

**LEARNING PROBLEMS OF STUDENTS IN GEOMETRY AT GRADE X**

**A**

**THESIS**

**BY**

**DIL RAJ AWASTHI**

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THE DEGREE OF MASTERS OF EDUCATION**

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त्रिभुवन विश्वविद्यालय  
शिक्षा शास्त्र केन्द्रीय विभाग

विश्वविद्यालय क्याम्पस  
कीर्तिपुर, काठमाडौं, नेपाल

# गणित शिक्षा विभाग

UNIVERSITY CAMPUS  
Kirtipur, Kathmandu, Nepal

TRIBHUVAN UNIVERSITY  
CENTRAL DEPARTMENT OF EDUCATION  
DEPARTMENT OF MATHEMATICS EDUCATION

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Date: .....

## LETTER OF CERTIFICATE

This is to certify to **Mr. Dil Raj Awasthi** a student of academic year 2072/73 with campus Roll No.557, exam Roll No.7228276, thesis number 1448 and T.U. Regd.No.9-2-329-416-2010 has completed his thesis under supervision of Mr. Krishna Bhatta during the period prescribed by the rules and regulation of Tribhuvan University, Nepal. The thesis entitled "**Learning Problems of Students in Geometry at Grade X**" has been prepared based on the result of this investigation. I, here by recommend and forward that his thesis be submitted for evaluation as the partial requirements to the degree of Master of Mathematics Education.

.....  
Assoc. Prof. Laxmi Narayan Yadav

Department Head



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**गणित शिक्षा विभाग**

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**LETTER OF APPROVAL**

A thesis by **Dil Raj Awasthi** entitled "**Learning Problems of Students in Geometry at Grade X**" has been approved for the partial fulfillment of the Requirements for Degree of Master of Mathematics Education.

**Committee for Viva-Voce**

**Signature**

Assoc. Prof. Laxmi Narayan Yadav  
(Chairman)

.....

Prof.Dr.Hari Prashad Upadhyay  
(External)

.....

Mr.Krishna Prashad Bhatt  
(Member)

.....

Date.....



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**RECOMMENDATION FOR ACCEPTANCE**

This is to certify that **Mr. Dil Raj Awasthi**, has completed his thesis entitled  
**"Learning Problems of Students in Geometry at Grade X"** under my supervision  
during the period prescribed by the rules and regulation of Tribhuvan University,  
Kirtipur, Kathmandu, Nepal. I recommend and forward his thesis to the Department  
of Mathematics Education to organize final viva-voce.

.....  
(Mr.Krishna Prashad Bhatt)

Supervisor

Date.....

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## DECLARATION

I hereby declare that this thesis is my original work. It contains no material which has been submitted for the award of other degree in any institution. To the best of my knowledge and belief this thesis contains no materials previously published by any authors except due acknowledgement has been made.

Date.....

.....

(Dil Raj Awasthi)

**DEDICATION**

Honestly dedicated

To

My parents

**Dev Datta Awasthi and Durga Devi Awasthi**

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.....

( Dil Raj Awasthi)



## ABSTRACT

The major objectives of this study were 'to find the problems faced by the students in learning geometry at grade X and to examine whether there is significance difference between problems faced by community and institutional school students in learning geometry. The population for this study consisted of all students and mathematics teacher of grade X of community and institutional schools of Kathmandu Metropolitan city .16 schools were selected (8 community and 8 institutional schools) according to random sampling method. Altogether 240 students of grade X taking 15 students from each selected school by random sampling method and mathematics teachers. This research was based on descriptive survey design. Questionnaire, VHGT and interview were the tools of this study. The data were collected by filling up questionnaires with students, test (VHGT) with 10 multiple choice items on 2 and 3 levels was constructed and implemented to the sample students and interview with students as well as mathematics teachers. The Van Hiele Geometry Test (VHGT) papers were scored according to the level based scheme of fit/unfit and success criterion (above 63%). On the basis of VHGT, students were assigned level so that each of the fitted students belonged to particular level .Also researcher had calculated total mean weight age to check the problems in geometry. The quantitative data had been found from questionnaire analyzed by 5- point Lickert method and t- test was applied for the comparison of problems faced by community and institutional schools students .

The result of this reveals that the teaching learning geometry in Kathmandu metropolitan city was not satisfactory. The significant problem was associated with learning geometry in curriculum, proving and verifying theorems, classroom management, teacher training, instructional material, teaching learning activities, schools physical facilities and evaluation techniques. It seems that there is no any significance difference between the problems faced by community and institutional schools students

## CONTENTS

	<b>Page</b>
<i>Letter of Certificate</i>	<i>i</i>
<i>Letter of Approval</i>	<i>ii</i>
<i>Recommendation for Acceptance</i>	<i>iii</i>
<i>Copy Rights</i>	<i>iv</i>
<i>Declaration</i>	<i>v</i>
<i>Dedication</i>	<i>vi</i>
<i>Acknowledgement</i>	<i>vii</i>
<i>Abstract</i>	<i>viii</i>
<i>Contents</i>	<i>ix</i>
<i>List of Tables</i>	<i>xii</i>
<i>Abbreviations</i>	<i>xiii</i>
<b>Chapters:</b>	
<b>I. INTRODUCTION</b>	<b>1-7</b>
Background of the study	1
Statement of the Problem	4
Objective of the Study	4
Significance of Study	5
Delimitations of the Study	6
Hypothesis Testing	6
Definition of Related Terms	6
<b>II. REVIEW OF THE RELATED LITERATURES</b>	<b>8-16</b>
Empirical Literature	8
Theoretical Literatures	13
Implication of the Review for the Study	15
Conceptual Understanding of the Study	16

<b>III.</b>	<b>METHODS AND PROCEDURES</b>	<b>17-23</b>
	Research Design	17
	Population of the Study	17
	Sample of Study	18
	Instrument of the study	18
	Questionnaire	18
	Construction of Van Hiele Geometry Test (VHGT)	19
	Item Analysis	19
	Interview	20
	Data collection Procedure	20
	Scoring Procedure	21
	Data Analysis Procedure	22
<b>IV.</b>	<b>ANALYSIS AND INTERPRETATION OF THE DATA</b>	<b>24-44</b>
	Analysis and Interpretation of Proving and Verifying Theorems and Construction based on VHGT	25
	Analysis and Interpretation of Students Responses	26
	Analysis and Interpretation of the Response on Curriculum	26
	Analysis and Interpretation of Proving and Verifying Theorems and Construction	28
	Analysis and Interpretation of Responses about Classroom Management	30
	Analysis and Interpretation of Responses on Teacher Training	32
	Analysis and Interpretation of Responses on Instructional Materials	34
	Analysis and Interpretation of Responses on Teaching Learning Activities	36
	Analysis and Interpretation on School's Physical Facilities	39
	Analysis and Interpretation on Evaluation Technique	40

Comparison of Problems Faced by Institutional and Community School Students	43
<b>V. SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS</b>	<b>45-49</b>
Summary of the Study	45
Findings of the Study	46
Conclusions of the Study	47
Recommendations	48
<b>References</b>	
<b>Appendices</b>	

**LIST OF TABLES**

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
2.1	Van Hiele's levels of Geometric thinking	15
3.1	Likert's 5 points scale scoring procedure	21
4.1	Distribution of Students at Each Van Hiele Level	25
4.2	Students Responses on Curriculum	27
4.3	Students Responses on Providing and Verifying Theorems and Construction	28
4.4	Students Responses about Classroom Management	30
4.5	Students Responses on Teacher Training	32
4.6	Students Responses on Instructional Materials	35
4.7	Students Responses on Teaching Learning Activities	37
4.8	Students Responses on Schools Physical Facilities	39
4.9	Students Responses on Evaluation Techniques	41
4.10	Comparison of Problems Faced by Community and Institutional School Students	44

**ABBREVIATIONS**

A	: Agree
D	: Disagree
ICT	: Information and communication Technology
MW	: Mean Weight age
NESP	: National Education System Plan
NCTM	: National Council of Teachers of Mathematics
OCE	: Office of the Controller of Examination
SA	: Strongly Agree
SD	: Strongly Disagree
SEE	: Secondary Education Examination
U	: Undecided
VHGT	: Van Hiele Geometry Test

## Chapter I

### INTRODUCTION

#### **Background of the Study**

Those students who are unable to understand the Mathematical concept and feel uneasy while solving mathematical problem. Also learning problem is obstruction of learning situation in which students feels as difficulty, learning is one of the important parts of mathematics education. It is a process of progressive behavior adaption. Similarly, learning is the process of acquiring new knowledge and new response. The effective learning always demands the collaboration of learning method in class room. There are certain stops in learning mathematics such as: goal, motivation, recreation, obstacles, response and generalization. There are many principle and theories of learning mathematics .Those learning theories and method of teaching play a vital role in students' achievement in mathematics. Different kinds of learning theories have been developed to solve the problems around in mathematics learning process.

Some problems of learning mathematics of students might directly be related to the teachers' academic background, classroom practices, school management and leadership (Bhattraï, 2005). This study showed that the source of problems in learning mathematics as relevancy of curriculum of daily life teaching learning activities, classroom management, physical facilities, evaluation technique inherent potentiality and circumstance of the individual learners. Students feel problems in understanding the new concepts and relations. These problems might have been partially contributed through teaching learning activities. The problems seen in teaching activities depend on the home, environment, classroom management, instructional materials used in

classroom, school environment provided to both students and teachers and facilities given to the learning activities.

After establishment of Durbar High school 1854, Mathematics has been included as a subject of instruction in every level during Rana regime. The development of education was taking place neither at sufficiently quick nor in really systematic till 1950 in Nepal. The birth of Nepalese democracy in 1951 opened its classroom to a more diverse population. Nepal 1971, education plan hastened its development in country. In 1971, National Education System Plan (NESP) was introduced with the aim of systematic development of education in the country. The national, level wise and class wise objectives were declared by NESP and its developed new curriculum for every level of school. The NESP Mathematics curriculum (1971) reads the role of Mathematics in every-day life: "A well - grounded understanding of mathematics is essential for everyday life as well as for higher study in the field of science and technology" (NESP, 1971).

The shapes, size and other properties of figures and the nature of space are the area of geometry. It is branch of Mathematics that deals with the measurement and relationship of lines, angles, surface and solids. Geometry is the science of shape and extend. It deals with position, shapes and size of bodies but has nothing to with their materials for properties.

School Mathematics curriculums of Nepal have given emphasis on geometry learning from the beginning of schooling. The curricula have aimed to develop students understanding of intended geometric concepts at basic and secondary level. Similarly geometry is one of the content standards of school mathematics, which aims at developing special reasoning problem solving skills and communicating. Moreover, about the importance of thinking skills in geometry.



A vision for school geometry (2005) writes, "Reasoning is fundamental to mathematical activity". Mathematics programs should provide opportunities for learners to develop and employ their reasoning skills.

Learning geometry may not be easy, and a large number of students fail to develop an adequate understanding of geometry problem solving skills (Battista, 1997). The lack of understanding in learning geometry often causes discouragement among the students, which invariably will lead to poor performance in geometry. A number of factors have been put forward to understand why geometry learning is difficult- geometry language, visualization abilities and ineffective instruction (Camgelosi, 1996). Poor reasoning skill are also another area of concern among secondary school students.

Teachers are the important agent for the successful implementation of mathematics curriculum. Only by hard work of the teachers the mathematics curriculum-can be successfully implemented successful teacher is he who can influence upon the attitude of students to mathematics learning.

There are various researches about teacher and students problems. Many government and non- governmental official research indicates the investment of huge amount of time and money to find the problems of teachers and students. But satisfactory result was not found. Hence no successful solution can be found to address the students so many problems that are occurring frequently.

About the modern Mathematics classroom, Bhatia and Bhatia (1987) said that the teacher's tools have long consisted of chalk, whiteboard, pencil and text book. However, today is to use demonstration models of various shape and size, drawing instrument, graph stencils, measuring instruments, project work, books mathematics

magazine, films, computer software, online class, slides etc. are being used in teaching mathematics in the modern classroom. Due to the economic condition we cannot buy readymade teaching materials. But mathematics teacher should teach the students using low cost and no cost teaching materials. The crowded classroom, unavailability of computer, collection of low cost no cost Materials plays a vital role for learning geometry.

About 35.12% students of Kathmandu district had got D and E grade in compulsory mathematics (OCE, 2016). They tried to avoid learning geometry in comparison with other branches (Algebra, Statistics, and Arithmetic). Therefore researcher has selected to identify the learning problems of students in geometry at grade X in Kathmandu metropolitan city.

### **Statement of the Problem**

The new curriculum of Mathematics in secondary level has been implemented in Nepal since 2055 B.S. It is revised in 2064 B.S. The students in average have become under the achievement. The result of SEE examination shows that most of the students to get D and E grade in Mathematics. So it is well appropriate to discuss about the learning problems in geometry at grade X of Kathmandu Metropolitan city. Basically this research had tried to answer the following research questions.

- What are the problems of the students in learning Geometry at grade X ?
- What are the differences between problems of students in community and institutional schools in learning geometry?

## **Objective of the Study**

The main objectives of this study were as follows:

- To find the problems faced by the students in learning geometry at grade X.
- To examine whether there is significance difference between problems faced by community and institutional school students in learning geometry.

## **Significance of Study**

Mathematics is an essential part of school curriculum of Nepal. It has been taught as compulsory subject at all level of school education program. Also mathematic is included as optional subject at secondary level education, most of the students are weak in mathematics and hence it is felt that most of the students dislike mathematics and afraid it.

In this research the learning problems of students in geometry were the main focused of the study. Therefore the following are major significance of the study.

- It would help to create sound environment to parents as well as concern administration.
- It would set up the implementation of mathematics curriculum in the present context and may be ground for the further researchers in this issue.
- It would help for the successful implementation of the mathematics curriculum.
- It would explain about the problems, are being faced the mathematics students.
- It would useful for teachers, parents, curriculum designers and other person who take interest in Mathematics.

## **Delimitations of the Study**

According to Oxford Advanced Learner's Dictionary, Delimitation means ' a line that indicates boundary.' This study was limited to the following facts.

- This study was carried out only in community and institutional school of Kathmandu Metropolitan city.
- This study was conducted on the students of grade X.
- This study was focused on identification for learning problems in geometry.
- This study was limited on only for 16 secondary school of Kathmandu metropolitan City. (8 Community and 8 institutional schools).
- The data of this study was generated through the questionnaire, VHGT and structured interview schedule.
- Some variable like I.Q. and socio- economic status were not be controlled.

## **Hypothesis Testing**

The researcher developed the following statistical hypothesis to carry out this study:

**Null Hypothesis ( $H_0$ ):** There is no significance difference between the problems faced by community and institutional school students in learning geometry.

**Alternative Hypothesis ( $H_1$ ):** There is a significance difference between the problems faced by community and institutional school students in learning geometry.

## **Definition of Related Terms**

**Community School:** Community schools are those schools, which receive regular logistic and financial support from the government.

**Institutional School:** Those schools, which are established by individual or community and do not get regular logistic and financial support from the government.

**Students:** The students studying in class X.

**Teacher:** Mathematics teacher teaching in class X.

**Geometry:** The mathematics of properties, measurement and relationship of points, lines, angles, surface and solids.

**Learning Problems:** Problems are that thing which is difficult to deal with or to understand during learning mathematics.

**Physical Facility:** The physical aspect at classroom which includes different variables such as classroom arrangement, seating pattern, materials and so on.

**Curriculum:** Mathematics course of study which had been implemented at present in grade X.

**Trained Teacher:** Trained teacher mean those teachers who obtained training.

## **Chapter II**

### **REVIEW OF THE RELATED LITERATURES**

The review of related literature deals with the theories of research studies which have been conducted earlier. It helps to conduct the new research in systematic manner by providing the outline of the research study and avoid the unnecessary duplication. Review of related literature helps and guides research literature provides authentic and strong knowledge. Mainly the literatures are previous thesis, books and journals; different sources used to site literature. To make the research effective and truly new researcher had studied the different research found in the mathematics education department. On this topic researcher has found some of the research which just indicated the problem but researcher had tried to research on the strategies that can be taken as a remedial tools. In this regard the following were the related literatures in this study.

#### **Empirical Literature**

Chaulagain (2005) has indicated on his research "A Study of Problems Faced by Secondary school Mathematics Teacher in Teaching Geometry "geometry teaching and learning activities in Kathmandu district is not satisfactory level. It was the survey among the government and private school teachers. Among the 30 teachers questionnaire had presented and asked him to give their response on different question. He had made the conclusion that most of the teachers are facing the following problems: a) Students evaluation techniques; b) Geometry instruction; c)Teacher professional development and d) constructing and using instructional, materials, students background and curriculum related factors.

Adolphus (2011) had done a research with the topic "Problems of Teaching and Learning of Geometry in Secondary school in Rivers state, Nigeria." It has been the Survey among the 300 students and 30 teachers of 10 government schools.

Questionnaire had given to the respondent to collect the information and it had been analyzed by the using the Likert scale. His some of the finding that emerged first is the foundation of most mathematics teachers in geometry is poor and second is the students have poor foundation in mathematics. Similarly, third is the teaching and learning environment is not conducive. Based on the findings, it was recommended that: a) The state government should as a matter of urgency send mathematics teachers for training and seminars for effective teaching and learning; b) The government should endeavor to provide the necessary infrastructures and facilities that will motivate teaching and learning of mathematics.

Bhatta (2011) conducted the research on "Causes of Failures in Maths at grade VIII." For the study of this case he did survey with using the tools questionnaire, FGD and interview among the 40 failures students of Kavre district. His conclusion was different variables like teacher training, home environment, socio-economic status of family, material used in teaching learning activities are responsible to this less achievement in maths.

Pathak (1987) conducted a research on "A Study of the Problems Faced by the Teacher of Kathmandu district in the Implementation of Mathematics on Mathematics Curriculum for lower Secondary level". He took sixty five teachers as the sample of lower secondary level of Kathmandu district. He administered a set of questionnaire to the lower secondary mathematics teachers who has faced problems regarding the problem of mathematics curriculum teaching method and evaluation techniques. Then

he concluded that the problems' regarding evaluation was that most serious problem to the lower secondary level mathematics teachers.

KC (2009) conducted a thesis "A Study of Problems Faced by Students in Compulsory Mathematics at Secondary level". The nature of this study was questionnaire as well as qualitative. In this study, three private and three government schools of Lamjung district were selected as sample study. The set of class observation form and interview schedule were used collect primary data. The data were analyzed and interpreted with the help of mean weight ages.

He found that illiterate and poor parents, lack of encouragement for study, gap of low achievement and high achieve students, lack of mathematics lab, lack of trained teachers, lack of physical facilities and sufficient budget for school were the main problems faced by secondary level students.

Luitel (2005) on the Dhulikhel Experience states that there are mainly three issues in teaching and learning geometry in reference to Nepalese schools. These are emphasis on learning geometry, contextualization of learning geometry and change from traditional one-way classroom to two- way interactive one. Firstly, the curriculums do not have a focus on "communication". Importance and use of communication in mathematics classroom, is necessary to increase students reading, writing, discussing, representing and modeling mathematics, because, when students communicate their ideas, they learn to clarify, refine, and consolidates their thinking. Secondly, the curricula also lack an emphasis on "Spatial reasoning". Spatial reasoning helps develop the understanding of everyday applications. The second issue of geometry learning is contextualization. The term "contextualization of learning" infers that learning can be promoted by meaningful contexts and relating instruction to the real-life situation. The learning in Nepalese schools is totally based on



textbooks, which have been prepared according to school curriculum. It is important to identify the extent of contextualization of the curricular contents. The third issue is related to the ways of teaching. In most of the Nepalese school students have less chance to interact with their peers and teachers. They have to listen to the teachers' idea. The crowded classroom is one of the major problems of implementing interactive teaching and learning situation.

Pande (2008) did his thesis on "Causes of low Achievement in Maths" at Rupandehi district. It was a case study of six students of Nayagaun secondary school, Butwal. By using the school documents, observation notes and interviews he made the conclusion that traditional type of teaching is one of the major causes.

Bhattarai (2005) made a study entitled "The Problem Faced by the Mathematics Students in existing Curriculum." This study being descriptive in nature, twelve schools from urban in Ilam district were selected by simple random sampling method as well, from each school one teacher and four students were chosen respectively. The main tool of the study was questionnaire. The questionnaire was developed into three-point Likert scale. The collected data are analyzed by calculating percentages. The major findings of this study are concluded that learning mathematics in secondary level is disturbed by so many factors such as lack of teachers' involvement in classroom planning, lack of referential and instructional facilities and aids, students' weak background in the subject matter and so on.

Pandit (2001) in the article "Problem faced by mathematics teachers' education in the implementation of three years B.Ed. level mathematics curriculum in Nepal." Mathematics teacher education program in Nepal was disturbed by many factors such as lack of teachers' involvement in curriculum planning, lack of efficiency to conduct teaching facilities and aids, weak background of students in mathematics, lack of

opportunity given to upgrade their knowledge and large number of lecture personal problems.

Bhatta (2013) conducted a research on the topic "Problems faced by students in Geometry at secondary level of Kailali district". For this study he took 20 public schools (5 urban and 15 rural) randomly with 10 students from each school and 1 teacher from urban and 4 teachers from rural area. Questionnaire, class observation and interview were the tools observation and interviews were the tools of data collection. He used descriptive survey design. The main problems in learning geometry were seen in teaching learning activities, instructional materials, theorems and construction classroom management and evaluation techniques.

Kapadi (2017) conducted a research on the topic "Learning Problems of Students in Geometry at Secondary level of Kanchanpur district". This research was based on descriptive survey design. All the students grade 10 and mathematics teacher of Kanchanpur district were the population of this study. The research was conducted on randomly selected 20 schools (10 community and 10 institutional of Kanchanpur district. The data were collected by questionnaire with students and interview with students as well as mathematics teachers.

The result of this study reveals that the teaching learning geometry in Kanchanpur district was not satisfactory. The learning, Geometry were seen in content and instructional materials, classroom management, teaching learning activities, evaluation technique, teacher training and physical facilities.

Atebe (2008) conducted a thesis entitled " Students Van Hiele's level of Geometric though Conception in plane Geometry". This study had three goals, out of which the main objective was to explore and determine the van Hiele levels of

geometric thinking of selected grade 10, 11, and 12 learners in Nigeria and South Africa. Using both purposive and stratified sampling, 144 mathematician learners from Nigeria and South Africa were selected. The whole process of analyzing the classroom videos involved a constructive panel of 4 observation and 3 critical readers, using the of Van Hiele phase descriptors to guide the analyzing process. Concerning learned level of geometric conceptualization, the result from this study related that the most of the learner were not yet ready for formal deductive study of school geometry, as only 2% and 3% of them were respectively at Van Hiele level 3 and 4 while 47%, 22% and 24% were at level 0, 1 and 2 respectively.

### **Theoretical Literatures**

Since Van Hiele model of thinking is taken as the theoretical basis of the study, the model has been reviewed in the respect of the study .The Van Hiele theory was developed in 1959 by two Dutch mathematics teachers: Piere Van Hiele and his wife Dina Van Hiele , Geldo based on their experience in classroom teaching of geometry in the Netherlands. The Van Hiele theory is that children's understanding of geometric concepts can be characterized as being at a certain level within a range of hierarchical levels (Mayberry 1983).The Van Hiele concerned about the difficulties their students were having with geometry so they conducted research aimed at understanding children's levels of geometric thinking to determine the kinds of instruction that can best help children. It is sequential learning and an activity approach.

The Van Hiele model of geometric thinking consists of the following levels (Van Hiele, 1959).

**Level 0: Recognition or Visualization**

It is initial level. Learners at this level recognize a geometric shape by its appearance alone (J. k Alex 2012).Learners can identify name, compare geometric shapes such as triangle, square and rectangles in their visible form ( Fusy,et.al.1988).

**Level 1: Analysis or Descriptive Level**

Students at this level recognize/analyze figures by their properties or components, which are seen as independent of one another. Learners analyze the attributes and discover properties and rules through observation (Mallory, 2002).Learners can recognize and name properties of geometric figures but they do not yet understand the difference between these properties and between different figures (Van Hiele, 1986).

**Level 2: Informal Deduction or Order Level**

Learners at this level discover and formulate generalization about previously learned properties and rules and informal arguments to justify those generalization (Malloy,2002).Children not only think about properties but also able to notice relationship within and between figure. At this level children are able to formulate meaningful definitions and also children able to make and follows informal deductive arguments.(eg. all squares are rectangles but not all rectangles are squares P.H. Van Hiele, 1959).

**Level 3: Formal Deduction or Logical Skills**

Learners at this level prove the theorems deductive and understand the structure of the geometric system (Mallory, 2002).At these level children think about relationships between properties of shapes and also understand relationship between

axioms, definitions, theorems, corollaries and postulates. They understand why it is needed (P. H. Van Hiele, 1959).

#### **Level 4: Rigor**

Learners at this level can establish theorems in different systems and to analyze deductive systems (Fusy, et.al. Mallory, 2002). They can also think in terms of abstract mathematical systems. College mathematics majors and mathematics students are at this level (P. H. Van Hiele, 1959).

**Table No: 2.1 Van Hiele's levels of Geometric thinking**

<b>Levels</b>	<b>Stages</b>	<b>Characteristics</b>
Level 0	Visualization	Students recognize the figures on the basis of their physical appearance.
Level 1	Analysis	Students analyze the component parts of a figure.
Level 2	Informal deduction	Students establish the interrelationship of properties both within figures.
Level 3	Deduction	Students are able to construct proofs using postulates of axioms and definitions.
Level 4	Rigor	Students can work in a variety of axiomatic systems.

#### **Implication of the Review for the Study**

Determining and reviewing the related literature is the central and most important task for a researcher in any research activity. It helps the researcher to bring clarity to the research problem and to improve and refine the methodology. From the above review, the researcher found that students and teachers have poor foundations in geometry, all levels are not testable, and also Van Hiele's level is a very good predictor for multiple-choice tests of geometry content (Usiskin, 1982). Teaching geometry is more effective if we use newly teaching materials by going through the

research (Connolly, 2010). From Rizo (2016) Van Hiele learning and instructional model be adopted and applied in the teaching of other areas of mathematics. The above mentioned evidences show that teaching strategies are significant to make teaching and learning effective. The research projects carried out in the similar area commensurable to this study. Thus the above review became very helpful for this study because those reviews made clear about the methodology and theoretical framework.

### Conceptual Understanding of the Study

The conceptual understanding design by the researcher is to identify the problems faced by students in learning geometry at Kathmandu metropolitan city. For the study of related literature above the researcher made the framework for the study, so the following framework sketch has presented below:

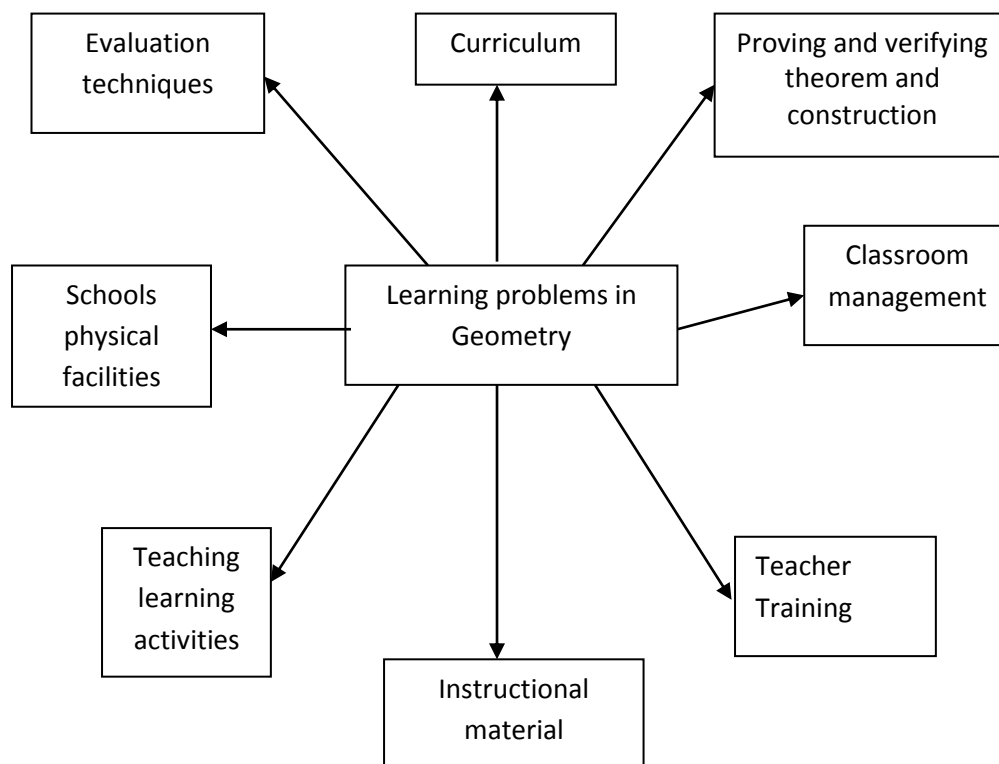


Fig 1: Conceptual framework of learning problem of students in Geometry.

## **Chapter III**

### **METHODS AND PROCEDURES**

This chapter deals about research design, population and sample of research study, data collection instrument, data collection procedure and analysis and interpretation of collected data. So the research methodology is the important aspect of the study. The major purpose of this study is to find out the learning problems of students in Geometry at grade X of Kathmandu metropolitan city.

The major components of procedures are research design, population of study, data collection procedure, scoring procedure and data analysis procedure about which detail explained can be found in this chapter.

#### **Research Design**

According to Sellitiz (1962) a research design is arrangement of condition for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy. So, a research design is a plan of a researcher which helps him to carry out a research successfully. The researcher has adopted descriptive survey research design for this study. Survey design is used when the population and sample both are too large and information is needed from wider sample. There would be included the self-administered questionnaires as main instrument of the study and tried to explore the problems faced by students in learning geometry at grade X. In this method, more items were asked and factual information were collected.

#### **Population of the Study**

Population is any group of individuals that has one or more characteristics common and that are of interest to the researcher (Best and Kahn, 2014) and the common characteristics common to all the students. All students and mathematics

teacher of grade X of community and institutional schools of Kathmandu metropolitan city were considered as total population of the study.

### **Sample of Study**

A sample is small proportion of the population that is selected for observation and analysis (Best and Kahn, 2014). That is portion of the population and representative of the population from which it was selected. For this research, 16 secondary schools of Kathmandu metropolitan city have been chosen. Among them the researcher has been selected (8 community and 8 institutional schools) by random sampling method as a sample. The total numbers of sampling students were 240 taking 15 students from each school by random sampling method. Interviews of 10 mathematics teacher and students of secondary level (Grade X) was conducted.

### **Instrument of the Study**

To carry out the research, the following data collection instruments were used.

#### **Questionnaire**

Questionnaire is regarded as the main tool of this study which was developed by researcher himself with the help of supervisor. For students, 40 questions concerning about curriculum, proving and verifying theorems and construction, classroom management, teaching learning activities, instructional materials, teacher training, schools physical facilities, evaluation techniques have been developed. The validity of questionnaire have been checked and approved by subject expert and supervisor. For the reliability, the questionnaire was administered to 35 X grade students. To establish reliability of the questionnaire, the researcher used split-half method and reliability was found 0.64. The final form of questionnaire has been given in the appendix I.



### **Construction of Van Hiele Geometry Test (VHGT)**

This test was constructed for content related problems, proving, verifying theorems and constructions. Van Hiele Geometry Test of 20 minutes consisting of multiple choice items were constructed from the Grade X Geometry contents based on 2 and 3 levels (i.e. informal deduction and formal deduction) with the help of Usiskin and Senk test (1982). The test was constructed on the basis of Van Hiele descriptors and level based indicators of the Van Hiele levels. The test consisted of 10 multiple choice items (see Appendix–III) on the 2 and 3 Van Hiele levels.

### **Validation and Reliability of Van Hiele Geometry Test (VHGT)**

For establishing validity, the items were constructed from class X Geometry course and the validation was established by consulting with the experts. For reliability, the VHGT was administered to 35 X grade students. To establish reliability of the test, the researcher used split–half method. The work involved in the calculation of split-half reliability and reliability was found 0.62. This is supposed to be satisfactory reliability.

### **Item Analysis**

The researcher VHGT test administered for pilot test among 35 students of Mangal H.S School, Kirtipur, Kathmandu. The upper 27% of higher score i.e. higher score of ten students and 27% of the score i.e. the ten lower students were selected to item analysis.

$$\text{Difficulty level (P)} = \frac{R}{T} \times 100$$

Where,

R = Number of examine who gave correct answer.

T = Total number of examine.

Discrimination index

$$D = \frac{U_R - L_R}{U_N \text{ or } L_N}$$

Where,

$U_R$  = Number of correct response from 27% of upper scoring students

$L_R$  = Number of correct response from 27% of lower scoring students

$U_N$  = Total number of 27% of upper scoring student

$L_N$  = Total number of 27% of lower scoring student

### **Interview**

An interview is a conversation where questions are asked and answers are given. In common parlance, the word "Interview" refers to a one-on-one conversation with one person to another person. In this research, researcher has been used structured interview with interview schedule. The interview of the students, teachers about the teaching learning activities such as interest, opinion, behavior, and so on. The area of problems has been related to the curriculum, classroom management, instructional material evaluation system, teacher training, and physical facilities in the schools. Van Hiele five levels of geometric thoughts have been used to construct the questions. At the end the respondent were request to provide comments.

### **Data Collection Procedure**

Data were collected from primary source. For this purpose, the researcher has taken visits to each of the sampled schools along with questionnaire, VHGT and interview schedule and requested letter from T.U. to get full support from the school administration. After explaining the purpose of the visit, the researcher has requested each of the students included in the sample to fill the questionnaire and VHGT

honestly. The researchers explain and clarify the confusions that arose in understanding the statements. The researcher has taken interview of some students and mathematics teachers on the working field and has recorded it in mobile recording system.

### Scoring Procedure

For the analysis of the items obtained from questionnaire weight age of 5,4,3,2, and 1 have been assigned to 'statement strongly ', ' Agree', ' Undecided', 'Disagree' and 'strongly disagree' respectively. For the statements opposing to this point of view, the items scored in the opposite order. Mean weight age have been calculated. Total score of five point linked scale is 15, thus its average score is 3. If the calculated index is greater than 3, then it is concluded that the statement contains in strong favor to the problems. If the index measure is less than or equal to three then it is weak favor to the problems.

#### 3.1 Likert's 5 Points Scale Scoring Procedure

S.N.	Meaning of Seals	Positive Statements	Negative Statements
1	Strongly agree	5	1
2	Agree	4	2
3	Undecided	3	3
4	Disagree	2	4
5	Strongly disagree	1	5

If the statement is positive, they give their opinion strongly agree then score is 5, In the similar manner agree, undecided, disagree, strongly disagree have scored 4, 3, 2 and 1 respectively.

If the statement is negative, they give their opinion strongly agree, then score is 1. In the similar manner agree, undecided, disagree, strongly disagree have score 2, 3, 4, and 5 respectively. Interview schedules have been used to justify the quantitative data that referred the problems.

### **Data Analysis Procedure**

The data have been calculated item wise and area wise in various problems faced by students related to teaching learning activities, curriculum, school environment in mathematics learning and so on. The collected data has been tabulated and analyzed according to the objectives of study. The information received through interview has been interpreted to justify the numerical findings.

The obtained data have been analyzed and interpreted with the help of following statistical techniques like mean weight age is used to locate the central position of the responses to the statements of students as a whole in the rating scale. The statistical of t-test were applied to find out difference in problems between the community and institutional school students. The difference has been tested at the 5% level of significance, i.e.  $\alpha = 0.05$

For VHGT, the data on the test (level based test) was scored and analyzed by using the scheme adopted by Usiskin and Senk (1982). Since there are 6 and 4 items of 2 and 3 levels respectively, above 63 % correct were taken as success criterion for each individual.

The collected data through questionnaire, VHGT and interview were analyzed and interpreted with the help of mean weight age, percentage and t - test and asking cross- questions to the students, teachers and administrators respectively obtained information and data have been analyzed and interpreted on the heading curriculum

proving and verifying the theorems and construction, classroom management, teacher training, Instructional materials, teaching learning activities, schools physical facilities, evaluation techniques.

## **Chapter IV**

### **ANALYSIS AND INTERPRETATION OF THE DATA**

This chapter deals with the analysis and interpretation of the data. This is a descriptive survey research related to find the problems faced by the students in learning geometry at grade X and to examine whether there is significance difference between problems faced by community and institutional school students in learning geometry. The data were collected from 16 secondary school of Kathmandu metropolitan City (8 communities and 8 institutional schools). The responses of 240 students from questionnaire and VHGT. Also face to face interview of 10 students and teachers were used for analyzing the data. From each school, 15 students were participated in questionnaire and VHGT. The interview of 10 students and teacher was taken during survey. The calculated data were tabulated and analyzed according to the objectives of the study. The collected data were analyzed under the following headings:

- To find out the problems related to curriculum, proving and verifying theorems and construction, classroom management and teacher training.
- To find out the problems related to instructional material, teaching learning activities, schools physical facilities and evaluation process.
- To compare the problems faced by community and institutional school students in geometry

## **Analysis and Interpretation of Proving and Verifying Theorems and**

### **Construction Based on VHGT**

This analysis and interpretation is based on Van Hiele geometry test (VHGT). The Van Hiele (1957) noted the difficulties that their students had in learning geometry. His theory explains why many students encounter difficulties in their geometry course especially with formal proofs. Van Hiele believed that writing and that many students need to have more experience in thinking at lower level before learning formal geometric concepts.

**Table No. 4.1**  
**Distribution of Students at Each Van Hiele Level**

<b>Level</b>	<b>No. of Students</b>	<b>Percentage (out of fit)</b>
2	117	54.16%
3	99	45.83%
Total fit	216	100%
Unfit	24	
<b>Total number of students taken van Hiele test</b>	<b>240</b>	

Van Hiele geometric test designed by researcher was administered to 240, X grade students of 16 selected schools to obtain their achievement scores. The score were sub-divided into the two Van Hiele levels. The answer sheets were scored and students were assigned Van Hiele levels according to success criterion (above 63%). To be at some levels, a student should meet success criterion of that level and success criterion of all preceding levels. Students not fitting in such a scheme are said to be unfit. Assigning Van Hiele levels in a such way, the following result were obtained.

Out of the 240 students taking Van Hiele geometric test a total of 216 (90%) learners were assignable at various Van Hiele level, while 24(10%) of them did not fit this classification scheme. The above table shows that out of fitted students about

54.16% were at informal deduction level (level 2) and about 45.83% attained deduction level (level 3). It implies that the number of students decreases when the students move to upper levels.

At these levels learners discover and formulate generalization about previous learned properties, meaningful definition, relationships between and within figures, axioms, postulates and theorems. Also, learners make the informal and formal deductive proof and understand the structure of geometric system. The course of grade X geometry was based on level 3 (formal deduction). But most of the students were unfit on this level and numbers of students were decreases when students move to informal deduction to formal deduction level. It means that most students were unable to learn geometry at grade X.

### **Analysis and Interpretation of Students Responses Based on Questionnaires and Interviews**

The analysis and interpretation of the topics curriculum, proving and verifying theorems and construction, classroom management, teacher training, instructional material, teaching learning activities, schools physical facilities and evaluation techniques are given below:

#### **Analysis and Interpretation of the Response on Curriculum**

The society and its needs are changing day by day due to fast development of modern science and technology. Mathematics curriculum must help the learner to invent new knowledge and technology. Mathematics curriculum should be designed according to the political and economic condition of the country. Mathematics curriculum should be based on the level of students and it should be practicable.



**Table No. 4.2**  
**Students Responses on Curriculum**

S.N.	Statements	SA	A	U	DA	SDA	MW	Remarks
1	Mathematics curriculums do not match according to age, ability, interest and needs to students.	84	92	132	124	175	2.53	Less Favorable
2	Mathematics curriculum match with present situation	630	248	102	8	14	4.18	Favorable
3	Mathematics curriculum is not practicable	15	24	165	444	235	3.68	Favorable
4	The difficulty level of the subject matters include in the curriculum is higher than the level of students.	225	404	165	66	6	3.61	Favorable
5	The subject matter of mathematics curriculum itself difficult	175	232	153	182	5	3.11	Favorable
<b>Total</b>							<b>3.42</b>	<b>Favorable</b>

The analysis of above table shows that total mean weight age of statement is 3.42. It implies that there were problems in curriculum. Due to the difficulty in curriculum students were not able to learn frequently. The mean weight age of statement 1 follows that students are less favorable with the problems. It implies that the mathematic curriculum of grade X is match according to age, ability, interest and needs of students. Most of the students were facing problems due to the curriculum. The mean weight age of statements 2, 3, 4 and 5 was greater than 3 this implies that there were problems in curriculum. It means that students are favor with the problems, mathematics curriculum is match with present situation, mathematics curriculum is not practicable, difficulty level of subject matters is higher than the students level and subject matter of mathematics curriculum is itself difficult.

While discussing the mathematics teacher and students, they complained about the complex and large syllabus in grade X mathematics curriculum.

### **Analysis and Interpretation of Proving and Verifying Theorems and**

#### **Construction**

Teaching theorems is abstract and challenging task because of its abstract nature. Construction is also appears as a great problems because of less skill of students in manipulating the instruments. Many students face difficulties in proof type geometry problem solving.

**Table No. 4.3**

**Students Responses on Providing and Verifying Theorems and Construction**

<b>S.N.</b>	<b>Statements</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>DA</b>	<b>SDA</b>	<b>MW</b>	<b>Remarks</b>
6	Teaching materials are used in teaching theorems and construction.	495	316	24	86	11	3.88	Favorable
7	Our teacher cannot recall the previous definition and postulate while teaching geometry.	610	248	87	22	16	4.10	Favorable
8	The statement of theorem teacher explains clearly.	205	220	153	146	20	3.10	Favorable
9	We rote the statement and proof of geometric theorem.	175	308	186	112	10	3.30	Favorable
<b>Total</b>							<b>3.59</b>	<b>Favorable</b>

The total mean weight age 3.59 indicates that most students are in favor of the problems of teaching construction and verifying the theorems and construction during research and analysis of 4.3. The mean weight age of statements 6 to 9 have more than 3 which implies that there were problems on proving and verifying theorems and constructions.

In conclusion, researcher had been found that teacher cannot recall the previous definitions and postulates while teaching geometry, teacher explain clearly about statement of theorem and students rote the statements and proofs of the theorems.

For justification of above quantitative result researcher interacted with the students and teachers which is given below.

*"Teacher always emphasis their own method and they also choose the lesson according to their will" (Students).*

*"Teacher always emphasis on exercise but mathematical concepts is not given broadly" (Students).*

The above response shows that teacher dominated the students' interest and teacher interest is way of teaching. Teacher cannot explain the previous definition, properties and relationship between the figures, postulates and axioms.

The Van Hiele model of geometric thinking emphasis on learners formulate meaningful definition, relationship within and between figures and relationship between definition, axioms, postulates and theorems are fundamental base for proving and verifying theorems and construction. But teacher emphasis on theoretical and rote learning.

*"My main aim is to make the students pass in examination. So, I emphasize on solving important questions in classroom" (teacher).*

*"Student centered method cannot be applied because of short teaching period" (teachers).*

The above response shows that the aim of teaching is to make the students pass in examination in short teaching period. So, teacher emphasis on teacher centered method and solving important questions while teaching geometry. The Van Hiele

model of learning closer to sequential learning and activity approach. Teacher does not emphasize on more collaborative and cooperative method for learning geometry. Also most of the students indicated that the mathematics teacher in classroom did not try to extra mathematics activities such as did not give many examples and did not try to give manage extra mathematical activities.

### **Analysis and Interpretation of Responses about Classroom Management**

The well classroom management of school plays a vital role in improvement of student's achievement and quality education. Classroom should be clean and well swept. There should be sufficient desks, benches, to sit in the class, writing board should be established in proper place, classroom should be student friendly and there should be sufficient windows from which sun light can be entered in the room.

**Table No. 4.4**  
**Students Responses about Classroom Management**

<b>S.N.</b>	<b>Statements</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>DA</b>	<b>SDA</b>	<b>MW</b>	<b>Remarks</b>
10	We feel difficulties while participating in the congested classroom	375	276	69	128	9	3.57	Favorable
11	We can feel enjoy and work efficiently while teaching geometry.	59	90	186	200	120	2.73	Less Favorable
12	We have no any problems of whiteboard and other furniture in our classroom.	103	118	30	196	95	2.26	Less Favorable
13	Our teacher establishing good relationship with every student.	315	356	120	64	16	3.63	Favorable
14	Anything written in whiteboard is visible.	330	488	63	30	16	3.86	Favorable
<b>Total</b>							<b>3.21</b>	<b>Favorable</b>

The analysis of above table shows that total mean weight age of statement is 3.21. It shows that students are facing problems in classroom management. The mean weight of statement number 10 has 3.57. It implies that students are favor in problems with congested classroom. Also statement number 13 and 14 has mean weight age 3.62 and 3.86 respectively which follows that students are in favor in problems with relationship between students and teachers and visibility of whiteboard. The mean weight age of item number 11 and 12 have 2.73 and 2.26 respectively which follows that students are in less favor of problems with whiteboard and other furniture in classroom and students feel enjoy and work efficiently while teaching geometry.

*"I feel geometry as an interesting and easy subject because our mathematics teacher teaches us interesting way, by using instructional materials all friends are cooperative, talent students share their knowledge for weak students"*  
(Students).

From the above response of related respondents, it had been found that students feel geometry as easy and interesting subject when teacher establishing good relationship with every students and using instructional materials while teaching geometry. Cooperative learning is a form of active learning where students work together to perform specific task in small group. When the students have cooperative relation than learning is effective and students learn easily. In the classroom some students have high achievement and some students have low achievement in subject matter. The high achievement students or talent students share the knowledge to weak students than weak students improve their knowledge. Cooperative group discussion method is more effective method for learning geometry.

In conclusion, the classroom is students friendly; using instructional material in teaching geometry, talent students share their knowledge to weak students make learning geometry is easy and interesting.

When researcher observed the classroom there were problems on size of white board, interaction between students and teacher. All most schools were well decorated. There were postures, charts, maps, furniture, light on the classroom but some schools were not well decorated. There were problems in good arrangement of furniture; visibility of room is not clear and alternative management for weak students.

### **Analysis and Interpretation of Responses on Teacher Training**

Teacher training increased opportunity for professional development through recurrent training would lead to improve professionalism dedication and motivation which will positively contribute to students learning. There could be many factors causing regular relationship training and students performance.

**Table No. 4.5**  
**Students Responses on Teacher Training**

<b>S.N.</b>	<b>Statements</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>DA</b>	<b>SDA</b>	<b>MW</b>	<b>Remarks</b>
15	The mathematics teacher have good skill in teaching mathematics.	725	228	30	10	23	4.23	Favorable
16	The teacher uses real life related example.	205	84	84	42	129	2.27	Less Favorable
<b>Total</b>							<b>3.25</b>	<b>Favorable</b>

From the above table, it is revealed that the total mean weight age is 3.25 means, maximum number of students are in favor of problems in teacher training. The item no. 15 which has mean weight age 4.23. It follows that mathematics teachers have good skill in teaching mathematics. But item no. 16 which has mean weight age

2.27 it indicates that mathematics teacher does not uses real life related example during the teaching mathematics.

During the data collection period the researcher discuss with head teacher of community and institutional schools.

*"We are not able to provide refreshing training for mathematics teacher because time consuming" (head teacher, community school).*

*"Sound content knowledge is most important for teaching mathematics but pedagogical knowledge can't play vital role in teaching and learning geometry" (head teacher, institutional school).*

From the above responses of the related respondents, the community schools teacher cannot gain refresher training. The aim of refresher training courses is to review, reinforce and upgrade participants existing knowledge and skills. The pedagogical knowledge of teachers in creating and facilitating effective teaching and learning environment for all students but in institutional school emphasis on teachers sound content knowledge only.

The Van Hiele phases of learning geometry adopted that teacher as a facilitator of teaching and learning geometry. Students building the new domain of thinking by sequential learning and an activity approach. it is concluded that teacher training play a vital role in learning geometry but mathematics teacher did not get well training for teaching and learning geometry.

*"Since, I have not taken training, effective method of teaching geometry by using information and communication technology (ICT)" (Teacher).*

According to related responses, teacher cannot get well training. ICT is basic understanding tool to motivate students and to provide some sense of how we can

threat learning more enjoyable and sustainable. It helps to simplify the abstracts ideas and promote a good environment. Through ICT, geometric figures can easily be used in teaching and learning geometry. Teachers can easily explain statements and proof of theorems, examples and definitions. Besta (2003) summarized the key benefits of ICT; it promotes greater collaborations among students and encourages communications and the sharing of knowledge. It helps us to simplify the mathematical concepts concretely. It helps us to explain the geometric concepts by movable figures.

The teacher cannot gain training about software program like geogebra, mathematica and etc. Teachers have not any special knowledge in teaching geometry by using ICT, than learning geometry is difficulty for students.

### **Analysis and Interpretation of Responses on Instructional Materials**

To make teaching learning activities effective and meaningful, use of instructional materials are indispensable. Different kinds of teaching materials can be used in teaching geometry such as audiovisual aids, models, textbook, and computer and so on. These materials could be used in classroom to facilitate teaching learning situation. Instructional materials are strong weapon to motivate the class. To minimize the geometrical problems all sorts of instructional materials can be adopted. Different teaching tools and materials can be used to make the teaching effective. 4.6 shows the situation of problems related with instructional materials.



**Table No. 4.6****Students Responses on Instructional Materials**

<b>S.N.</b>	<b>Statements</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>DA</b>	<b>SDA</b>	<b>MW</b>	<b>Remarks</b>
17	Text books and practice books are available in time	300	420	99	58	13	3.71	Favorable
18	Our teacher uses locally available and low cost materials in teaching geometry.	95	284	219	122	16	3.07	Favorable
19	Manipulative geometrical materials are not available in our school	275	272	150	68	33	3.33	Favorable
20	Less use of teaching materials	225	300	84	146	19	3.23	Favorable
21	Teacher use instructional materials (geometric box only) while teaching geometry.	305	108	90	222	11	3.07	Favorable
<b>Total</b>							<b>3.28</b>	<b>Favorable</b>

From the detailed study of the above table, it is clear that problem in the field of instructional materials. Most of the students were facing problems due to the not proper use of instructional materials. The total mean weight age of statements is 3.28. It implies that there were problems in field of instructional materials while teaching geometry. The mean weight age of item 17 to 21 are 3.71, 3.07, 3.33, 3.23 and 3.07 respectively which follows that the students were in favor of the problems with textbook and practice book are available in time, uses local geometric materials, manipulative materials were not used, less uses of teaching materials and instructional materials ( geometric box only) while teaching geometry.

*"Teacher does not use materials except geometry box and daily uses materials at teaching" (students).*

*"I spend more time arrival and departure because of road traffic management. So, I did not prepare about teaching materials" (teacher).*

The above responses follows that instructional materials are any collection of materials including inanimate and animate objects and human and non human resources that a teacher may use teaching and learning situation to help achieve desired learning objectives. In modern time various types of instructional materials available but the mathematics teacher uses geometric box and daily uses materials while teaching geometry. The Kathmandu metropolitan city had been traffic jam. So, the teacher spent more time in road.

The Van Hiele level of thought indicates that when the students understanding properties of figures and meaningful definitions then students learn geometry.

It concluded that lack of well managed traffic system, teacher didn't prepare about instructional materials .Lack of instructional materials students feel uneasy in learning geometry.

The researcher discussion to the mathematics teacher of every sampled school, there has been found that the mathematics teachers were unable to make necessary teaching materials due to the lack of training and enough time. Time factor hinder use of instructional materials due to the short time period of mathematics class.

### **Analysis and Interpretation of Responses on Teaching Learning Activities**

Analysis and interpretation of the responses on teaching learning activities plays important role to shape knowledge and understanding the subject matter.

Students' performance and perception depend upon how the teacher presents subject matter. Students centered teaching method is now highly appreciated.

**Table No. 4.7**

**Students Responses on Teaching Learning Activities**

S.N.	Statements	SA	A	U	DA	SDA	MW	Remarks
22	The class starts from interesting way	400	296	117	38	28	3.66	Favorable
23	Teacher gives extra parallel problems related with exercise	350	448	36	62	15	3.80	Favorable
24	Teachers provide opportunity for weak students	295	100	75	210	26	2.94	Less Favorable
25	The teachers also participate with you in classroom discussion.	365	340	99	66	16	3.69	Favorable
26	Learning geometry is only exam oriented.	33	76	246	228	150	3.05	Favorable
<b>Total</b>							<b>3.37</b>	<b>Favorable</b>

From the table presented above, it is related that the total mean weight age is 3.37 means maximum number of students are in the favor of problems on teaching learning activities. The mean weight age of statement 22, 23, 25 and 26 are 3.66, 3.80, 3.69 and 3.05 respectively which are all more than 3. Therefore, there were problems on teaching learning activities related to solving questions in given exercise, proving theorems teachers participant in the classroom activities and learning geometry is only exam oriented. The mean weight age of item no. 24 has 2.94 which follows that teacher does not provide opportunity for weak students. According to the researcher's discussion with students and mathematics teacher always promotes lecturer method in geometry teaching.

To explore the possible causes in facing problem on teaching learning activities, the researcher asked a question to the students.

Then students reply as follows:

*"The previous subject matter which are very need to know the geometrical, ideas, but teacher does not reviewed" (students).*

*"Geometry becomes hard subject to me because I use the evening time by playing football, cricket, carom board, listening folk song is mobiles as well as a watching TV and playing some games on mobile every day as like" (students).*

From the above interview response, the teacher of mathematics does not review the previous definitions, figures, statements of theorems and postulates. Also, students feel geometry as hard subjects because they didn't more practice for learn geometry. Students use more time for playing football, cricket, carom board, watching T.V and playing some game on mobile phone. Encourage someone to continue to do something many times, so that they will learn to do it very well (Cambridge Dictionary, 2008) .In conclusion students feel difficult in learning geometry teacher didn't recall the previous chapter and lack of sufficient time to practice geometry at learn.

The mathematics teacher always promotes lecture method in geometry teaching. There are few number of students in the class of geometry but teacher do not use child centered approaches and teacher applied traditional teaching method, not using appropriate teaching materials. Also institutional schools teacher does not have formal teacher training.

### Analysis and Interpretation on School's Physical Facilities

The physical facilities contained land of school, building, room, furniture, teaching materials and game materials. The physical facilities available in school were a major component of creating learning environment of school. The physical facilities and infrastructure of institutional plays the key role on its well functioning physical facilities help gaining and sharing knowledge.

**Table No. 4.8**  
**Students Responses on Schools Physical Facilities**

S.N.	Statements	SA	A	U	DA	SDA	MW	Remarks
27	The math lab do not available in school	138	100	12	84	135	1.95	Less Favorable
28	The school library is correlated with learning mathematics.	295	340	108	76	22	3.50	Favorable
29	Geometrical instrument are not available in school	49	96	147	228	185	2.94	Less Favorable
<b>Total</b>							<b>2.79</b>	<b>Less Favorable</b>

However, during the research period it had been found that students were disagreed about the problems in schools physical facilities in teaching geometry. The mean weight age of item no. 28 has 3.50 which imply that school library is correlated with learning mathematics. Also, the mean weight age of item no. 27 and 28 have 1.95 and 2.94 respectively which follows that students are in less favor with math lab do not available in school. The item no. 29 shows those geometrical instruments are available in school.

### **Analysis and Interpretation on Evaluation Technique**

Evaluation of students into classroom had usually been implemented and measured using limited forms of tasks generally referred as "Pencil and paper test" emphasizing logical process of calculation, deduction and organization skills. Different devices are used to evaluate the students' achievement. The major purpose of evaluation is to improve the teaching learning activities in the classroom.

For evaluation teacher can use informal evaluation that are placement test, formative test, diagnostic test, achievement test, oral test, homework etc. and formal evaluation that are placement test, achievement test, monthly test, unit test, terminal test etc. Given table shows that situation of evaluation techniques.

Table No. 4.9

## Students Responses on Evaluation Techniques

S.N.	Statements	SA	A	U	DA	SDA	MW	Remarks
30	The teacher checks our homework daily	340	152	66	174	25	3.15	Favorable
31	The teacher does not take the test at the end of unit	320	304	153	54	22	3.55	Favorable
32	Our teacher takes different types of test except terminal exam.	305	332	165	44	19	3.60	Favorable
33	We exchange the homework copy with friends.	310	296	171	32	31	3.50	Favorable
34	The teachers focus on our performance in class.	49	98	132	196	245	3.00	Less Favorable
35	In the terminal examination our seat plan is like as daily classroom.	180	304	135	114	26	3.16	Favorable
36	Teachers give the feedback	180	228	162	114	36	3.00	Less Favorable
37	All geometrical problems are not included in terminal exam.	51	158	150	204	45	2.53	Less Favorable
38	The first priority is not given to teach geometry	45	126	273	132	40	2.57	Less Favorable
39	All the question papers of terminal exam are not made by subject teacher.	80	160	126	120	82	2.37	Less Favorable
40	Teacher does not give us project work, group work and home work.	405	356	72	40	26	3.75	Favorable
<b>Total</b>							<b>3.10</b>	<b>Favorable</b>

The total mean weight age 3.10 shows that most students are in favor of the problems of evaluation techniques during the research period. It had been found that most of the students specially in items 30, 31, 32, 33, 35 and 40 with mean weight age greater than 3. So they are in the favor of the problems. This result follows that teacher does not take the test at the end of the unit, weak students copy the homework of talent students, terminal exam has low reliability due to cheating, teacher does not give students project work, group work and homework regularly are the problems related to evaluation techniques. But items 34, 37, 38 and 39 which have mean weight age less than 3 less favor with the problems of evaluation techniques. It means that teacher does not focus on students performance in classroom, teacher does not give feedback to the students and all the question paper of terminal exam are prepared by subject teacher. According to the students, sometimes poor students also pass in examination due to side cheating and promoting policy of schools. There is no connection between terminal and final examination, checking homework in the class is an overload to teacher to care the students. To justify the above result, the researcher interviewed with teachers which is given below.

*"I plan to make unit test regularly, but students sit plan is like as daily classroom and question paper is made by me". (Teacher)*

From the above information, it was found that teacher conducts the unit test to evaluate the achievement of students in geometry, unit tests allow teacher to get a baseline understating of where our students are. It helps to develop and refine lesson plans, methods, instructional materials etc. But the school's students sit plan is like as daily classroom, when test was administered. So, weak students copy the answer of talent students. Also, question paper of the test was prepared by subject teacher. Teachers had prior training in testing than unit test have low reliability.



Teacher conduct a unit test regularly was strength part of learning geometry. But it is affected by not proper sit plan and teachers made test. This test gives poor reliable result than learning geometry is not effective.

The researcher interacted with teachers and students the other problems related to evaluation techniques are as follows:

- Terminal examination has low reliable due to cheating.
- Poor students copy the homework of talent students.
- Record keeping evaluation system is tiresome job.
- Due to continuous assessment system weak students are upgraded.
- Paper-pencil test is more in use.

### **Comparison of Problems Faced by Institutional and Community School Students**

We have to check the homogeneity of variances, before using t-test. The F ratio does not less than 1 because the largest variance is always divided by the smallest variance. To test the homogeneity of variance, the F-value obtained by using the F-table with  $n_1 - 1$  and  $n_1 - 1$  degree of freedom must be insignificant. In this case, t-test can be used to test null hypothesis. The researcher found that calculated value of F is 1.11. Now, from the table  $F_{\alpha} (v_1, v_2) = F_{0.05} (119, 119) = 1.35$

Here, calculated value of F is less than tabulated value. So, the groups are homogenous. Therefore, we can apply t-test to compare the problems faced by community and institutional school students. In this case, we apply paired sample t-test.

**Table No. 4.10****Comparison of Problems Faced by Community and Institutional School Students**

<b>Group Compared</b>	<b>Mean</b>	<b>S.D.</b>	<b>No. of Students</b>	<b>df</b>	<b>Calculated Value</b>	<b>Tabulated Value</b>
Community students	$\bar{X}_1=3.22$	$S_1=0.59$	$n_1=120$	$n_1+n_2-2$	-1.15	1.96
Institutional students	$\bar{X}_2 = 3.29$	$S_2 = 0.55$	$n_1=120$			

The above table shows that tabulated value at 5% level of significance and 238 degree of freedom  $t_{0.05,238} = 1.96$ . The calculated value of community and institutional school's students at 238 degree of freedom is 1.15. Here, tabulated value is greater than the calculated value for two tailed test. So, the value fall on the acceptance regions. Therefore, the null hypothesis is accepted that there is no significance difference between the problems faced by community and institutional school students in geometry. For the statistical formula it is concerned in appendix VII.

## **Chapter V**

### **SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

This chapter deals with summary major findings, conclusion and recommendations.

#### **Summary of the Study**

The design of study was descriptive survey. The main purpose of study was to find the problems faced by the students in learning geometry at grade X. In order to achieve the objectives, the researcher constructed VHGT, questionnaire and interview schedule mainly based on grade X.

For the convenience of the study the problems were categorized into eight different areas such as curriculum, proving and verifying theorem and construction, classroom management, teacher training, instructional materials, teaching learning activities, School physical facilities and evaluation techniques. For this study VHGT was used for proving and verifying theorems and construction. The tests were piloted in Mangal H.S. School, Kirtipur, Kathmandu. Finally, VHGT contains 10 multiple choice items which are administered to the 240 sample students on basis of the data obtained from the test analysis and interpretation were made in chapter IV.

The population of this study consisted of entire grade X students and teachers of community and institutional schools of Kathmandu metropolitan city. The questionnaire, VHGT and interview schedule were taken from the authentic sources under the guideline of supervisor and added some problems by the research himself with the advice of experienced mathematics teachers. The responses were collected from different students and mathematics teachers selected from sample by random sampling method. Likert five point scales were used to quantify the collected data.

Questionnaire, interview schedule and VHGT were included in each category of problems and descriptive analysis of collected responses was carried out. Mean weight age, percentage and t-test were used to analyze the problems.

### **Findings of the Study**

On the basis of analysis and interpretation of the collected data, it was found that students have been facing numerous problems in learning geometry at grade X. Based on analysis and interpretation of data, the major findings of this study are presented below in hierarchical order as follows:

- Difficulty level of problems in mathematics curriculum is higher than the level of students and mathematics curriculum is not practicable also.
- Teacher cannot recall the previous definitions, examples, axioms, postulates and theorems while teaching geometry. Also, students rote the statements and proof of theorems is the problems in learning geometry.
- 117(54.16% )students were fit on Van Hiele's level 2 and 99(45.83%) students were fit on the Van Hiele's level 3,number of students decreases when students move level 2 to level 3.
- Students cannot feel enjoy while teaching geometry, problems in size of white board and other furniture in classroom and classroom is congested.
- Teachers qualification, training and teaching experience were strong in average but they were not apply their skill and knowledge gained from training in classroom while teaching geometry and they did not get refresher training in community school but most of the teachers were untrained in institutional school.

- There were not sufficient teaching and learning materials for the students that help in learning geometry. Teachers were not construction and using available manipulative instructional materials and ICT to teach geometry in classroom even in 21<sup>st</sup> century.
- Students feel geometry as a hard subject due to anxiety in mathematics, they did not labour hard and sufficient practice, teacher did not provide appropriate opportunity for weak students, teacher have not special vision for group work and project work and did not provide appropriate example to make the concept clear.
- The math labs were not available in the school and school library did not have sufficient learning materials correlated with geometry.
- Problems in evaluating classroom activities, cheating in internal exam, poor correlation between terminal and final examination, marking system in extra-curriculum activity and creativity of students. Also, there are problems of misusing of information technology devices by students and reliability and validity of teacher made test. Due to short time period and teacher did not check homework regularly.
- There is no significance difference between the problems faced by community and institutional school students in learning geometry.

### **Conclusions of the Study**

From the above stated findings of this study, it can be concluded that learning geometry at grade X is not satisfactory in Kathmandu Metropolitan city. There had been significant problems in learning geometry in curriculum, proving and verifying theorems and construction, classroom management, teacher training, instructional

materials, teaching learning activities, school physical facilities and evaluation techniques. Also, it is concluded that there is no significant difference between the problems faced by community and institutional school students in geometry.

However, the institutional school students were facing problems of rote method of learning to pass the exam and course of mathematics is not match with students cognitive level. Where the community school students were facing problems large number of students in their classroom, economy, and school did not conduct the class test and unit test regularly. Almost students were agreed that negative attitude, fear and anxiety towards geometry are a major psychological problem of students that also affects to gain better achievement in whole mathematics subject.

### **Recommendations**

On the basis of above findings and conclusions, the following recommendations are presented:

- Student centered teaching method for teaching geometry should be adopted with much focus on weak students.
- The mathematics teacher should be encouraged to use Van Hiele's approach in teaching geometry.
- Mathematics teacher should search the suitable methodology, which motivate and arises the interest in learning geometry.
- The mathematics curriculum should be more interesting, student-friendly and practicable.

- The use of technology should be strongly introduced in learning geometry conducted with lesson plan and instructional materials that would be best learning and higher achievement of students.
- Suitable evaluation system should be adopted for the promotion of the students in mathematics. There should be proper connection between terminal and final examination to promote students rather than upgrading on the basis of continuous assessment system.
- Much focus on teaching theorems and construction is needed while teaching geometry.
- Much focus on teacher training and promotion.
- Similar studies can be replicated among students of different social, cultural and geographical background.
- On the basis of this study, comparison of the problems faced by girls and boys students can be carried out.

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**Appendix-I**  
**Questionnaires**

Name of the School:

Date:

Periods:

Starts at:

Ends at:

Class size:

Boys:

Girls:

Time: 1 hour

Please give tick mark ( ) which you feel the best option where SA = Strongly Agree, A = Agree, U = Undecided, DA = Disagree, SDA = Strongly Disagree

S.N.	Statements	SA	A	U	DA	SDA	MW	Remarks
<b>Questionnaire Related to Curriculum</b>								
1	Mathematics curriculums do not match according to age, ability, interest and needs to students.							
2	Mathematics curriculum match with present situation							
3	Mathematics curriculum is not practicable							
4	The difficulty level of the subject matters include in the curriculum is higher than the level of students.							
5	The subject matter of mathematics curriculum itself difficult							
<b>Questionnaire Related to Proving and Verifying Theorems and Construction</b>								
6	Teaching materials are used in teaching theorems and construction.							
7	Our teacher cannot recall the previous definition and postulate while teaching geometry.							
8	The statement of theorem teacher explains clearly.							
9	We rote the statement and proof of geometric theorem.							
<b>Questionnaire Related to Classroom Management</b>								
10	We feel difficulties while participating in the congested							

	classroom.							
11	We can feel enjoy and work efficiently while teaching geometry.							
12	We have no any problems of whiteboard and other furniture in our classroom.							
13	Our teacher establishing good relationship with every student.							
14	Anything written in whiteboard is visible.							
<b>Questionnaire Related to Teacher Training</b>								
15	The mathematics teachers have good skill in teaching mathematics.							
16	The teacher uses real life related example.							
<b>Questionnaire Related to Instructional Materials</b>								
17	Text books and practice books are available in time.							
18	Our teacher uses locally available and low cost materials in teaching geometry.							
19	Manipulative geometrical materials are not available in our school							
20	Less use of teaching materials							
21	Teacher use instructional materials (geometric box only) while teaching geometry.							
<b>Questionnaire Related to Teaching Learning Activities</b>								
22	The class starts from interesting way							
23	Teacher gives extra parallel problems related with exercise							
24	Teachers provide opportunity for weak students							
25	The teachers also participate with you in classroom discussion.							
26	Learning geometry is only exam oriented.							



## Appendix-II

### Students Responses on Total Number of Questionnaire

S.N.	Statements	SA	A	U	DA	SDA	MW	Remarks
<b>Questionnaire Related to Curriculum</b>								
1	Mathematics curriculums do not match according to age, ability, interest and needs to students.	84	92	132	142	175	2.53	Less Favorable
2	Mathematics curriculum match with present situation	630	248	102	8	14	4.18	Favorable
3	Mathematics curriculum is not practicable	15	24	165	444	235	3.68	Favorable
4	The difficulty level of the subject matters include in the curriculum is higher than the level of students.	225	404	165	66	6	3.61	Favorable
5	The subject matter of mathematics curriculum itself difficult	175	232	153	182	5	3.11	Favorable
<b>Questionnaire Related to Proving and Verifying Theorems and Construction</b>								
6	Teaching materials are used in teaching theorems and construction.	495	316	24	86	11	3.88	Favorable
7	Our teacher cannot recall the previous definition and postulate while teaching geometry.	610	248	87	22	16	4.10	Favorable
8	The statement of theorem teacher explains clearly.	205	220	153	146	20	3.10	Favorable
9	We rote the statement and proof of geometric theorem.	175	308	186	112	10	3.30	Favorable
<b>Questionnaire Related to Classroom Management</b>								
10	We feel difficulties while participating in the congested classroom	375	276	69	128	9	3.57	Favorable
11	We can feel enjoy and work efficiently while teaching	59	90	186	200	120	2.73	Less Favorable

	geometry.							
12	We have no any problems of whiteboard and other furniture in our classroom.	103	118	30	196	95	2.26	Less Favorable
13	Our teacher establishing good relationship with every student.	315	356	120	64	16	3.63	Favorable
14	Anything written in whiteboard is visible.	330	488	63	30	16	3.86	Favorable
<b>Questionnaire Related to Teacher Training</b>								
15	The mathematics teacher have good skill in teaching mathematics.	725	228	30	10	23	4.23	Favorable
16	The teacher uses real life related example.	205	84	84	42	129	2.27	Less Favorable
<b>Questionnaire Related to Instructional Materials</b>								
17	Text books and practice books are available in time	300	420	99	58	13	3.71	Favorable
18	Our teacher uses locally available and low cost materials in teaching geometry.	95	284	219	122	16	3.07	Favorable
19	Manipulative geometrical materials are not available in our school	275	272	150	68	33	3.33	Favorable
20	Less use of teaching materials	225	300	84	146	19	3.23	Favorable
21	Teacher use instructional materials (geometric box only) while teaching geometry.	305	108	90	222	11	3.07	Favorable
<b>Questionnaire Related to Teaching Learning Activities</b>								
22	The class starts from interesting way	400	296	117	38	28	3.66	Favorable
23	Teacher gives extra parallel problems related with exercise	350	448	36	62	15	3.80	Favorable
24	Teachers provide opportunity for weak students	295	100	75	210	26	2.94	Less Favorable
25	The teachers also participate with you in classroom discussion.	365	340	99	66	16	3.69	Favorable

26	Learning geometry is only exam oriented.	33	76	246	228	150	3.05	Favorable
<b>Questionnaire Related to Schools Physical Facilities</b>								
27	The math lab do not available in school	138	100	12	84	135	1.95	Less Favorable
28	The school library is correlated with learning mathematics.	295	340	108	76	22	3.50	Favorable
29	Geometrical instrument are not available in school	49	96	147	228	185	2.94	Less Favorable
<b>Questionnaire Related to Evaluation Techniques</b>								
30	The teacher checks our homework daily	340	152	66	174	25	3.15	Favorable
31	The teacher does not take the test at the end of unit	320	304	153	54	22	3.55	Favorable
32	Our teacher takes different types of test except terminal exam.	305	332	165	44	19	3.60	Favorable
33	We exchange the homework copy with friends.	310	296	171	32	31	3.50	Favorable
34	The teachers focus on our performance in class.	49	98	132	196	245	3.00	Less Favorable
35	In the terminal examination our seat plan is like as daily classroom.	180	304	135	114	26	3.16	Favorable
36	Teachers give the feedback	180	228	162	114	36	3.00	Less Favorable
37	All geometrical problems are not included in terminal exam.	51	158	150	204	45	2.53	Less Favorable
38	The first priority is not given to teach geometry	45	126	273	132	40	2.57	Less Favorable
39	All the question papers of terminal exam are not made by subject teacher.	80	160	126	120	82	2.37	Less Favorable
40	Teacher does not give us project work, group work and home work.	405	356	72	40	26	3.75	Favorable



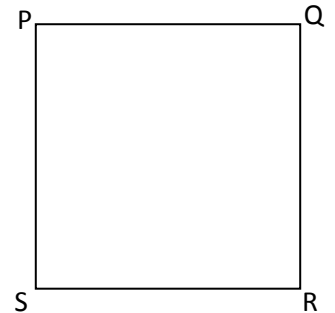
### Appendix-III

#### Van Hiele Geometry Test (VHGT)

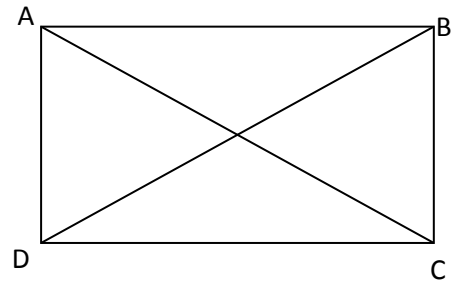
Please read carefully and tick ( ) the best answer.

Time: 20 min

1. PQRS is a square which relationship is true in all squares?



- a) PR and RS have same length.
  - b) QS and PR are perpendicular
  - c) PS and QR are perpendicular
  - d) PS and QS have same length
  - e) Angle Q is larger than angle R.
2. In the rectangle ABCD, AC and BD is the diagonal which of the following is true in every rectangle.

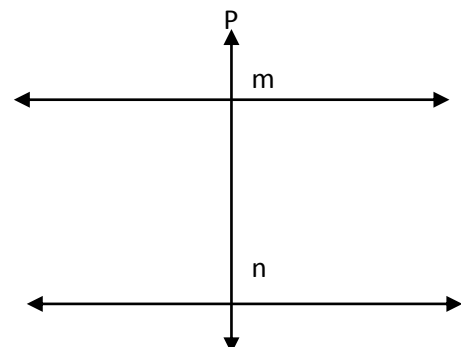


- a) There are four right angles.
  - b) There are four sides.
  - c) The diagonals have same length.
  - d) The opposite side has same length.
  - e) All the above are true in every rectangle.
3. Examine the three statements.

- a) Two lines perpendicular to the same line are parallel.
- b) A line that is perpendicular to one of two parallel lines is perpendicular to each other.
- c) If two lines are equidistant, then they are parallel.

In the figure below, it is given that line M and P are perpendicular and lines n and p are perpendicular. Which of the above sentences could be the reason that line M s parallel to line n?

- a) (1) only
- b) (2) only
- c) Either (1) or (2)
- d) (3) only
- e) Either (3) or (2)



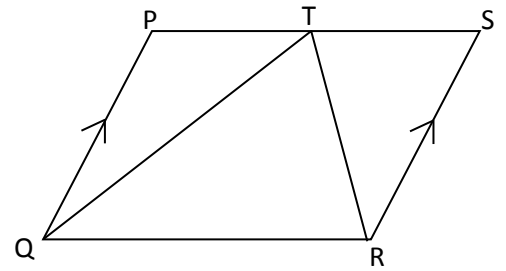
4. What do all rectangles have that some parallelograms do not have?
- a) Opposite sides equal.
  - b) Diagonals equal
  - c) Opposite sides parallel
  - d) Opposite angles equal
  - e) None of the above
5. The area of the triangle is equal to the area of parallelograms, if
- a) Both standing on same base
  - b) Between the same parallel lines
  - c) Both standing on same base and between the same parallel lines
  - d) None of the above.
6. Which of the following steps will be not helpful before drawing the actual figure ?
- a) Draw a rough sketch of a figure.
  - b) Mark the given measurement in it.
  - c) Analyze the figure and plan the steps.
  - d) By using the mathematical formula.
7. Which of the following is not true about circle?
- a) Centre angle is double of the inscribed angle standing on same arc
  - b) Inscribed angle is double of the center angle standing on same arc.
  - c) An angle formed by the radius of the circle is called centre angle.
  - d) An angle between the two chords which have a common endpoint is called inscribed angle.
8. The diameter of circle is 14 cm. which of the following is area of given circle?
- a) 153.86cm
  - b) 253.86 cm<sup>2</sup>
  - c) 153.86cm<sup>2</sup>
  - d) 353.86cm<sup>3</sup>

9. The base of an isosceles triangle is  $b$  cm. and equal sides are  $a$  cm. What is the measure of triangle?

- a)  $\frac{a}{4} \sqrt{4a^2 - b^2}$       b)  $\frac{b}{4} \sqrt{4a^2 - b^2}$     c)  $\frac{a}{4} \sqrt{b^2 - 4a^2}$     d)  $\frac{b}{4} \sqrt{b^2 - 4a^2}$

10. In the given figure, what is the relation between the area of the parallelogram PQRS and  $\square$ QTR ?

- a) Area of  $\square$ QTR =  $\frac{1}{2} \times$  area of PQRS  
b) Area of PQRS =  $\frac{1}{2} \times$  area of  $\square$ QTR  
c)  $2 \times$  area of  $\square$ QTR = area of PQRS  
d) area of  $\square$ QTR = area of PQRS



## Appendix - IV

### Item Analysis Table of VHGT

Item No.	Upper 27% Students Making Correct Response										Lower 27% Students Making Correct Response										P value	D value	Remarks
	1	2	3	4	5	6	7	8	9	10	26	27	28	29	30	31	32	33	34	35			
1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1	72%	0.3	accepted
2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	70%	0.4	accepted
3	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	1	1	0	1	0	70%	0.4	accepted
4	1	1	1	1	1	1	0	0	0	1	0	0	0	0	1	0	1	1	0	0	50%	0.4	accepted
5	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	85%	0.1	cancelled
6	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	0	1	1	0	65%	0.5	accepted
7	1	1	1	1	1	1	0	0	1	0	0	1	0	0	0	0	1	0	1	0	60%	0.5	accepted
8	1	1	1	1	1	1	0	1	0	1	0	1	0	0	1	1	0	0	0	0	53%	0.5	accepted
9	1	1	1	1	1	1	0	1	0	1	1	0	1	1	0	1	0	1	0	1	70%	0.1	cancelled
10	1	1	1	1	0	1	0	1	1	1	1	0	1	0	0	0	0	0	1	0	60%	0.6	accepted
11	1	1	1	1	1	0	1	0	1	0	1	0	1	0	0	0	1	1	1	0	65%	0.5	accepted
12	1	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	0	1	0	0	64%	0.3	accepted

## **Appendix-V**

### **Guidelines for Interview with Geometry Mathematics Students**

Name : Age : Sex :  
Father's name : Qualification : Occupation  
:  
Mother's name : Qualification : Occupation :  
School's name :  
Nature : Community/Institutional  
Time-to reach school :

The' interview with compulsory mathematics students was taken on the basis of following main topic.

- Teaching learning activities

Starting situation, methods, response, management, question/evaluation system, summarize

- School environment of, classroom managements
- Instructional materials

Nature of materials, effectiveness etc.

- Opportunity provided by school group work given in classroom
- Extra related subject matter in classroom activities
- Reasons of feeling geometry as hard topic

## **Appendix-VI**

### **Guidelines for Interview with Compulsory Mathematics Teacher**

Name:

Qualification:

Age:

Sex:

Teaching experience:

Training:

School Name:

Nature: Community/Institutional

The interview with compulsory mathematics teacher will take on the bases of following main topic.

- Home environment
- Parent status, qualification of parents, help of parents, financial supports.
- Classroom management
- Space, whiteboard, physical facilities, number of students, school environment.
- Teaching learning activities:
- Method encouragement for students, relative questions, materials, learning environment.
- Instructional materials:
- Effectiveness, time use etc.
- Causes of low achievement
- School environment of learning.

## Appendix-VII

### Formula

$$1) t = \frac{\bar{X}_1 - \bar{X}_2}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,  $S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}$  = Pooled sampled variance

$\bar{X}_1$  = Mean of community school

$\bar{X}_2$  = Mean of institutional school

$S_1$  = Standard deviation of community school

$S_2$  = Standard deviation of institutional school

$n_1$  = Number of first sample (Community school students)

$n_2$  = Number of first sample (Institutional school students)

$$S_p^2 = \frac{119 (0.59045)^2 + 119 (0.55950)^2}{120 + 120 - 2}$$

$$= 0.325$$

$$\text{Now, } t = \frac{3.22 - 3.29}{0.57 \sqrt{\frac{1}{120} + \frac{1}{120}}}$$

$$= -1.15$$

$$2) F = \frac{S_1^2}{S_2^2}$$

$$= \frac{(0.59045)^2}{(0.55950)^2}$$

$$= 1.11$$

$$3) \text{ Difficulty level (P)} = \frac{R}{T} \times 100$$

Where,

R = Number of examine who gave correct answer.

T = Total number of examine.

4) Discrimination index

$$D = \frac{U_R - L_R}{U_N \text{ or } L_N}$$

Where,

$U_R$  = Number of correct response from 27% of upper scoring students

$L_R$  = Number of correct response from 27% of lower scoring students

$U_N$  = Total number of 27% of upper scoring student

$L_N$  = Total number of 27% of lower scoring student

## Appendix-VIII

### List of Sample Schools

#### i) Community Schools

S.N.	Name of schools
1	Shree Saskrit Secondary School, Putalisadak, Kathmandu
2	Shree Padmodaya Secondary School, Ramshahpath, Kathmandu
3	Shree Shaheed Shukra Secondary School, Bagbazar, Kathmandu
4	Shree Bhanu Secondary School, Putalisadak, Kathmandu
5	Shree Janapath Secondary School, Kalanki, Kathmandu
6	Shree Ratnarajya Higher Secondary School, Baneshwor, Kathmandu
7	Shree Padma Kanya Secondary School, Dillibazar, Kathmandu
8	Shree Bhimsengola Secondary School, New Baneshwor, Kathmandu

#### ii) Institutional Schools

S.N.	Name of schools
1	Jana Jyoti English Secondary School, Tahachal, Kathmandu
2	Himalaya English Boarding School, Koteshwor, Kathmandu
3	Greenland International Boarding School, Gongabu, Kathmandu
4	Buddha Jyoti Academy, Dallu, Kathmandu
5	Little Buddha Academy, Swayambhu, Kathmandu
6	Capital Hill Secondary School, Sitapaila, Kathmandu
7	Valley View English School, New Baneshwor, Kathmandu
8	Peace Point Boarding School, Sinamangal, Kathmandu



