ATTITUDE TOWARDS MATHEMATICS AND PROBLEM SOLVING ABILITY – A STUDY ON HIGHER SECONDARY STUDENTS

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DECLARATION

I hereby declare that the dissertation entitled **"ATTITUDE TOWARDS MATHEMATICS AND PROBLEM SOLVING ABILITY- A STUDY ON HIGHER SECONDARY STUDENTS"** Submitted to the Tamil Nadu Teachers Education University, Chennai for the fulfillment of the degree of Master of Education is the record of my original research work carried out by me under the guidance of Mr. PRASAD P.S. Assistant Professor in Education, N.V.K.S.D College of Education, Attoor – 629191 and it has not been submitted for the award of any degree, diploma, associateship, fellowship of any university or institution.

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CHAPTER –I

INTRODUCTION

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Chapter – I

INTRODUCTION

Education is the process of instruction aimed at the all- round development of individuals providing the necessary tools and knowledge to understand and participate in day to day activities. Education is not a static but a dynamic process which develops the child according to changing situation and times. Education as the aggregate of all the process by which a person develops ability , attitudes and other forms of behaviour of practical values in the society in which he lives.

The different meanings and definitions of education lead us to the conclusion that education should have a comprehensive definition. Education involves learning how to learn, how to analyze and solve complex problems, how to think creatively and critically about the future, how to anticipate and make our own histories.

The development of science and technology in addition to skilled human capital has led to increased productivity and economic strength. These goals can also be achieved by improving science and Mathematics education. According to various definitions, Mathematics is the science of measurement quality and magnitude.

Mathematics dominates almost every field of one's activities. In this age of science and technology it has permeated through the human life and

become every man's everyday concern. Mathematics disciplines the mind, systematizes ones thought and reasoning. The subject has also rich potentialities of affording true enjoyment to its students.

Mathematics is an important subject in school curriculum. It is more closely related to one's daily life as compared to other subjects. Except one's mother tongue there is no other subject which is more closely related to one's daily life as Mathematics. Mathematics is considered to be queen of all sciences. The progress and improvement of Mathematics is linked to the prosperity of the state.

Mathematics has been very liberally used and applied in almost all aspects of human endeavour, with power and convenience. The Kothari commission draws the attention of the educators to the teaching of Mathematics. Butler and Wren (1960) maintain that through the teaching of Mathematics, students attain higher intellectual and Mathematical ability like logical thinking, rational reasoning, Concentration of mind, orderly presentation, precision and accuracy, analytical and Inductive skills and above all general problem solving abilities.

Problem solving is now being encouraged to be used as the main activity in all Mathematics classes. Students should be encouraged and exposed to work on problems that may take hours, days and even weeks to solve and to develop effective problem solving ability (Mikusa 1998). However it has been observed that students lack the necessary skills to engage in real life

problem solving outside the school setting. This is because students are only trained to work on routine problems that have well defined goals where all the needed information are given to be able to solve the problem. This is why it is vital to explore other types of problems that can be given as class activities to develop effective problem solving skills.

NEED AND SIGNIFICANCE OF THE STUDY

Science and Mathematics are considered as most important subjects in school curriculum. Considering the importance of science and Mathematics in the modern technological world the Education Commission, (1966) has recommended teaching of those subjects on a compulsory basis up to the school stage. High School Mathematics is a basis for higher Secondary classes. Knowledge of Mathematics is very essential for bearing other subjects also. But nowadays, majority of the students think that Mathematics is a difficult subject. Because of that they hate mathematics.

When we observe the achievement of the students, we can see that the students have low achievement in Mathematics compared with other subjects. This may be due to the unfavourable attitude of students towards Mathematics. According to Mcleod and Ortega (1993) students beliefs, attitudes and emotions are important factors in Mathematics learning. When students have positive beliefs and attitude towards Mathematics, the quality of their problem solving ability also increases. Our education system also failed in developing interest in learning Mathematics among students. It is

generally observed that there is a sense of fear and dislike for Mathematics in our students. Because of the above reasons the investigator directed to conducted a study in this area.

STATEMENT OF THE PROBLEM

The purpose of the study was to examine attitude towards mathematics and problem solving ability and is entitled as "ATTITUDE TOWARDS MATHEMATICS AND PROBLEM SOLVING ABILITY- A STUDY ON HIGHER SECONDARY STUDENTS".

OPERATIONAL DEFINITIONS OF TERMS

ATTITUDE TOWARDS MATHEMATICS

"Attitude towards mathematics is an important variable which steers the behaviours of students about Mathematics lesson as how they should be and which have contribution for their motivation in otherwords, it can be considered as the determinant of personal emotions" –(Bayturan 2004).

In this study attitude refers to the attitude of Higher Secondary students towards Mathematics.

PROBLEM SOLVING ABILITY

Problem solving ability is the degree or capacity to find the correct solution.

In this study problem solving ability refers to the ability of higher secondary students in solving Mathematical problems.

HIGHER SECONDARY STUDENTS

Students who are studying XI standard of various higher secondary schools.

OBJECTIVES

(i) To construct and validate a scale to measure the Attitude towards Mathematics of higher secondary students.

(ii) To study the level of attitude towards Mathematics of higher secondary students.

(iii) To study the level of problem solving ability of higher secondary students.

(iv) To compare the mean scores of attitude towards Mathematics of higher secondary students with respect to the background variables namely,

   (1) Gender

   (2) Locale

   (3) Type of management

   (4) Religion

   (5) Community

(v) To compare the mean scores of problem solving ability of higher secondary students with respect to the background variables namely

   (1) Gender

   (2) locale

(3) Type of management

(4) Religion

(5) Community

(vi) To study whether there is any significant correlation between attitude towards mathematics and problem solving ability of higher secondary students for total sample and subsample.

NULL HYPOTHESES

(i) There is no significant difference in the mean scores of attitude towards Mathematics of male and female higher secondary students.

(ii) There is no significant difference in the mean scores of attitude towards Mathematics of rural and urban higher secondary school students.

(iii) There is no significant difference in the mean scores of attitude towards Mathematics among Government, aided and unaided higher secondary school students.

(iv) There is no significant difference in the mean scores of attitude towards Mathematics among Hindu, Muslim, Christian higher secondary students.

(v) There is no significant difference in the mean scores of attitude towards Mathematics among FC, BC, MBC and SC/ST higher secondary students.

(vi) There is no significant difference in the mean scores of problem solving ability of male and female higher secondary students.

(vii) There is no significant difference in the mean scores of problem solving ability of rural and urban higher secondary school students.

(viii) There is no significant difference in the mean scores of problem solving ability among Government, aided and unaided higher secondary school students.

(ix) There is no significant difference in the mean scores of problem solving ability among Hindu, Christian, Muslim higher secondary students.

(x) There is no significant difference in the mean scores of problem solving ability among FC, BC, MBC, SC/ST Higher secondary students.

(xi) There is no significant correlation between attitude towards Mathematics and problem solving ability of higher secondary school students for the total sample and subsample.

METHODOLOGY IN BRIEF

METHOD

Normative survey method used for the study

SAMPLE

The present study conducted on a sample of 400 students in various higher secondary schools in Kanyakumari District.

TOOLS

(i) Attitude scale towards mathematics. (constructed and validated by D. Nabisha Banasir and Prasad P.S (2013-2014)

(ii) Problem solving ability test [Dr. A.P. Deepa and Dr. M. Sadanandan (2010-2011)]

(iii) General data sheet.

STATISTICAL TECHNIQUES USED

(i) Percentage

(ii) Arithmetic mean

(iii) Standard deviation

(iv) t-test

(v) ANOVA

(vi) Pearsons product moment method of correlation.

DELIMITATIONS OF THE STUDY

The scope of the study is delimited in the following manner.

(i) The sample size is delimited to 400 students.

(ii) The study has been delimited to the schools in Kanyakumari district only.

ORGANIZATION OF THE REPORT

CHAPTER I: Deals with introduction, need and significance of the study, statement of the problem, operational definition of terms, objectives of the study, hypotheses framed, organization of the report.

CHAPTER II: Gives a detailed look into the theoretical overview and related studies in India and Abroad.

CHAPTER III: Deals with methodology.

CHAPTER IV: Deals with analysis and interpretation.

CHAPTER V: Gives the summary and conclusion that includes a brief restatement of the problem, a description of the findings and conclusion of the study. Finally the references and appendices.

CHAPTER –II

REVIEW OF RELATED LITERATURE

THEORETICAL OVERVIEW

INDIAN STUDIES

FOREIGN STUDIES

CRITICAL REVIEW

Chapter – II

REVIEW OF RELATED LITERATURE

The development of research project is based on its review of the theoretical and related literature. The review of related literature is an important aspect and essential pre-requisite of any investigation. One of the early steps in planning a research work is to review the research. It avoids the duplication of the study and it finds to take an advantage from similar of related literature indicates the clean picture of the problem to the solved.

IMPORTANCE OF THE REVIEW OF RELATED LITRATURE

(i)   It enables the researcher to define the limits of his field. It helps to delimit and define his problems

(ii)   Review of literature gives the scholar and an understanding of previous work that has been done.

(iii)   It gives an understanding of the methodology which refers to the study is to be conducted.

(iv)   It provides the means of getting to the frontiers in the field of his research unless he has learnt what others have done and what still remains to be done, he cannot develop are search project that will contribute something to the knowledge in his field.

(v)   It prevents pointless repetition of research.

THEORETICAL OVERVIEW

ATTITUDE TOWARDS MATHEMATICS

The lack of theoretical framework that characterizes research on attitude towards Mathematics is partially shown by the fact that a large portion of studies do not provide a clear definition of the construct itself. Attitude tends to be defined implicity and posteriori through the instruments used to measure it (Lender, 1985, Daskalogianni and Simpson 2000).

When a definition is explicitly given or can be inferred, it mainly refers to one of the three following types.

1) A simple definition of attitude that describes it as the positive or negative degree of affect associated with a certain subject. From this point of view, the attitude towards Mathematics is just a positive or negative emotional disposition toward mathematics (Mcleod 1992; Halayna and Shaughnessy 1983)

2) A multidimensional definition which recognizes three components in the attitude, emotional response, beliefs, regarding the subject behaviour related to the subject. From this point of view, an individuals attitude towards Mathematics is defined in a more complex way by the emotions that associates with Mathematics (which however have a positive or negative value) by the individuals belief towards Mathematics and by how behaves (Hart 1989).

3) A bi - dimensional definition in which behaviours do not appear explicity (Daskabgianni and Simpson 2000) attitude towards Mathematics is therefore seen as the pattern of beliefs and emotions association with Mathematics.

PROBLEM SOLVING ABILITY

Mathematical problem solving has occupied a very important place in the teaching of Mathematics. Rose bloom and Polya (1966) assert of that the 'central' activity of all teaching of Mathematics is the development of problem solving skills in the students. Collier and Lerch (1969) observed that problem solving is a major source in the growth of modern mathematics and Barnes (1959) stressed that it should be 'major concern' of the school curriculum.

A Mathematical problem solving task can be down into two major component process (a) problem comprehension (b) problem solution. Most Mathematics instruction focuses on the problem solution phase. Students usually have trouble in the problem comprehension and translation phase (major 1989). In order to solve the problem efficiently one has to acquire new information, select relevant information to employ it for a problem situation and transform it so as to make it worthy for problem situation. The task of acquiring new information can be viewed as an instance of problem solving (Brans ford 1948). The task of problem solving also requires

prediction analysis of facts and principles to develop Cause – effect relationship.

If the child does not realize the existence of a problem (problem – identification) one cannot expect him to look for a solution (getzel, 1986). Problem definition is extremely important because it influences the types of solutions that will be considered (Mayer 1930). Results of students frequently have difficulty the score of executing problems.

After identifying the problem, one must act on the basis of a strategy and work at the assumption. A number of studies suggested that most of the pupils frequently fail to re-evaluate their process about how to interpret materials that they are doing (smith 1975),failure in this step could have adverse impact on the problem solving skills.

The definition of a problem that is commonly used in Mathematical Literature (Kantowski, 1980) is a problem for a task situation where the individual is compelled to connect the known information is a way that is new in order to the task, then it will be routine task for him. According to Lola June May (1970) problem solving is a complex mental process involving – solving models visualization, imagination, manipulation, abstraction and the association of ideas. An analysis of problem solving models (Deway 1910; Johndon 1944; Polya 1945; and Kafun 1982) revealed that the basis steps associated with the problem solving are essentially given for the scientific method.

ATTITUDE TOWARDS MATHEMATICS

INDIAN STUDIES

Mahanta, Islam (2000) conducted a study on "Attitude of secondary students towards Mathematics and its relationship to achievement in Mathematics". The data has been collected from 1057 secondary students selected by simple random sampling from 33 secondary schools of Kamrup District, Assam. To obtain data on instrument Mathematics Attitude scale (MAS) has been developed by the investigator. MAS consist of 32 items. The instrument uses five point scale. For achievement their marks in Mathematics examination have been considered. The major findings revealed that boys show more positive attitude towards Mathematics than girls. Also Attitude of students and achievement are positively correlated.

Ravanan, Mary, Julie (2003) conducted a study on "Attitude towards Mathematics of XI standard students in Trichy District. The sample consisted of 450 students of XI standard. The major findings revealed that there was no significant difference in Attitude towards Mathematics of XI standard students in Trichy District owing to differences in their gender, Religion and medium of instruction. There was significant difference in Attitude towards Mathematics of XI standard students in Trichy District owing to difference in their stream of study, types of school management and socio economic status. There was no significant association between

attitudes towards Mathematics of XI standard students in Trichy district regarding their gender and medium of instruction.

Farooq, shah (2008) conducted a study on "Students attitude towards Mathematics". Sample of the study was 685 students (male-379 and female 306) of 10th grade selected conveniently 10 private and public sector schools. The results of this study lead us to an important conclusion. The male and female students of 10th grade of the secondary schools of lahore have same type of attitude towards Mathematics. It means that gender differential has no impact on the attitude of students towards Mathematics.

Choudhry, Kumar (2012) made a study on "Influence of areas in relation to the attitude towards Mathematics and study habit on the achievement in Mathematics to the pupils at secondary stage". The sample consisted of 500 students of standard IX from secondary school of south Kamrup District, Assam, participated in the study in which the relationship among the achievement in Mathematics was most closely related with attitude towards Mathematics and study habit.

Bora (2012) conducted a study of "An Evaluation on school students Attitude towards learning Mathematics". The sample consisted of 1840 students selected from 48 secondary and higher secondary schools of Karbi Analong of Assam. The study investigated the difference in attitude of school students towards Mathematics by gender and environment of school. The major findings revealed that there exist significant difference in attitude

towards mathematics between male and female students, rural and urban school students.

Bhowmik, Banerjee (2013) conducted a study on "Fuzzy Measure of secondary students attitude towards Mathematics". The purpose of this study is to find out the students attitude towards Mathematics in a selected school of midnapore. A total of secondary students were administered with a questionnaire to find out their attitude towards Mathematics. The students answered questions regarding their personal confidence to Mathematics and perceived usefulness of Mathematics. The results revealed that the students positive attitude towards Mathematics.

Kumar, Nelama (2013) conducted a study on "Secondary school students Attitude towards learning Mathematics". In relation to gender locale and type of school. The sample consisted of 200 students selected from the secondary schools in Himachala Pradesh. Data was collected using Attitude towards Mathematics scale (ATMS). The results indicated that female students attitude towards Mathematics were significantly favourable than male students. Further rural student rated more on attitude towards Mathematics than their counterparts. The result also indicated that there was no significant difference in attitude towards Mathematics of Government private and public secondary schools.

Lakshmi, Veliappan (2014) conducted a study on "An investigation on high school students attitude towards Mathematics". Sample of the study

was 120 IX standard students selected from six schools of Thirunelveli District. A descriptive survey method was adopted for the present study. The major findings revealed that female students attitude towards Mathematics were significantly favourable than male students. Further, urban students rated more on attitude towards Mathematics than their counter parts and the government high school students have more Attitude towards Mathematics.

FOREIGN STUDIES

Konassi (1999) conducted a study on "A psychological study of Mathematics Attitude and Achievement among female Ivorian Students". For this study 140 female students in cote Ivoire have completed on inventory of Mathematics Attitudes (the Fennema – Sherman Mathematics attitudes scale, 1976) and a background questionnaire. The major findings revealed that high-achieving female students report less anxious attitudes, more positive attitude towards problem solving and more positive attitude towards the usefulness of Mathematics than do low- achieving students.

Ifamuyiwa, Akinsola (2008) conducted a study on "Improving senior secondary school students Attitude towards Mathematics through self and co-operative instructional strategies. The study adopted pre-test, post-test control group quasi Experimented design using a 3x2x2 factorial matrix with two experimental groups and one control group 350 SSS II students from six purposively selected higher secondary school in Ijesu North local

Government area of Ogan state were the subjects. The major findings revealed that the treatment had significant main effect on students attitude towards Mathematics and also found no significant main effects of locus of control and gender on the participates attitude towards Mathematics.

Yee, Siew (2010) conducted a study on "Mathematics Attitude and achievement of Junior college students in Singapore". To address this issue the Mathematics attitudes and achievement of 984 junior college students were ,measured. Results indicated that students had positive attitude towards Mathematics but lacked intrinsic motivation to do Mathematics students were extrinsically motivated to study Mathematics, but the relationship between extrinsic motivation and achievement was weak. However, there was a significant positive correlation between intrinsic motivation and achievement.

Huang (2010) conducted a study on "Investigation of Engineering students Attitude towards calculus in Taiwan". Sampling survey objects were 792 first year Engineering students in six technology universities in Taiwan. The participants consisted of 257 females and 535 males. The current study used the research instrument students attitude towards calculus (SATC). The SATC is an adapted instrument from the modified Fennema - Sherman Mathematics Attitude scale based on the tripartite model. The major findings revealed that Engineering students have favourable attitude towards calculus. This information could be helpful to calculus Lectures.

Khan (2011) made a study on "Secondary school students attitude towards Mathematics". The first purpose of the study was to investigate school students attitude towards Mathematics the secondary level in Quetta. Another aim of the study was to find out whether there is a difference between male and female students attitude towards Mathematics. The population of the study consisted of 387 students of 9th grade selected by in random sampling technique. Data was collected through an adapted questionnaire. "Attitude towards Mathematics inventory (ATMI). The major findings revealed that there were no significant differences between male and female students where male students reported to have a significantly high degree of positive attitude towards Mathematics as compared to their female counterparts.

Mohamed, Waheed (2011) conducted a study on "Secondary students Attitude towards Mathematics in a selected school of Maldives". The purpose of this study is to find out the students attitude towards Mathematics and find out gender difference in attitude towards Mathematics in a selected school of Maldives. A total of 200 secondary students were administered with a questionnaire to find out their attitudes towards Mathematics. The students answered questions regarding their personal confidence to Mathematics and perceived usefulness of Mathematics. The major findings revealed that the student positive attitude towards Mathematics is medium and there is no gender difference.

Mensah, Okeyere (2013) conducted a study on "Students Attitude towards mathematics and performance: Does the teacher attitude matter". The study was fashioned to extend the discussion to the influence of teacher attitude on students attitude. The sample consisted of 100 students and 4 Mathematics teachers. The students were randomly selected while the teachers were purposively sampled. This study revealed that a significant relationship between teacher attitude and student attitude towards Mathematics. It was realized that teachers positive attitude radiated confidence in student made them develop positive attitude towards Mathematics. The result of this study were also consistent with existing findings on the relationship between teacher attitude and students performance in Mathematics.

Muheen, Saeed, Arif (2013) made a study on "Attitude towards Mathematics and Academic Achievement in Mathematics among secondary level boys, and girls". The main purpose of the study was to measure relationship of attitude towards Mathematics with academic achievement in math among 9th and 10th class secondary level students. The sample consisted of 500 student out of 200 were boys and 300 were girls. A 25 item questionnaire was self developed in the light of available literature on the subject and adaptation of another instrument development developed by steinberk and Gwizdala. Academic Achievement was measured by the marks obtained by the sample in their recently held examination in

Mathematics. The major findings revealed that boys differed in their Mathematical achievement from girls. Girls achieved better results as compared to boys. Attitude towards Mathematics and achievement in Math did not go together.

PROBLEM SOLVING ABILITY

INDIAN STUDIES

James, Marice (2005) conducted a study on "Select Variables as determinants of problem solving ability". The sample consisted of 556 XI standard students who opted for science group drawn from 10 higher secondary school of Palakkad Distict in Kerala. The major findings revealed that students who have right brain and left brain hemisphericity dominance differ significantly in their problem solving ability owing to difference in Gender, religion, School management type and socio-economic status.

Rani (2006) conducted a study on "Effectiveness of the Synthetic and Poly's Heuristic Approaches on the Acquisition of problem solving skills in Mathematics". In this study infact classes were considered for reasons of administrative feasibility. Two different sections of students from two different schools in same locality were chosen. The major findings revealed that the gain scores differed significantly between Synthetic and Polya's method group.

Manoharan, Ganesh (2007) examined "The creative problem solving ability of standard XI students". The sample consisted of 200 students who were randomly selected from five higher secondary schools in Pondichery region. The investigator administered the Passi - Usha test of creative problem solving (PUTC.PS). The major finding revealed that the creative problem solving ability of XI standard students are just average.

Behera (2009) made a study "To examine problem solving skills in Mathematics learnings". The sample consisted of 60 students of class VIII by simple random sampling technique. The major findings revealed that students with high Mathematical ability are for superior in Mathematical problem solving skill to their counter parts in the lower ability irrespective of their Gender.

Devi (2009) conducted a study on "The relationship between problem solving ability and Academic achievement of secondary school students". The sample consisted of 200 ninth standard students of which 100 boys and 100 girls were selected randomly from both private and government secondary schools of Davangere city, Karnataka. The problem solving ability test developed by C.N. Dubey (1997) was used as tool. The major findings revealed that there is a positive relationship between problem solving ability and Academic achievement of IX standard student.

Ajwani, Vohara, Verma (2012) examined "the level of problem solving ability of high intellectual adolescents". The data were collected by

descriptive survey method. The sample consisted of 1400 school going adolescents of Raipur city aging 14-18 years and studying in class XI and XII. The major findings showed that difference between emotionally high and low intelligent subjects in solving the anagram list involving undextrous (left brain) thinking or undextrous (Right brain) thinking is considerably different from that involving the anagram list involving ambidextrous (left and right brain) thinking.

Sundari, Pillai (2013) conducted "An empirical study on higher secondary students problem solving ability". The sample consisted of 950 students studying higher secondary schools in Kanchipuram District. The major findings revealed that the level of problem solving ability of higher secondary students is low male and female students caused significant difference in respect of this problem solving ability.

Mahavidyalaya (2013) focused on the study of "problem solving ability among undergraduate Mathematical gifted students of Jabalpur Madya Pradesh". Normative survey method used to collect data. By using random sampling technique, 40 Mathematical gifted students (20 boys and 20 girls) studying in different Government private colleges selected. The results revealed that (i) The problem solving ability of Mathematical gifted students are high in colleges at Jabalpur. (ii) There is significant difference in respect of the sub samples gender, mothers education, category of

educational institution while in respect of fathers education there is no significant difference on their problem solving ability.

FOREIGN STUDIES

Nassar (2000) made a study to "Development on Geometric reasoning in a problem solving situation using dynamic geometry software". Participants are conveniently accessible private school in Mount – Lebanon. The group consists of 35 students, 12 females and 23 males coming from middle socio – economic background. The major findings revealed that students were able to produce more correct figures using dianamic geometry software than when using paper pencils. They were also able to better experiment and explore the problem. This made them understand the problem and the theorems and properties it involved students produced more correct conjectures.

Nicolaidou, Philippou (2003) conducted a study to examine "The Attitude towards mathematics Self- efficiency and Achievement in problem solving ability ". The sample consisted of 238 fifth grade pupils. Problem solving performance was measured by a specially prepared test, including simple and multistep problems. The analysis of the data indicated significant relationship between attitudes and achievement and a stronger relationship between efficacy and achievement. Attitudes and efficacy were also correlated and both predicted achievement in the problem solving.

However, efficacy was a more powerful predictor than attitudes. No gender difference was found in any of the examined variables.

Tuobimaa, Aunola, Nurmi (2008) conducted a study on "The association between Mathematical word problems and reading comprehension". The sample consisted of 225 children aged 9-10 (grade 4). The children text comprehension and Mathematical word problem solving performance was tested. The major findings revealed that there were no gender differences in Math problem solving performance but the girls were better in technical reading and reading comprehension. Parental levels of education positively predicted children's Maths word problem solving performance and reading comprehension skills.

Erdemir (2009) made a study on "Determining students attitude towards, Physics through problem solving strategy. The study was conducted Turkey. The major findings indicated that students in the experimental group made more positive improvement in attitudes towards physics than the control group. Thus teachers may integrate problem based strategies in their teaching practice and let their students increase their positive attitude towards Physics. As a result of this increase, students could have better success in Physics.

Chen (2011) conducted a study "An investigation of Chinese teachers related problem solving abilities and beliefs". The sample consisted of 208 pre-service elementary school teachers from three different grade levels

selected from shenyang normal university in China. The results revealed that a strong and straight forward relationship was found between the teachers realistic reactions in the problem solving test and their evaluation of the pupils responses in the problem solving questionnaire.

Evans (2012) conducted a study on "Problem solving ability and perceptions in alternative certification Mathematics teachers". The purpose of this study was to understand alternative certification middle and high school teachers Mathematical problem solving ability and perceptions. The sample consisted of 34 new teachers in the Newyork city teaching fellows alternative certification programme enrolled in a graduate algebra content Mathematics course for teachers that involved rigorous derivations and proofs. The major findings showed that teachers perceived their students problem solving ability as generally weak due to not understanding how to start a problem, lack of persistence and poor literacy skills.

CRITICAL REVIEW

The investigator reviewed 30 studies 14 related to problem solving ability and 16 related to Attitude towards Mathematics. The majority of the studies employed survey method. One study was used Synthetic and Heuristic approach (Rani 2006) and another study was used pre-test, post-test, control group quasi-experimental design (Ifamuyiwa and Akinsola 2008). In many of the studies simple random techniques has been used

selecting sample (Behra (2009); Manoharan and Ganesh (2009); Devi (2009) Mahavidyalaya (2013); Mahanta and Islam (2000) Khan (2011).

The present study differs, from the above studies in terms of area, population and sample. A wide range of factors have been investigated in relation to Attitude towards Mathematics and problem solving ability. In the present study the researcher tried to find out the Attitude towards Mathematics and problem solving ability of higher secondary students.

CHAPTER- III

METHODOLOGY

POPULATION AND THE SAMPLE

TOOLS USED

STATISTICAL TECHNIQUES USED FOR THE STUDY

Chapter – III
METHODOLOGY

Research is endless quest for knowledge. It brings to light new knowledge or corrects previous errors and misconceptions and adds in an orderly way to the existing body of knowledge. The knowledge obtained by research in scientific and objective manner and is a matter of rational understanding, common verification and experience. It is a deliberate effort to collect information, to shift it, to analyze it, to put it together and to evaluate it. It works with a high degree of organization on a rather well defined problem and pursues it hopefully to a successful conclusions to the problems that plague and puzzle the mankind.

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. We study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/ techniques but also the methodology.

" Research is an honest, exhaustive intelligent searching for facts and their meanings or implications with reference to a given problem. It is the process of arriving at dependable solutions to problems through the planned

and systematic collection, analysis and interpretation of data. The best research is that which is reliable verifiable and exhaustive so that it provides information in which we have confidence" (Cook).

Different methods are used for Research. George J. Mouly has classified research methods into three basic types. They are

1) Historical method

2) Experimental method

3) Normative survey method

In the present study, the investigator has selected normative survey method.

Normative survey method

Normative survey method is that method of investigation which attempts to describe and interpret what exists at present in the from of conditions, practices, process, trends, effects, attitudes, beliefs etc. It is an organized attempt to analyze, interpret and report the present of a social institution, group (or) area.

The word survey indicates the gathering of the data regarding current conditions. The word "Normative "is used because surveys are frequently made for the normal or typical condition or practice.

George J. Mouly has said, "No category of educational research in more widely used than the type known variously as the survey. The normative survey, status and descriptive research. The broad classification comparisons a variety of specific techniques and procedures, all similar from the stand point of the phenomenon under investigation.

CHARACTERISTICS OF NORMATIVE SURVEY METHOD

- It gathers data from a relatively large number of cases.

- It provides information useful for the solution of local problem.

- It requires expects imaginative planning

- It is more reliable

- It requires careful analysis and interpretation of the data gathered.

- It determines the present trends and solves current problems.

- It is more realistic than the experiment is that investigates phenomena in their natural setting.

TOOLS USED

Tools are the instruments that help the researcher to gather data. The selection of suitable tools is great importance for successful research. The investigator used the following tools for the collection of data.

a) General data sheet

b) Mathematical Attitude scale

(D. Nabisha Banasir & Prasad P.S 2013-2014)

c) Problem solving ability test

(Dr. R. P. Deepa & M. Sadanandan 2010-2011)

General data sheet

The personal data sheet serves to collect personal information. Students were asked to write their name of the school, gender, locale, type of management of school, religion and community.

Mathematical Attitude scale

For measuring the attitude of XI standard students towards mathematics learning the investigator constructed and standardized a likert type Mathematical Attitude scale (M.A.S)

TOOL CONSTRUCTION

Likert Attitude scale

In this type, the subjects are asked to respond to a certain number of statements. Reply to each statement is given in terms of five degree of agreement or disagreement, for example, "Strongly agree", "agree", "neutral", "disagree", "strongly disagree". Each statement thus becomes a scale in itself having five points on it. At one end of this scale is strong approval and at the other end is strong disapproval between them lie intermediate points.

Of the total number of statements included in the scale nearly half are favourable and the other half are unfavourable. For the favourable statements the values given to "strongly agree", "agree", "neutral", "disagree", and "strongly disagree" are 5, 4, 3, 2,1 respectively. For unfavourable statements the values are 1, 2, 3, 4, 5, respectively. Thus agreement with favourable statements and disagreement with unfavourable statements are treated as equivalent.

Procedure of constructing a likert scale

The development and validation of mathematical Attitude Scale includes the following steps.

a) Collection of statements

b) Screening of the statements

c) Sample for tryout

d) The draft scale and its administration

e) Instructions for scoring

f) Item Analysis.

g) Selecting the final list of statements

a) Collection of statements

The first step in the construction of the scale is the collection of a number of statements about the topic. So here statements related to certain

dimensions such as general attitude towards Mathematics, impact of Mathematics on everyday life, correlation of Mathematics with others subjects and everyday life, scope of practical work, attitude towards inclusion of Mathematics as a compulsory subject. For this discussions were held with experts in the field of education and concerned guide. Besides this, the statements prepared by investigator in related areas of research are also studied. Again the investigator collected ideas from magazines, journals, newspapers etc. By making use of 60 statements were prepared to include in the draft form of Mathematical attitude scale (M.A.S).

b) Screening the statements

The scale was then submitted to the guide and experts in the field of education to judge the suitability of the items. According the suggestions given by experts and concerned guide, few statements which seemed to overlap with one another were rejected. The vague items were revised and finally 60 statements were selected for the attitude scale. Of these 60 statements 29 statements show favourable attitude towards Mathematics and 31 statements show unfavourable attitude towards Mathematics. All the items selected were arranged in a random order. The draft form of Mathematical Attitude scale (M.A.S)was then printed.

c) Sample for tryout

The draft attitude scale was subjected to a pilot study. The attitude scale was administered to a sample of 400 higher secondary students in the schools of Kanyakumari District.

d) The draft scale and its administration

The draft scale consisted of 60items administered to a sample of 400 secondary school students. Statements related to Mathematics were given in the scale. Each statements have five choices viz; "strongly agree", "agree", "neutral", "disagree", "strongly disagree" representing S.A, A,N,D, S.D. Students were instructed to read each of the statements carefully and answer them by making a tick (✓) mark against the answer which they think as appropriate for themselves.

e) Instruction for scoring

The scoring was done as follows; A score of 5, 4, 3, 2,1 was given to the category "strongly agree", "agree", "neutral", "disagree", "strongly disagree" for a position statement and a score of 1,2,3,4,5 was given to the category "strongly agree", "agree", "neutral", "disagree", "strongly disagree" for a negative statement. The score for Mathematical Attitude scale (M.A.S) is the total of the scores obtained for all the items.

f) Item Analysis

For the standardization of attitude scale , the investigator used Likert Item analysis method.

Likert item analysis method

The procedure of likert item analysis is as follows.

(i)   First of all total score for each student for all the items was found out.

(ii)   The subjects were divided in to two atbitrard defined groups. For example those subjects with the top 25% of all total scores may be considered to have the most favourable attitudes and those with the lowest 25% of all total scores may be considered to have the least favourable attitudes.

(iii)   The mean score for each statement is calculated separately in two groups. The following table illustrates this method.

Table:3.1. Calculation of means for one statement for the two groups, with the most favourable and the least favourable attitudes.

Response category	Scale Value	High group		Low group	
		f	fx	f	fx
S.A	5	35	175	49	245
A	4	41	164	24	96
N	3	20	60	14	42
D	2	3	6	4	8
S.D	1	1	1	9	9
Sum			**406**		**400**

$$\bar{X}_H = \frac{\Sigma fx}{\Sigma f} = \frac{406}{100} = 40.6 \; ; \; \bar{X}_L = \frac{\Sigma fx}{\Sigma f} = \frac{400}{100} = 40.00$$

$Xd = \bar{X}_H - \bar{X}_L$

　　$= 40.6 - 40.00$

　$= 0.6$

(iv)　Next the difference of the two mean scores is calculated in respect of each statement for example it is shown in the above table.

(v)　Finally all the statements are ranked according to their difference in mean scores. Those with mean difference below 0.8 are considered poor and therefore eliminated.

g) Selected the final list of statements

Using likert item analysis 30 items were selected, which have high discriminating power. Items with mean difference below 0.8 are considered poor and therefore eliminated. Thus the final attitude scale consists of 30 items. These items were then arranged in random order. The items which are selected is shown with *.

Table.3.2: Details of item selected for Mathematical Attitude Scale (M.A.S)

S. No	Statements	Value	Item Selected
1	I have good knowledge in Mathematics	0.06	
2	I feel difficulty to solve simple problems in Mathematics	1.22	*
3	I feel difficult to recall the Mathematical formulas	0.78	
4	Studying Mathematics theories are waste of time	1.15	*
5	I like to read and solve Mathematical puzzles in newspapers and weekly	0.49	
6	I like to read articles related to Mathematics	0.37	
7	I hate Mathematics	1.24	*
8	Knowledge of Mathematics helps me to do computer programmes easily	0.93	*
9	Knowledge of Mathematics helps me to solve problems in physics and chemistry	0.46	
10	Mathematics helps me to think deeply	1.29	*
11	I like to apply Mathematical concepts in real life situations	0.32	
12	I am not able to concentrate in Mathematics	1.43	*
13	I am not confident in solving Mathematical problems	0.9	*
14	I don't need to improve my problem solving ability	0.6	

15	I would like to more opportunity to learn Mathematics	1.36	*
16	I took Maths group because of compulsion	1.4	*
17	I eagerly wait for Mathematics class	1.17	*
18	I can't get results when I solve Mathematical problems	0.62	
19	I can't do well in Mathematics	1.07	*
20	Mathematics is a bore subject	1.31	*
21	Mathematics improves mental aptitude	0.46	
22	I don't like to take Mathematics as my special subject for higher studies	1.27	*
23	I don't use calculators for simple arithmetic	0.73	
24	I feel shared when the Mathematics teacher on leave	0.03	
25	I don't feel sad when I get less marks on Mathematics than any other subjects	0.96	*
26	I am not interested in doing home works in mathematics	0.95	*
27	I stop working with problems when I am not getting answers	0.97	*
28	I like to copying Mathematics home work from my friends	1.14	*
29	Mathematics is a queen of all sciences	0.31	
30	Mathematics is a difficult subject to learn and understand	1.05	*
31	Mathematics provides more scope for employment in different fields	0.67	
32	Study of Mathematics is not very essential to lead a peaceful life	1.06	*
33	For a common man knowledge of Mathematics is not very essential	1.19	*
34	I feel that Mathematics is not develops the memory power	1.21	*
35	Mathematics help to develop creativity	0.89	*
36	Mathematics is comparatively easier than all other science subject to understand	0.4	
37	Mathematics is not loved by everyone	0.01	
38	Mathematics is the important base subject for higher studies	0.53	
39	Mathematics is an integral part of school curriculum	0.73	

40	Mathematics helps for intellectual development	0.69	
41	Study of Mathematics trains the student to be honest	0.44	
42	I like to do research in Mathematics	0.23	
43	Study of Mathematics develops interest in inventing new things	0.04	
44	The study of Mathematics helps to increase the power of reasoning	0.59	
45	I try to remain absent for the Maths classes	0.03	
46	Mathematics lessons are not interesting	0.49	
47	Study of Mathematics makes confused	0.5	
48	Mathematics teachers are narrow minded	0.88	*
49	Mathematics principles are always true	0.84	*
50	I like to participate in Mathematics club activities	0.92	*
51	Mathematicians are not often practical	0.36	
52	Mathematics is my favourite subject	0.92	*
53	I am not interested to learn new areas in Mathematics	0.71	
54	I spend more time to study Algebra	0.09	
55	I can easily understand the matrix portions in Mathematics	0.83	*
56	In Mathematics I feel probability is too difficult	0.49	
57	I confuse a lot in differentiation because of the more number of formula's	0.27	
58	I am very interested in doing set theory problems	1.09	*
59	I draw only geometry and graphs for examinations	0.87	*
60	I like to solve Mathematical problems in my leisure time	1.06	*

ESTABLISHING RELIABILITY AND VALIDITY OF THE TEST

Reliability

The Reliability of a test can be assessed in different ways such as test-retest method, split-half method, rational equivalence method and score reliability method. For the purpose of the present scale reliability co-efficient of tool was found by split-half method. Using Brown prophecy formula

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

where r= reliability co-efficient of split half test

x= Total score for a section in odd items test

y= Total score for a section in even items test

xy= Estimated reliability of the whole test

N= Total number of students in the group

Reliability co- efficient formula

$$R = \frac{2r}{1+r}$$

Table: 3.3: Reliability analysis of Mathematical Attitude Scale

Number of Samples	100
Number of items	30
Correlation between odd half and even half	0.6001
Reliability co-efficient	0.7501

The spilt half reliability co-efficient calculated which is in table 3.9 shows high reliability. This reveals that the present Mathematical attitude scale possess 0.7501 reliability co-efficient.

Validity

A test is valid when it meets the purpose which it was designed. The two main types of validity established for this tool were face validity and content validity.

Face Validity

Face validity means that the given tool appears or seen to measure what it is to measure. The tool was submitted to a panel of experts and their opinion it appeared to measure the relevant objectives of the tool. It's close link on the items of the scale reveals that each and every item in capable of

reflecting the attitude towards Mathematics. This provided face validity for the scale.

Content Validity

Content validity of a test was established by verifying the comprehensiveness coverage of the content of the test using authentic literature and opinion of the experts. Thus it is ascertained that the tool was moderate content validity.

Problem Solving Ability Test

Problem solving ability test in Mathematics was prepared by Dr.R.P.Deepa and Dr. S.Sadanandan (2010). This test is aimed at measuring ability in problem solving. The test consisted of three areas namely Mathematical formulation, Arithmetic reasoning and Numerical ability. 58 questions were given in the test. It was a multiple choice type and for each questions four answers were given. Pupils had to select the correct answer and put in the answer sheet.

Reliability

The reliability of the test was found by split-half method. The reliability of problem solving ability of problem solving ability was found to be 0.8561.

POPULATION AND THE SAMPLE

Population is the well defined portion of the universe. The sample may be said to be the small portion of population selected for collecting information. For the purpose of analysis by observing the characteristics of the sample one can make certain inferences about characteristics of the population from which it is drawn. So for problem the present study the investigator used simple random sampling technique.

The sample of this study consisted of higher secondary students who were studying in various higher secondary school of Kanyakumari District, while selecting the subjects the representations were given to factors such as gender, locale, type of management, Religion, community.

DETAILS OF THE SAMPLE SELECTED FOR PRESENT STUDY

Table 3.4: List of schools selected

S.No.	Name of the Schools	No of students
1	Government Boys Hr.Sec.School, Marthandam	40
2	Hindu Vidyalaya Matric Hr.Sec.School, Marthandam	55
3	Government Hr.Sec.School, Thickurichy	26
4	SRKV Matric Hr.Sec.School, Kulasekaram	43
5	Government Hr.Sec.School, Kulasekaram	21
6	Government Hr.Sec.School, Thiruvithancode	20
7	Amala Convent Girls Hr.Sec.School, Thuckalay	35
8	Government Hr.Sec.School, Thuckalay	35
9	Duthie Girls Hr.Sec.School, Nagercoil	39
10	Yettacode Hr.Sec.School, Yettacode	28
11	St. Josephs M.S.C. Hr.Sec.School, Chellamkonam	25
12	S.G.S. Matric Hr.Sec.School, Karungal	33

DETAILS OF SAMPLE SELECTED FOR THE STUDY

Gender wise distribution of higher secondary students

The sample consisted of 203 male students and 197 female students which are shown in table 3.5.

Table: 3.5: Gender wise distribution of higher secondary students

Category	Division	Count	Percent
Gender	Male	203	50.75
	Female	197	49.25
	Total	**400**	**100**

Locality wise distribution of higher secondary students

The sample consisted of 196 rural higher secondary students and 204 urban higher secondary students which are shown in table 3.6

Table 3.6: Locality wise distribution of higher secondary students

Category	Division	Count	Percent
Locality	Rural	196	49.00
	Urban	204	51.00
	Total	**400**	**100**

Type of management wise distribution of higher secondary students

The sample consisted of 142 Government higher secondary students 127 aided higher secondary students and 131 Muslim higher Secondary students which are shown in table 3.7.

Table 3.7: Type of management wise distribution of higher secondary students

Category	Division	Count	Percent
Type of Management	Govt	142	35.50
	Aided	127	31.75
	Unaided	131	32.75
	Total	**400**	**100**

Religion wise distribution of higher secondary students.

The sample consisted of 151 Hindu students 167 Christian students and 82 Muslim students which are shown in table 3.8

Table: 3.8: Religion wise distribution of higher secondary students

Category	Division	Count	Percent
Religion	Hindu	151	37.75
	Christian	137	41.75
	Muslim	82	20.50
	Total	**400**	**100**

Community wise distribution of higher secondary students

The sample consisted of 34 FC students 301 BC students, 32 MBC students and 33 SC/ST students which are shown in table 3.9.

Table 3.9: Community wise distribution of higher secondary students

Category	Division	Count	Percent
Community	FC	34	8.50
	BC	301	75.25
	MBC	32	8.00
	SC/ST	33	8.25
	Total	**400**	**100**

Administration of the Tool

For administration of the tool, the investigator visited the higher secondary schools in Kanyakumari District as per the schedule fixed. The permission for administering the tools were obtained from the Headmasters of selected schools.

Before administering the tool, the investigator explained the purpose of her study. The respondents were given a copy of "Mathematical Attitude Scale, problem solving ability test and general data sheet". The investigator explained the instructions clearly. The response sheets were collected from

the respondents after marking the responses. Depending on the facts supplied by them analysis has been made.

Scoring

The scoring was done as follows for Mathematical Attitude Scale. A score of 5,4,3,2,1 was given to the category strongly Agree, Agree, Neutral, Disagree, Strongly Disagree for a positive statement. The score is reversed for negative statement. The score for Mathematical Attitude scale (M.A.S) is the total of the scores obtained for all items. Scoring key given in the Appendix-E.

The scoring was done as follows for problem solving ability test. For each correct responses one mark was given and for each wrong response zero mark was given. A scoring key was used by the investigator for easy and quick scoring. Scoring key given in the Appendix-F.

STATISTICAL TECHNIQUES USED FOR THE STUDY

Statistical techniques are very important for any research. The relevant statistical techniques help the investigator to analysis and interpret the data meaningfully in the study. In the present study the investigator used the following techniques.

1. Arithmetic mean
2. Standard deviation

3. t-test

4. ANOVA

5. Pearsons product moment correlation Co-efficient.

Arithmetic mean

It is the most widely used measure for representing entire data by one value. It is the center of gravity in a distribution and is useful for further statistical interpretation.

$$A.M = A + \left(\frac{\Sigma fd}{N}\right) \times C$$

A- Assumed mean of the score obtained

f-frequency of each class interval

d-Deviation of scores from the assumed mean

N-Total frequency

C-class interval of the frequency

Standard Deviation

It the measure absolute disperssion (or) variability of the distribution. The amount of variability greater the standard deviation. It reveals high degree of uniformity of observation.

$$S.D, \sigma = C\sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2}$$

Where c-class interval

f-frequency of each class

N-Total frequency

d^2- squares of the deviation of score from the assumed mean.

t-test

The t-test has a wide number of applications in statics. It can be used to the test the significance between the means of two independent groups, t value is calculated. The calculated t value is compared with table value at t at 0.05 levels and 0.01 levels

$$t = \frac{M_1 - M_2}{\sqrt{\dfrac{\sigma_1^2}{N_1} + \dfrac{\sigma_2^2}{N_2}}}$$

Where M_1- Arithmetic mean of 1st sample

M_2- Arithematic mean of 2nd sample

σ_1 - Standard deviation of 1st sample

σ_2 - Standard deviation of 2nd sample

N_1- Number of students in 1st group

N_2- Number of students in 2nd group.

ANOVA

To find out whether there is any significant difference among the means of more than two random samples, we use the f-distribution. The analysis of variance lead with variance, rather than with standard deviation and standard error.

$$F = \frac{\text{Mean square variance between group}}{\text{Mean square variance within groups}}$$

Pearsons product moment correlation co-efficient

Correlation on used for measuring the degree of relationship between two variables. It shows as the extent to which values is one variable are linked or related to values in another variable.

Correlation co-efficient is calculated using the formula,

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

where, r- correlation co-efficient

N- Number of paired scores

$\sum x$-Sum of x scores

$\sum y$- Sum of y scores

Verbal interpretation of r

The following classification of interpreting the various values of r's are given by Garett.

r-Zero denotes no relationship

r-0.00 to 0.20 denotes negligible correlation

r- 0.20 to 0.40 denotes low correlation

r-0.40 to 0.70 denotes substantial correlation

r- 0.70 to 0.90 denotes high correlation

r-0.90 to 0.99 denotes very high correlation

r- 1 denotes perfects correlation.

It may be mentioned here that computer facilities were made use for analysis the data.

CHAPTER- IV

ANALYSIS AND INTERPRETATION

PERCENTAGE WISE DISTRIBUTION

COMPARISON ANALYSIS

Chapter – IV

ANALYSIS AND INTERPRETATION

The analysis and interpretation of data is one of the important steps in the research process. It is the application of the deductive and inductive logic to examine critically thesis of data means study results obtained in the light of the previous studies.

Analysis of data studying the tabulated materials in order to determine inherent facts or meanings. If involves breaking down existing complex factors into simpler parts and putting the parts together in new arrangement for proposes of interpretation. Interpretation of data calls for a critical examination of the results of one's analysis in the light of all the limitations of his data gathering.

Francis Rummel has said "The Analysis and interpretation of data involve the objectives material in the possession of the researcher and his subjective reactions and inherent meanings in their relations to problem. To avoid making conclusions or interpretations from insufficient or invalid data, the final analysis must be anticipated in detail when plans are being made for collecting information .The problem should be analyzed in detail to see what data are necessary in its solution and to be assured that the methods used will provide for definite answer. The researcher must

determine whether or not the factors. Chosen for study will satisfy all the conditions of the problem and if the sources to be used will provide the requisite data".

ATTITUDE TOWARDS MATHEMATICS OF HIGHER SECONDARY STUDENTS

Table: 4.1 Attitude towards mathematics of the higher secondary students.

Attitude towards Mathematics of higher secondary students	Mean	S.D	Count
	88.35	**20.32**	**400**

It is clear that the total number of sample selected for the present study was 400. The Arithmetic mean scores obtained for the total sample was 88.35 and standard deviation 20.32.

Table 4.2: Percentagewise distribution of different levels of attitude towards mathematics

Attitude	Count	Percent
Unfavourable	65	16.25
Neutral	273	68.25
Favourable	62	15.50
Total	**400**	**100.00**

From the table it is clear that 16.25% of higher secondary students possess unfavourable Attitude towards Mathematics, 68.25% of higher secondary students possess Neutral Attitude towards Mathematics, 15.50% of higher secondary students possess favourable Attitude towards Mathematics. This indicates that most of the higher secondary students have Neutral level of Attitude towards Mathematics.

COMPARISON OF MEAN SCORES OF ATTITUDE TOWARDS MATHEMATICS AMONG HIGHER SECONDARY STUDENTS BASED ON BACKGROUND VARIABLES

COMPARISON OF ATTITUDE TOWARDS MATHEMATICS BASED ON GENDER

H_01: Null Hypothesis

There is no significant difference in the mean scores of Attitude towards mathematics of male and female higher secondary students.

Table 4.3: Comparison of Attitude towards Mathematics based on gender

Gender	Mean	SD	N	t	P	Sig. at 5% level
Male	87.16	18.96	203	1.19	0.235	NS
Female	89.58	21.62	197			

The calculated t value (t- 1.19, p>0.05) is not significant at any level. Therefore the null hypothesis, "There is no significant difference in the

mean scores of Attitude towards mathematics of male and female higher secondary students" is accepted. That is Attitude towards mathematics of higher secondary students do not statistically differ with their gender. Thus from the mean scores it is confirmed that male and female higher secondary students possess more or less same Attitude towards mathematics.

COMPARISON OF ATTITUDE TOWARDS MATHEMATICS BASED ON LOCALE

H$_0$2: Null hypothesis

There is no significant difference in the mean scores of Attitude towards mathematics of rural and urban higher secondary students.

Table 4.4: Comparison of Attitude towards Mathematics based on Locale

Gender	Mean	SD	N	t	P	Sig. at 5% level
Rural	87.38	20.38	196	0.93	0.351	NS
Urban	89.28	20.27	204			

The calculated t value (t-0.93, p>0.05) is not significant at any level. Therefore the null hypothesis, "There is no significant different in the mean scores of Attitude towards mathematics of rural and urban higher secondary students" is accepted. That is Attitude towards mathematics of higher

secondary students do not statistically differ with locale. Thus from the mean scores it is confirmed that rural and urban higher secondary students possess more or less same Attitude towards mathematics.

COMPARISON OF ATTITUDE TOWARDS MATHEMATICS BASED ON TYPE OF MANAGEMENT

H$_0$ 3: Null hypothesis

There is no significant difference in the mean scores of Attitude towards mathematics of Government, Aided and Unaided higher secondary students.

Table 4.5: Comparison of Attitude towards Mathematics based on type of management.

Type of management	Mean	SD	Source	Sum of Squares	df	Mean Square	F	P	Sig. at 5% level
Govt	85.01	20.43	Between GP	7080.50	2	3540.25	8.91	0.000	S
Aided	85.90	17.72	Within GP	157668.80	397	397.15			
UnAided	94.36	21.35	Total	164749.30	399				

The calculated F value (F-8.91, p<0.01) is significant at 5% level. Therefore the null hypothesis, "There is no significant difference in the mean scores of attitude towards mathematics of Government , Aided and Unaided higher secondary students " is rejected. That is Attitude towards

mathematics of higher secondary students statistically differ with their type of management.

The result does not help to identify exactly the pairs of groups which differ statistically. Hence scheffe's multiple comparison is used for further analysis.

Table 4.6 Reesult of Scheffe's procedure for Attitude towards Mathematics based on type of management

Type of management	N	Pair	P(Scheffe)	Sig. at 5% level
Govt (A)	142	A Vs B	0.935	NS
Aided (B)	127	B Vs C	0.003	S
UnAided (C)	131	A Vs C	0.001	S

From table 4.5, it is clear that the mean scores that the attitude towards Mathematics of unaided students is 94.36 which is significantly higher than that of Aided higher secondary students whose mean score is 85.90. The attitude towards Mathematics of unaided students is 94.35 which is significantly higher than that of Government higher secondary students whose mean score is 85.01. The Government and aided higher secondary students possess same attitude towards Mathematics while comparing the means. Hence, the unaided higher secondary students were found to have significantly favourable attitude towards Mathematics than those of aided and government higher secondary students.

COMPARISON OF ATTITUDE TOWARDS MATHEMATICS BASED ON RELIGION

H₀4: Null hypothesis

There is no significant difference in the mean scores of Attitude towards Mathematics of Hindu, Christian and Muslim higher secondary students.

Table 4.7: Comparison of Attitude towards Mathematics based on religion

Religion	Mean	SD	Source	Sum of Squares	df	Mean Square	F	P	Sig. at 5% level
Hindu	92.41	20.87	Between GP	4316.8	2	2158.42	5.34	0.005	S
Christian	86.69	19.31	Within GP	160432.4	397	404.11			
Muslim	84.27	20.25	Total	164749.30	399				

The calculated F-value (F-5.34, p<0.01) is significant at 5% level. Therefore the null hypothesis, "There is no significant difference in the mean scores of Attitude towards Mathematics of Hindu, Christian and Muslim higher secondary students" is rejected. That is Attitude towards Mathematics of higher secondary students statistically differ with their Religion.

The result does not help to identify exactly the pairs of groups which differ statistically. Hence scheffe's multiple comparison is used for further analysis.

Table 4.8: Result of scheffe's procedure for Attitude towards Mathematics based on Religion.

Religion	N	Pair	P(Scheffe)	Sig. at 5% level
Hindu (A)	151	A Vs B	0.041	S
Christian (B)	167	B Vs C	0.672	NS
Muslim (C)	82	A Vs C	0.013	S

From the table 4.7, it is clear that mean scores that the Attitude towards Mathematics of Hindu students is 92.41 which is significantly higher than that of Christian students whose mean score is 86.69. The attitude towards Mathematics of Hindu students is 92.41 which is significantly higher than that of Muslim students whose mean score is 84.27. The Christian and Muslim higher secondary students possess nearly same attitude towards mathematics while comparing the means. Hence, the Hindu higher secondary students were found to have significantly favourable attitude towards Mathematics than those of Christian and Muslim higher secondary students.

COMPARISON OF ATTITUDE TOWARDS MATHEMATICS BASED ON COMMUNITY

H₀5 : Null hypothesis

There is no significant difference in the mean scores of Attitude towards mathematics of FC, BC, MBC and SC/ST higher secondary students.

Table .4.9: Comparison of Attitude towards Mathematics based on community

Community	Mean	SD	Source	Sum of Squares	df	Mean Square	F	P	Sig. at 5% level
FC	92.82	22.37	Between GP	5190.04	3	1730.01			
BC	86.64	20.3	Within GP	159559.25	396	402.93	4.29	0.005	S
MBC	88.94	18.01	Total	164749.30	399				
SC/ST	98.82	17.08							

The calculated F value (F-4.29, $p<0.01$) is significant at 5% level. Therefore the null hypothesis, "There is no significant difference in the mean scores of Attitude towards Mathematics of FC,BC,MBC and SC/ST higher secondary students is rejected. That is Attitude towards Mathematics of higher secondary students statistically differ with their community.

The result does not help to identify exactly the pairs of groups which differ statistically. Hence scheffe's multiple comparison is used for further analysis.

Table 4.10: Result of Scheffe's procedure for Attitude towards Mathematics based on community

Community	N	Pair	P(Scheffe)	Sig. at 5% level
FC (A)	151	A Vs B	0.409	NS
BC (B)	167	B Vs C	0.944	NS
MBC (C)	82	A Vs C	0.893	NS
SC/ST (D)	33	A Vs D	0.683	NS
		B Vs D	0.013	S
		C Vs D	0.270	NS

From the table 4.9, it is clear that the mean scores that the attitude towards Mathematics of SC/ST students in 98.82 which is significantly higher than that of BC students whose mean score is 86.64.   Hence, the SC/ST higher secondary students were found to have significantly favourable attitude towards Mathematics than of BC higher secondary students.

PROBLEM SOLVING ABILITY OF HIGHER SECONDARY STUDENTS

Table 4.11: Problem solving ability of the higher secondary students

Problem solving ability of higher secondary students	Mean	S.D	Count
	21.21	7.33	400

It is clear that the total number of sample selected for the present study was 400. The Arithmetic mean scores obtained for the total sample was 21.21 and standard deviation 7.33.

Table 4.12: Percentage distribution of different levels of problem solving ability

Problem solving Ability	Count	Percent
Low	59	14.75
Medium	282	70.50
High	59	14.75
Total	**400**	**100.00**

From the table it is clear that 14.75% of higher secondary students possess low problem solving Ability, 70.50% of higher secondary students possess medium problem solving Ability, 14.75% of higher secondary students possess high attitude towards Mathematics. This indicates that most of the higher secondary students have medium level of problem solving Ability.

COMPARISON OF MEAN SCORES OF PROBLEM SOLVING ABILITY AMONG HIGHER SECONDARY STUDENTS BASED ON BACKGROUND VARIABLES

COMPARISION OF PROBLEM SOLVING ABILITY BASED ON GENDER

H$_0$ 6: Null hypothesis

There is no significant difference in the mean scores of problem solving ability of male, female higher secondary students.

Table: 4.13: Comparison of problem solving ability based on gender

Gender	Mean	SD	N	t	P	Sig. at 5% level
Male	21.57	7.49	203	1.00	0.320	NS
Female	20.84	7.16	197			

The calculated t value (t-1.00, p>0.05) is not significant at any level. Therefore the null hypothesis, "There is no significant difference in the mean scores of problem solving ability of male and female higher secondary students" is accepted. That is problem solving ability of higher secondary students do not statistically differ with their gender. Thus from the mean scores it is confirmed that male and female higher secondary students possess more or less same problems solving ability.

COMPARISON OF PROBLEM SOLVING ABILITY BASED ON LOCALE

H$_0$ 7: Null hypothesis

There is no significant difference in the mean scores of problem solving ability of rural and urban higher secondary students.

Table 4.14: Comparison of problem solving ability base on locale

Gender	Mean	SD	N	t	P	Sig. at 5% level
Rural	21.41	7.15	196	0.55	0.59	NS
Urban	21.01	7.51	204			

The calculated t value (t-0.55,p>0.05) is not significant at any level. Therefore the null hypothesis, "There is no significant different in the mean scores of problem solving ability of rural and urban higher secondary students" is accepted. That is problem solving ability of higher secondary students do not statistically differ with locale. Thus from the mean scores, it is confirmed that rural and urban higher secondary students possess more or less same problem solving ability.

COMPARISON OF PROBLEM SOLVING ABILITY BASED ON TYPE OF MANAGEMENT

H$_0$8: Null hypothesis

There is no significant difference in the mean scores of problem solving of Government, Aided and unaided higher secondary students.

Table: 4.15: Comparison of problem solving ability based on type of management

Type of Management	Mean	SD	Source	Sum of Squares	df	Mean Square	F	P	Sig. at 5% level
Govt	18.61	6.22	Between GP	1878.32	2	939.16			
Aided	21.39	6.88	Within GP	19536.04	397	49.21	19.09	0.000	S
UnAided	23.85	7.9	Total	21414.36	399				

The calculated F value (F-19.09, p<0.01) is significant at 5% level. Therefore the null hypothesis "There is no significant difference in the mean scores of problem solving ability of Government, Aided, unaided higher secondary students" is rejected. That is problem solving ability of higher secondary students statistically differ with their type of management.

The result does not help to identify exactly the pairs of groups which differ statistically. Hence scheffe's multiple comparison is used for further analysis.

Table: 4.16: Comparison of scheffe's procedure problem solving ability based on type management

Community	N	Pair	P(Scheffe)	Sig. at 5% level
Govt (A)	142	A Vs B	0.006	S
Aided (B)	127	B Vs C	0.020	S
UnAided (C)	131	A Vs C	0.000	S

From table 4.15 it is clear that mean scores that the problem solving ability of unaided students is 23.85 which is significantly higher than that of Aided higher secondary students whose mean score is 21.39. The problem solving ability of unaided students is 23.85 which is significantly higher than that of Government higher secondary students whose mean score is 18.61. The Government and aided higher secondary students possess low problem solving ability while comparing the men scores of unaided higher secondary students. Hence, the unaided higher secondary students were found to have significantly high problem solving ability than those of aided and Government higher secondary students.

COMPARISON OF PROBLEM SOLVING ABILITY BASED ON RELIGION

H$_0$9: Null hypothesis

There is no significant difference in the mean scores of problem solving ability of Hindu, Christian and Muslim higher secondary students.

Table: 4.17: Comparison of problem solving ability based on Religion

Religion	Mean	SD	Source	Sum of Squares	df	Mean Square	F	P	Sig. at 5% level
Hindu	19.92	7.3	Between GP	630.0	2	315.02			
Christian	21.32	7.19	Within GP	20784.329	397	52.35	6.02	0.003	S
Muslim	23.23	7.2	Total	21414.36	399				

The calculated F value (F-6.02, p<0.01) is significant at 5% level. Therefore the null hypothesis "There is no significant difference in the mean scores of problem solving ability Hindu, Christian and Muslim higher secondary students" is rejected. That is problem solving ability of higher secondary students statistically differ with their religion.

The result does not help to identify exactly the pairs of groups which differ statistically. Hence scheffe's multiple comparison is used for further analysis.

Table: 4.18: Comparison of Scheffe's procedure problem solving ability based on Religion

Religion	N	Pair	P(Scheffe)	Sig. at 5% level
Hindu (A)	151	A Vs B	0.228	NS
Christian (B)	167	B Vs C	0.116	NS
Muslim (C)	82	A Vs C	0.003	S

From the table 4.17, it is clear that mean scores that the problem solving ability of Muslim students is 23.35 which is significantly higher than that of Christian higher secondary students whose mean score is 21.32. The problem solving ability of Muslim higher secondary students is 23.35 which is significantly higher than that of Hindu higher secondary students whose mean score is 19.92. The Hindu and Christian higher secondary students possess low problem solving ability while comparing the mean scores of Muslim higher secondary students. Hence, the Muslim higher secondary students were found to have significantly high problem solving ability than those of Hindu and Christian higher secondary students.

COMPARISON OF PROBLEM SOLVING ABILITY BASED ON COMMUNITY

H$_0$10: Null hypothesis

There is no significant difference in the mean scores of problem solving ability of FC,BC, MBC and SC/ST higher secondary students.

Table: 4.19: Comparison of problem solving ability based on community

Community	Mean	SD	Source	Sum of Squares	df	Mean Square	F	P	Sig. at 5% level
FC	24.68	9.93	Between GP	820.6	3	273.54			
BC	21.26	7.15	Within GP	20593.8	396	52.00	5.26	0.001	S
MBC	20.63	5.25	Total	21414.4	399				
SC/ST	17.73	5.97							

The calculated F value (F- 5.26, p<0.01) is significant at 0.01 level. Therefore the null hypothesis "There is no significant difference in the mean scores of problem solving ability of FC,BC, MBC and SC/ST higher secondary students statistically differ with their community.

The result does not help to identify exactly the pairs of groups which differ statistically. Hence scheff's multiple comparison is used for further analysis.

Table: 4:20: Comparison of Scheffe's procedure for problem solving

ability based on community

Community	N	Pair	P(Scheffe)	Sig. at 5% level
FC (A)	34	A Vs B	0.078	NS
BC (B)	301	B Vs C	0.974	NS
MBC (C)	32	A Vs C	0.160	NS
SC/ST (D)	33	A Vs D	0.002	S
		B Vs D	0.070	NS
		C Vs D	0.454	NS

From the table 4.19,it is clear that the mean scores that the problem solving ability of FC students is 24.68 which is significantly higher than that of SC/ST students whose mean score is 17.73. Hence, the FC higher secondary students were found to have significantly high problem solving ability than of SC/ST higher secondary students.

THE RELATIONSHIP BETWEEN ATTITUDE TOWARDS MATHEMATICS AND PROBLEM SOLVING ABILITY OF HIGHER SECONDARY STUDENTS

Table: 4.21: Pearson product moment correlation between Attitude towards Mathematics and problem solving ability of higher secondary students based on background characteristics

Background Characteristics		Pearson Correlation	P	Sig. at 5% level
Total		0.248	0.000	S
Gender	Male	0.318	0.000	S
	Female	0.190	0.007	S
Locale	Rural	0.312	0.000	S
	Urban	0.192	0.006	S
Type of Management	Govt	0.225	0.007	S
	Aided	0.228	0.010	S
	Un Aided	0.178	0.042	S
Religion	Hindu	0.339	0.000	S
	Christian	0.288	0.000	S
	Muslim	0.157	0.159	NS
Community	FC	0.381	0.026	S
	BC	0.257	0.000	S
	MBC	0.265	0.143	NS
	SC/ST	0.199	0.267	NS

From the above table 4.21 it can be seen that the calculated 'r' value is 0.248 which is significant at 5% level and verbally interpreted as low.

There exists positive low correlation between Attitude towards Mathematics and problem solving ability.

1. a. The correlation between Attitude towards Mathematics and problem solving ability of male students is 0.318 which is significant at 5% level and verbally interpreted as low. There exists positive low correlation between Attitude towards Mathematics and problem solving ability of male higher secondary students.

   b. The correlation between Attitude towards Mathematics and problem solving ability of female students is 0.190 which is significant at 5% level and verbally interpreted as negligible. There exists positive negligible correlation between Attitude towards Mathematics and problem solving ability of female higher secondary students.

2. a The correlation between Attitude towards Mathematics and problem solving ability of rural students is 0.312 which is significant at 5% level and verbally interpreted as low. There exists positive low correlation between Attitude towards Mathematics and problem solving ability of rural higher secondary students.

   b. The correlation between Attitude towards Mathematics and problem solving ability of urban students is 0.192 which is significant at 5% level and verbally interpreted as negligible. There exists positive negligible

correlation between Attitude towards Mathematics and problem solving ability of urban higher secondary students.

3. a The correlation between Attitude towards Mathematics and problem solving ability of Government school students is 0.225 which is significant at 5% level and verbally interpreted as low. There exists positive low correlation between Attitude towards Mathematics and problem solving ability of Government higher secondary school students.

b. The correlation between Attitude towards Mathematics and problem solving ability of aided school students is 0.228 which is significant at 5% level and verbally interpreted as low. There exists positive low correlation between Attitude towards Mathematics and problem solving ability of aided higher secondary school students.

c. The correlation between Attitude towards Mathematics and problem solving ability of unaided school students is 0.178 which is significant at 5% level and verbally interpreted as negligible. There exists positive negligible correlation between Attitude towards Mathematics and problem solving ability of unaided higher secondary school students.

4. a The correlation between Attitude towards Mathematics and problem solving ability of Hindu students is 0.339 which is significant at 5%

level and verbally interpreted as low. There exsits positive low correlation between Attitude towards Mathematics and problem solving ability of Hindu higher secondary school students.

b. The correlation between Attitude towards Mathematics and problem solving ability of Christian students is 0.288 which is significant at 5% level and verbally interpreted as low. There exists positive low correlation between Attitude towards Mathematics and problem solving ability of Christian higher secondary school students.

c. The correlation between Attitude towards Mathematics and problem solving ability of Muslim students is 0.157 which is not significant at 5% level. So there exists no correlation between Attitude towards Mathematics and problem solving ability of Muslim higher secondary school students.

5. a The correlation between Attitude towards Mathematics and problem solving ability of FC students is 0.381 which is significant at 5% level. There exists positive low correlation between Attitude towards Mathematics and problem solving ability of FC higher secondary school students.

b. The correlation between Attitude towards Mathematics and problem solving ability of BC students is 0.257 which is significant at 5% level.

So there exists positive low correlation between Attitude towards Mathematics and problem solving ability of BC higher secondary school students.

c. The correlation between Attitude towards Mathematics and problem solving ability of MBC students is 0.265 which is not significant at 5% level. So there exists no correlation between Attitude towards Mathematics and problem solving ability of MBC higher secondary school students.

d. The correlation between Attitude towards Mathematics and problem solving ability of SC/ST students is 0.199 which is not significant at 5% level. So there exists no negligible correlation between Attitude towards Mathematics and problem solving ability of SC/ST higher secondary school students.

TENABILITY OF HYPOTHESIS

(i) There is no significant difference in the mean scores of attitude towards Mathematics of male and female higher secondary students is accepted.

(ii) There is no significant difference in the mean scores of attitude towards Mathematics of rural and urban higher secondary school student is accepted.

(iii) There is no significant difference in the mean scores of attitude towards Mathematics among Government, aided and unaided higher secondary school students is rejected.

(iv) There is no significant difference in the means, cores of attitude towards Mathematics of many Hindu, Muslim, Christian higher secondary students is rejected.

(v) There is no significant difference in the mean scores of attitude towards Mathematics of FC, BC, MBC and SC/ST higher secondary students is rejected.

(vi) There is no significant difference in the mean scores of problem solving ability of male and female higher secondary students is accepted.

(vii) There is no significant difference in the mean scores of problem solving ability of rural and urban higher secondary school students is accepted.

(viii) There is no significant difference in the mean scores of problem solving ability among Government, aided and unaided higher secondary school students is rejected.

(ix) There is no significant difference in the mean scores of problem solving ability away Hindu, Christian, Muslim higher secondary student is rejected.

(x) There is no significant difference in the mean scores of problem solving ability away FC, BC, MBC, Sc/ST Higher secondary students is rejected.

(xi) There is no significant correlation between attitude towards Mathematics and problem solving ability of higher secondary school students for the total sample and subsample is rejected.

CHAPTER –V

RESUME OF THE STUDY

MAJOR FINDINGS

EDUCATIONAL IMPLICATIONS

SUGGESTION FOR FURTHER RESEARCH

LIMITATIONS

Chapter – V

FINDINGS, SUMMARY, CONCLUSION AND SUGGESTIONS

The study under investigation is entitled as "Attitude towards Mathematics and problem solving ability – A study on higher secondary students".

A sample of 400 students who were selected from different schools in Kanyakumari District of Tamil Nadu. Here the investigator used normative survey method. The technique used for selecting the sample was random sampling technique.

For collecting data the tools employed were General data sheet, Mathematical Attitude Scale and problem solving ability test. The data were subjected to statistical analysis such as mean, percentage, Standard deviation, t-test, ANOVA, product moment correlation co-efficient.

MAJOR FINDINGS

FINDINGS WITH REGARDING TO THE MEAN SCORES OF ATTITUDE TOWARDS MATHEMATICS OF HIGHER SECONDARY STUDENTS

(i)   There was no significant difference in the mean scores of Attitude towards Mathematics of male and female higher secondary students. The male and female higher secondary students possessed more or less level of Attitude towards Mathematics.   (t-1.19; t>0.01).

(ii)   There was no significant difference in the mean scores of Attitude towards Mathematics of rural and urban higher secondary students. The rural and urban higher secondary students possessed more or less level of Attitude towards Mathematics.   (t-0.93; p>0.01).

(iii)   There was significant difference in the mean scores of Attitude towards Mathematics of Government , Aided and Unaided higher secondary students.   The unaided higher secondary students possessed favourable Attitude towards Mathematics than Government and Aided higher secondary students.   (F-8.91; p<0.01).

(iv)   There was significant difference in the mean scores of Attitude towards Mathematics of Hindu, Christian and Muslim higher secondary students. The Hindu higher secondary students possessed favourable Attitude towards Mathematics than Christian and Muslim higher secondary students. (F-5.34; p<0.01).

(v)   There was significant difference in the mean scores of Attitude towards Mathematics of FC, BC,MBC and SC/ST higher secondary students. The SC/ST higher secondary students possessed favourable Attitude towards Mathematics than FC, BC and MBC higher secondary students. (F-4.29; p<0.01).

FINDINGS WITH REGARDING TO THE MEAN SCORES OF PROBLEM SOLVING ABILITY OF HIGHER SECONDARY STUDENTS

(i)   There was no significant difference in the mean scores of problem solving ability of male and female higher secondary students. The male and female higher secondary students possessed more or less level of problem solving ability.   (t-1.00; t>0.01).

(ii)   There was no significant difference in the mean scores of problem solving ability of rural and urban higher secondary students. The rural and urban higher secondary students possessed more or less level of problem solving ability. (p-0.59; p>0.01).

(iii)   There was significant difference in the mean scores of problem solving ability of Government, Aided and Unaided higher secondary students. The unaided higher secondary students possessed high problem solving ability than Government and Aided higher secondary students.   (F-19.09; p<0.01).

(iv)   There was significant difference in the mean scores of problem solving ability of Hindu, Christian and Muslim higher secondary students. The Muslim higher secondary students possessed high problem solving ability than Hindu and Christian higher secondary students. (F-6.02; p<0.01).

(v)   There was significant difference in the mean scores of towards problem solving ability of FC, BC, MBC and SC/ST higher

secondary students. The FC higher secondary students possessed high problem solving ability than BC, MBC and SC/ST higher secondary students. (F-5.26; p<0.01).

FINDING WITH REGARDING TO CORRELATION OF ATTITUDE TOWARDS MATHEMATICS AND PROBLEM SOLVING ABILITY

There was significant positive low correlation between Attitude towards Mathematics and problem solving ability of higher secondary students as whole and based on background variables positive low and negligible correlation between Attitude towards Mathematics and problem solving ability.

CONCLUSION

From the result, the study that higher secondary students possessed the average level of Attitude towards mathematics and problem solving ability. Also from the result of the study it was found that Gender, locale had no influence on Attitude towards Mathematics and problem solving ability. The study also revealed that type of management, religion and community had influence on Attitude towards Mathematics and problem solving ability. The study concluded that mean scores of Attitude towards Mathematics and problem solving ability was positively correlated. When Attitude towards Mathematics was high problem solving ability in Mathematics also high among higher secondary students. The study

recommended that the concern higher secondary students in various schools have taken necessary step and training for developing problem solving ability.

EDUCATIONAL IMPLICATIONS

There was low correlation between Attitude towards Mathematics and problem solving ability. The study revealed that majority of the higher secondary students of Kanyakumari District for the academic year 2013-2014 had average level of Attitude towards Mathematics and problem solving ability.

(i) The curriculum for the child should be designed to have some scope for problem solving ability.

(ii) Examination system should provide opportunities for problem solving ability.

(iii) Teacher should change the mode of assessment to examine students Mathematics abilities.

(iv) Students should the encourage to participate in quiz programmes, exhibition, and other competitive test related to Mathematics .

(v) Science club and Mathematics club can be conducted in schools.

(vi) Pupil should encourage solving difficult and challenging Mathematics task like brain storming.

(vii)   Pupil should be provided with free and necessary environment at home and school for learning Mathematics and developing problem solving ability.

SUGGESTION FOR FURTHER RESEARCH

Based on the finding of present investigations investigator suggests the following areas for further research in the field.

1) The present study is confirmed only to the student of Kanyakumari District. This can be extended further to other district of Tamil Nadu and other states.

2) The present study was confirmed only to higher secondary students. Further studies can be carried out on primary school students, adolescence, prospective teachers, gifted children and first generation learners.

3) The study is conducted only two variables namely Attitude towards mathematics and problem solving ability. Similarly the study can be extended by taking more variables by including more samples for further researches.

4) The present study is concerned on relation between problem solving ability and Attitude towards mathematics. This can be conducted to other subjects like creativity and problem solving ability achievement

in school students and problem solving ability intelligent and problem solving ability.

LIMITATIONS

(i) The investigator was not able to maintain the proportion between male and female; rural and urban; Hindu, Christian and Muslim; Government, Aided and Unaided; FC,BC,MBC and SC/ST.

(ii) Further statistical techniques like factor analysis, regression analysis were not employed.

REFERENCES

REFERENCES

Books

1. Aggarwal, J.C (1996). Educational Research- An introduction: New Delhi; Arya Book Depot.

2. Chattarjee, s. (2006). Principles and practice of modern education. Eureka printing and publishing Arunabhasen books and allied Pvt.Ltd.

3. Garet, Henry. (2004) . Statistics in Psychology and Education, New Delhi Paragon International publishers.

4. John .W. Best and Khan .V.James, (1993). Research in Education. New Delhi: prentice Hall of India private limited.

5. Kothari, C.R. (1985) Research methodology methods and techniques. New Delhi : New Age International Pvt.Ltd.

6. Koul Lokesh, (1984). Methodology of educational research, New Delhi; Vikas publishing House pvt. Ltd.

7. Pathak (2011). Research in education and psychology, New Delhi.

8. Sharma, R.A(2007). Educational technology meerut. R.Lall book Depot.

9. Sharma, R.N.(2005). Methodology of Educational Research New Delhi; prentice hall of India Pvt.Ltd.

10. Sidhu, K.S(2007). Methodology of research in education. New Delhi sterling publishers Pvt. Ltd.

Journals

1. Affri Ajay Kumar and Devi Nelama (2013), "secondary school students Attitude towards learning Mathematics," Journal of Multidisciplinary research:3(3): 135-142.

2. Ajwani,A.J,Mariyam Vohara and Sandhya Verma (2012), "The level of problem solving ability of high intellectual adolescents", Journal of the Indian Academy of Applied Psychology : 38(1): 126-133.

3. Anice James and Marice P.V. (2005), "Select Variables as determinants of problem solving ability", Edutracts 4(11) : 27-37.

4. Bijwajit Behera (2009), "To examine problem solving skills in mathematics learnings", Edutracts 8(7): 34-36.

5. Chich- Hsien Huang (2010), "Investigation of Engineering students Attitude towards calculus in Taiwan", World transaction of Engineering and technology: 9(2).

6. Hitkarini Mahila Mahavidyalaya (2013), "problem solving ability among undergraduate mathematical gifted students of Jabalpur Madya Pradesh", Indian Journal of Applied Research 3(8): 22-28.

7. Ifamuyiwa and M.K. Akinsola (2008), "Improving senior secondary school students Attitude towards Mathematics through self and co-operative instructional strategies", International journal of Mathematicalo Education in science and technology: 39(5): 569-585.

8. John Louis Manoharan, R and Ramganesh.E, (2007), "The creative problem solving ability of standard XI students", Edutracts 9(4): 29-31.

9. Limin Chen (2011), "An investigation of Chinese teachers related problem solving abilities and beliefs", Journal of Mathematics Education: 4(2): 80-96.

10. Lowsha Mohamned, Hussiain Waheed (2011), "Secondary students Attitude towards Mathematics in a selected school of Maldives", International journal of humanities and social science: 1(15).

11. Manoranjan Bhowmik and Bharati Banerjee (2013), "Fuzzy Measure of secondary students attitude towards Mathematics", Consotia Academia publishing : 2(2): 62-69.

12. Maria Nicoladou, George Philippou (2003), "The Attitude towards Mathematics Self- efficiency and Achievement in problem solving ability", European Research in Mathematics Education 111.

13. Mensah .J.K. and Okeyere. M. (2013), "students Attitude towards Mathematics and Performance. Does the teacher attitude matter", Journal of Education and practice: 4(3).

14. Mohammed Shahid Farooq and syed zia Ullah, (2008), "students attitude towards Mathematics", Pakistan Economic and social review :46(1): 75-83.

15. Muthu Lakshmi. P. and Veliappan. A. (2014), "An investigation on high school students attitude towards Mathematics", Indian journal of Applied Research 4(1).

16. Naki Erdemir, (2009), "Determining students attitude towards, physics through problem solving strategy", Asia – Pacific forum through on science learning and teaching 10(2): Article 1.

17. Piia Maria Vilenius Tuobimaa Aunota and Jari Erik Nurmi, (2008), "The association between Mathematical word problems and reading comprehension", Educational Psychology 28(4): 409-426.

18. Ranjana Choudhry and Dhiraj Kumar. D.S. (2012), "Influence of areas in relation to the attitude towards Mathematics and study habit on the achievement in Mathematics to the pupils at secondary stage", International Journal of Engineering Research and Applications, 2(6): 192-196.

19. Ravanan. R. and Blessing Mary .A. and Julie (2003) "Attitude towards Mathematics of XI standard students in Trichy District", 20108 (13): 43-51.

20. Sabitha Mahanta and Mofidual Islam (2000), "Attitude of secondary students towards Mathematics and its relationship to achievement in Mathematics", International Journal of Computer Technology and Applications : 3(2): 713-715.

21. Sarwat Muheen and Safia Saeed and Manzoor Hussian Arif (2013), "Attitude towards Mathematics and Academic Achievement in Mathematics",10SR journal of humanities and social science : 6(4): 38-41.

22. Sivakama Sundari and Kulasekara Perumal Pillai (2013), "An empirical study on higher secondary student problem solving ability", Golden Research thoughts 3(2): paper1.

23. Swarupa Rani.T. (2006) ,"Effectiveness of the synthetic and poly's Heuristic Approaches on the Acquisition of problem solving skills in mathematics",Edutracts 6(1): 33-36.

24. Uma Devi. M.R. (2009), "The relationship between problem solving ability and Academic achievement of secondary school students", Edutracts 46(2) :1-5.

Websites

1. Abdul Kaliq Khan (2011), "Secondary school students attitude towards Mathematics", Journal of Age Khan University: http:// ecommons. aku. edu>412/

2. Ashim Bora (2012), "An Evaluation on school students Attitude towards learning Mathematics", Social science Network : http://ssrm. com/abstract= 2263764.

3. Brian Evans (2012) ,"Problem solving ability and perceptions in alternative certification Mathematics teachers", NERA Conference proceedings paper1, http:// digital commons. Ucom. Edu/nera 2012//

4. Olga Nassar, (2000), "Development on Geometric reasoning in a problem   solving situation using dynamic geometry software", http:// ecommons. Lau .edu.lb: 8443/xmlui/..

5. Susan Frazier-Konassi (1999*),* "A psychological study of Mathematics Attitude and Achievement among female Ivorian students", http:// genun. Isp. Msu. Edu/documents.

6. Yee and Lim Siew (2010), "Mathematics Attitude and achievement of Junior college students in Singapore", Mathematics Education Research group of Australlia: http://www.merga.net. au/.

APPENDICES

APPENDIX – A

N.V.K.S.D. COLLEGE OF EDUCATION, ATTOOR

KANYAKUMARI DISTRICT

GENERAL DATA SHEET

2013-2014

Instruction

Certain personal data regarding you are required for my research purposes. The information given by you will be kept confidential and will be used for the research purpose only.

Name of the student   :

Name of the School   :

Gender   :   Male / Female

Locale   :   Rural / Urban

Type of Management   :   Govt / Aided / Un aided

Religion   :   Hindu / Christian / Muslim

Community   :   FC /BC /MBC /SC &ST

APPENDIX – B

N.V.K.S.D. College of Education
Attoor, Kanaykaumari District
Mathematical Attitude Scale Draft
Prepared by D. Nabisha Banasir & Mr. Prasad .P.S
(2013 -2014)

Instructions:

Certain statements related to mathematics are given below. Each statement has five choices viz. Strongly agree, Agree, Neutral, Disagree, Strongly disagree representing SA, A, N, D, SD. Please read each one of the statements carefully and answer them making a tick (√) mark against the answer which you think as appropriate for yourself. Respond to all the statements.

S.No	Statements	SA	A	N	D	UD
1	I have good knowledge in Mathematics					
2	I feel difficulty to solve simple problems in Mathematics					
3	I feel difficult to recall the Mathematical formulas					
4	Studying Mathematics theories are waste of time					
5	I like to read and solve Mathematical puzzles in newspapers and weekly					
6	I like to read articles related to Mathematics					
7	I hate Mathematics					
8	Knowledge of Mathematics helps me to do computer programmes easily					
9	Knowledge of Mathematics helps me to solve problems in physics and chemistry					
10	Mathematics helps me to think deeply					
11	I like to apply Mathematical concepts in real life situations					
12	I am not able to concentrate in Mathematics					
13	I am not confident in solving Mathematical problems					
14	I don't need to improve my problem solving ability					
15	I would like to more opportunity to learn Mathematics					

16	I took Maths group because of compulsion					
17	I eagerly wait for Mathematics class					
18	I can't get results when I solve Mathematical problems					
19	I can't do well in Mathematics					
20	Mathematics is a bore subject					
21	Mathematics improves mental aptitude					
22	I don't like to take Mathematics as my special subject for higher studies					
23	I don't use calculators for simple arithmetic					
24	I feel shared when the Mathematics teacher on leave					
25	I don't feel shared when I get less marks on Mathematics than any other subjects					
26	I am not interested in doing home works in mathematics					
27	I stop working with problems when I am not getting answers					
28	I like to copying Mathematics home work from my friends					
29	Mathematics is a queen of all sciences					
30	Mathematics is a difficult subject to learn and understand					
31	Mathematics provides more scope for employment in different fields					
32	Study of Mathematics is not very essential to lead a peaceful life					
33	For a common man knowledge of Mathematics is not very essential					
34	I feel that Mathematics is not develops the memory power					
35	Mathematics help to develop creativity					
36	Mathematics is comparatively easier than all other science subject to understand					
37	Mathematics is not loved by everyone					
38	Mathematics is the important base subject for higher studies					
39	Mathematics is an integral part of school curriculum					
40	Mathematics helps for intellectual development					

41	Study of Mathematics trains the student to be honest					
42	I like to do research in Mathematics					
43	Study of Mathematics develops interest in inventing new things					
44	The study of Mathematics helps to increase the power of reasoning					
45	I try to remain absent for the Maths classes					
46	Mathematics lessons are not interesting					
47	Study of Mathematics makes confused					
48	Mathematics teachers are narrow minded					
49	Mathematics principles are always true					
50	I like to participate in Mathematics club activities					
51	Mathematicians are not often practical					
52	Mathematics is my favourite subject					
53	I am not interested to learn new areas in Mathematics					
54	I spend more time to study Algebra					
55	I can easily understand the matrix portions in Mathematics					
56	In Mathematics I feel probability is too difficult					
57	I confuse a lot in differentiation because of the more number of formula's					
58	I am very interested in doing set theory problems					
59	I draw only geometry and graphs for examinations					
60	I like to solve Mathematical problems in my leisure time					

APPENDIX – C

N.V.K.S.D. College of Education
Attoor, Kanaykaumari District
Mathematical Attitude Scale Final
Prepared by D. Nabisha Banasir & Mr. Prasad .P.S
(2013 -2014)

Instructions:

Certain statements related to mathematics are given below. Each statement has five choices viz. Strongly agree, Agree, Neutral, Disagree, Strongly disagree representing SA, A, N, D, SD. Please read each one of the statements carefully and answer them making a tick (√) mark against the answer which you think as appropriate for yourself. Respond to all the statements.

	Statements	SA	A	N	D	UD
1	I feel difficulty to solve simple problems in Mathematics					
2	Studying Mathematics theories are waste of time					
3	I hate Mathematics					
4	Knowledge of Mathematics helps me to do computer programmes easily					
5	Mathematics helps me to think deeply					
6	I am not able to concentrate in Mathematics					
7	I am not confident in solving Mathematical problems					
8	I would like to more opportunity to learn Mathematics					
9	I took Maths group because of compulsion					
10	I eagerly wait for Mathematics class					
11	I can't do well in Mathematics					
12	Mathematics is a bore subject					
13	I don't like to take Mathematics as my special subject for higher studies					
14	I don't feel sad when I get less marks on Mathematics than any other subjects					

15	I am not interested in doing home works in mathematics					
16	I stop working with problems when I am not getting answers					
17	I like to copying Mathematics home work from my friends					
18	Mathematics is a difficult subject to learn and understand					
19	Study of Mathematics is not very essential to lead a peaceful life					
20	For a common man knowledge of Mathematics is not very essential					
21	I feel that Mathematics is not develops the memory power					
22	Mathematics help to develop creativity					
23	Mathematics teachers are narrow minded					
24	Mathematics principles are always true					
25	I like to participate in Mathematics club activities					
26	Mathematics is my favourite subject					
27	I can easily understand the matrix portions in Mathematics					
28	I am very interested in doing set theory problems					
29	I draw only geometry and graphs for examinations					
30	I like to solve Mathematical problems in my leisure time					

APPENDIX – D

N.V.K.S.D. COLLEGE OF EDUCATION, ATTOOR

KANYAKUMARI DISTRICT

PROBLEM SOLVING ABILITY TEST

(Prepared by Deepa R.P. & Dr. M. Sadanandan)

Instructions: Dear Students

This test is designed for checking the ability in problem solving. The test consists of items related to number series, figural problems, missing parts and word problems. Read the following items carefully, identify the problem and select the correct solution. For each item four alternatives namely a,b,c,d are given write your response in the box given in the right.

I. How the problem figures are given. Find the answer figure from among the given alternatives.

1. Find the missing part of the following
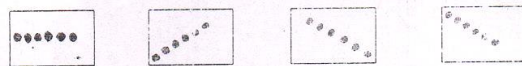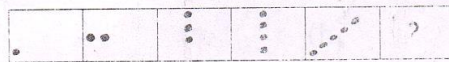
a)   b)   c)   d)

2. Please find the figures continuing the series.
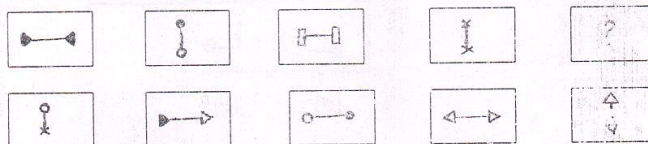
a)   b)   c)   d)   e)

3. Please find the figures continuing the series.
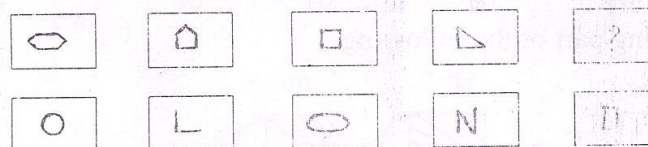
a)   b)   c)   d)   e)

4. Please find the figures continuing the series
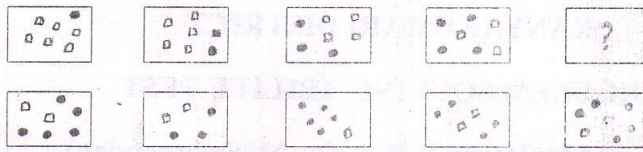
a)   b)   c)   d)   e)

5. Please find the figures continuing the series
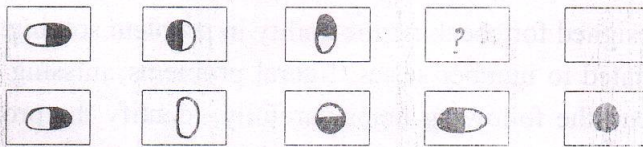
a)   b)   c)   d)   e)

6. Please find the figures continuing the series
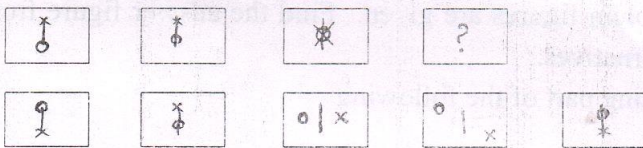
a)   b)   c)   d)   e)

7. Please find the figures continuing the series
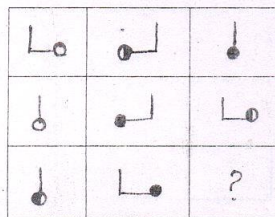
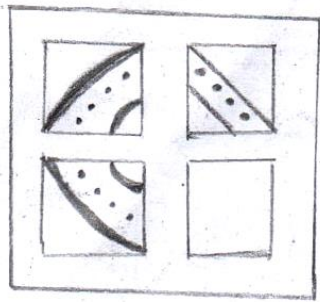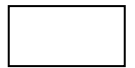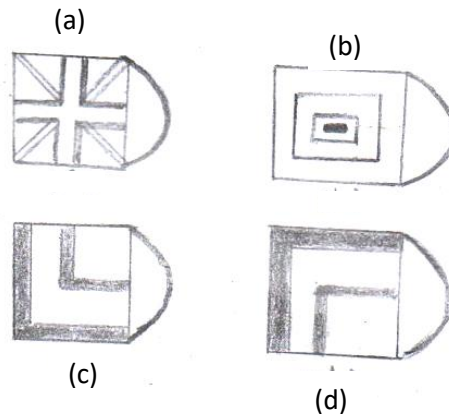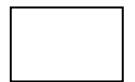(a)   (b)   (c)
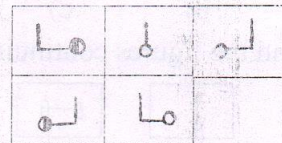
(d)   (e)
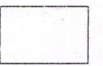
8. Please find the odd one?
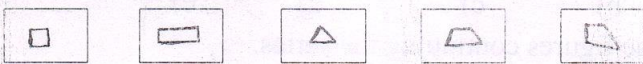
a)   b)   c)   d)   e)
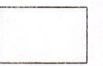
9. Find the missing part of the following

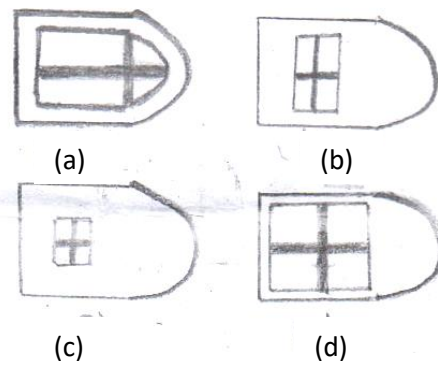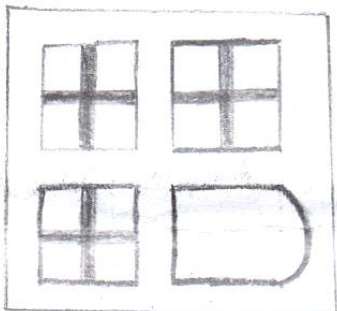(a)   (b)

(c)   (d)

1. Find the missing part of the following

(a)   (b)

(c)   (d)
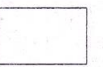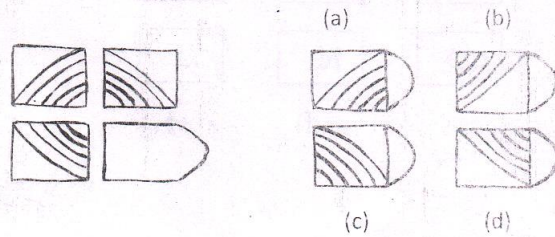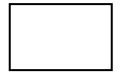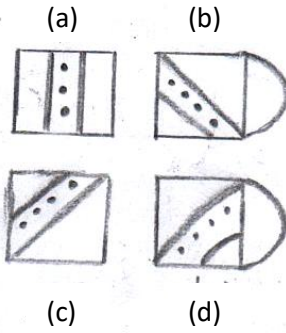
2. Find the missing part of the following

(a)

(b)

(c)

(d)
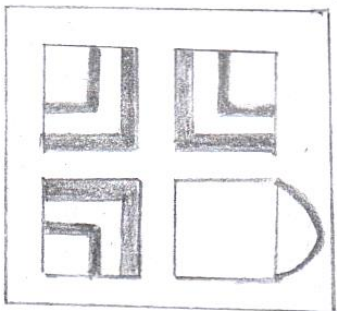
3. Find the missing part of the following

(a)   (b)

(c)   (d)

4. Find the missing part of the following

(a)   (b)

(c)

(d)
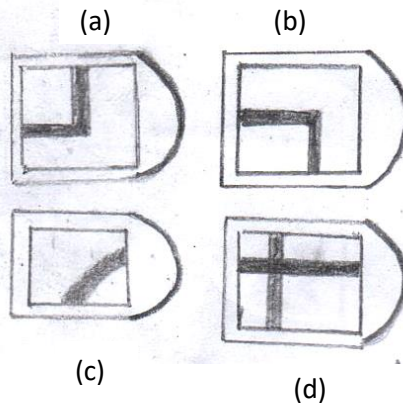
5. Find the missing part of the following

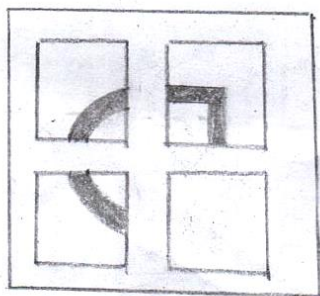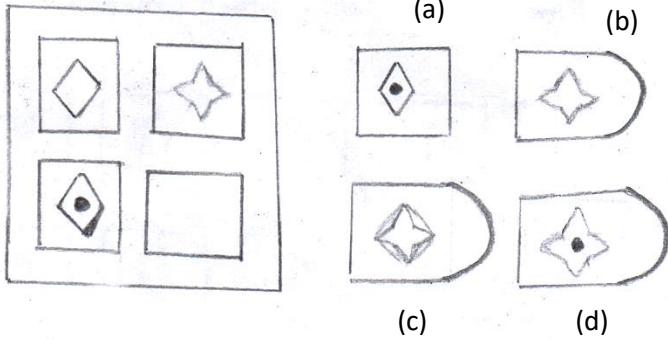15. Please find the odd one

a)   b)   c)   d)   e)
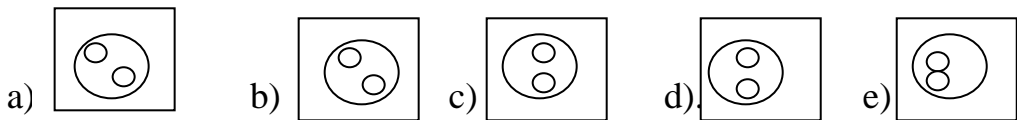
I. **In the following items a series of numbers or letters are given. Find the missing character from among the given alternatives.**

16. Find the missing term

0, 2, 8, 14, ___, 34

a) 24   b) 22   c) 20   d) 10

17. Find the wrong term in the number series

1, 3, 7 15, 27, 63, 127
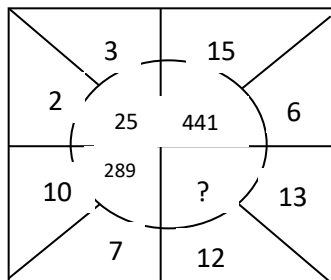
a) 7   b) 15   c) 27   d) 63

18. Find the next term of a letter series

WVTSQPNM

a) I J   b) J I   c) J K   d) K J

19. Find the missing character from among the given alternatives.

a) 625   b) 25   c) 125   d) 156

20. Find the missing character form among the given alternatives

a) 115 b) 130 c) 135 d) 140

21. Find the missing character from among the given alternatives

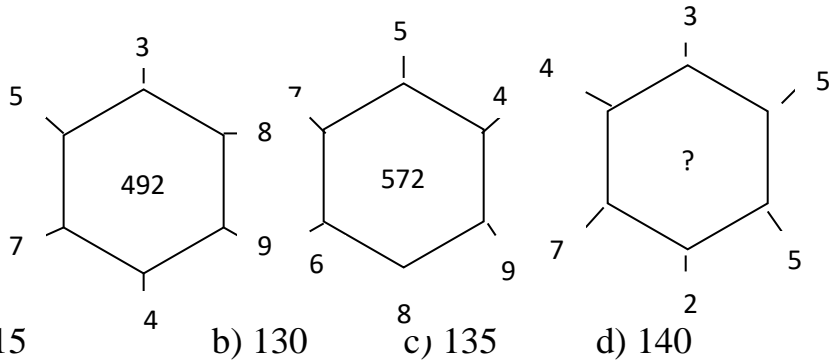| ?	1	2
21	22	40
1	2	5

a) 5 b) 4 c) 3 d) 2

22. Find the missing character from among the given alternatives

a) 4 b) 305 c) 343 d)729

23. Find the missing character from among the given alternatives

a) 72 b) 70 c) 68 d) 66

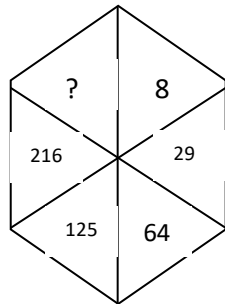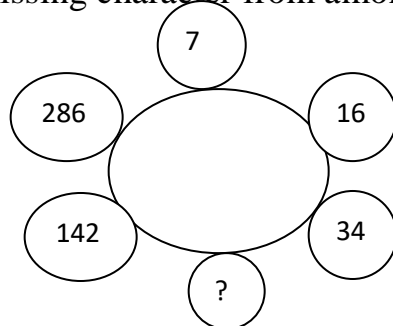24. Find the missing character from among the given alternatives.

```
        4            7
  5     1     64        3
  11    27     ?        8
        8
                  2
```

a) 0   b) 8   c) 125   d) 216

25. Find the missing character from among the given alternatives.

```
     4    5
           1
  64          8
           2
     ?
     25
```
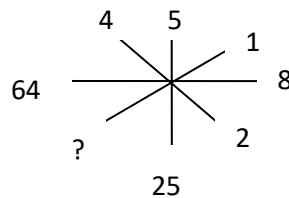
a) 1   b) 2   c) 3   d) 4

26. Find the missing character from among the given alternatives.

```
           1
  15       2       17
      ?        16
      4         6
  3       18       5
           19
```
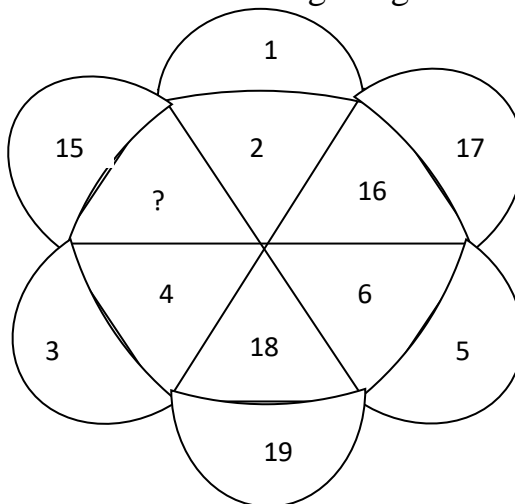
a) 13   b) 14   c) 20   d) 21

27. Find the missing character from among the given alternatives.

```
           7
          63
  2    14      ?    9
          30
          15
```
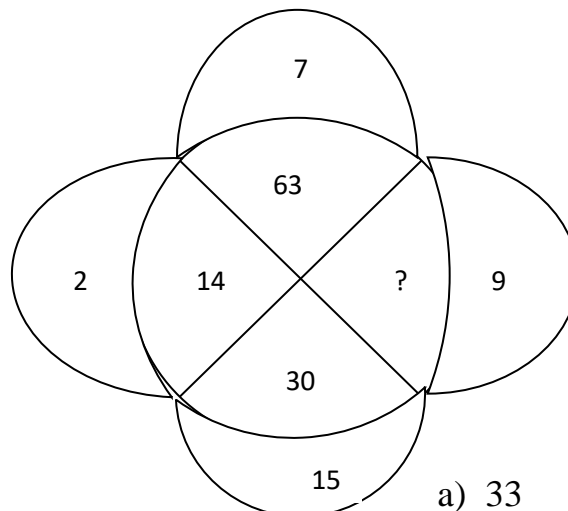
a) 33   b) 145   c) 135   d) 18

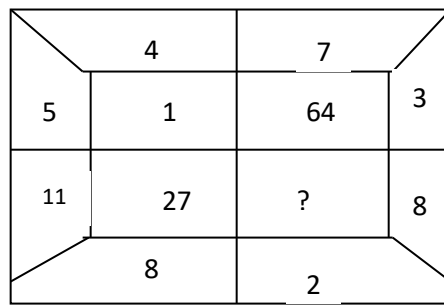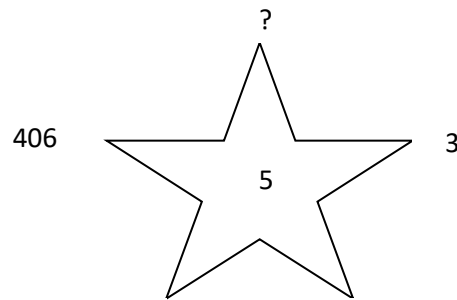28. Find the missing character from among the given alternatives.

a) 1   b) 731   c) 625   d) 2031

29. If 53+31=2, 45+27=1, 69+32=3, What is 97+26=?

a) 1   b) 2   c) 3   d) 4

II. Certain problems and solutions are given below. Read the problems carefully and select the correct solutions from the given alternatives.

30. 30 years ago it would take a worker few hours to make a chair. Today it takes him just 30 minutes.
   a) Man has become more industrious
   b) People work faster in order to avoid unemployment
   c) chairs have a shorter life cycle
   d) workers have more spare time
   e) productivity has increased.

31. Drinking and driving causes many accidents
   a) People drink too much alcohol
   b) People should not drive when drunk over the legal limit
   c) There is a chance of 20 percent to cause an accident by driving in drunk condition
   d) Alcohol dimenses driving skills
   e) The police should carry out more breath analyzing tests

32. Today is Wednesday, what will be the fourth day from yesterday be?
   a) Sunday   b) Monday   c) Friday
   d) Thursday   e) Saturday

33. Which lamp is the brightest?
   a) Lamp A is less bright than lamp B
   b) Lamp B is the brighter than Lamp C

c) Lamp C is a s bright as Lamp D

d) Lamp D is brighter than Lamp A

    a) lamp A   b) Lamp B   c) Lamp C   d) Lamp D   e)   No solution

34. A trader buys tea for Rs.1200/- and sells it for 1500 per sack of tea He makes a profit of Rs. 50/- How many of sacks of tea did he have?

    a) 6   b) 7   c) 8   d) 4

35. 87 kg of potatoes are distributed in two boxes. One box weighs 11kg less than the other one. How many kilograms of potatoes does the lighter box contain?

    a) 38   b) 23   c)42   d) 35

36. Aruna ranks twelfth in a class of forty six. What will be her rank form the last

    a) 33   b) 34   c) 35   d) 37

37. Starting from a point P, Sachin walked 20 metres towards south. He turned left and walked so meters. He then turned left and walked 20 meters. He again turned left and walked 40 meters and reached a point Q. How for and in which direction is the point Q from the point P?

    a) 20m west   b) 10m east   c) 10mwest   d)10   m north

38. A clock is so placed that at 12 noon its minute hand point at 1.30 P.M?

    a)North   b) south   c) East   d) West

39. What is the smallest number of ducks that could swim in this formation. Two ducks in front of duck, two ducks behind a duck and a duck between two ducks.

    a) 3   b) 5   c) 7   d) 9

40. In a group of 15 people 7 read French, 8 read English while 3 of them read none of these two. How many of them read French and English both?

    a) 0   b) 3   c) 4   d) 5

41. The mean of five consecutive number is 7. Which is the highest number?

    a) 8   b) 10   c) 7   9

42. If the price of silver is Rs. 3810 per 100 gms. What will be the approximate value of 15.7gm?

    a) 900   b) 65   c) 600   d) 750

43. One third of three forth of a number is 30 What is the number?
    a) 90   b)12   c) 150   d) 80

44. A train running at speed of 90 km /hr crosses a platform double its length in 36 second. Find the length of the platform.

45. In the following number series one number is wrong. find the number 11,13,19,26,35,46,59.
    a) 19   b)46   c) 13   d) 26

46. Sixteen men complete a work in twelve days. In how many days will 24 men complete the same work.
    a) 4   b) 8   c) 6   d) 3

47. The average age of 24 boys in 2 class is 11. why the teacher's age is included the average increases by one. What is the age of the teacher?
    a) 34 years   b) 42 years   c) 36 years   d) 48 years

48. A boat goes 12km down steam and then comes back in 3 hours. If the speed of the current is 3 km/hr, the speed of boat in still water is
    a) 9km/hr   b) 8km/hr   c) 6km/hr   d) 12 km/hr

49. If a man can swim down a steam at kmph and upsteam at 2 kmph, his speed in still water is
    a) 4 kmph   b) 2 kmph   c) 3 kmph   d) 12km/hr

50. Walking 3/4 th of his usual rate, a man is 2½
    a) 7½hrs   b) 3½hrs   c) 3¼hrs   d)7/8 hrs

51. Two pipes A and B would fill a tank in 30 to 36 minutes respectively. Both pipes being opened, find when the first pipe must be turned off so that the tank may be filled in 18 minutes?
    a) after 20 mts   b) after 15 mts   c) after 13 mts   d) after 17 mts

52. An electric pump can fill a tank in 3 hrs. Because of a leak in the tank, it took 3½ hours to fill the tank.   The leak can drain out all the water of the tank in
    a) 21 hrs   b) 24 hrs   c) 10½hrs   d) 12 hrs

53. Two candles A and B of the same length were lighted at the same time, after 5 minutes the candle a was twice as long as the candle B. After 6 minutes the candle A was three times as long as candle B. How long would candle B take to burn completely?
    a) 7½ mts   b) 10 mts   c) 12 mts   d) 15 mts

54. If the population of a town is 64,000 and it grows annually at a rate of 10% what is the increase in the population at the end of 3 years.
a) 21184 b) 20814   c) 21888   d) 20614

55. The area of a rectangular field is 144 sq.m. If its length is increased by 5m, its area increases by 40 sq.m. The length of the field is
a) 12m   b) 14.4m   c) 16m   d) 18m

56. Six friends A,B,C,D,E & F are sitting in a closed circle facing the cnetre. E is left of D,C is between A & B, F is between E & A who is left of B?
a) A   b) C   c)D   d) E

57. Anu is taller than Anand but shorter than seema. Krishna is taller than Rohan but shorter than Anand. Dhiraj is taller than Krishna but shorter than seema who among them is the tallest?
a) rohan   b) Seema   c) Krishna   d) dhiraj

58. There are some horse and hens in a ground. The number of heads is 79. and the number of legs is 200. Find the number of horses
a) 21   b) 35   c) 22   d) 42

APPENDIX – E

SCORING KEY – MATHEMATICAL ATTITUDE SCALE

1)	1	2	3	4	5
2)	1	2	3	4	5
3)	1	2	3	4	5
4)	5	4	3	2	1
5)	5	4	3	2	1
6)	1	2	3	4	5
7)	1	2	3	4	5
8)	5	4	3	2	1
9)	1	2	3	4	5
10)	5	4	3	2	1
11)	1	2	3	4	5
12)	1	2	3	4	5
13)	1	2	3	4	5
14)	1	2	3	4	5
15)	1	2	3	4	5
16)	1	2	3	4	5
17)	1	2	3	4	5
18)	1	2	3	4	5
19)	1	2	3	4	5
20)	1	2	3	4	5
21)	1	2	3	4	5
22)	5	4	3	2	1
23)	1	2	3	4	5
24)	5	4	3	2	1
25)	5	4	3	2	1
26)	5	4	3	2	1
27)	5	4	3	2	1
28)	5	4	3	2	1
29)	1	2	3	4	5
30)	5	4	3	2	1

APPENDIX – F

SCORING KEY – PROBLEM SOLVING ABILITY TEST

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