d
2	a	b	c	d		32	a	b	c	d
3	a	b	c	d		33	a	b	c	d
4	a	b	c	d		34	a	b	c	d
5	a	b	c	d		35	a	b	c	d
6	a	b	c	d		36	a	b	c	d
7	a	b	c	d		37	a	b	c	d
8	a	b	c	d		38	a	b	c	d
9	a	b	c	d		39	a	b	c	d
10	a	b	c	d		40	a	b	c	d
11	a	b	c	d		41	a	b	c	d
12	a	b	c	d		42	a	b	c	d
13	a	b	c	d		43	a	b	c	d
14	a	b	c	d		44	a	b	c	d
15	a	b	c	d		45	a	b	c	d
16	a	b	c	d		46	a	b	c	d
17	a	b	c	d		47	a	b	c	d
18	a	b	c	d		48	a	b	c	d
19	a	b	c	d		49	a	b	c	d
20	a	b	c	d		50	a	b	c	d
21	a	b	c	d		51	a	b	c	d
22	a	b	c	d		52	a	b	c	d
23	a	b	c	d		53	a	b	c	d
24	a	b	c	d		54	a	b	c	d
25	a	b	c	d		55	a	b	c	d
26	a	b	c	d		56	a	b	c	d
27	a	b	c	d		57	a	b	c	d
28	a	b	c	d		58	a	b	c	d
29	a	b	c	d		59	a	b	c	d
30	a	b	c	d		60	a	b	c	d

Total score

APPENDIX VIII

ACHIEVEMENT TEST IN MATHEMATICS - STANDARD X
SCORING KEY

പേര് വയസ്സ്
സ്കൂൾ ആണുകൂട്ടി/പെൺകൂട്ടി

1	a	(b)	c	d		31	(a)	b	c	d
2	(a)	b	c	d		32	a	(b)	c	d
3	a	b	c	(d)		33	(a)	b	c	d
4	a	b	c	(d)		34	a	b	c	(d)
5	(a)	b	c	d		35	a	b	(c)	d
6	a	(b)	c	d		36	a	(b)	c	d
7	a	b	(c)	d		37	a	(b)	c	d
8	a	b	(c)	d		38	a	b	(c)	d
9	(a)	b	c	d		39	a	(b)	c	d
10	a	b	(c)	d		40	a	b	c	(d)
11	(a)	b	c	d		41	a	b	(c)	d
12	a	(b)	c	d		42	a	(b)	c	d
13	a	b	c	(d)		43	a	b	c	(d)
14	a	(b)	c	d		44	a	b	(c)	d
15	a	b	(c)	d		45	a	(b)	c	d
16	a	b	(c)	d		46	a	b	(c)	d
17	(a)	b	c	d		47	a	(b)	c	d
18	a	b	(c)	d		48	(a)	b	c	d
19	a	b	(c)	d		49	a	(b)	c	d
20	a	b	(c)	d		50	a	b	c	(d)
21	a	b	(c)	d		51	a	(b)	c	d
22	a	b	c	(d)		52	(a)	b	c	d
23	(a)	b	c	d		53	a	b	(c)	d
24	a	b	c	(d)		54	a	(b)	c	d
25	a	b	c	(d)		55	a	b	(c)	d
26	a	b	(c)	d		56	a	(b)	c	d
27	a	(b)	c	d		57	a	b	c	(d)
28	a	(b)	c	d		58	a	b	c	(d)
29	a	(b)	c	d		59	a	(b)	c	d
30	a	b	(c)	d		60	a	b	(c)	d

Total score

APPENDIX IX

SCALE OF ATTITUDE TOWARDS MATHEMATICS

DR. SANTHAMMA RAJU (PROFESSOR IN EDUCATION, UNIVERSITY OF CALICUT) & ANCEL MARIA

നിർദ്ദേശങ്ങൾ

താഴെക്കൊടുത്തിരിക്കുന്ന പ്രസ്താവനകൾ ശ്രദ്ധാപൂർവ്വം വായിക്കുക. ഓരോ പ്രസ്താവനയ്ക്കും മൂന്നു പ്രതികരണങ്ങൾ വീതം തന്നിരിക്കുന്നു. ഓരോന്നിനെ സംബന്ധിച്ചും നിങ്ങളുടെ പ്രതികരണം അതതു പ്രസ്താവനകളെ സൂചിപ്പിക്കുന്ന നമ്പറിനുനേരെ അനുയോജ്യമായ വൃത്തത്തിൽ X അടയാളമിട്ട് രേഖപ്പെടുത്തുക. എല്ലാ പ്രസ്താവനകൾക്കും ഉത്തരം രേഖപ്പെടുത്തേണ്ടതാണ്. ഒരു പ്രസ്താവനയ്ക്ക് ഒരു അഭിപ്രായം മാത്രമേ രേഖപ്പെടുത്താവൂ.

ആദ്യം അടയാളപ്പെടുത്തിയ X ചിഹ്നം തെറ്റായ സ്ഥാനത്ത് ആണെങ്കിൽ അതു തിരുത്തുന്നതിന് വൃത്തത്തിനു ചുറ്റും ഒരു □ വരയ്ക്കുക. അതിനുശേഷം ശരിയായ വൃത്തത്തിൽ X ചിഹ്നം അടയാളപ്പെടുത്തുക.

- 1. ഗണിതശാസ്ത്രം സൃഷ്ടിപരമായ കഴിവുകളുള്ള കുട്ടികൾക്കു പറ്റിയ മേഖലയാണ്.
2. കണക്ക് അറിയാൻ പാടില്ലാത്തവർ അനുദിനജീവിതത്തിൽ വഞ്ചിക്കപ്പെടാൻ ഇടയുണ്ട്.
3. പത്രങ്ങളിലും മാസികകളിലും കാണുന്ന ഗണിതശാസ്ത്ര വിവരങ്ങൾ വായിക്കുവാൻ എനിക്ക് ഇഷ്ടമാണ്.
4. ഗണിതശാസ്ത്രക്ലാസ്സുകൾ എനിക്കു വിരസതയും മടുപ്പും ഉളവാക്കുന്നു.
5. ഗണിതശാസ്ത്രത്തിലെ ഗൃഹപാഠങ്ങൾ ചെയ്യാൻ എനിക്കു താല്പര്യമില്ല.
6. ജ്യോമിതീയ രൂപങ്ങൾ വരച്ച് ചായം കൊടുക്കുന്നത് എന്റെ ഒരു വിനോദമാണ്.
7. പ്രസിദ്ധീകരണങ്ങളിൽ കാണാറുള്ള കണക്കിലെ കളികൾ എന്ന പംക്തി ഞാൻ വായിക്കാറുണ്ട്.
8. സഹപാഠികൾക്ക് കണക്കിലെ സംശയങ്ങൾ തീർത്തുകൊടുക്കാൻ എനിക്കിഷ്ടമാണ്.
9. ഗണിതശാസ്ത്ര ക്ലാസ്സിൽ അദ്ധ്യാപകൻ പൊതുവിൽ ചോദ്യം ചോദിക്കുമ്പോൾ എന്റെ ഊഴമെന്നു തോന്നിയാലേ ഞാൻ അന്തേക്കുറിച്ചു ചിന്തിക്കാറുള്ളൂ.
10. വിഷമമുള്ള കണക്കുകൾ സഹപാഠികളുമായി ചർച്ച ചെയ്യുവാൻ എനിക്കിഷ്ടമില്ല.
11. ഗണിതശാസ്ത്രതത്വങ്ങളെ ആസ്പദമാക്കി മനോഹരമായ ചിത്രങ്ങൾ ഞാൻ വരയ്ക്കാറുണ്ട്.
12. കണക്കുകൾ ചെയ്യാനുള്ള എളുപ്പവഴി കണ്ടുപിടിക്കാൻ എനിക്കു താല്പര്യമുണ്ട്.

13. ഗണിതശാസ്ത്രത്തിന്റെ പ്രാധാന്യത്തെക്കുറിച്ച് കൂട്ടുകാരെ ബോധവാന്മാരാക്കാറുണ്ട്.
14. ഗണിതശാസ്ത്രക്ലാസ്സുകളെപ്പറ്റി ആലോചിക്കുന്നതുപോലും എനിക്ക് അരോചകമാണ്.
15. ഗണിതപ്രശ്നങ്ങൾ കൂട്ട് കളിക്കൊണ്ടുതന്നെ ചെയ്യിക്കുന്ന അദ്ധ്യാപകരെ ഞാൻ ഇഷ്ടപ്പെടുന്നില്ല.
16. ഗണിതശാസ്ത്രത്തിലെ കണ്ടുപിടിത്തങ്ങൾ ശരിയോ തെറ്റോ എന്ന് മറ്റു ശാസ്ത്രജ്ഞന്മാർക്കു പരീക്ഷിച്ചു നോക്കാവുന്നതാണ്.
17. ഗണിതശാസ്ത്രജ്ഞന്മാരുടെ പടങ്ങൾ ശേഖരിക്കുന്നത് എനിക്കു ഇഷ്ടമാണ്.
18. മറ്റു ശാസ്ത്രവിഷയങ്ങളുടെ പഠനത്തിന് ഗണിതശാസ്ത്രപഠനം അത്യാവശ്യമാണ്.
19. ഗണിതശാസ്ത്രതത്വങ്ങൾ കാര്യകാരണങ്ങളെയല്ല വെറും നിരീക്ഷണങ്ങളെയാണ് ആശ്രയിക്കുന്നത്.
20. ഗണിതശാസ്ത്രത്തിന് സൗന്ദര്യാത്മകമായ ഒരു വശം ഉണ്ട് എന്ന് എനിക്കും തോന്നുന്നില്ല.
21. ഗണിതത്തിന് നിത്യജീവിതവുമായുള്ള ബന്ധത്തെപ്പറ്റി കൂട്ടുകാരുമായി സംസാരിക്കാറുണ്ട്.
22. ഗണിതശാസ്ത്രത്തിലെ കണ്ടുപിടിത്തങ്ങൾ നടത്തുന്നവരെപ്പറ്റി കൂടുതൽ അറിയുവാൻ ഞാൻ ശ്രമിക്കാറുണ്ട്.
23. സമയം കിട്ടുമ്പോൾ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട പുസ്തകങ്ങൾ വായിക്കാൻ താല്പര്യമാണ്.
24. മാതാപിതാക്കളുടെ നിർബന്ധം നിമിത്തമാണ് ഞാൻ ഗണിതശാസ്ത്രപാഠങ്ങൾ വീട്ടിൽ വച്ച് വായിക്കുന്നത്.
25. ക്ലാസ്സിൽ മുൻ നിരയിൽ ഇരിക്കുന്ന കുട്ടികളോട് അദ്ധ്യാപകൻ കൂടുതൽ ചോദ്യങ്ങൾ ചോദിക്കുമെന്നതു കൊണ്ട് പിൻനിരയിൽ ഇരിക്കാൻ ഞാൻ ഇഷ്ടപ്പെടുന്നു.
26. ഗണിതശാസ്ത്രക്ലബ്ബുകളിൽ സജീവമായി പ്രവർത്തിക്കാൻ എനിക്കു താല്പര്യമാണ്.
27. ഗണിതശാസ്ത്രതത്വങ്ങൾ, ഫോർമുലകൾ ഇവ ഹൃദിസ്ഥമാക്കുവാൻ എനിക്കു താല്പര്യമാണ്.
28. ഗണിതശാസ്ത്ര കിസ്തസരങ്ങളിൽ പങ്കെടുക്കാൻ ഞാൻ ഇഷ്ടപ്പെടുന്നു.
29. പ്രയാസമുള്ള ഗണിതശാസ്ത്രഭാഗങ്ങൾ കൂടുതൽ സമയമെടുത്ത് പഠിക്കാൻ ഞാൻ ബുദ്ധിമുട്ടാറില്ല.
30. ഗണിതശാസ്ത്രപരീക്ഷയ്ക്ക് എങ്ങനെയെങ്കിലും ജയിച്ചാൽ മതി എന്ന മനോഭാവമാണ് എനിക്കുള്ളത്.
31. ഗണിതശാസ്ത്രപ്രദർശനങ്ങൾ കാണാൻ പോകുന്നത് എനിക്കിഷ്ടമാണ്.
32. ടീച്ചറിന്റെ സഹായം കൂടാതെ പാഠപുസ്തകത്തിലെ പരിശീലന പ്രശ്നങ്ങൾ ചെയ്യാൻ ശ്രമിക്കാറുണ്ട്.
33. സ്കൂൾ വിദ്യാഭ്യാസത്തിനുശേഷം ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട മേഖലയിൽ പഠനം തുടരാൻ ഞാൻ ഇഷ്ടപ്പെടുന്നില്ല.
34. ഗണിതശാസ്ത്രത്തേക്കാൾ മറ്റു വിഷയങ്ങൾ പഠിക്കാനാണ് എനിക്കു താല്പര്യം.
35. ഗണിതശാസ്ത്രപഠനം സിലബസ്സിൽ നിന്നു നീക്കംചെയ്തിരുന്നെങ്കിൽ നന്നായിരുന്നു.



APPENDIX X

SCALE OF ATTITUDE TOWARDS MATHEMATICS

DR. SANTHAMMA RAJU
PROFESSOR IN EDUCATION, UNIVERSITY OF CALICUT)
&
ANCEL MARIA
LECTURER
ST. THOMAS TRAINING COLLEGE,
PALA

നിർദ്ദേശങ്ങൾ

താഴെക്കൊടുത്തിരിക്കുന്ന പ്രസ്താവനകൾ ശ്രദ്ധാപൂർവ്വം വായിക്കുക. ഓരോ പ്രസ്താവനയ്ക്കും അഞ്ചു പ്രതികരണങ്ങൾ വീതം തന്നിരിക്കുന്നു. ഓരോന്നിനെ സംബന്ധിച്ചും നിങ്ങളുടെ പ്രതികരണം അതതു പ്രസ്താവനകളെ സൂചിപ്പിക്കുന്ന നമ്പറിനുനേരെ അനുയോജ്യമായ വൃത്തത്തിൽ X അടയാളമിട്ട് രേഖപ്പെടുത്തുക. എല്ലാ പ്രസ്താവനകൾക്കും ഉത്തരം രേഖപ്പെടുത്തേണ്ടതാണ്. ഒരു പ്രസ്താവനയ്ക്ക് ഒരു അഭിപ്രായം മാത്രമേ രേഖപ്പെടുത്താവൂ.

ആദ്യം അടയാളപ്പെടുത്തിയ X ചിഹ്നം തെറ്റായ സ്ഥാനത്ത് ആണെങ്കിൽ അതു തിരുത്തുന്നതിന് വൃത്തത്തിനു ചുറ്റും ഒരു □ വരയ്ക്കുക. അതിനുശേഷം ശരിയായ വൃത്തത്തിൽ X ചിഹ്നം അടയാളപ്പെടുത്തുക.

- 1. കണക്ക് അറിയാൽ പാടില്ലാത്തവർ അനുദിനജീവിതത്തിൽ വഞ്ചിക്കപ്പെടാൻ ഇടയുണ്ട്.
2. പത്രങ്ങളിലും മാസികകളിലും കാണുന്ന ഗണിതശാസ്ത്ര വിവരങ്ങൾ വായിക്കുവാൻ എനിക്ക് ഇഷ്ടമാണ്.
3. ഗണിതശാസ്ത്രക്ലാസ്സുകൾ എനിക്കു വിരസതയും മടുപ്പും ഉളവാക്കുന്നു.
4. ഗണിതശാസ്ത്രത്തിലെ ഗൃഹപാഠങ്ങൾ ചെയ്യാൻ എനിക്കു താല്പര്യമില്ല.
5. ജ്യോമിതീയ രൂപങ്ങൾ വരച്ച് ചായം കൊടുക്കുന്നത് എന്റെ ഒരു വിനോദമാണ്.
6. പ്രസിദ്ധീകരണങ്ങളിൽ കാണാവുന്ന കണക്കിലെ കളികൾ എന്ന പംക്തി ഞാൻ വായിക്കാറുണ്ട്.
7. സഹപാഠികൾക്ക് കണക്കിലെ സംശയങ്ങൾ തീർത്തുകൊടുക്കാൻ എനിക്കിഷ്ടമാണ്.
8. ഗണിതശാസ്ത്ര ക്ലാസ്സിൽ അദ്ധ്യാപകൻ പൊതുവിൽ ചോദ്യം ചോദിക്കുമ്പോൾ എന്റെ ഊഴമെന്നു തോന്നിയാലേ ഞാൻ അതേക്കുറിച്ചു ചിന്തിക്കാറുള്ളൂ.
9. വിഷമുള്ള കണക്കുകൾ സഹപാഠികളുമായി ചർച്ച ചെയ്യുവാൻ എനിക്കിഷ്ടമില്ല.
10. ഗണിതശാസ്ത്രതത്വങ്ങളെ ആസ്പദമാക്കി മനോഹരമായ ചിത്രങ്ങൾ ഞാൻ വരയ്ക്കാറുണ്ട്.
11. കണക്കുകൾ ചെയ്യാനുള്ള എളുപ്പവഴി കണ്ടുപിടിക്കാൻ എനിക്കു താല്പര്യമുണ്ട്.

12. ഗണിതശാസ്ത്രത്തിന്റെ പ്രാധാന്യത്തെക്കുറിച്ച് കൂട്ടുകാരെ ബോധവാന്മാരാക്കാറുണ്ട്.
13. ഗണിതശാസ്ത്രക്ലാസ്സുകളെപ്പറ്റി ആലോചിക്കുന്നതുപോലും എനിക്ക് അരോചകമാണ്.
14. ഗണിതപ്രശ്നങ്ങൾ കൂട്ടുകളെക്കൊണ്ടുതന്നെ ചെയ്യിക്കുന്ന അദ്ധ്യാപകരെ ഞാൻ ഇഷ്ടപ്പെടുന്നില്ല.
15. ഗണിതശാസ്ത്രജ്ഞന്മാരുടെ പടങ്ങൾ ശേഖരിക്കുന്നത് എനിക്കു ഇഷ്ടമാണ്.
16. മറ്റു ശാസ്ത്രവിഷയങ്ങളുടെ പഠനത്തിന് ഗണിതശാസ്ത്രപഠനം അത്യാവശ്യമാണ്.
17. ഗണിതശാസ്ത്രതത്വങ്ങൾ കാര്യകാരണങ്ങളെയല്ല വെറും നിരീക്ഷണങ്ങളെയാണ് ആശ്രയിക്കുന്നത്.
18. ഗണിതശാസ്ത്രത്തിന് സൗന്ദര്യമകമായ ഒരു വശം ഉണ്ട് എന്ന് എനിക്കും തോന്നുന്നില്ല.
19. ഗണിതത്തിന് നിത്യജീവിതവുമായുള്ള ബന്ധത്തെപ്പറ്റി കൂട്ടുകാരുമായി സംസാരിക്കാറുണ്ട്.
20. ഗണിതശാസ്ത്രത്തിലെ കണ്ടുപിടിത്തങ്ങൾ നടത്തുണവരെപ്പറ്റി കൂടുതൽ അറിയുവാൻ ഞാൻ ശ്രമിക്കാറുണ്ട്.
21. സമയം കിട്ടുമ്പോൾ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട പുസ്തകങ്ങൾ വായിക്കാൻ താല്പര്യമാണ്.
22. മാതാപിതാക്കളുടെ നിർബന്ധം നിമിത്തമാണ് ഞാൻ ഗണിതശാസ്ത്രപാഠങ്ങൾ വീട്ടിൽ വെച്ച് വായിക്കുന്നത്.
23. ഗണിതശാസ്ത്രക്ലബ്ബുകളിൽ സജീവമായി പ്രവർത്തിക്കാൻ എനിക്കു താല്പര്യമാണ്.
24. ഗണിതശാസ്ത്രതത്വങ്ങൾ, ഫോർമുലകൾ ഇവ ഹൃദിസ്ഥമാക്കുവാൻ എനിക്കു താല്പര്യമാണ്.
25. ഗണിതശാസ്ത്ര കിസ്മത്തരങ്ങളിൽ പങ്കെടുക്കാൻ ഞാൻ ഇഷ്ടപ്പെടുന്നു.
26. പ്രയാസമുള്ള ഗണിതശാസ്ത്രഭാഗങ്ങൾ കൂടുതൽ സമയമെടുത്ത് പഠിക്കാൻ ഞാൻ ബുദ്ധിമുട്ടാറില്ല.
27. ഗണിതശാസ്ത്രപരീക്ഷയ്ക്ക് എങ്ങനെയെങ്കിലും ജയിച്ചാൽ മതി എന്ന മനോഭാവമാണ് എനിക്കുള്ളത്.
28. ഗണിതശാസ്ത്രപ്രദർശനങ്ങൾ കാണാൻ പോകുന്നത് എനിക്കിഷ്ടമാണ്.
29. ടീച്ചറിന്റെ സഹായം കൂടാതെ പഠപുസ്തകത്തിലെ പരിശീലന പ്രശ്നങ്ങൾ ചെയ്യാൻ ശ്രമിക്കാറുണ്ട്.
30. സ്കൂൾ വിദ്യാഭ്യാസത്തിനുശേഷം ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട മേഖലയിൽ പഠനം തുടരാൻ ഞാൻ ഇഷ്ടപ്പെടുന്നില്ല.
31. ഗണിതശാസ്ത്രത്തേക്കാൾ മറ്റു വിഷയങ്ങൾ പഠിക്കാനാണ് എനിക്കു താല്പര്യം.
32. ഗണിതശാസ്ത്രപഠനം സിലബസ്സിൽ നിന്നു നീക്കംചെയ്തിരുന്നെങ്കിൽ നന്നായിരുന്നു.



APPENDIX XI

SCALE OF ATTITUDE TOWARDS MATHEMATICS

Dr. Santhamma Raju
Professor in Education
University of Calicut

Ansel Maria
Lecturer
St. Thomas Training college,
Pala.

INSTRUCTIONS

- * This scale consists of 32 statements related to mathematics. Each statement has five alternative responses - Strongly agree, Agree, Undecided, Disagree and strongly Disagree. Read each statement and decide how far the matter is true as far as you are concerned.
 - * Put a 'X' mark with in the circle against the response you feel correct for each statements.
 - * If you find that you have marked wrong and want to change it, put a around the circle and put the 'X' in the correct place.
 - * Mark the responses for every statement.
1. For those ignore of mathematics, there is a chance of being cheated in their day to day life.
 2. I like to read the articles relating to mathematical details that come in magazines and newspapers.
 3. I feel so bored and bothered over mathematics classes.
 4. I am not interested in doing the problems or assignments in mathematics.
 5. It is my pastime to draw and paint geometrical figures.
 6. I used to read the column the puzzles in mathematics, of the periodicals.
 7. I like to help my classmates to clear their doubts in mathematics.
 8. When it comes to my turn only, I think about the question that is asked in the mathematics class.

9. I don't like to discuss the difficult mathematical problems with my friends.
10. I used to draw beautiful pictures based on the mathematical principles.
11. I am very much interested to find out the short cut ways to work out problems.
12. I make my friends aware of the significance of mathematics.
13. It is allergic for me even to think about mathematics classes.
14. I don't like the mathematics teachers who make the student do the problems themselves.
15. I like to collect the photographs of the mathematicians.
16. The study of mathematics is necessary for the study of other scientific subjects.
17. Mathematical principles depend mainly on observations and not on reasons.
18. I don't think mathematics has any artistic side to it.
19. I talk about the relation of mathematics to everyday life with my friends.
20. I really try to know more about the mathematicians who find out new theories.
21. During my leisure time, I like to read books related to mathematics.
22. I read mathematics at home, only due to compulsion of my parents.
23. I am interested to take an active part in the mathematics club activities.
24. I like to learn by heart the formula and principles in mathematics.
25. I like to participate in mathematics quiz competitions.
26. I don't take the trouble of spending more time on difficult portions of mathematics.
27. I am satisfied with a just minimum pass in mathematics.
28. I like to see the exhibitions on mathematics.
29. I try to do the exercises in mathematics texts without the assistance of the teacher.
30. After my schooling, I don't like to go for any course of studies related to mathematics.
31. I prefer the study of other subjects to mathematics.
32. I wish the study of mathematics removed from the syllabus.

ATTITUDE TOWARDS MATHEMATICS
DEPARTMENT OF EDUCATION, UNIVERSITY OF CALICUT

SCORE SHEET

പേര്.....

വയസ്സ്.....

സ്കൂൾ.....

ആൺകുട്ടി /പെൺകുട്ടി

നമ്പർ	ശക്തനായി യോജിക്കുന്നു	യോജിക്കുന്നു	തീർച്ചയില്ല	വിയോജിക്കുന്നു	ശക്തനായി വിയോജിക്കുന്നു
01	0	0	0	0	0
02	0	0	0	0	0
03	0	0	0	0	0
04	0	0	0	0	0
05	0	0	0	0	0
06	0	0	0	0	0
07	0	0	0	0	0
08	0	0	0	0	0
09	0	0	0	0	0
10	0	0	0	0	0
11	0	0	0	0	0
12	0	0	0	0	0
13	0	0	0	0	0
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	0	0	0	0	0
22	0	0	0	0	0
23	0	0	0	0	0
24	0	0	0	0	0
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
31	0	0	0	0	0
32	0	0	0	0	0

APPENDIX XIII

CLASS ROOM ENVIRONMENT INVENTORY FOR MATHEMATICS

DR. SANTHAMMA RAJU

PROFESSOR IN EDUCATION UNIVERSITY OF CALICUT

&

ANCEL MARIA

നിർദ്ദേശങ്ങൾ

താഴെക്കൊടുത്തിരിക്കുന്ന പ്രസ്താവനകൾ നിങ്ങളുടെ ക്ലാസ് മുറിയിലെ ഗണിതശാസ്ത്ര പഠനവുമായി ബന്ധപ്പെട്ടതാണ്. ഓരോ പ്രസ്താവനയ്ക്കും മൂന്ന് പ്രതികരണങ്ങൾ വീതം കൊടുത്തിരിക്കുന്നു. ഓരോന്നും ശ്രദ്ധാപൂർവ്വം വായിക്കുക. നിങ്ങളുടെ പ്രതികരണം അതതു പ്രസ്താവനകളെ സൂചിപ്പിക്കുന്ന നമ്പറിനെതിരെ അനുയോജ്യമായ വൃത്തത്തിൽ X അടയാളമിട്ട് രേഖപ്പെടുത്തുക. ഒരു പ്രസ്താവനയ്ക്ക് ഒരു അഭിപ്രായം മാത്രമേ രേഖപ്പെടുത്താവൂ.

ആദ്യം അടയാളപ്പെടുത്തിയ X ചിഹ്നം തെറ്റായ സ്ഥാനത്ത് ആയിരുന്നു എങ്കിൽ അതു തിരുത്തുന്നതിന് വൃത്തത്തിനു ചുറ്റും ഒരു □ വരയ്ക്കുക. അതിനുശേഷം ശരിയായ വൃത്തത്തിൽ X ചിഹ്നം അടയാളപ്പെടുത്തുക. എല്ലാ പ്രസ്താവനകൾക്കും ഉത്തരം രേഖപ്പെടുത്തേണ്ടതാണ്.

1. ക്ലാസ്സുകളുടെ ആരംഭത്തിൽ തന്നെ പാഠഭാഗവുമായി ബന്ധപ്പെട്ടു കുട്ടികളുടെ മുന്നറിവ് ഗണിതശാസ്ത്ര അദ്ധ്യാപകൻ പരിശോധിക്കാറുണ്ട്.
2. മുന്നറിവ് കുറഞ്ഞ കുട്ടികൾക്ക് അവ നൽകിയശേഷമാണ് അദ്ധ്യാപകൻ പാഠഭാഗത്തേക്ക് കടക്കുന്നത്.
3. കുട്ടികൾ ചിന്തിച്ച് ഉത്തരം നൽകത്തക്ക രീതിയിലുള്ള ചോദ്യങ്ങളാണ് അദ്ധ്യാപകൻ ചോദിക്കുന്നത്.
4. കുട്ടികളുടെ ചിന്താശക്തിക്കനുസരണം ഗണിതശാസ്ത്ര പ്രശ്നങ്ങൾക്ക് പരിഹാരം കണ്ടെത്തുവാൻ അദ്ധ്യാപകൻ അനുവദിക്കാറില്ല.
5. ക്ലാസ്സിൽ ശൃംഖലകളായി തിരിച്ച് ഗണിതശാസ്ത്ര പ്രശ്നങ്ങൾ ചർച്ചചെയ്യാറില്ല.
6. ഗണിതശാസ്ത്ര പ്രശ്നപരിഹാരത്തിന് ആവശ്യമായ വസ്തുതകൾ ശേഖരിക്കുവാൻ അദ്ധ്യാപകൻ കുട്ടികളെ പരിശീലിപ്പിക്കുന്നുണ്ട്.
7. സ്കൂളിലുള്ള പഠനോപകരണങ്ങൾക്കു പുറമെ, ഗണിതശാസ്ത്ര അദ്ധ്യാപകൻ പാഠഭാഗവുമായി ബന്ധപ്പെട്ട ചാർട്ടുകൾ, ചിത്രങ്ങൾ, മോഡലുകൾ എന്നിവ ഉപയോഗിച്ച് പഠിപ്പിക്കാറുണ്ട്.
8. പുതിയ പഠനോപകരണങ്ങൾ നിർമ്മിക്കുവാൻ അദ്ധ്യാപകൻ കുട്ടികൾക്ക് പ്രോത്സാഹനവും മാർഗ്ഗനിർദ്ദേശങ്ങളും നൽകാറുണ്ട്.
9. ഗണിതശാസ്ത്രസംബന്ധമായ പാഠ്യതര പ്രശ്നങ്ങൾ ചെയ്യുവാൻ അദ്ധ്യാപകൻ പരിശീലിപ്പിക്കാറില്ല.
10. ക്ലാസ്സിൽ ചെയ്യുന്ന പ്രശ്നങ്ങളെ എന്ത്, എന്തിന്, എങ്ങനെ എന്നു ചിന്തിപ്പിച്ച് ഉത്തരം കണ്ടുപിടിക്കുവാൻ ഗണിതശാസ്ത്ര അദ്ധ്യാപകൻ കുട്ടികളെ പരിശീലിപ്പിക്കാറില്ല.
11. ചർച്ചയ്ക്കു യോജിച്ച ഗണിതശാസ്ത്ര പാഠഭാഗങ്ങളിൽ കുട്ടികൾക്ക് അതിനുള്ള പരിശീലനം നൽകുന്നുണ്ട്.
12. ഓരോ ഗണിതശാസ്ത്ര പാഠഭാഗം പഠിക്കുമ്പോഴും നിത്യജീവിതത്തിൽ അതിനുള്ള ഉപയോഗം അദ്ധ്യാപകൻ മനസ്സിലാക്കിത്തരാറുണ്ട്.
13. ഗണിതശാസ്ത്രക്ലബ്ബുകൾ സ്കൂളിൽ പ്രവർത്തിക്കുന്നുണ്ട്.
14. ഗണിതശാസ്ത്രക്ലബ്ബുകളുടെ പ്രവർത്തനത്തിനുവേണ്ട പ്രോത്സാഹനവും സഹായസഹകരണങ്ങളും അദ്ധ്യാപകൻ നൽകുന്നില്ല.
15. ഗണിതശാസ്ത്ര പഠനത്തിൽ പിന്നോക്കം നില്ക്കുന്ന കുട്ടികൾക്ക് അദ്ധ്യാപകൻ പ്രത്യേക പരിശീലനം നൽകാറില്ല.

16. ക്ലാസ്സിൽ പഠനഗ്രൂപ്പിന്റെ ലീഡറായി പ്രവർത്തിക്കാൻ അവസരം ലഭിക്കാറുണ്ട്.
17. ഗണിതശാസ്ത്രക്ലബ്ബുകളുടെ അടിസ്ഥാനത്തിൽ ചർച്ചാക്ലാസ്സുകൾ സംഘടിപ്പിക്കാറുണ്ട്.
18. ഓരോ അധ്യായവും പഠിപ്പിച്ചു തീരുമ്പോൾ അധ്യാപകൻ ക്ലാസ് പരീക്ഷ നടത്താറുണ്ട്.
19. പരീക്ഷാപേപ്പറുകൾ കൃത്യമായി മുദ്രണിർണ്ണയം ചെയ്തു തരാറില്ല.
20. പരീക്ഷാപേപ്പറുകൾ മടക്കിത്തരുമ്പോൾ ഉത്തരക്കടലാസിൽ വന്നിട്ടുള്ള തെറ്റുകൾ, അധ്യാപകൻ, ഓരോ കുട്ടിക്കും മനസ്സിലാക്കിക്കൊടുക്കാറില്ല.
21. ക്ലാസ്സിൽ സംശയങ്ങൾ ചോദിക്കുന്നവരെ അധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
22. അധ്യാപകൻ ഗൃഹപഠനം നൽകുകയും അവ പരിശോധിച്ച് തെറ്റുകൾ തിരുത്തുകയും ചെയ്യാറുണ്ട്.
23. ഓരോ കുട്ടിയുടെയും ഗണിതശാസ്ത്ര പഠനത്തിൽ വ്യക്തിപരമായ താല്പര്യം അധ്യാപകൻ കാണിക്കാറുണ്ട്.
24. ഗണിതശാസ്ത്രത്തിലെ എന്റെ സംശയങ്ങൾക്ക് ഉത്തരം കണ്ടെത്തുവാൻ അധ്യാപകൻ സഹായിക്കാറില്ല.
25. ക്ലാസ്സിൽ ആവശ്യമായ ബഞ്ച്, ഡസ്ക് ഇവ ഇല്ല.
26. ഗണിതശാസ്ത്ര വിഷയവുമായി ബന്ധപ്പെട്ട മറ്റു പുസ്തകങ്ങൾ വായിക്കുവാൻ അധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
27. റേഡിയോ, ടെലിവിഷൻ തുടങ്ങിയവയിൽ പ്രക്ഷേപണം ചെയ്യപ്പെടുന്ന ഗണിതശാസ്ത്രസംബന്ധമായ ക്ലാസ്സുകൾ, അഭിമുഖം, കിസ് എന്നിവ ശ്രദ്ധിക്കുവാൻ അധ്യാപകൻ ഉപദേശിക്കാറുണ്ട്.
28. ഗണിതശാസ്ത്ര പ്രദർശനങ്ങളിൽ പ്രദർശിപ്പിക്കുവാനുള്ള ഗണിതശാസ്ത്ര ഉപകരണങ്ങൾ, മാതൃകകൾ, ചാർട്ടുകൾ, പ്രോജക്റ്റുകൾ തുടങ്ങിയവ നിർമ്മിക്കുവാൻ അധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
29. സ്കൂളിൽ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട പുസ്തകങ്ങളുള്ള ലൈബ്രറി ഇല്ല.
30. ക്ലാസ്സിൽ നല്ല ബ്ലാക്ക് ബോർഡ് ഇല്ല.
31. അനുദിനജീവിതത്തിൽ ഗണിതശാസ്ത്രത്തിനുള്ള പങ്ക് ക്ലാസ്സിൽ ചർച്ചാവിഷയമാക്കാറുണ്ട്.
32. ഗണിതശാസ്ത്ര വസ്തുതകൾ മറ്റു ശാസ്ത്രങ്ങളുമായി ബന്ധപ്പെടുത്തി ക്ലാസ്സിൽ അവതരിപ്പിക്കാറുണ്ട്.
33. ഔദ്യോഗിക രൂപങ്ങൾ വരയ്ക്കുമ്പോൾ എപ്പോഴും അനുയോജ്യമായ ഉപകരണം ഉപയോഗിക്കുവാൻ അധ്യാപകൻ നിർബന്ധിക്കാറുണ്ട്.
34. ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട പ്രസ്താവനകൾ, പടങ്ങൾ, ഗ്രാഫുകൾ എന്നിവ വിശദീകരിക്കാനുള്ള അവസരം ക്ലാസ്സിൽ ലഭിക്കാറില്ല.
35. പാഠഭാഗത്തിലെ കംപ്യൂട്ടേഷൻ എന്ന ഭാഗം കംപ്യൂട്ടറിന്റെ സഹായത്തോടെ അല്ല അധ്യാപകൻ പഠിപ്പിച്ചത്.
36. ഗണിതശാസ്ത്രത്തിലെ പുതിയ കണ്ടുപിടിത്തങ്ങളുടെയും സംഭവങ്ങളുടെയും വിവരങ്ങളടങ്ങിയ പേപ്പർ കട്ടിംഗ് ശേഖരിക്കുവാൻ അധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
37. ക്ലാസ്സിൽ തെറ്റായ ഉത്തരങ്ങൾ നൽകുന്ന കുട്ടികളെ അധ്യാപകൻ ഒരിക്കലും കളിയാക്കാറില്ല.
38. ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട കളികളിലൂടെ പഠനം രസകരമാക്കുവാൻ അധ്യാപകൻ ശ്രദ്ധിക്കാറുണ്ട്.
39. ജില്ല, സംസ്ഥാനതലങ്ങളിൽ നടത്തപ്പെടുന്ന ഗണിതശാസ്ത്ര പ്രദർശനങ്ങളിൽ പങ്കെടുക്കുവാൻ അധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറില്ല.
40. ഒരേ പ്രശ്നത്തിന് വ്യത്യസ്തമായ പരിഹാരമാർഗ്ഗങ്ങൾ കണ്ടുപിടിക്കുന്ന കുട്ടികളെ അധ്യാപകൻ നിരുത്സാഹപ്പെടുത്തുന്നു.
41. അധ്യാപകൻ സ്റ്റേഹത്തോടെ പെരുമാറുന്നു.
42. എല്ലാ കുട്ടികൾക്കും കേൾക്കത്തക്ക രീതിയിലാണ് അധ്യാപകൻ ക്ലാസ്സെടുക്കുന്നത്.
43. പാഠഭാഗത്തെ സംശയം ക്ലാസ്സുമുറിയിൽ വെച്ചു തന്നെ അധ്യാപകൻ തീർത്തു തരാറുണ്ട്.
44. പുറത്തു നിന്നുള്ള സ്വരം പഠനത്തിനു തടസ്സമാകുന്നുണ്ട്.
45. പരീക്ഷണ നിരീക്ഷണങ്ങളിലൂടെ ഗണിതശാസ്ത്രതത്വങ്ങൾ രൂപീകരിക്കുവാൻ അധ്യാപകൻ പരിശീലിപ്പിച്ചിട്ടില്ല.
46. ഗണിതശാസ്ത്രം വെറുതെ ഹൃദിസ്ഥമാക്കേണ്ട ഒരു ശാസ്ത്രമല്ലെന്നും, അത് കാര്യകാരണസഹിതം പരിശോധിച്ചു പഠിക്കേണ്ടതാണെന്നും ബോധ്യപ്പെടുത്തിത്തന്നിട്ടുണ്ട്.

* *

APPENDIX XIV

CLASS ROOM ENVIRONMENT INVENTORY FOR MATHEMATICS

DR. SANTHAMMA RAJU

PROFESSOR IN EDUCATION UNIVERSITY OF CALICUT

&

ANCEL MARIA

LECTURER

ST. THOMAS TRAINING COLLEGE

PAI.A

നിർദ്ദേശങ്ങൾ

താഴെക്കൊടുത്തിരിക്കുന്ന പ്രസ്താവനകൾ നിങ്ങളുടെ ക്ലാസ് മുറിയിലെ ഗണിതശാസ്ത്ര പഠനവുമായി ബന്ധപ്പെട്ടതാണ്. ഓരോ പ്രസ്താവനയ്ക്കും മൂന്ന് പ്രതികരണങ്ങൾ വീതം കൊടുത്തിരിക്കുന്നു. ഓരോന്നും ശ്രദ്ധാപൂർവ്വം വായിക്കുക. നിങ്ങളുടെ പ്രതികരണം അതതു പ്രസ്താവനകളെ സൂചിപ്പിക്കുന്ന നമ്പറിനെതിരെ അനുയോജ്യമായ വൃത്തത്തിൽ X അടയാളമിട്ട് രേഖപ്പെടുത്തുക. ഒരു പ്രസ്താവനയ്ക്ക് ഒരു അഭിപ്രായം മാത്രമേ രേഖപ്പെടുത്താവൂ.

ആദ്യം അടയാളപ്പെടുത്തിയ X ചിഹ്നം തെറ്റായ സ്ഥാനത്ത് ആയിരുന്നു എങ്കിൽ അതു തിരുത്തുന്നതിന് വൃത്തത്തിനു ചുറ്റും ഒരു □ വരയ്ക്കുക. അതിനുശേഷം ശരിയായ വൃത്തത്തിൽ X ചിഹ്നം അടയാളപ്പെടുത്തുക. എല്ലാ പ്രസ്താവനകൾക്കും ഉത്തരം രേഖപ്പെടുത്തേണ്ടതാണ്.

1. ക്ലാസ്സുകളുടെ ആരംഭത്തിൽ തന്നെ പാഠഭാഗവുമായി ബന്ധപ്പെട്ടു കുട്ടികളുടെ മുന്നറിവ് ഗണിതശാസ്ത്ര അധ്യാപകൻ പരിശോധിക്കാറുണ്ട്.
2. മുന്നറിവ് കുറഞ്ഞ കുട്ടികൾക്ക് അവ നല്കിയശേഷമാണ് അധ്യാപകൻ പാഠഭാഗത്തേക്ക് കടക്കുന്നത്.
3. കുട്ടികളുടെ ചിന്താശക്തിക്കനുസരണം ഗണിതശാസ്ത്ര പ്രശ്നങ്ങൾക്ക് പരിഹാരം കണ്ടെത്തുവാൻ അധ്യാപകൻ അനുവദിക്കാറില്ല.
4. ക്ലാസ്സിൽ ഗ്രൂപ്പുകളായി തിരിച്ച് ഗണിതശാസ്ത്ര പ്രശ്നങ്ങൾ ചർച്ചചെയ്യാറില്ല.
5. ഗണിതശാസ്ത്ര പ്രശ്നപരിഹാരത്തിന് ആവശ്യമായ വസ്തുതകൾ ശേഖരിക്കുവാൻ അധ്യാപകൻ കുട്ടികളെ പരിശീലിപ്പിക്കുന്നുണ്ട്.
6. സ്കൂളിലുള്ള പഠനോപകരണങ്ങൾക്കു പുറമെ, ഗണിതശാസ്ത്ര അധ്യാപകൻ പാഠഭാഗവുമായി ബന്ധപ്പെട്ട ചാർട്ടുകൾ, ചിത്രങ്ങൾ, മോഡലുകൾ എന്നിവ ഉപയോഗിച്ച് പഠിപ്പിക്കാറുണ്ട്.
7. പുതിയ പഠനോപകരണങ്ങൾ നിർമ്മിക്കുവാൻ അധ്യാപകൻ കുട്ടികൾക്ക് പ്രോത്സാഹനവും മാർഗ്ഗനിർദ്ദേശങ്ങളും നല്കാറുണ്ട്.
8. ഗണിതശാസ്ത്രസംബന്ധമായ പാഠ്യേതര പ്രശ്നങ്ങൾ ചെയ്യുവാൻ അധ്യാപകൻ പരിശീലിപ്പിക്കാറില്ല.
9. ക്ലാസ്സിൽ ചെയ്യുന്ന പ്രശ്നങ്ങളെ എന്ത്, എന്തിന്, എങ്ങനെ എന്നു ചിന്തിപ്പിച്ച് ഉത്തരം കണ്ടുപിടിക്കുവാൻ ഗണിതശാസ്ത്ര അധ്യാപകൻ കുട്ടികളെ പരിശീലിപ്പിക്കാറില്ല.
10. ചർച്ചയ്ക്കു യോജിച്ച ഗണിതശാസ്ത്ര പാഠഭാഗങ്ങളിൽ കുട്ടികൾക്ക് അതിനുള്ള പരിശീലനം നൽകുന്നുണ്ട്.
11. ഓരോ ഗണിതശാസ്ത്ര പാഠഭാഗം പഠിക്കുമ്പോഴും നിത്യജീവിതത്തിൽ അതിനുള്ള ഉപയോഗം അധ്യാപകൻ മനസ്സിലാക്കിത്തരാറുണ്ട്.
12. ഗണിതശാസ്ത്രക്ലബ്ബുകൾ സ്കൂളിൽ പ്രവർത്തിക്കുന്നുണ്ട്.
13. ഗണിതശാസ്ത്രക്ലബ്ബുകളുടെ പ്രവർത്തനത്തിനുവേണ്ട പ്രോത്സാഹനവും സഹായസഹകരണങ്ങളും അധ്യാപകൻ നൽകുന്നില്ല.
14. ഗണിതശാസ്ത്ര പഠനത്തിൽ പിന്നോക്കം നില്ക്കുന്ന കുട്ടികൾക്ക് അധ്യാപകൻ പ്രത്യേക പരിശീലനം നൽകാറില്ല.

14-2
141

15. ക്ലാസ്സിൽ പഠനശൃംഖലിന്റെ ലിഡറായി പ്രവർത്തിക്കാൻ അവസരം ലഭിക്കാറുണ്ട്.-
16. ഗണിതശാസ്ത്രക്ലബ്ബുകളുടെ അടിസ്ഥാനത്തിൽ ചർച്ചാക്ലാസ്സുകൾ സംഘടിപ്പിക്കാറുണ്ട്.
17. ഓരോ അദ്ധ്യായവും പഠിപ്പിച്ചു തീരുമ്പോൾ അദ്ധ്യാപകൻ ക്ലാസ് പരീക്ഷ നടത്താറുണ്ട്.
18. പരിഷ്കാരപേപ്പറുകൾ കൃത്യമായി മൂല്യനിർണ്ണയം ചെയ്തു തരാറില്ല.
19. പരിഷ്കാരപേപ്പറുകൾ മടക്കിത്തരുമ്പോൾ ഉത്തരക്കടലാസിൽ വന്നിട്ടുള്ള തെറ്റുകൾ, അദ്ധ്യാപകൻ, ഓരോ കുട്ടിക്കും മനസ്സിലാക്കിക്കൊടുക്കാറില്ല.
20. അദ്ധ്യാപകൻ ഗൃഹപാഠം നൽകുകയും അവ പരിശോധിച്ച് തെറ്റുകൾ തിരുത്തുകയും ചെയ്യാറുണ്ട്.
21. ഓരോ കുട്ടിയുടെയും ഗണിതശാസ്ത്ര പഠനത്തിൽ വ്യക്തിപരമായ താല്പര്യം അദ്ധ്യാപകൻ കാണിക്കാറുണ്ട്.
22. ഗണിതശാസ്ത്രത്തിലെ എന്റെ സംശയങ്ങൾക്ക് ഉത്തരം കണ്ടെത്തുവാൻ അദ്ധ്യാപകൻ സഹായിക്കാറില്ല.
23. ക്ലാസ്സിൽ ആവശ്യമായ ബഞ്ച്, ഡസ്ക് ഇവ ഇല്ല.
24. ഗണിതശാസ്ത്ര വിഷയവുമായി ബന്ധപ്പെട്ട മറ്റു പുസ്തകങ്ങൾ വായിക്കുവാൻ അദ്ധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
25. റേഡിയോ, ടെലിവിഷൻ തുടങ്ങിയവയിൽ പ്രക്ഷേപണം ചെയ്യപ്പെടുന്ന ഗണിതശാസ്ത്രസംബന്ധമായ ക്ലാസ്സുകൾ, അഭിമുഖം, കിസ് എന്നിവ ശ്രദ്ധിക്കുവാൻ അദ്ധ്യാപകൻ ഉപദേശിക്കാറുണ്ട്.
26. ഗണിതശാസ്ത്ര പ്രദർശനങ്ങളിൽ പ്രദർശിപ്പിക്കുവാനുള്ള ഗണിതശാസ്ത്ര ഉപകരണങ്ങൾ, മാതൃകകൾ, ചാർട്ടുകൾ, പ്രോജക്റ്ററുകൾ തുടങ്ങിയവ നിർമ്മിക്കുവാൻ അദ്ധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
27. സ്കൂളിൽ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട പുസ്തകങ്ങളുള്ള ലൈബ്രറി ഇല്ല.
28. ക്ലാസ്സിൽ നല്ല ബ്ലാക്ക് ബോർഡ് ഇല്ല.
29. അനുദിനജീവിതത്തിൽ ഗണിതശാസ്ത്രത്തിനുള്ള പങ്ക് ക്ലാസ്സിൽ ചർച്ചാവിഷയമാക്കാറുണ്ട്
30. ഗണിതശാസ്ത്ര വസ്തുതകൾ മറ്റു ശാസ്ത്രങ്ങളുമായി ബന്ധപ്പെടുത്തി ക്ലാസ്സിൽ അവതരിപ്പിക്കാറുണ്ട്.
31. ജ്യോമിതീയ രൂപങ്ങൾ വരയ്ക്കുമ്പോൾ എപ്പോഴും അനുയോജ്യമായ ഉപകരണം ഉപയോഗിക്കുവാൻ അദ്ധ്യാപകൻ നിർബന്ധിക്കാറുണ്ട്.
32. ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട പ്രസ്താവനകൾ, പട്ടങ്ങൾ, ഗ്രാഫുകൾ എന്നിവ വിശദീകരിക്കാനുള്ള അവസരം ക്ലാസ്സിൽ ലഭിക്കാറില്ല.
33. പാഠശാലത്തിലെ കമ്പ്യൂട്ടേഷൻ എന്ന ഭാഗം കമ്പ്യൂട്ടറിന്റെ സഹായത്തോടെ അല്ല അദ്ധ്യാപകൻ പഠിപ്പിച്ചത്.
34. ഗണിതശാസ്ത്രത്തിലെ പുതിയ കണ്ടുപിടിത്തങ്ങളുടെയും സംഭവങ്ങളുടെയും വിവരങ്ങളടങ്ങിയ പേപ്പർ കട്ടിംഗ് ശേഖരിക്കുവാൻ അദ്ധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
35. ക്ലാസ്സിൽ തെറ്റായ ഉത്തരങ്ങൾ നൽകുന്ന കുട്ടികളെ അദ്ധ്യാപകൻ ഒരിക്കലും കളിയാക്കാറില്ല.
36. ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട കളികളിലൂടെ പാഠം രസകരമാക്കുവാൻ അദ്ധ്യാപകൻ ശ്രദ്ധിക്കാറുണ്ട്.
37. ജില്ല, സംസ്ഥാനതലങ്ങളിൽ നടത്തപ്പെടുന്ന ഗണിതശാസ്ത്ര പ്രദർശനങ്ങളിൽ പങ്കെടുക്കുവാൻ അദ്ധ്യാപകൻ പ്രോത്സാഹിപ്പിക്കാറില്ല.
38. ഒരേ പ്രശ്നത്തിന് വ്യത്യസ്തമായ പരിഹാരമാർഗ്ഗങ്ങൾ കണ്ടുപിടിക്കുന്ന കുട്ടികളെ അദ്ധ്യാപകൻ നിരുത്സാഹപ്പെടുത്തുന്നു.
39. അദ്ധ്യാപകൻ സ്റ്റേഹത്തോടെ പെരുമാറുന്നു.
40. പാഠശാലത്തെ സംശയം ക്ലാസ്സ്മുറിയിൽ വെച്ചു തന്നെ അദ്ധ്യാപകൻ തീർത്തു തരാറുണ്ട്.
41. പരീക്ഷണ നിരീക്ഷണങ്ങളിലൂടെ ഗണിതശാസ്ത്രതത്വങ്ങൾ രൂപീകരിക്കുവാൻ അദ്ധ്യാപകൻ പരിശീലിപ്പിച്ചിട്ടില്ല.
42. ഗണിതശാസ്ത്രം വെറുതെ ഹൃദിസ്വരം കേൾക്കേണ്ട ഒരു ശാസ്ത്രമല്ലെന്നും, അത് കാര്യകാരണസഹിതം പരിശോധിച്ചു പഠിക്കേണ്ടതാണെന്നും ബോധ്യപ്പെടുത്തിത്തന്നിട്ടുണ്ട്.

* *

14-11-22

APPENDIX XV

CLASS ROOM ENVIRONMENT INVENTORY FOR MATHEMATICS

Dr. Santhamma Raju
Professor in Education
University of Calicut

Ancel Maria
Lecturer
St. Thomas Training College,
Pala.

INSTRUCTIONS

- * This is an inventory related to your mathematics learning in the class room. Each statement has three responses - Agree, Undecided and Disagree.
 - * Put a 'X' mark within the circle against the response you feel correct for each statement.
 - * If you find you have marked wrongly and want to change it, put a around the circle and put 'X' in the correct place.
 - * Mark responses for every statement.
1. At the outset of the class itself the mathematics teacher tests the pupils previous knowledge relating to the topic of study.
 2. The teacher will switch on to the new topic only after imparting basic knowledge related to it.
 3. Teacher will not allow the pupils to find solutions to the mathematical problems according to their own mode of thinking.
 4. Mathematics problems are not discussed in groups in the class.
 5. The teacher trains the pupils to collect the data needed to solve the mathematical problems.
 6. In additions to the mathematical aids provided by the school the teacher uses other charts, diagrams, and models to teach.
 7. Teacher encourages and gives directions to the pupils in making new mathematical aids to study mathematics.
 8. Teacher does not give training to pupils to discuss and solve mathematical problems that are non-academic.
 9. Teacher does not train the pupils to think "What, why and how" of a problem to get the solution.

10. Pupils are given practice in discussing mathematical topics where it is needed.
11. The relevance of each topic in the present day to day life is stressed whenever a mathematical topic is taught.
12. Mathematics club function in our school.
13. The teacher does not give proper guidance and encouragement and co-operation in the working of the club.
14. Special care is not imparted to pupils who are weak in mathematics.
15. Pupils are given chances to become the leaders of the study groups.
16. Discussion classes are organised on the basis of the mathematics clubs.
17. After each chapter is taught, class test is conducted.
18. Proper evaluation of the answer sheet is not done by the teacher.
19. The teacher does not make each student understand the mistakes committed by him in the answer sheets while distributing the same.
20. The teacher gives home work and checks and corrects it.
21. The teacher takes personal individual interest in pupils for the study of mathematics.
22. The teacher does not help to find out the answers to the pupil's doubts in mathematics
23. The class lacks enough benches and desks.
24. Teacher encourages reading other books related to the study of mathematics.
25. Teacher advises to watch and listen to the programmes like quiz, classes and internews etc. That are telecast though the T.V and radio.
26. Teacher encourages and prompts to make equipments, models, charts, aids and projects to be exhibited in mathematics exhibitions.
27. Books related to mathematics are not available in the school library.
28. Class lacks a good black board.
29. The importance of mathematics in our daily life is discussed in the class.
30. Facts relating to mathematics are introduced in class relating it with the other science subjects.
31. Teacher insists on the use of apt instruments to draw geometrical figures.

32. In the class pupils do not get chance to explain the mathematical statements, diagrams and graphs.
33. The topic on 'computation' in the text is not taught with the help of a computer.
34. Teacher encourages to collect the paper cuttings on incidents and new discoveries in mathematics.
35. Teacher never teases children who come out with the wrong answers.
36. Teacher makes the class interested by introducing games related to mathematics.
37. The teacher never encourages to go for or to participate in the mathematics exhibition conducted in the district and state level.
38. Teacher discourages those children who come out with different methods in solving the same problem.
39. Teacher behaves in quite a loving way in the class.
40. Teacher clarifies the doubts regarding to the portions in the class itself.
41. Teacher has not given practice to form mathematical principles by observation and experimentation.
42. Teacher has made us aware that mathematics is not a science to be studied by heart but one to be logically examined and studied.

APPENDIX XVI

CLASS ROOM ENVIRONMENT INVENTORY FOR MATHEMATICS
DEPARTMENT OF EDUCATION, UNIVERSITY OF CALICUT

SCORE SHEET

നമ്പർ.....

വയസ്സ്.....

സ്കൂൾ.....

ആൺകുട്ടി /പെൺകുട്ടി

നമ്പർ	യോജിക്കുന്നു	തീർച്ചയില്ല	വിയോജിക്കുന്നു	നമ്പർ	യോജിക്കുന്നു	തീർച്ചയില്ല	വിയോജിക്കുന്നു
01	0	0	0	24	0	0	0
02	0	0	0	25	0	0	0
03	0	0	0	26	0	0	0
04	0	0	0	27	0	0	0
05	0	0	0	28	0	0	0
06	0	0	0	29	0	0	0
07	0	0	0	30	0	0	0
08	0	0	0	31	0	0	0
09	0	0	0	32	0	0	0
10	0	0	0	33	0	0	0
11	0	0	0	34	0	0	0
12	0	0	0	35	0	0	0
13	0	0	0	36	0	0	0
14	0	0	0	37	0	0	0
15	0	0	0	38	0	0	0
16	0	0	0	39	0	0	0
17	0	0	0	40	0	0	0
18	0	0	0	41	0	0	0
19	0	0	0	42	0	0	0
20	0	0	0				
21	0	0	0				
22	0	0	0				
23	0	0	0				

HOME ENVIRONMENT INVENTORY FOR MATHEMATICS

DR. SANTHAMMA RAJU
(PROFESSOR IN EDUCATION UNIVERSITY OF CALICUT)
&
ANCEL MARIA

നിർദ്ദേശങ്ങൾ

താഴെ തന്നിരിക്കുന്ന പ്രസ്താവനകൾ നിങ്ങളുടെ വീട്ടിലെ ഗണിതശാസ്ത്ര പഠനവുമായി ബന്ധപ്പെട്ടതാണ്. ഓരോ പ്രസ്താവനയ്ക്കും മൂന്ന് പ്രതികരണങ്ങൾ വീതം കൊടുത്തിരിക്കുന്നു. ഓരോന്നും ശ്രദ്ധാപൂർവ്വമായിക്കുക. നിങ്ങളുടെ പ്രതികരണം അതതു പ്രസ്താവനകളുടെ നേരെ തന്നിരിക്കുന്ന മൂന്ന് ഉത്തരങ്ങളിൽ അനുയോജ്യമായ വൃത്തത്തിൽ X അടയാളമിട്ട് രേഖപ്പെടുത്തുക.

1. ഗണിതശാസ്ത്രത്തിന്റെ നോട്ടുബുക്കുകൾ എന്റെ മാതാപിതാക്കൾ പരിശോധിക്കാറുണ്ട്.
2. ഗണിതശാസ്ത്ര പഠനത്തിൽ എനിക്കുണ്ടാകുന്ന സംശയങ്ങൾ നിവാരണം ചെയ്യുന്നതിൽ മാതാപിതാക്കൾ സഹായിക്കാറില്ല.
3. എന്റെ പഠനസമയത്ത് റേഡിയോ, T.V. ഇവയൊന്നും പ്രവർത്തിപ്പിക്കാതിരിക്കാൻ മാതാപിതാക്കൾ ശ്രദ്ധിക്കുന്നു.
4. സ്വസ്ഥമായി പഠിക്കുവാനുള്ള സൗകര്യം വീട്ടിൽ ഇല്ല.
5. റേഡിയോ, T.V. ഇവയിലൂടെയുള്ള ഗണിതശാസ്ത്രപാഠങ്ങൾ ശ്രദ്ധിക്കുവാൻ മാതാപിതാക്കൾ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
6. ഗണിതശാസ്ത്രത്തിന്റെ ഗൃഹപാഠങ്ങൾ ചെയ്യാൻ എന്റെ മാതാപിതാക്കൾ സഹായിക്കാറില്ല.
7. പാവ്യവസ്തുക്കളുമായി ബന്ധപ്പെട്ട ലഘു പരീക്ഷണ നിരീക്ഷണങ്ങൾക്ക് ആവശ്യമായ ഉപകരണങ്ങൾ മാതാപിതാക്കൾ വാങ്ങിത്തരാറുണ്ട്.
8. ഗണിതശാസ്ത്ര കിസ് പരിപാടികളിൽ സംബന്ധിക്കുവാൻ മാതാപിതാക്കൾ പ്രോത്സാഹിപ്പിക്കാറില്ല.
9. പഠിക്കാനുള്ള ഗണിതശാസ്ത്ര പുസ്തകങ്ങൾക്ക് പുറമെ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട മറ്റു പുസ്തകങ്ങൾ വാങ്ങിത്തരാറുണ്ട്.
10. ഗണിതശാസ്ത്ര പരീക്ഷയിൽ കിട്ടുന്ന മാർക്ക് പരിശോധിച്ചു മാതാപിതാക്കൾ വേണ്ട മാർഗ്ഗനിർദ്ദേശങ്ങൾ തരാറില്ല.
11. ഗണിതശാസ്ത്ര ക്ലാസ്സുകൾ നഷ്ടപ്പെട്ടാൽ ആ ക്ലാസ്സിലെ പാഠഭാഗങ്ങൾ അദ്ധ്യാപകരോടു ചോദിച്ചു മനസ്സിലാക്കാൻ മാതാപിതാക്കൾ നിഷ്കർഷിക്കാറുണ്ട്.

15

12. ഗണിതശാസ്ത്രത്തിൽ ഉന്നതപഠനം നടത്തിയാലുണ്ടാകുന്ന നേട്ടങ്ങളെക്കുറിച്ച് മാതാപിതാക്കൾ എന്ന ബോധ്യപ്പെടുത്താറില്ല.
13. ഗണിതശാസ്ത്ര പരീക്ഷയുടെ ഉത്തരക്കടലാസുകൾ പരിശോധിക്കുകയും തെറ്റായ ഉത്തരങ്ങൾ എഴുതിയിട്ടുള്ള ചോദ്യങ്ങളുടെ ശരിയായ ഉത്തരങ്ങൾ കണ്ടുപിടിച്ച് എഴുതുവാൻ ആവശ്യപ്പെടുകയും ചെയ്യാറുണ്ട്.
14. ഗണിതശാസ്ത്രത്തിലെ പുതിയ കണ്ടുപിടിത്തങ്ങളുടെയും സംഭവങ്ങളുടെയും പത്രക്കുറിപ്പുകൾ മാതാപിതാക്കൾ എന്റെ ശ്രദ്ധയിൽ പെടുത്താറില്ല.
15. ഗണിതശാസ്ത്രജ്ഞന്മാരുടെ ജീവചരിത്രങ്ങൾ, ഗണിതശാസ്ത്ര കഥകൾ തുടങ്ങിയവ മാതാപിതാക്കൾ പറഞ്ഞു കേൾപ്പിക്കാറുണ്ട്.
16. മാതാപിതാക്കൾ ഗണിതശാസ്ത്രാധ്യാപകനെ ഇടയ്ക്കിടെ കണ്ട് എന്റെ പഠനത്തിലുള്ള പുരോഗതിയെക്കുറിച്ച് അന്വേഷിക്കാറില്ല.
17. ഗണിതശാസ്ത്രകഥ വീട്ടിൽ ചർച്ചാവിഷയമാക്കാറുണ്ട്.
18. പഠന നിലവാരം മെച്ചപ്പെടുത്തുന്നതിന് അധ്യാപകൻ നൽകുന്ന മാർഗ്ഗനിർദ്ദേശങ്ങൾ എന്റെ പഠനക്രമത്തിൽ പ്രായോഗികമാക്കുവാൻ മാതാപിതാക്കൾ ശ്രദ്ധിക്കാറില്ല.
19. ഗണിതശാസ്ത്ര നിലങ്ങളുകൾ, വിജ്ഞാനകോശങ്ങൾ തുടങ്ങിയവ സംശയ നിവാരണത്തിന് ഉപയോഗപ്പെടുത്തുന്നതിനെക്കുറിച്ച് ഓർമ്മിപ്പിക്കാറുണ്ട്.
20. ലൈബ്രറിയിൽ നിന്ന് ഗണിതശാസ്ത്ര സംബന്ധമായ പുസ്തകങ്ങൾ കൊണ്ടുവന്നു തരാറില്ല.
21. ഗണിതശാസ്ത്രത്തിൽ ഉന്നത നിലവാരം പുലർത്തുന്ന വിദ്യാർത്ഥികളുമായി ചർച്ച ചെയ്ത് ഗണിത പ്രശ്നങ്ങൾക്ക് പരിഹാരം കണ്ടെത്താൻ മാതാപിതാക്കൾ എന്നോട് ആവശ്യപ്പെടാറുണ്ട്.
22. ഗണിതശാസ്ത്ര പരീക്ഷയിൽ ഉയർന്ന മാർക്ക് കിട്ടുമ്പോൾ മാതാപിതാക്കൾ അഭിനന്ദിക്കാറില്ല.
23. പരീക്ഷയിൽ മാർക്ക് കുറഞ്ഞുപോയാൽ നിരുത്സാഹപ്പെടുത്താറില്ല.
24. ബുദ്ധിമുട്ടുള്ള പാഠഭാഗങ്ങൾക്ക് റ്റുഷൻ ഏർപ്പെടുത്താറില്ല.



APPENDIX XVIII

HOME ENVIRONMENT INVENTORY FOR MATHEMATICS

DR. SANTHAMMA RAJU (PROFESSOR IN EDUCATION UNIVERSITY OF CALICUT) & ANCEL MARIA LECTURER ST. THOMAS TRAINING COLLEGE PALA

നിർദ്ദേശങ്ങൾ

താഴെ തന്നിരിക്കുന്ന പ്രസ്താവനകൾ നിങ്ങളുടെ വീട്ടിലെ ഗണിതശാസ്ത്ര പഠനവുമായി ബന്ധപ്പെട്ടതാണ്. ഓരോ പ്രസ്താവനയ്ക്കും മൂന്ന് പ്രതികരണങ്ങൾ വീതം കൊടുത്തിരിക്കുന്നു. ഓരോന്നും ശ്രദ്ധാപൂർവ്വമായി വായിക്കുക. നിങ്ങളുടെ പ്രതികരണം അതതു പ്രസ്താവനകളുടെ നേരെ തന്നിരിക്കുന്ന മൂന്ന് ഉത്തരങ്ങളിൽ അനുയോജ്യമായ വൃത്തത്തിൽ X അടയാളമിട്ട് രേഖപ്പെടുത്തുക.

- 1. ഗണിതശാസ്ത്രത്തിന്റെ നോട്ടുബുക്കുകൾ എന്റെ മാതാപിതാക്കൾ പരിശോധിക്കാറുണ്ട്.
2. ഗണിതശാസ്ത്ര പഠനത്തിൽ എനിക്കുണ്ടാകുന്ന സംശയങ്ങൾ നിവാരണം ചെയ്യുന്നതിൽ മാതാപിതാക്കൾ സഹായിക്കാറില്ല.
3. സമ്പന്നമായി പഠിക്കുവാനുള്ള സൗകര്യം വീട്ടിൽ ഇല്ല.
4. റേഡിയോ, T.V. ഇവയിലൂടെയുള്ള ഗണിതശാസ്ത്രപാഠങ്ങൾ ശ്രദ്ധിക്കുവാൻ മാതാപിതാക്കൾ പ്രോത്സാഹിപ്പിക്കാറുണ്ട്.
5. ഗണിതശാസ്ത്രത്തിന്റെ ഗൃഹപാഠങ്ങൾ ചെയ്യാൻ എന്റെ മാതാപിതാക്കൾ സഹായിക്കാറില്ല.
6. പാഠ്യവസ്തുക്കളുമായി ബന്ധപ്പെട്ട ലഘു പരീക്ഷണ നിരീക്ഷണങ്ങൾക്ക് ആവശ്യമായ ഉപകരണങ്ങൾ മാതാപിതാക്കൾ വാങ്ങിത്തരാറുണ്ട്.
7. ഗണിതശാസ്ത്ര കിസ് പരിപാടികളിൽ സംബന്ധിക്കുവാൻ മാതാപിതാക്കൾ പ്രോത്സാഹിപ്പിക്കാറില്ല.
8. പഠിക്കാനുള്ള ഗണിതശാസ്ത്ര പുസ്തകങ്ങൾക്ക് പുറമെ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട മറ്റു പുസ്തകങ്ങൾ വാങ്ങിത്തരാറുണ്ട്.
9. ഗണിതശാസ്ത്ര പരീക്ഷയിൽ കിട്ടുന്ന മാർക്ക് പരിശോധിച്ച് മാതാപിതാക്കൾ വേണ്ട മാർഗ്ഗനിർദ്ദേശങ്ങൾ തരാറില്ല.
10. ഗണിതശാസ്ത്ര ക്ലാസ്സുകൾ നഷ്ടപ്പെട്ടാൽ ആ ക്ലാസ്സിലെ പാഠഭാഗങ്ങൾ അദ്ധ്യാപകരോടു ചോദിച്ചു മനസ്സിലാക്കാൻ മാതാപിതാക്കൾ നിഷ്കർഷിക്കാറുണ്ട്.

11. ഗണിതശാസ്ത്രത്തിൽ ഉന്നതപഠനം നടത്തിയാലുണ്ടാകുന്ന നേട്ടങ്ങളെക്കുറിച്ച് മാതാപിതാക്കൾ എന്നെ ബോധ്യപ്പെടുത്താറില്ല.
12. ഗണിതശാസ്ത്ര പരീക്ഷയുടെ ഉത്തരക്കടലാസുകൾ പരിശോധിക്കുകയും തെറ്റായ ഉത്തരങ്ങൾ എഴുതിയിട്ടുള്ള ചോദ്യങ്ങളുടെ ശരിയായ ഉത്തരങ്ങൾ കണ്ടുപിടിച്ച് എഴുതുവാൻ ആവശ്യപ്പെടുകയും ചെയ്യാറുണ്ട്.
13. ഗണിതശാസ്ത്രത്തിലെ പുതിയ കണ്ടുപിടിത്തങ്ങളുടെയും സംഭവങ്ങളുടെയും പത്രക്കുറിപ്പുകൾ മാതാപിതാക്കൾ എന്റെ ശ്രദ്ധയിൽ പെടുത്താറില്ല.
14. ഗണിതശാസ്ത്രജ്ഞന്മാരുടെ ജീവചരിത്രങ്ങൾ, ഗണിതശാസ്ത്ര കഥകൾ തുടങ്ങിയവ മാതാപിതാക്കൾ പറഞ്ഞു കേൾപ്പിക്കാറുണ്ട്.
15. മാതാപിതാക്കൾ ഗണിതശാസ്ത്രാധ്യാപകനെ ഇടയ്ക്കിടെ കണ്ട് എന്റെ പഠനത്തിലുള്ള പുരോഗതിയെക്കുറിച്ച് അന്വേഷിക്കാറില്ല.
16. ഗണിതശാസ്ത്രകഥ വീട്ടിൽ ചർച്ചാവിഷയമാക്കാറുണ്ട്.
17. പഠന നിവാരണം മെച്ചപ്പെടുത്തുന്നതിന് അധ്യാപകൻ നൽകുന്ന മാർഗ്ഗനിർദ്ദേശങ്ങൾ എന്റെ പഠനക്രമത്തിൽ പ്രായോഗികമാക്കുവാൻ മാതാപിതാക്കൾ ശ്രമിക്കാറില്ല.
18. ഗണിതശാസ്ത്ര നിലങ്ങളുടെ, വിജ്ഞാനകോശങ്ങൾ തുടങ്ങിയവ സംശയ നിവാരണത്തിന് ഉപയോഗപ്പെടുത്തുന്നതിനെക്കുറിച്ച് ഓർമ്മിപ്പിക്കാറുണ്ട്.
19. ലൈബ്രറിയിൽ നിന്ന് ഗണിതശാസ്ത്ര സംബന്ധമായ പുസ്തകങ്ങൾ കൊണ്ടുവന്നു തരാറില്ല.
20. ഗണിതശാസ്ത്ര പരീക്ഷയിൽ ഉയർന്ന മാർക്ക് കിട്ടുമ്പോൾ മാതാപിതാക്കൾ അഭിനന്ദിക്കാറില്ല.
21. പരീക്ഷയിൽ മാർക്ക് കുറഞ്ഞുപോയാൽ നിരുത്സാഹപ്പെടുത്താറില്ല.
22. ബുദ്ധിമുട്ടുള്ള പാഠഭാഗങ്ങൾക്ക് റ്റുഷൻ ഏർപ്പെടുത്താറില്ല.



APPENDIX XIX

HOME ENVIRONMENT INVENTORY FOR MATHEMATICS

Dr. Santhamma Raju
Professor in Education
University of Calicut

Ancel Maria
Lecturer
St. Thomas Training College,
Pala.

INSTRUCTIONS

- * This inventory is related to your home environment in learning mathematics.
Each statement has three responses- Agree, Undecided and Disagree.
- * Put 'X' mark with in the circle against the response you feel correct for each statement.
- * If you find that you have marked wrongly and want to change it put a around the circle and put 'X' in the correct place.
- * Mark the responses for every statement.

1. My parents used to check my mathematics notebooks.
2. My parents do not help me to clarify my doubts in mathematics.
3. There is no convenience at home to study undisturbed.
4. Parents encourage me to listen to the mathematics lessons in the T. V & Radio.
5. They do not help to do my homework in mathematics.
6. Parents buy for me equipments to conduct simple experiments and observations in studies.
7. They do not encourage me to participate in mathematics quiz programmes.
8. Parents buy books related to mathematics than the prescribed mathematics texts.
9. Parents do not give the necessary guide lines to me after checking the answer sheets in mathematics.
10. My parents insists on my studying the portions that I missed, when I was absent from class.
11. My parents donot convince me about the possible achievements that I can attain if I go for higher studies in mathematics.

12. They would check my answer papers of mathematics tests and would ask me to find out the correct answers where I have gone wrong and to write it down.
13. They won't bring to my notice the articles regarding any new incidents and discoveries in mathematics that come in the news papers.
14. They use to tell me the stories and life history of the mathematicians.
15. They do not bother to consult my mathematics teachers and ask about my performance in mathematics.
16. We use to discuss mathematics stories at home.
17. Parents do not care to help me practice the guidelines imparted by my teachers to improve my studies.
18. They would remind me to use and refer to the mathematics dictionary and encyclopedia to clarify my doubts.
19. They do not bring books related to mathematics from the library.
20. Parents will not appreciate me when I get low marks in mathematics.
21. Parents will not discourage me when I get low marks in mathematics.
22. At home, no tuition is arranged for difficult topics.

APPENDIX XX

**HOME ENVIRONMENT INVENTORY FOR MATHEMATICS
DEPARTMENT OF EDUCATION, UNIVERSITY OF CALICUT**

SCORE SHEET

പേര്.....

വയസ്സ്.....

സ്കൂൾ.....

ആൺകുട്ടി /പെൺകുട്ടി

നമ്പർ	യോജിക്കുന്നു	തീർച്ചയില്ല	വിയോജിക്കുന്നു	നമ്പർ	യോജിക്കുന്നു	തീർച്ചയില്ല	വിയോജിക്കുന്നു
01	0	0	0	14	0	0	0
02	0	0	0	15	0	0	0
03	0	0	0	16	0	0	0
04	0	0	0	17	0	0	0
05	0	0	0	18	0	0	0
06	0	0	0	19	0	0	0
07	0	0	0	20	0	0	0
08	0	0	0	21	0	0	0
09	0	0	0	22	0	0	0
10	0	0	0				
11	0	0	0				
12	0	0	0				
13	0	0	0				

HOME PRACTICE INVENTORY FOR MATHEMATICS

DR. SANTHAMMA RAJU
(PROFESSOR IN EDUCATION UNIVERSITY OF CALICUT)
&
ANCEL MARIA

നിർദ്ദേശങ്ങൾ

ഗണിത ശാസ്ത്ര പഠന രീതികളെപ്പറ്റിയുള്ള 25 പ്രസ്താവനകളാണ് തന്നിരിക്കുന്നത്. ഓരോ പ്രസ്താവനയ്ക്കും മൂന്ന് പ്രതികരണങ്ങൾ വീതം ഉണ്ട്. 'എല്ലായ്പ്പോഴും', 'ചിലപ്പോൾ', 'ഒരിക്കലുമില്ല.' ഓരോ പ്രസ്താവനയും വായിച്ച് നിങ്ങളെ സംബന്ധിച്ചിടത്തോളം എത്ര മാത്രം ശരിയാണെന്നു തീരുമാനിച്ചശേഷം അഭിപ്രായം രേഖപ്പെടുത്തുക.

ചോദ്യവലിയിലെ ക്രമനമ്പർ നോക്കി ഉത്തരക്കടലാസിൽ ആ ക്രമനമ്പറിന് എതിരെയുള്ള വൃത്തങ്ങളിൽ നിങ്ങളുടെ പ്രതികരണത്തിനു താഴെയുള്ള വൃത്തത്തിനുള്ളിൽ X രേഖപ്പെടുത്തുക.

ഓരോ പ്രസ്താവനയ്ക്കും ഒരു അഭിപ്രായ മാത്രമേ രേഖപ്പെടുത്തുവാൻ പാടുള്ളൂ. തെറ്റായ സ്ഥാനത്ത് X അടയ്ക്കപ്പെടുത്തിയാൽ ചിഹ്നം ഇട്ടിരിക്കുന്ന വൃത്തത്തിന്റെ ചുറ്റും ഒരു □ (ചതുരം) വരയ്ക്കുക അതിനുശേഷം ശരിയായ ഉത്തരത്തിനുള്ള ചിഹ്നം അനുയോജ്യമായ വൃത്തത്തിനുള്ളിൽ ഇടുക.

1. എല്ലാ ദിവസവും കൃത്യസമയത്ത് ഞാൻ പഠനം ആരംഭിക്കാറുണ്ട്.
2. പഠിക്കാൻ എനിക്ക് നിശ്ചയിതമായ ഒരു സ്ഥലമുണ്ട്.
3. പഠനത്തിന് ഒരു ടൈംടേബിൾ മുൻകൂട്ടി തയ്യാറാക്കി പഠിക്കാറുണ്ട്.
4. ഗണിത ശാസ്ത്ര പഠനത്തിന് ഒരു കൃത്യസമയം ടൈംടേബിളിൽ ഉൾക്കൊള്ളിച്ചിട്ടില്ല.
5. നിത്യജീവിതത്തിലെ സംഭവങ്ങൾക്ക് ഞാൻ പഠിച്ച ഗണിതശാസ്ത്ര ഭാഗവുമായുള്ള ബന്ധം കണ്ടു പിടിക്കാൻ ശ്രമിക്കാറില്ല.
6. ഗണിത ശാസ്ത്രം പഠിക്കുമ്പോൾ അവയിലെ പ്രധാന ആശയങ്ങൾ എളുപ്പം ഓർമ്മിക്കുവാൻ വേണ്ടി ചില സൂത്രങ്ങൾ ഉപയോഗിക്കാറുണ്ട്.
7. പാഠഭാഗങ്ങൾ പഠിച്ചശേഷം അതതു ഭാഗത്തെ പ്രധാന ആശയങ്ങൾ കുറിച്ചു വയ്ക്കാറുണ്ട്.
8. സംശയ നിവാരണത്തിനായി ഗണിതശാസ്ത്രം അറിയാവുന്നവരെ കണ്ട് എന്റെ സംശയങ്ങൾക്ക് ഉത്തരം കണ്ടെത്താറുണ്ട്.
9. എന്റെ ഗണിതശാസ്ത്ര പഠനത്തിന് സഹായകരമായ പുസ്തകങ്ങൾ, മാസികകൾ തുടങ്ങിയവ ഞാൻ വാങ്ങാറില്ല.
10. ഓരോ ഗണിതശാസ്ത്രഭാഗവും പഠിക്കുമ്പോൾ അതുമാത്രം ബന്ധപ്പെട്ട മറ്റു ഭാഗങ്ങളോട് അവയെ താരതമ്യപ്പെടുത്തി ചിന്തിക്കാറില്ല.

11. വിശമവേളകളിൽ മാതാപിതാക്കളുമായി ഗണിതശാസ്ത്ര വിഷയങ്ങളെക്കുറിച്ച് ചർച്ച ചെയ്യാറുണ്ട്.
12. ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട റോഡിയോ വാർത്തകളും T.V. പരിപാടികളും കൃത്യമായി ശ്രദ്ധിക്കാറുണ്ട്.
13. ദിനപത്രങ്ങളിൽ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട ലേഖനങ്ങൾ വരുമ്പോഴൊക്കെ അവ വായിക്കാറുണ്ട്.
14. അസാധ്യമെന്ന് മറ്റുള്ളവർ പറയുന്ന ഗണിതശാസ്ത്ര പ്രശ്നങ്ങൾക്ക് പരിഹാരം കണ്ടെത്തുവാൻ താല്പര്യം കാണിക്കാറില്ല.
15. ഓരോ ദിവസവും ക്ലാസ്സിൽ പഠിച്ച ഗണിതശാസ്ത്ര ഭാഗവുമായി ബന്ധപ്പെട്ട പ്രശ്നങ്ങൾ പാഠപുസ്തകത്തിലെ അഭ്യാസഭാഗത്തു നിന്ന് സ്വയം കണ്ടു പിടിച്ചു ചെയ്യാറുണ്ട്.
16. ഒരു ഗണിത ശാസ്ത്ര പ്രശ്നത്തിനു പരിഹാരം കണ്ടെത്തേണ്ടി വരുമ്പോൾ തന്നിരിക്കുന്ന വസ്തുതകൾ പൂർണ്ണവും ആവശ്യമുള്ളതും ആണോ എന്നു പരിശോധിക്കാറുണ്ട്.
17. പ്രത്യക്ഷമായ സാദൃശ്യം കാണിക്കുന്ന ഗണിതശാസ്ത്ര ആശയങ്ങളിലെ വ്യത്യാസങ്ങൾ കണ്ടു പിടിക്കാൻ ശ്രമിക്കാറുണ്ട്.
18. പാഠഭാഗവുമായി ബന്ധപ്പെട്ട പാഠപുസ്തകത്തിന്റെ ഓരോ അദ്ധ്യായത്തിന്റെയും അവസാനഭാഗത്ത് കൊടുത്തിരിക്കുന്ന പ്രവർത്തനങ്ങൾ (activities) ഞാൻ ചെയ്യാറില്ല.
19. ഗണിത ശാസ്ത്രത്തിലെ സമവാക്യങ്ങൾ, സൂത്രവാക്യങ്ങൾ ഇവ എഴുതി പഠിക്കാറില്ല.
20. ഗണിത ശാസ്ത്രവുമായി ബന്ധപ്പെട്ട ചാർട്ട്, മോഡലുകൾ, പദപ്രശ്നം തുടങ്ങിയ നിർമ്മാണ പ്രവർത്തനങ്ങൾക്കുവേണ്ടി സമയം ചെലവഴിക്കാറുണ്ട്.
21. ഓരോ ദിവസത്തെയും പഠനം മുൻകൂട്ടി നിശ്ചയിച്ചവിധം പൂർത്തിയാക്കാൻ ശ്രമിക്കാറുണ്ട്.
22. റിവിഷൻ സമയത്ത് എന്തെല്ലാം പാഠഭാഗങ്ങൾ കൂടുതൽ ശ്രദ്ധിക്കണം എന്നു മുൻകൂട്ടി തീരുമാനിച്ചു പഠിക്കാറുണ്ട്.
23. ഗണിതശാസ്ത്ര അഭ്യാസങ്ങൾ സ്വയം ചെയ്യാതെ മറ്റുള്ളവരുടെ ഉത്തരങ്ങൾ പകർത്തി എഴുതുകയാണ് എന്റെ പതിവ്
24. പരീക്ഷയുടെ ഉത്തരക്കടലാസുകൾ വീണ്ടും വായിച്ച് തെറ്റുകൾ തിരുത്തുവാൻ ശ്രമിക്കാറില്ല.
25. പഠിച്ച ഭാഗങ്ങൾ ആവർത്തിച്ച് ഓർമ്മിക്കുവാൻ ശ്രമിക്കാറുണ്ട്.



APPENDIX XXII

HOME PRACTICE INVENTORY FOR MATHEMATICS

DR. SANTHAMMA RAJU (PROFESSOR IN EDUCATION UNIVERSITY OF CALICUT)

&

ANCEL MARIA LECTURER ST. THOMAS TRAINING COLLEGE PALA

നിർദ്ദേശങ്ങൾ

ഗണിത ശാസ്ത്ര പഠന രീതികളെപ്പറ്റിയുള്ള 24 പ്രസ്താവനകളാണ് തന്നിരിക്കുന്നത്. ഓരോ പ്രസ്താവനയ്ക്കും മൂന്ന് പ്രതികരണങ്ങൾ വീതം ഉണ്ട്. 'എല്ലായ്പ്പോഴും', 'ചിലപ്പോൾ', 'ഒരിക്കലുമില്ല.' ഓരോ പ്രസ്താവനയും വായിച്ച് നിങ്ങളെ സംബന്ധിച്ചിടത്തോളം എത്ര മാത്രം ശരിയാണെന്നു തീരുമാനിച്ചശേഷം അഭിപ്രായം രേഖപ്പെടുത്തുക.

ചോദ്യവലയിലെ ക്രമനമ്പർ നോക്കി ഉത്തരക്കടലാസിൽ ആ ക്രമനമ്പറിന് എതിരെയുള്ള വൃത്തങ്ങളിൽ നിങ്ങളുടെ പ്രതികരണത്തിനു താഴെയുള്ള വൃത്തത്തിനുള്ളിൽ X രേഖപ്പെടുത്തുക.

ഓരോ പ്രസ്താവനയ്ക്കും ഒരു അഭിപ്രായം മാത്രമേ രേഖപ്പെടുത്തുവാൻ പാടുള്ളൂ. തെറ്റായ സ്ഥാനത്ത് X അടയ്ക്കപ്പെടുത്തിയാൽ ചിഹ്നം ഇട്ടിരിക്കുന്ന വൃത്തത്തിന്റെ ചുറ്റും ഒരു □ (ചതുരം) വരയ്ക്കുക അതിനുശേഷം ശരിയായ ഉത്തരത്തിനുള്ള ചിഹ്നം അനുയോജ്യമായ വൃത്തത്തിനുള്ളിൽ ഇടുക.

- 1. എല്ലാ ദിവസവും കൃത്യസമയത്ത് ഞാൻ പഠനം ആരംഭിക്കാറുണ്ട്.
2. പഠിക്കാൻ എനിക്ക് നിശ്ചയിതമായ ഒരു സ്ഥലമുണ്ട്.
3. പഠനത്തിന് ഒരു ടൈംടേബിൾ മുൻകൂട്ടി തയ്യാറാക്കി പഠിക്കാറുണ്ട്.
4. ഗണിത ശാസ്ത്ര പഠനത്തിന് ഒരു കൃത്യസമയം ടൈംടേബിളിൽ ഉൾക്കൊള്ളിച്ചിട്ടില്ല.
5. നിത്യജീവിതത്തിലെ സംഭവങ്ങൾക്ക് ഞാൻ പഠിച്ച ഗണിതശാസ്ത്ര ഭാഗവുമായുള്ള ബന്ധം കണ്ടു പിടിക്കാൻ ശ്രമിക്കാറില്ല.
6. ഗണിത ശാസ്ത്രം പഠിക്കുമ്പോൾ അവയിലെ പ്രധാന ആശയങ്ങൾ എളുപ്പം ഓർമ്മിക്കുവാൻ വേണ്ടി ചില സൂത്രങ്ങൾ ഉപയോഗിക്കാറുണ്ട്.
7. പാഠഭാഗങ്ങൾ പഠിച്ചശേഷം അതതു ഭാഗത്തെ പ്രധാന ആശയങ്ങൾ കുറിച്ചു വയ്ക്കാറുണ്ട്.
8. സംശയ നിവാരണത്തിനായി ഗണിതശാസ്ത്രം അറിയാവുന്നവരെ കണ്ട് എന്റെ സംശയങ്ങൾക്ക് ഉത്തരം കണ്ടെത്താറുണ്ട്.
9. എന്റെ ഗണിതശാസ്ത്ര പഠനത്തിന് സഹായകരമായ പുസ്തകങ്ങൾ, മാസികകൾ തുടങ്ങിയവ ഞാൻ വാങ്ങാറില്ല.
10. ഓരോ ഗണിതശാസ്ത്രഭാഗവും പഠിക്കുമ്പോൾ അതുമായി ബന്ധപ്പെട്ട മറ്റു ഭാഗങ്ങളോട് അവയെ താരതമ്യപ്പെടുത്തി ചിന്തിക്കാറില്ല.

11. വിശമവേളകളിൽ മാതാപിതാക്കളുമായി ഗണിതശാസ്ത്ര വിഷയങ്ങളെക്കുറിച്ച് ചർച്ച ചെയ്യാറുണ്ട്.
12. ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട റോഡിയോ വാർത്തകളും T.V. പരിപാടികളും കൃത്യമായി ശ്രദ്ധിക്കാറുണ്ട്.
13. ദിനപത്രങ്ങളിൽ ഗണിതശാസ്ത്രവുമായി ബന്ധപ്പെട്ട ലേഖനങ്ങൾ വരുമ്പോഴൊക്കെ അവ വായിക്കാറുണ്ട്.
14. അസാധ്യമെന്ന് മറ്റുള്ളവർ പറയുന്ന ഗണിതശാസ്ത്ര പ്രശ്നങ്ങൾക്ക് പരിഹാരം കണ്ടെത്തുവാൻ താല്പര്യം കാണിക്കാറില്ല.
15. ഓരോ ദിവസവും ക്ലാസ്സിൽ പഠിച്ച ഗണിതശാസ്ത്ര ഭാഗവുമായി ബന്ധപ്പെട്ട പ്രശ്നങ്ങൾ പാഠപുസ്തകത്തിലെ അഭ്യാസഭാഗത്തു നിന്ന് സ്വയം കണ്ടു പിടിച്ചു ചെയ്യാറുണ്ട്.
16. ഒരു ഗണിത ശാസ്ത്ര പ്രശ്നത്തിനു പരിഹാരം കണ്ടെത്തേണ്ടി വരുമ്പോൾ തന്നിരിക്കുന്ന വസ്തുതകൾ പൂർണ്ണവും ആവശ്യമുള്ളതും ആണോ എന്നു പരിശോധിക്കാറുണ്ട്.
17. പ്രത്യക്ഷമായ സാദൃശ്യം കാണിക്കുന്ന ഗണിതശാസ്ത്ര ആശയങ്ങളിലെ വ്യത്യാസങ്ങൾ കണ്ടു പിടിക്കാൻ ശ്രമിക്കാറുണ്ട്.
18. പാഠഭാഗവുമായി ബന്ധപ്പെട്ട പാഠപുസ്തകത്തിന്റെ ഓരോ അദ്ധ്യായത്തിന്റെയും അവസാനഭാഗത്ത് കൊടുത്തിരിക്കുന്ന പ്രവർത്തനങ്ങൾ (activities) ഞാൻ ചെയ്യാറില്ല.
19. ഗണിത ശാസ്ത്രത്തിലെ സമവാക്യങ്ങൾ, സൂത്രവാക്യങ്ങൾ ഇവ എഴുതി പഠിക്കാറില്ല.
20. ഗണിത ശാസ്ത്രവുമായി ബന്ധപ്പെട്ട ചാർട്ട്, മോഡലുകൾ, പദപ്രശ്നം തുടങ്ങിയ നിർമ്മാണ പ്രവർത്തനങ്ങൾക്കുവേണ്ടി സമയം ചെലവഴിക്കാറുണ്ട്.
21. ഓരോ ദിവസത്തെയും പഠനം മുൻകൂട്ടി നിശ്ചയിച്ചവിധം പൂർത്തിയാക്കാൻ ശ്രമിക്കാറുണ്ട്.
22. റിവിഷൻ സമയത്ത് ഏതെല്ലാം പാഠഭാഗങ്ങൾ കൂടുതൽ ശ്രദ്ധിക്കണം എന്നു മുൻകൂട്ടി തീരുമാനിച്ചു പഠിക്കാറുണ്ട്.
23. ഗണിതശാസ്ത്ര അഭ്യാസങ്ങൾ സ്വയം ചെയ്യാതെ മറ്റുള്ളവരുടെ ഉത്തരങ്ങൾ പകർത്തി എഴുതുകയാണ് എന്റെ പതിവ്
24. പരീക്ഷയുടെ ഉത്തരക്കടലാസുകൾ വീണ്ടും വായിച്ച് തെറ്റുകൾ തിരുത്തുവാൻ ശ്രമിക്കാറില്ല.



60

APPENDIX XXIII

HOME PRACTICE INVENTORY FOR MATHEMATICS

Dr. Santhamma Raju
Professor in Education
University of Calicut

Ancel Maria
Lecturer
St. Thomas Training College, Pala.

INSTRUCTIONS

- * This is an inventory of 24 statements regarding your home practice of learning mathematics. Each statement has three responses - Always, Some times and Never.
 - * Read each statement and decide how far the matter is true as far as you are concerned.
 - * Put a 'X' mark within the circle against the response you feel correct for each statement.
 - * If you find that you have marked in the wrong circle, put a around it and put the 'X' in the correct place.
 - * Mark the response for every statement.
1. I begin my studies daily at a fixed time.
 2. I have a fixed place to study.
 3. A time table is made in advance for my daily studies.
 4. A fixed time for studying mathematics is not included in my time table.
 5. I do not try to find out the relation of the mathematics I learned with the daily life incidents
 6. I use some short cuts to remember the important points while studying mathematics.
 7. I jot down the important points after studying each portion.
 8. I consult with experts in mathematics to clarify my doubts and in finding the answers.
 9. I don't buy books, magazines etc. Which help the study of mathematics.

10. I do not compare and study each topic with relation to the other topics in mathematics.
11. I used to discuss mathematical topics with parents during leisure time.
12. We listen regularly to the T.V and Radio programmes relating to mathematics.
13. We make it a point to read articles relating to mathematics in the dailies.
14. I am encouraged and helped to find solutions for problems which are told difficult by others.
15. I select and do the problems in the exercise from the topics covered in the class.
16. I examine whether the given data is complete and necessary to find out the solutions to the problems.
17. An effort is made to find out the differences, between mathematical principles showing outward similarities.
18. I don't work out the activities specified at the end of each chapter.
19. While learning the equations and formula in mathematics, I donot have the habit of writing them down.
20. I spend time on making charts models, word puzzles etc. related to mathematics.
21. I try to complete the daily portion strictly according to my pre-decided time table.
22. Decision is taken in advance regarding the topics which need more attention during revision time.
23. It is my habit just to copy down the correct answers from others without taking strain to do the exercise myself.
24. I do not recheck and rectify mistakes of my answers during the examination.

APPENDIX XXIV

HOME PRACTICE IVENTORY
DEPARTMENT OF EDUCATION, UNIVERSITY OF CALICUT

SCORE SHEET

നാമം.....

വയസ്സ്.....

സ്കൂൾ.....

ആൺകുട്ടി / വെൺകുട്ടി

നമ്പർ	എല്ലാംസ്താം	ചിലപ്പോൾ	ഒരിക്കലുമില്ല	നമ്പർ	എല്ലാംസ്താം	ചിലപ്പോൾ	ഒരിക്കലുമില്ല
01	0	0	0	14	0	0	0
02	0	0	0	15	0	0	0
03	0	0	0	16	0	0	0
04	0	0	0	17	0	0	0
05	0	0	0	18	0	0	0
06	0	0	0	19	0	0	0
07	0	0	0	20	0	0	0
08	0	0	0	21	0	0	0
09	0	0	0	22	0	0	0
10	0	0	0	23	0	0	0
11	0	0	0	24	0	0	0
12	0	0	0				
13	0	0	0				

134444