



## **A Study of Mathematical Reasoning Ability of Students of Grade IX of Ahmedabad In Relation To Certain Variables**

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### **1. Introduction**

Nature is unique, mysterious and mystifying. Human being are so much inclined towards travelling and discovering the truth surrounds that barely spares little or no time in knowing the own potential, talent, skills, likes, dislikes, interest, abilities, aptitudes etc. In contrast to animals man is considered to be endowed with certain cognitive abilities which make him a rational being. He can reason, discriminate, understand, adjust and face a new situation more intelligently. Definitely man is superior to animals in all such aspects of behaviour. But human being them selves is not alike. Some may be bright, others are average and some are dull. Since man is a product of his heredity and environment, the answer lies with either these question from the very beginning of the knowledge. These are wide individual differences among individuals.

The National Curriculum Frame work (NCF) 2005 recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legally of bookish learning which continue to shape our system and causes a gap between the school, home and society (community). It is necessary to encourage the children to reflect on their own learning and pursue imaginative activities and questions.

Almost in all entrance examination, Mathematical reasoning ability is a major part. The student who has the ability to solve the reasoning questions, those who do well in arithmetic and measuring, can do well as these abilities also help in technical careers and others jobs like laboratory assistants, books keepers, clerks, in construction work and in many others grade skills. Mathematical reasoning constitutes a powerful personal and social tool. Today's society, characterized by high demands, competition and constant change related to new scientific and technological developments, requires individuals who, in addition to knowledge, have the ability to solve the challenging problems they face in their lives. Many of those challenges are based on mathematics.

Now a day's educational scenario in the society is changing. And due to such changing scenario of education, the schooling patterns for the students are also changing. Along with state boards in each respective states of our country (India), various schools and boards are also coming up like CBSE (Central Board of Secondary Education) board, ICSE board and many others international board like Cambridge, Oxford and etc. The study patterns are different in different board but the common centre of importance in all of them is the level of mathematical ability of their students.

So, keeping all these points in mind, the researcher limits the area and draws the attention towards the mathematical reasoning ability of the boys and girls of the Ahmedabad for this study among the two different zones of Ahmedabad that is west zone and East zone of Ahmedabad. But how these two educational boards helps the child to develop one's numerical ability is not given much importance yet. In the present study the researcher has decided to conduct a research on the study of Mathematical reasoning ability of IX grade students of Ahmedabad in relation to certain variables.

## 2. Objectives

Before starting any activity there should be some objective. It motivates us to accomplish the given task. Without any objective, the investigator is likely to wander aimlessly in his field and achieve nothing worth while. It gives perfect direction to the research as well as researcher.

By keeping in mind the objectives of the study, the process of research is analysed. The research has its own aim which are tried to attain within a short period. They have importance in any research.

The objectives of the study are as follows-

1. To study the effect of gender on the mathematical reasoning ability of Students of Grade IX of Ahmedabad.
2. To study the effect of Zone on the mathematical reasoning ability of Students of Grade IX of Ahmedabad.
3. To study the effect of Type of school on the mathematical reasoning ability of Students of Grade IX of Ahmedabad.

## 3. Hypotheses

Ho<sub>1</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of the boys and girls of students of Grade IX of Ahmedabad.

Ho<sub>2</sub> There will be no significant difference between the mean scores of Mathematical reasoning Ability of Students of grade IX belonging to east and west zone.

Ho<sub>3</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of students of grade IX belonging to Grant in Aid and Non Grant in Aid schools of Ahmedabad.

Ho<sub>4</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in Grant in Aid schools.

Ho<sub>5</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in non Grant in Aid schools.

Ho<sub>6</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in the west Zone.

Ho<sub>7</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in the east Zone.

## 4. Research Design

Research design is the conceptual structure within which research is conducted; it constitutes the blue print for the collection, measurement, measurement and analysis data.

Important features of research design:-

- It is a plan that specific sources and types of information relevant to the research Problem.
- It is a strategy specifying which approach will be used for gathering and analyzing the data.
- It's also includes the time and cost budgets since most studies are done under these two constrains.
- In brief, research design must, at least contain-

(a) A clear statement of the research problems;

(b) Procedures and techniques to be used for gathering information;

(c) The population to be studied; and

(d) To be used in processing and analyzing data.

## 5. Population

In the present study researcher has taken students of grade IX of Ahmedabad city as population.

## 6. Sampling

Multi stage sampling is used in the present study which is a probability sampling technique. Researcher took a list of schools and from different area of Ahmedabad city different schools were selected. The selection of the school were done by keeping in mind the two different zones of the Ahmedabad city. The list of the selected schools is shown in the appendix. The schools were selected randomly. The

students were selected by the procedure of cluster sampling. The sample of the study were 320 students of grade IX. Their respective Mathematical reasoning ability scores were kept in tabular form.

## 7. Method of Study

In the present study the researcher has employed the survey method because researcher can gather information in terms of individual scores by a standardized test. Survey studies was conducted because detailed descriptions of existing phenomena with the intent of employing data to justify current conditions and practices or to make more intelligent plans for improving them. It determines the present problem and solves current problems. It provides information useful to the solution of the local problems.

## 8. Tool

To test the level of Mathematical Reasoning ability of students of grade IX studying in GSEB Schools of Ahmedabad district, the researcher has used the Mathematical Reasoning Ability test, Prepared by Dr. Satishprakash S. Shukla, Ahmedabad. It has been standardized on the students of grade VIII to X of Gujarat state. The researcher's dissertation titled is also concerned with the students of grade IX of Ahmedabad city of Gujarat State.

Therefore, the researcher has chosen this test which is valid and reliable for the present study. The reliability of the test found out by Split half method is 0.934, reliability found out by SE (Rullon) is 0.934, when found out by the method of SE (Flangon) is 0.866, reliability found out by Kuder Richardson (KR 21) is 0.773. The validity of the test found out by comparing marks of test with the mark obtained by students in Annual exam in Mathematics. The validity of the test is 0.8367.

## 9. About the Mathematical Reasoning Ability Test

This test has been devised to measure the Mathematical reasoning ability of students studying in grade VIII to X of Gujarat State. It is a written type of test in the form of booklet and can be administered on nearly 40 students at a time. It has 115 items and total time required to administrator the test is 75 minutes. Instructions are to be given in 10 minutes and after that students have to solve the 115 items in 75 minutes as stretch. As such the Mathematical reasoning ability standardized test consists of 115 questions, the total marks of this test are 115 that is one mark for each item (question). The students (sample) have to select the right option from four given options (select most appropriate answers from given four options). There is a separate answer sheet and students do not have to write anything in the test booklet.

The test comprises of Logical expression, Ratio and proportion, coding and decoding, classification, puzzles, module test, geometry, changing mathematical sign, vein diagram, reasoning and similarity test.

## 10. How to check the test

In the manual the test prepared by Dr. Satishprakash S. Shukla, key score (scoring key) is given. With the help of this key, each test paper has been checked by the researcher one by one accordingly. One score was given to right answer and zero to wrong answer. If somebody has encircled two options for an item then that item was scored zero. Total number of correctly answered items would give the raw score of that student.

The standardized tool which is used in the study is shown in the appendix.

## 11. Data Collection

Data means, observation or evidence. Data are both qualitative and quantitative in nature.

Measurement process is employed to identify the variables. Data are collected for both variables as well as attributes which are gathered in term of frequency and scores. Scores is the Mathematical Reasoning ability description of an individual with regard to some characteristics for variable. Data depend on the type of instrument employed for its measurement. Which test yield the data in the form of scores,

questionnaires provide data. Data are things with which we think of both data and facts are used in educational research.

In the present study the researcher used the Mathematical Reasoning ability test prepared by Dr. Satishprakash S. Shukla for the student of grade IX.

In the first step of administration, researcher collected the details of the schools from Ahmedabad city of Gujarat. After fixing the sample, the researcher contacted the principal of the school and obtained their permission for collecting the data by administering the Mathematical Reasoning ability test. Before answering the question, clear and precise instructions were given to the subject and their doubts were clarified. The test was administered in a very conducive environment.

## 12. Analysis and Interpretation of the Data

Analysis of the data means studying the organized material in order to discover inherent facts. The data studied from as many angles as possible to explore the new facts. Analysis requires an alert flexible and open mind. It is worthwhile to prepare a plan of analysis before the actual collection of data. This is the most important section of this research report. The data should be presented in tabular forms. The results of each statically analyses must discuss in term of the original hypothesis to which it is related. It provides the original work or contribution by the researcher.

## 13. Statistical Techniques Used

In order to analyze and interpret the data obtained by the administering the students Mathematical Reasoning ability. The following statistical techniques are used with the help of computer aid

(1)Mean

(1)Standard deviation and – t - test

The test of the significance of the difference between two mean is known as t- test. In the present study, researcher used t-value because there is comparison between two variables. And it has following conditions.

(i)It should be interval scale or ratio scale.

(ii)It should have equal variance nearly equal variance.

(iii)Data should be N.P.C. (Normal probability curve)

Ho<sub>1</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of the boys and girls of students of Grade IX of Ahmedabad.

**Table 1: Analysis of Mathematical reasoning ability of boys and girls of students of grade IX of Ahmedabad**

No.	Variables (Gender)	N	Mean	S.D.	t-value	Significance
1	Boys	160	75.875	16.46	0.46	Not significant
2	Girls	160	76.75	17.05		

$$t_{cal} = 0.46 < t_{tab} = t_{0.05} = 1.96$$

From the table 1, it is evident that t-value which is calculated i.e.  $t_{cal} = 0.46$  is less than  $t_{0.05} = 1.96$  which implies that  $t_{cal}$  is not significant at  $t_{0.05}$  level of significance. Hence the hypothesis that there will be no significance difference between the mean scores of mathematical reasoning ability of the boys and girls of grade IX students of Ahmedabad is not rejected at 0.05 level. It means there is no significant difference in mathematical reasoning ability of boys and girls of grade IX student of Ahmedabad. .

Ho<sub>2</sub> There will be no significant difference between the mean scores of Mathematical reasoning Ability of Students of grade IX belonging to east and West Zone.

**Table- 2 Analysis of Mathematical reasoning ability of students of grade IX of east and West Zone of Ahmedabad**

No.	Variables (Zone)	N	Mean	S.D.	t- value	Significance
1	East Zone	162	75.93	16.67	0.41	Not significant
2	WestZone	158	76.70	16.86		

$$t_{cal} = 0.41 < t_{tab} = t_{0.05} = 1.96$$

From the table 2, it is evident that t-value which is calculated i.e.  $t_{cal} = 0.41$  is less than  $t_{0.05} = 1.96$  which implies that  $t_{cal}$  is not significant at  $t_{0.05}$  level of significance. Hence the hypothesis that there will be no significance difference between the mean scores of mathematical reasoning ability of grade IX students belonging to east and West Zone of Ahmedabad is not rejected at  $t_{0.05}$  level. It means there is no significant difference in Mathematical reasoning ability of Grade IX students belonging to east and West Zone of Ahmedabad.

Ho<sub>3</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of students of grade IX belonging to Grant in Aid and non Grant in Aid schools of Ahmedabad.

**Table – 3 Analysis of mathematical reasoning ability of students of grade IX belonging to Grant in Aid and Non-Grant in Aid schools of Ahmedabad.**

No.	Variables (Type of school)	N	Mean	S.D.	t-value	Significance
1	Grant in Aid	158	75.18	15.81	1.19	Not significant
2	Non Grant in Aid	162	77.41	17.57		

$$t_{cal} = 1.19 < t_{tab} = t_{0.05} = 1.96$$

From the table 3 it is evident that t-value which is calculated i.e.  $t_{cal} = 1.19$  is less than  $t_{0.05} = 1.96$  which implies that  $t_{cal}$  is not significant at  $t_{0.05}$  level of significance. Hence the hypothesis that there will be no significance difference between the mean scores of mathematical reasoning ability of the grade IX student of Grant in Aid and non Grant in Aid school of Ahmedabad is not rejected at 0.05 level. It means there is no significance difference in mathematical reasoning ability of grade IX students of Grant in Aid and non- Grant in Aid school of Ahmedabad. Ho<sub>4</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in Grant in Aid schools

**Table – 4: Analysis of mathematical reasoning ability of boys and girls of students of grade IX studying in Grant in Aid schools**

No.	Variables	N	Mean	S.D.	t-value	Significance
1	Boys	78	75.37	15.16	0.14	Not significant
2	Girls	80	75	16.42		

From the table 4. it is evident that t-value which is calculated i.e.  $t_{cal} = 0.14$  is less than  $t_{0.05} = 1.96$  which implies that  $t_{cal}$  of significance is not significant at  $t_{0.05}$  level of significance. Hence the hypothesis that there will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in Grant in Aid schools is not rejected at 0.05 level of significance. It means there is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in Grant in Aid schools of Ahmedabad.

Ho<sub>5</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in non Grant in Aid schools.

**Table- 5 Analysis of mathematical reasoning ability of boys and girls of grade IX studying in Non Grant in Aid schools**

No.	Variables	N	Mean	S.D.	t-value	Significance
1	Boys	82	76.35	17.59	0.77	Not significant
2	Girls	80	78.5	17.49		

$$t_{cal} = 0.77 < t_{tab} = t_{0.05} = 1.96$$

From the table 5 it is evident that t-value which is calculated i.e.  $t_{cal} = 0.77$  is less than  $t_{0.05} = 1.96$  which implies that  $t_{cal}$  of significance is not significant at  $t_{0.05}$  level of significance. Hence the hypothesis that there will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in non Grant in Aid schools is not rejected at 0.05 level of significance. It means there is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in non Grant in Aid schools of Ahmedabad.

Ho<sub>6</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in the West Zone.

**Table -6: Analysis of mathematical reasoning ability of boys and girls of grade IX studying in West Zone.**

No.	Variables	N	Mean	S.D.	t-value	Significance
1	Boys	79	78.22	16.53	1.13	Not significant
2	Girls	79	75.18	17.05		

$$t_{cal} = 1.13 < t_{tab} = t_{0.05} = 1.96$$

From the table 6 it is evident that t-value which is calculated i.e.  $t_{cal} = 1.13$  is less than  $t_{0.05} = 1.96$  which implies that  $t_{cal}$  of significance is not significant at  $t_{0.05}$  level of significance. Hence the hypothesis that there will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in West Zone is not rejected at 0.05 level of significance. It means there is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in West Zone of Ahmedabad.

Ho<sub>7</sub> There will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in the East Zone.

**Table-7 Analysis of mathematical reasoning ability of boys and girls of grade IX studying in East Zone**

No.	Variables	N	Mean	S.D.	t-value	Significance
1	Boys	81	73.58	16.07	1.8	Not significant
2	girls	81	78.27	16.92		

$$t_{cal} = 1.8 < t_{tab} = t_{0.05} = 1.96$$

From the table 7 it is evident that t-value which is calculated i.e.  $t_{cal} = 1.8$  is less than  $t_{0.05} = 1.96$  which implies that  $t_{cal}$  of significance is not significant at  $t_{0.05}$  level of significance. Hence the hypothesis that there will be no significant difference between the mean scores of mathematical reasoning ability of boys and girls of grade IX studying in East Zone is not rejected at 0.05 level of significance. It means there is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in East Zone of Ahmedabad.

#### 14. Findings

Following are the findings of the present study.

1. There is no significant difference in mathematical reasoning ability of boys and girls of grade IX students of Ahmedabad. It means that the Mathematical reasoning ability of boys and girls of students of grade IX of Ahmedabad are similar.
2. There is no significant difference in Mathematical reasoning ability of Grade IX students belonging to east and west zone of Ahmedabad. It means the Mathematical reasoning ability of east and west zone of students of grade IX of Ahmedabad are same.
3. There is no significance difference in mathematical reasoning ability of grade IX students of granted and non- granted school of Ahmedabad. It means that the Mathematical reasoning ability of Granted school and non granted school students of grade IX of Ahmedabad are same.
4. There is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in granted schools of Ahmedabad.
5. There is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in non granted schools of Ahmedabad.
6. There is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in west area of Ahmedabad.
7. There is no significant difference in mathematical reasoning ability of boys and girls of grade IX studying in east area of Ahmedabad.

### 15. Conclusion

The present research deals with the Mathematical reasoning ability of students of grade IX for this researcher had firstly formulated objectives and hypothesis. Then the review of related literature and how the present study is different from other past researchers are nicely referred and discussed for getting knowledge to precede the present study in proper direction without any replication of previous research. Then three hundred and twenty students of grade IX studying in granted and non granted school of east and west zone of Ahmedabad has been selected by multi stage and survey method as a method of study and data has been collected by administrating the Mathematical reasoning ability test with the help of standardized tool. Demarcating and separating the scores based on the variables, that is gender, area and type of school and putting their respective Mathematical reasoning ability marks in tabular form analysis of the data has been done by applying appropriate statistical method like mean, standard deviation and t-test. After that the finding has been presented as a result from analysis and interpretation of data. On the basis of research findings the researcher has presented the finding of the study that the variables sex, type of school and zone are in dependent variables. Finally on the basis of findings the researcher has presented suggestion and new areas for which the further research studies can be proceed.

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