

**THE EFFECTIVENESS OF GEOGEBRA ON TEACHING LINEAR
EQUATION**

A

THESIS

BY

KAILASH BAHADUR SINGH

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
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2019

LETTER OF CERTIFICATE

This is certified that Mr. Kailash Bahadur Singh, a student of the academic year 2075/76 B.S. with the Exam Roll No. 7228297, Campus Roll No. 656, Thesis Number 1478 and T.U. Registration No 9-2-29-567-2012 has completed his thesis under the supervision of Dr. Dirgha Raj Joshi, during the period prescribed by the rules and regulation of Tribhuvan University, Nepal. The thesis entitled "**The Effectiveness of GeoGebra on Teaching Linear Equation**" embodies the result of his investigation, conducted during the period 2018 in the Department of Mathematics Education, Tribhuvan University, Kirtipur, Kathmandu. I recommended and forward that this thesis be submitted for the evaluation to awarding the degree of Master of Education.

.....

Assoc. Prof. Laxmi Narayan Yadav

December, 2019

Head

RECOMMENDATION FOR ACCEPTANCE

This is to certify that Mr. Kailash Bahadur Singh has completed his M. Ed. thesis entitled "**The Effectiveness of GeoGebra on Teaching Linear Equation**" under my supervision during the period prescribed the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. I recommend and forward his thesis to the Department of Mathematics Education to organize final viva-voice

.....

(Dr. Dirgha Raj Joshi)

Supervisor

December, 2019

LETTER OF APPROVAL

This thesis entitled "**The Effectiveness of GeoGebra on Teaching Linear Equation**" submitted by Mr. Kailash Bahadur Singh in partial fulfilment of the requirement for the Master's Degree in Education has been approved.

Viva Voice

Signature

1. Assoc. Prof. Laxmi Narayan Yadav

.....

(Chairman)

2. Prof. Uma Nath Pandey

.....

(External)

3. Dr Dirgha Raj Joshi

.....

(Supervisor)

December, 2019

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DEDICATION

Honestly Dedicated

To

My Parents

Who spend their life to make me what I am today

DECLARATION

This thesis contains no material which has been accepted for the award of other degree in any institutions. To the best of knowledge and belief this thesis contains no material previously published by any authors except due acknowledgement has been made.

.....

(Kailash Bahadur Singh)

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.....

Kailash Bahadur Singh

ABSTRACT

This study was based on "The Effectiveness of GeoGebra on Teaching Linear Equation ". The purpose of this study was to compare the effect of GeoGebra and its perception in teaching linear equation. This research has conducted by using mixed method. This study involved forty student of grade eight from Heartland academy Kathmandu, Nepal. The forty students were divided into two groups as experimental group and control group by random sampling technique. The data was collected by using achievement test of linear equation and questionnaire for perception of student towards GeoGebra. The experimental group was subjected to the lessons arranged with the GeoGebra software in computer- assisted teaching method, while the control group was subjected to the lessons shaped with traditional method. The data were collected by the experiment two weeks of teaching. Significance result was found in achievement score of the experimental and control group in favour of the experimental group at 5% level of significance. Furthermore, the perception of the students towards the use of GeoGebra in teaching was found the positive. So the researcher concludes that GeoGbra is an effective tool for teaching linear equation.

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Chapter I

INTRODUCTION

Background of the Study

Use of technology in the teaching is essential for last two decades. The developed countries like America, Japan, and Malaysia are using technology in teaching and learning Algebra. Technology nowadays becomes a part and areas of our lives. Recent information technologies are being integrated into learning environments as well (Reezan, 2013).

Computers provide extensive opportunities for supporting the learning of mathematics in schools. Many types of computer applications are available for the support of mathematics education. Web-based interactive learning objects, spreadsheets and graphing programs are some of these tools. In addition to these tools, there are two different types of systems as computer algebra system and dynamic geometry system that can effectively support teaching and learning of mathematics in schools (Reezan, 2013). Computer algebra system operates on the symbols which are used for represent the abstract mathematical concepts such as integers, rational numbers, complex numbers, polynomials, functions and equation systems (Davenport, Siret&Tournier, 1993). Computer algebra systems (e.g. Derive, Mathematica, Livemath) enable students to improve computational skills, to discover, visualize and practice mathematical concepts, and they help the teachers to prepare teaching materials, improve the communication between students and teacher, support the distance education (Majewski, 1999).

GeoGebra is created by Markus Hohenwarter in 2001. It is the combination of computer algebra system and dynamic geometry system. Related literatures showed GeoGebra's positive effects on students' performance in geometrical concepts

(Bilgici&Selçik, 2011; Dogan&Icel, 2011). In addition, since the combination of visual capabilities of computer algebra system and dynamic changeability of dynamic geometry system enables GeoGebra to examine multiple representation of an equation (Hohenwarter& Fuchs, 2004), GeoGebra was found as an effective tool while teaching algebra (Dikovic, 2009; Kutluca&Birgin, 2007; Zulnaidi&Zakaria, 2012). Confrey and Smith (1991) define representation as a tool for representing mathematical ideas such as graphs, equations and tables. Representation is divided into two categories as internal and external representation.

There are five representations for an equation which are daily life situation, concrete model, table, symbol, and graph. GeoGebra enable examining three main representations; namely, symbolic, tabular and graphical. Correspondingly with these representations, there are six views on GeoGebra; algebra, spreadsheet, CAS, Geometry, graphic Probability views, in algebraic view of GeoGebra, symbolic representations of constructions can be observed. When user draw a vector, line, or circle, symbolic representations of the input can be simultaneously seen on the screen.

The functions can be plot by just writing the equation on the algebra view. Furthermore, spreadsheet view provides with the opportunity to enter not only numerical data but also all types of mathematical concepts such as coordinate of points, equation or any command. Any data entered in spreadsheet can also be seen in graphic view immediately. In a typical computer algebra system, when the graph of an equation is drawn, no change on the graphic representation of an equation can be done. It is hard to notice the relationship between the graph of the equation and its algebraic and tabular representations. However, GeoGebra allows manipulations on each representation of an equation. For example, when the user changes parametric values of symbolic representation of an equation, the changes on the tabular and

graphical representations can be observed simultaneously. In this way, the relation between the representations can be analysed.

Another property of GeoGebra is free and multi-platform dynamic mathematics software for all levels of education that combines geometry and algebra in one easy-to-use package. It is open source software, which allows increased accessibility for even economically challenged schools. In addition, it allows for usage in various languages including Turkish. All of these properties of GeoGebra make students to examine the relationship between representations to understand algebra better.

The national mathematics curriculums in Nepal, graphic representations of linear equations are covered in grade eight. Therefore, it is expected that deficiencies and difficulties on learning graph of linear equations at basic level would a barrier to learn some higher level subjects like functions. Therefore, it is important to teach the graph of linear equation accurately in grade eight level. Taking into account all of these, the aim of this research is to investigate the effect of teaching linear equations with dynamic mathematics software on grade eight.

There is space to discover or to find out the new knowledge in the field of teaching linear equation. Now a days, different method are using in teaching. Among them, the use of technology is one of them; very few schools in Nepal are using technology in teaching and learning. So, it is the challenge and still in the problems for finding the result to apply the software in learning linear equation. GeoGebra is computer software for mathematics for learning Geometry, algebra, Calculus Kindergarten to university level (Hohenwarter, 2008). Thus, there should be deep thinking about using GeoGebra application in linear equation teaching and how it

effect in teaching linear equation? What is the perception of the students about the GeoGebra? To find the answer to the above question it is necessary to study.

Statement of the Problem

In the teaching and learning linear equation, It has been often realized that student still take the cognitive and process abilities in the total understanding of the Algebra. Different method and process were implementing in the teaching field and different type of software also be used in visualized and conceptualized the algebra among them GeoGebra is one. GeoGebra software can used to explain algebra at each level of school education. Nepal is in developing country, which is still back on use of technology for teaching and learning mathematics (Kandel, 2017).The government of Nepal emphasis integrating technology in teaching mathematics (MOE, 2016). In the practice law or on the encouragement of students to explore mathematical ideas and concept that they are aspect. Still, mathematics teachers in Nepal were not using the software in the mathematics classroom (Kandel, 2017). This can be taken as main problem and researcher decided to study under this point. Very few schools are in the access to technology in Nepal (Kandel, 2017). In fact, classrooms are dominated by traditional pedagogy, exam-oriented output and parrot learning approach. On the other hand, the use of technology in the mathematics classroom may or may not fruitful in teaching and learning.

GeoGebra might play vital role in filling up the gap by assisting the student to visualize and understanding the concept of linear equation. The important of mathematics education hasn't to make the student pass in the exam, the teacher need to focus in the process then product, which process could share by learner to the other new learner to gain new knowledge. Educators and non-educators believe that the use of GeoGebra as the part of curriculum is the superior then other pedagogies (Kulik,

1994). A study had done in Malaysia to evaluate the impact of GeoGebra in learning transformation by Bakar (2002) revealed that secondary school students and found better result using the software. The research had intended to determine to effect of GeoGebra assist instruction and traditional method. The experimental study determines the effect of GeoGebra in teaching Algebra at Grade VIII.

Statement of the problems as mentioned bellow:

- What is the effect of GeoGebra in teaching linear equation?
- What is the student's perception about the GeoGebra in teaching linear equations?

Significance of the Study

The significance of the research were given bellow

- Finding of this research would help mathematics teacher to improve their teaching strategies.
- To manage the ICT based classroom and apply the technology in the teaching pedagogy.
- Students might understand and visualize of the linear equation and solve the problems.
- As the curriculum designer could be helped to develop the technology base curriculum.

Objectives of the Study

The main objective of this study is investigate the effects of teaching linear equations with GeoGebra on eight grade students' achievement compared to the regular instruction. Further, the study also aimed at investigating if this learning method surpassed the traditional method and was to elicit student's perception in learning linear equations by using GeoGebra.

More precisely the objectives of this study were as follows:

- To compare the achievement of students taught by using GeoGebra and without using GeoGebra.
- To explore the students perception about GeoGebra in the teaching linear equation.

Research Hypothesis

The dynamic software GeoGebra Yield effective result in terms of the achievement of mathematics then the achievement of the students taught without using GeoGebra.

Statistical Hypotheses

For my research the following null and alternative hypotheses were made;

H₀: There is no significant difference between the achievement of students taught by using GeoGebra and conventional method.

H₁: There is significance difference between the achievement of students taught by using GeoGebra and conventional method.

Delimitation of the Study:

- This research is focused on the student of grade eight only.
- Only linear equation has been taught during the study.
- Only private school was selected.

Operational definition of the key terms

GeoGebra. It is computer software which is combination of dynamic geometry and computer algebra systems.

Traditional Instruction. Instruction in which course contents is delivered by lecture in a face-to-face classroom setting in which students listen passively and take notes.

Effect. Effect is the achievement of the learner which is obtained from the test.

Perception. Perception is concept of students of GeoGebra.

Experimental group. A group of students, which is explore and use of GeoGebra regularly, while teaching linear equation at class

Control group. A group of students who has given regular instruction in linear equation, without using GeoGebra.

Achievement. In this study, the term "Achievement" is defined in term of the scores obtained by the students on the achievement test prepared by the researcher.

Private school. Private School in which has not government grant for the salary of teacher and other purpose.

Chapter II

REVIEW OF RELATED LITERATURE

Literature Review

A literature review is a description of the relevant to a particular. It gives an overview of what has been said, who the key writers are, what the prevailing theories are and hypotheses, what question are being asked and what methodologies are appropriate and useful. As such, it is not in itself primary research, but rather it reports on other finding"(Cooper, 2002).

Review of Empirical literature

Dikkartin (2018) study on The Impact of Instructing Quadratic Functions with the Use of Geogebra Software on Students' Achievement and Level of Reaching Acquisitions. Objective of this study is to examine the impact of instructing quadratic functions with the use of GeoGebra software and guided discovery worksheets on students' achievement and level of reaching acquisitions. This study utilized a pre-test post-test control group experimental design on 2017-2018 academic year with 62 student of tenth grade of Balikesir, Turkey. The data were collected by using quadratic functions achievement test and data has been analyzed by using t-test. The findings of the study indicated that the instruction exercised with the use of GeoGebra software and guided discovery worksheets was effective in increasing achievement and the level of the capability to reach acquisitions compared to the control group; the findings also indicated that the instruction created a significant difference. Additionally, the students in the experimental group were better in building the relation between algebraic expression and graphics, and more successful in interpreting graphics.

Reezan (2013) conducted study on the effect of teaching linear equations with Dynamic Mathematics Software (GeoGebra) on seventh grade students' achievement compared to the regular instruction. Randomized post-test only control group design was utilized in the study. 60 seventh grade students (32 girls and 28 boys) of a public school in Yenimahalle district in Ankara participated in the study. The data were collected by three Mathematics Achievement Tests: Cartesian coordinate system achievement test linear relation achievement test and graph of linear equation achievement test. The data were analysed by using analysis of covariance (ANCOVA). The results revealed that teaching Cartesian coordinate system and linear relation by using Dynamic Mathematics Software had no significant effect on seventh grade students' achievement compared to the regular instruction. Furthermore, the results also indicated that teaching graph of linear equations by using Dynamic Mathematics Software had a significant effect on mathematics achievement in favour of experimental group.

Furkanb,Zengtina and Kutluca (2011) study on the effect of dynamic mathematics software GeoGebra on student's achievement in teaching of trigonometry. The purpose of this study was to determine the effects of GeoGebra on student achievement in teaching of trigonometry. The sample of the study consists of 51 students. The experimental group was subjected to the lessons arranged with the GeoGebra software in computer assisted teaching method, while the control group was subjected to the lessons shaped with constructivist instruction. After five weeks experiment researcher found significant result between experimental group and control group in favour of experimental group.

Herceg and Herceg (2010) conducted a study on numerical integration with geoGebra in high school with two groups of students. One group used applets only,

whilst the other used the GsoGebra software and applets. The study tested how to incorporate computer based learning to reduce the working process of numerical integration. The result of this study showed that the GeoGebra experimental group gained more knowledge and skill then the control. This study also suggested that use of GeoGebra is helpful for students who face difficulty in solving mathematical problems since they do not have to spend much time solving by hand.

Onur (2008) investigated the effects of graphic calculators on eighth grade students' achievement in graph of linear equations and the concept of slope. In quasi experimental research design was used in the study. The two groups (experimental and control group) containing 27/27 student were selected randomly. The researcher found significant effect on eight grade student's achievement in graph of linear equation and slop concept. Furthermore, researcher found positive attitude of the students towards the use of graphic calculator.

Theoretical Literature

The study based upon the constructivist theory of social interaction for cognitive development because the use of ICT in teaching learning means to construct new style and knowledge based on subject matter. It was directly linked with society because new trends in education and teaching learning process help to change society. Also for all the changing of means of teaching materials should be favour of the society. GeoGebra not only for linear equation but also for the mathematical concept which gave the opportunity for all students to construct new trend of learning. The main application would anchored on the zone of proximal development (ZPD) and scaffolding. Students have general challenges in understanding the mathematical concepts. Therefore, in this study the dynamic geometrical software GeoGebra was introduced as a scaffold to improve student understanding of linear equation. The

ZPD is described as the variance between mental age and the level one might attain in problem solving with guidance. Scaffolding refers to guidance provided for one to reach the ZPD. In this study GeoGebra software acts as the primary scaffold in assisting and guiding the students to reach their ZPD.

Social interaction between peers gave the students opportunities to help one another and reach the level of shared understanding. Here the higher capacity students play big role for helping the lower ability students to reach their zone of proximal development ZPD. The higher capacity students also benefit through the new ideas and views of their peers. Students were also placed in groups of two to work for constructing the diagrams. They had to work hand-in-hand assisting each other in constructing diagrams and making conjectures based on their findings.

Vygotsky's views are related to this learning environment where he emphasized that cultural environment and social interaction contribute to cognitive development (Kandel, 2017). However, this must take place within the zone of the individual's potential development. In this study, students were placed in groups where the scaffolding process can take place for them to construct linear line, coordinate and related figure based on what they already know and with help accepted from their peers when needed. In this environment the teacher play role as a facilitator. This manner of learning improved critical thinking skills as students contribute ideas and views to reach a common understanding. However, this process had to be closely monitored to ensure a balance in terms of input from both group members. Here the higher ability students played a big role in helping the lower ability students to reach their ZPD. The higher ability students also benefit through the insights gained from their peers. GeoGebra gave the students golden opportunity

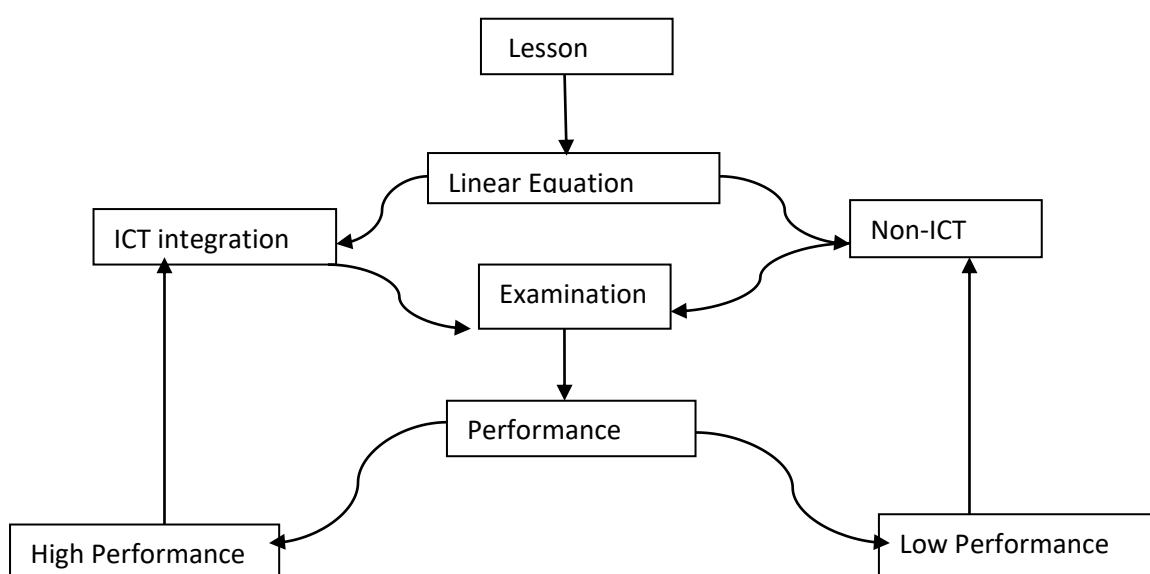
for peer interaction to understanding and visualization of the concept of linear equation.

Conceptual Framework

This section deals about the conceptual framework for the research. The conceptual framework has established on the basis of research topic possible areas to fulfil the objectives of the theoretical framework for the study. Learning is process that occurs through social interaction, and students generated new knowledge by building on to what the already know (Burner, 1973).

According to Wang and Woo (2007), ICT integration can happen in three areas; namely, curriculum/macro, topic/ meso and lesson/micro. At macro-level, ICT is exploited to support the complete content and learning experience of a whole course in a specific discipline whereas at meso-level, it is used in certain topics to supplement student learning. At micro-level, ICT is applied onto one lesson to help learners better understand certain concepts and to help explain specific knowledge units within a topic. In this study, ICT integration is at lesson level.

The effect on achievement of GeoGebra on teaching linear equation.



Traditional Transmission Instruction is based on learning theory which suggests that student would learn facts, concepts and understanding by absorbing the content of teacher's explanations. Skills are mastered through guided and repetitive practice in sequence, systematic and highly prescribed fashion. Constructionist-Compatible Instruction is based on the theory of learning which suggest that understanding arises only through prolonged engagement of the learner in relating new ideas and explanation to the learner's own prior beliefs. Capacity to employ skills only come from experience in working with concrete problems that provide experience in deciding how and when to call upon each of a diverse set of skills. Modern learning theories emphasizes that learners learn better if they are accorded autonomy in the classroom, time and facilities to construction knowledge for themselves and others. The current study is intended that through interactions with the computer, learners are able to construct knowledge involving trigonometric graphs by manipulations and discussions as many times as they wish.

Chapter III

METHODS AND PROCEDURES

In this chapter, research design, the sample size and sampling process, procedure and data analysis of the study are presented.

Design of the Study

The study is design to examine the effect of GeoGebra in the linear equation teaching at grade eight. The quantitative method would be used in this research. The purpose of this study was to investigate the effects of teaching cartesian coordinate system, linear relations and graph of linear equations with GeoGebra, on students' achievement. Since, according to Fraenkel and Wallen (2006), experimental research is the best way to establish cause and effect relationship, randomized pre-test has conduct to all student of grade eight then the student from the pre-test will formed a new group through random selection as a control group and post-test only control group design would use to discover the effect of the learning with dynamic mathematics software on success. The focus is on variable relationship, as define; deliberate manipulation is always a part of the experimental method. Experimental design as;

Table I: Design of the study

Groups	Pre-test	Treatments	Post-test
Experimental	Q1	GeoGebra assisted teaching	Q2
Control	Q3	Traditional teaching	Q4

Where,

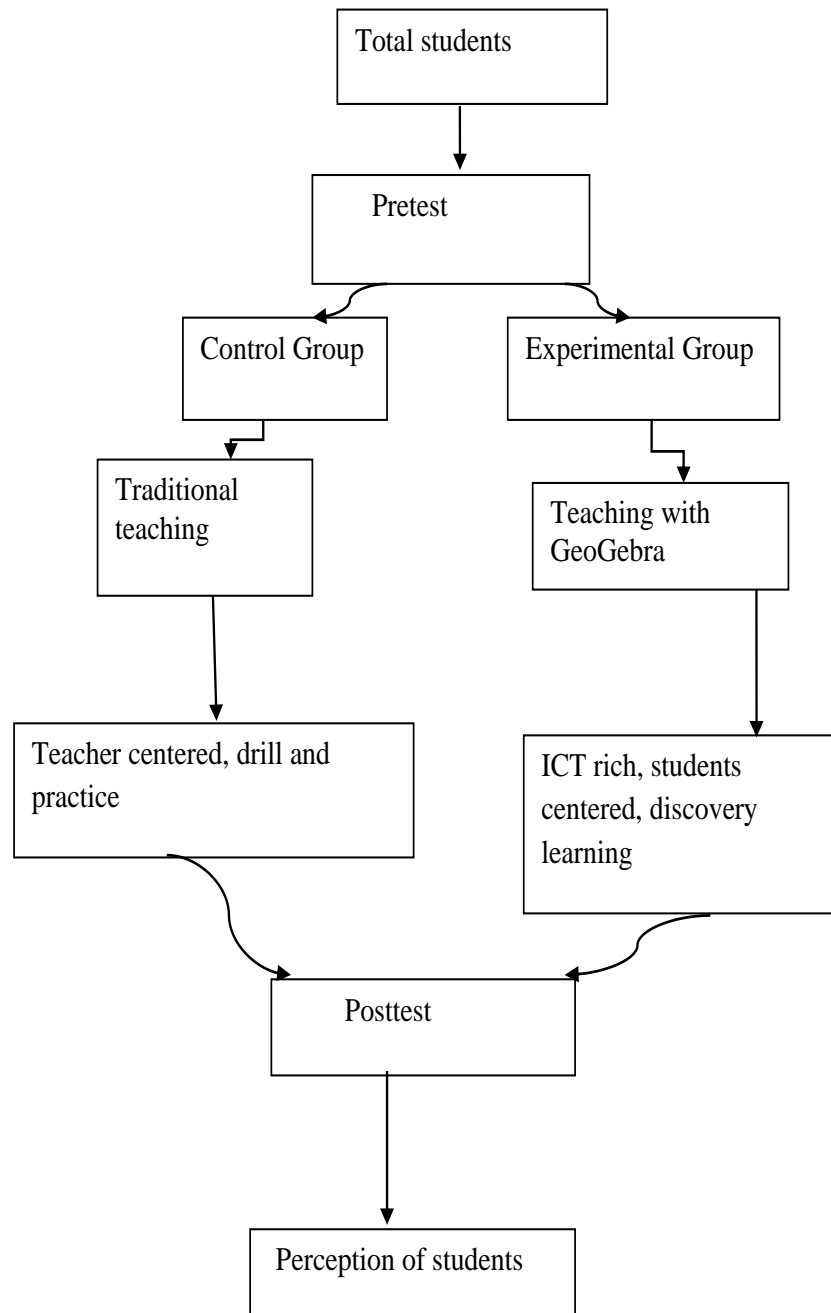
Q1=Pre-test given to experimental group

Q2=Post-test given to experimental group

Q3=Pre-test given to control group

Q4=Post-test given to control group

Map of Design of the study



Population and Sample

Heartland Academy has been selected by the convenience sampling and the school have well managed computer lab and other digital resources. All students of grade eight were chosen as sample. There were two section in grade eight. Among them one section was selected as experimental group and another as the control group by coin toss. A computer laboratory having 30 computers and projector were available in the school and school administrator agreed to time and class management for experiment.

Sampling process

The school was inside the Kathmandu district. Most of the students' parents' were civil servants in these public institutions. Therefore, socio-economic levels of students are similar. Because researcher has linked with the school so, it is very easy to know about the school management and parents condition also the student's psychology.

All students of eight grade of the school were assigned to the experimental and control groups equally. Then, one section students in the experimental group received an instruction by using GeoGebra in the computer laboratory and other section students in the control group attended to a regular instruction in a classroom setting during two weeks. After the treatment, mathematics achievement tests would be administered to both groups.

Independent and Dependent Variables

Variables are condition that the experimenter manipulates, controls, or observe. The independent variables are the condition or characteristics that the experimenter manipulates or controls in his or her attempt to ascertain their relationship to observed phenomena. The independent variables are the condition or

characteristics that appear, disappear, or change as the experimenter introduces, removes, or changes independent variables (Best and Kahn, 2006).

In this study dynamic software GeoGebra is independent variables but student's achievement in linear equation as well as students perceptions towards linear equation is dependent variables.

Data Collection Tools

The tool used by researcher as questionnaire to measure the student's perception towards GeoGebra was qualitative and subjective test to measure student's achievements from the experimental and control group. The major tools used on research were mathematics achievement test and questionnaire as five point Likert's scale. The piloting test has taken to ensure selected mathematics achievement items using split-half method and Spearman formula. The all data were analysed by using SPSS 20.0.

Achievement Test

Self-constructed tool "Achievement test" had been constructed as pre-test and post -test through questionnaire where pre test contained 10 multiple choice questions and post test contained 20 multiple choice questions. The question for pre-test and post-test were prepared by the help of subject experts.

Questionnaire

This questionnaire contains nine items using a likert scale of '1-Strongly agree, 2-Agree, 3- Neutral, 4- Disagree and 5-Strongly disagree' for positive questionnaire and '5-Strongly agree, 4-Agree, 3- Neutral, 2- Disagree and 1-Strongly disagree' for negative questionnaire. This study used to modify questions based on Shadaan and Leong (2013). This questionnaire contains statements which reflect the students'

perception towards the use of GeoGebra software in classroom teaching. The questionnaire was distributed to the experimental group students.

Data collection procedure

The data were collected by achievement test and attitude/ perception test. A 10 hours course which contained grade eight main GeoGebra activities and many other practices about the stated achievements has been planned in accordance with the school level mathematics curriculum. Then the activities were constructed with GeoGebra for the experiment group. The GeoGebra prepared activities aimed to make the subject more dynamic, concrete and visual. GeoGebra software was introduced in introductory hour of the course. In all of the other sessions, the GeoGebra prepared activities were shared with the students both with visual and dynamic features. Furthermore, examples and drawings on the textbooks were constructed with the GeoGebra during the sessions. In the official curriculum by CDC the total teaching hour of linear equation for grade eight takes total of 10 hours.

Data Analysis Procedure

After collecting data with the help of relevant tools and techniques; the next important steps, is analyze and interpret data with a view to arriving at empirical solution of problems (Singh, A.K, 2009). The data were analysed by using descriptive and inferential statistics as frequency, percentage, mean, SD and t-test. Achievement test scores were analyzed using inferential statistics as t-test. That t-test was used to calculate the significance difference of mean score between control and experimental groups at the beginning and at the end of study. This would done primarily by comparing the mean score of the pre-test and post score of both the groups. Descriptive statistics also used to analyse the data from the questionnaire to elicit student's perception towards dynamic software GeoGebra in linear equation of

experimental group only. For the students perception level was identified (high, medium, low) based on following equation:

$$\frac{\text{The scales highest value} - \text{the scales lowest value}}{\text{Number of level}} = \frac{5-1}{3} = 1.33, \text{ Level Scales value}$$

low is 1.33 to 2.33, medium 2.34 to 3.67 and 3.67 to 5.00 is high. (Eid. Alharbi, 2014)

External Validity

The accessible population of the study was the eighth grade students of a private school in Kathmandu district of Nepal. Since the school was chosen conveniently, the results presented in this study cannot be generalized to a larger population regarding external validity. However, the results can be applied to a larger population of samples which have similar characteristics with the sample of this study. The tests were administered in regular classroom settings during the regular lesson hours with around 20 students each. The conditions of the classrooms were quite similar, the sitting arrangements and the lighting were equal in two classrooms. Thus, the threats to the ecological validity were controlled.

Selection Bias

Selection bias which is likely to affect the internal validity results when the researcher makes a comparison between the non-equivalent experimental and control group. It is another treat to the experiment. But in this study, the equivalency of two groups at the beginning of this study was censured by the analysis of pre-test result.

Estimation of Reliability and Validity

Researcher conducted as the pilot test and find out the P-value and D-value of 24 items, when 4 items were rejected and 20 items were selected in the tool, which has constructed and apply in the research. In this study, to determine the internal consistency of the achievement test correlation coefficient had tested. To test the correlation coefficient split half method apply and the find the reliability of the

achievement test. The reliability of a test refers to the extent to which the test is likely to produce consistent scores. In my present study, after piloting test among 20 students, it was found that reliability coefficient of achievement test was 0.92 which show that the achievement test has more reliable (Kandel, 2017).

Chapter IV

ANALYSIS AND INTERPRETATION OF DATA

The most important part of the study is to analyse the collected data. The purpose of this study was to study the effects of using GeoGebra on eight grade students' achievement in linear equations. Linear equation topic includes three subtopics which are Cartesian coordinate system, linear relations and graph of linear equation in Nepal mathematics curriculum. This chapter deals the statistical analysis and interpretation of data from the achievement score of the sample students. These data has tabulated and analysed through mean standard deviation and analysed data and perception had analysed with the help of mean and standard deviation.

Table II: Result of pre-test

Group	Sample	Mean	S.D.	Variance	F- Value	Calculate T- value	Result
Experimental	20	6.95	2.089	4.36	0.56	-0.078	0.459
Control	20	7.0	1.946	3.789			

The above table shows us, there were 20/20 number of students in each of experimental and control group. In pre-test 10 marks of mathematics achievement test was administrated. The mean standard deviation and variance of experimental group were 6.95, 2.0894 and 4.365 respectively. Similarly the mean standard deviation and variance of control group were 7.0, 1.946 and 3.789 respectively. The calculate t-value -0.078 was less than the tabulate t- value 1.96at 0.05 level of significance with the degree of freedom 38 in one tail test. This indicates that the different between these two groups was not significance at 0.05 level of significance in the 38 degree of freedom. Therefore, The GeoGebra assist learning group and traditional learning

groups were at the same level of achievement .Both the group had nearly same ability in pre- test.

Table III: Result of post-test

Group	Mean	S.D.	Variance	F- Value	Calculate T- value	Result
Experimental	16.60	2.25	5.062	8.096	2.597	0.07
Control	13.80	4.29	18.40			

The above table shows us, there were 20-20 number of students in experimental and control group. In post-test 20 marks of mathematics achievement test was administrated. The mean standard deviation and variance of experimental group were 16.60, 2.25 and 5.062 respectively. Similarly the mean and standard deviation of control group were 13.80, 4.29 and 18.40 respectively. The calculate t-value is 2.597 had greater than the tabulated t value 1.96 at 0.05 level of significance with the degree of freedom 38 in one tail test. Thus the null hypothesis on the achievement of the students was rejected i.e. alternative hypothesis on the achievement of the students was accepted. Hence it is concluded that the average achievement of the students at experimental group is higher than the average achievement of the students at mathematics of control groups on post-test. Thus GeoGebra software is more powerful strategy to gain more achievement for students. It means that GeoGebra assist learning method is better than the traditional learning method in teaching linear equation at grade eight students.

Perception of Students towards the Use of GeoGebra Software

To determine student's perception towards the use of GeoGebra in linear equation and overall mathematics, basically a set of questionnaire based on Five point

Likert's scale consisting nine items standing on different dimensions. The set of questionnaire was distributed twenty students of experimental group and they were returned back after ten minutes by attempting their views towards GeoGebra software. There were altogether five options to mention student's views. They are Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree standing of GeoGebra in mathematics, GeoGebra in Linear equation,

Table IV: Students perception towards the use of GeoGebra in mathematics (n=20)
(SA- Strongly Agree, A-Agree, N-neutral, D- Disagree and SD- Strongly Disagree)

Items	SA	A	N	D	SD	Mean	S.D	Level
At the beginning , I did not like GeoGebra software	0	1	8	5	6	3.8	0.95	High
I liked GeoGebra software while learning linear equation	9	10	1	0	0	4.4	0.59	High
Geogebra helped me a lot to learn the mathematics concept	9	8	4	0	0	4.25	0.78	High
GeoGebra is essential and important for the teaching Mathematics	0	16	4	0	0	4.0	0.64	High
GeoGebra software helps easy to understand Mathematical problems	1	18	1	0	0	4.0	0.32	High
I felt confident to solve the problems using the GeoGebra.	6	8	5	1	0	4.0	0.85	High
GeoGebra software helps to make me more creative	5	12	3	0	0	4.1	0.64	High
I enjoyed learning mathematics much more using GeoGebra.	4	15	1	0	0	4.05	0.82	High
GeoGebra helps to visualize mathematical content	2	15	3	0	0	4.0	0.45	High

Table IV showed that the level of perception in each items found to be high.

The highest mean 4.40 was the item "I liked the GeoGebra software while learning

linear equation" and its standard deviation 0.59 while the lowest mean is 3.8 which is obtained from the item " At the beginning, I did not like GeoGebra software". Its standard deviation was 0.95. Other items mean were near about the highest mean. According to Denbel(2015) study and Shadaan and Leong(2013), a mean score of 3.0 or higher indicate a positive feedback or view about GeoGebra and mean score lower than 3.0 indicate and negative feedback or view about GeoGebra in learning linear equation. The result from the overall mean 4.06 shows the students generally gave positive feedback or view about the GeoGebra software in learning linear equation at grade VIII. Hence, from the above data and my observation in the experimental class that, about subject matter on mathematics, students were sitting mostly their discipline and they tried to gain more information about specific subject matter. In class time students were little bit discussed about previous topic. After solved their problem every student had concerned their mind to the subject matter. Every day I started new topic so all student focused their concern towards GeoGebra program. Students had very excited while the problem connected on their real life.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSION AND IMPLICATIONS

Summary of the Results

This study was concerned to the effectiveness of GeoGebra on teaching linear equation at the grade eight. This study was intended to find the answer of the question whether the use of GeoGebra affects the achievement of students in teaching linear equation at grade eight.

The theory constructivism was used on this research based on quasi-experimental study with non-equivalent pre-test and post-test design between the experimental group and the control group. In conceptual framework, GeoGebra software was very important standing on content, information, action and demonstration to the students. The experimental group and the control group were treated. The descriptive statistics including mean, standard deviation, and t-test in Table II, and Table III. According to the analysis of the test results, the experimental group students' pre-test mean score on mathematics achievement test was 6.95 and standard deviation was 2.0894 while the post-test mean score was 16.60 and standard deviation was 2.25 on the other hand, the control group students' pre-test mean score on the same achievement test was 7 and standard deviation was 1.946 while the post-test mean score was 13.80 and standard deviation was 4.29. There was no statistically significant mean difference between the two groups' pre-test scores on Mathematics Achievement Test. However, there was a statistically significant mean difference between the two groups' post-tests scores on Mathematics Achievement Test in favour of the experimental group.

In this study, the teaching and learning of linear equation using GeoGebra has been effective. This was shown through the improved scored of the students in the

experimental group. The result highlight that students in the experimental group performed better using GeoGebra in the control group that uses the traditional learning method. In addition, students in the experimental group better in the post - test compared to the control group. The student's perception about the GeoGebra was also the positive, where around ten different questions were included among them most of the students give the positive attitude.

Finding and Discussion

The main objective of the research had found the effectiveness of the GeoGebra in teaching linear equation at grade eight. During the treatment, students in both groups transformed representation of a linear equation from symbolic to tabular and then tabular to graphical and Cartesian coordinate system. Moreover they examined symbolic representation of linear equations of which graphs were passing through origin or intercepting the axes and Cartesian coordinate. The results of Mathematics achievement test revealed that there was a statistically significant difference between the groups in terms of their achievement in drawing graph of linear equation in favour of dynamic mathematics software-based instruction same result found by reviewing the different literature Dikkartin (2018), in teaching quadratic function, Reezan (2013) teaching linear equation, Furkanb, Zengtina and Kuttulca (2011) in teaching trigonometry and Herceg and Herceg (2010) in teaching numerical integration. The possible reason of this result is that experimental group students had a chance to examine three representations, namely tabular, algebraic and graphical, on the same screen as GeoGebra provided opportunity to examine the relationship between representations at a glance. The overall findings are listed below.

- In pre-test, there was no significant difference between the student's achievement in mathematics among the experimental group and the control group.
- There was higher achievement of the experimental group than the control group in post-test. Use of GeoGebra became effective than traditional method for linear equation.
- The perception of student towards use of GeoGebra in teaching linear equation was positive

Conclusion

The results of the study indicated that there was a significant difference between the means of mathematics achievement scores on the post-test in favour of the experimental group. The findings showed that computer assisted instruction as a supplement to traditional classroom instruction is more effective than traditional instruction alone. It clearly demonstrates the instructional effectiveness of GeoGebra as compared to the traditional construction tools. This study gives an alternative to the teachers to utilize the mathematics software as a tool in their instructional activities. In the study, the GeoGebra software has proven to be an effective tool in enhancing mathematics teacher and learner in the basic level. Students were motivated and taking positive to learn the linear equation through the GeoGebra. Conclusively, this study has shown that GeoGebra software has a positive impact on student's achievement in the topic linear equation. The students also have positive perception on GeoGebra software. This software should be introduced to mathematics educators so that students can explore the world mathematics in a wider and make the students able to think critically and creatively.

Implications of the Study

The results of this study showed that using GeoGebra in linear equations had positive effects on students' achievement. In different representations of a linear equation is an important dimension of conceptual understanding. In this study, GeoGebra gave good opportunities to realize that a linear equation can be represented in different ways. In other students were able to examine different representations of equations and transition between them through GeoGebra. Therefore, teachers should use this software while they instruct graph of linear equations in their lessons. In addition, curriculum developers and textbook writers should incorporate such kind of activities which are based on dynamic mathematics software into the curriculum and textbooks for graph of linear equations. Furthermore, dynamic mathematics software should be used for different mathematics subjects which require examination of multiple representations such as slope, inequality.

Recommendations for Further Research

This study was focused on linear equation topic on eight grade, so the further research can be conducted at different grade level and different algebra topic. This research was limited with two weeks. Further research should be conducted to investigate long term effects of GeoGebra usage on students' achievement in all algebra content other mathematical contain.

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Appendices

Appendix-A

Pre-test questions

Grade: 8

F.M. - 10

Name:

Tick (✓) the best alternatives

10×1=10

QN1: what is linear equation?

- a) An **equation** that makes a **straight line** when it is graphed.
- b) An **equation** of the first degree in any number of variables.
- c) Both a and b
- d) None of the above

QN2: Which is the coordinate of the point A?

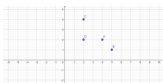


- a) (2, 4)
- b) (4,4)
- c) (3,2)
- d) (-4,2)

QN3: which of the given linear equation passes through origin?

- a) $y=2x+1$
- b) $y=2x$
- c) $y=2x-1$
- d) $y=3x+5$

QN4: Which point represent coordinate (4,2) ?



- a. (A) b. (B) c.(C) d.(D)

QN5: Which is not a linear equation?

- a) $2x+y=3$ b) $y= x^2$ c) $x+3 y +12 = 0$ d) $x + 3y= 2$

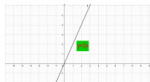
QN6: If $y = x + 2$ which coordinate of A (0,2) point is true in equation 'y' ?

- a) 0 b) 2 c) -2 d) 1

QN7: Solve $2x+y=4$ and $x-2y=5$ for the coordinate of (x,y)?

- a. (3,-1) b. (3, 1) c. (1, 3) d. (-1, 3)

QN8: which table is true while plotting the given coordiantes in graph?



x	Y
0	1
1	3
2	5

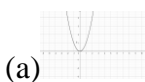
X	y
0	1
1	2
2	3

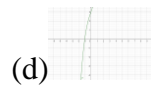
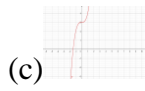
x	y
0	0
1	2
2	4

x	y
0	2
1	4
2	6

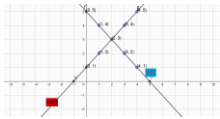
- (a) (b) (c) (d)

QN9: Which of the following graphs represents a linear relationship?





QN 10: Which is the common solution of the equations $x+y= 5$ and $x-y=1$?



a) (3,2)

b) (2,3)

c) (1,4)

d) (3,4)

Thank you

Apendix-B

Post-test question

F.M: 20

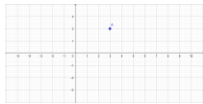
Grade: 8

Tikack (✓) the best answer..... $20 \times 1 = 20$

QN1: Which solution set of the equation $3x + 1 = 10$ is the following?

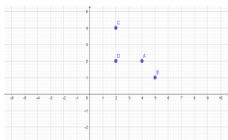
- a) -7 b) 7 c) 3 d) 20

ON2: Which is the coordinate of the point A?



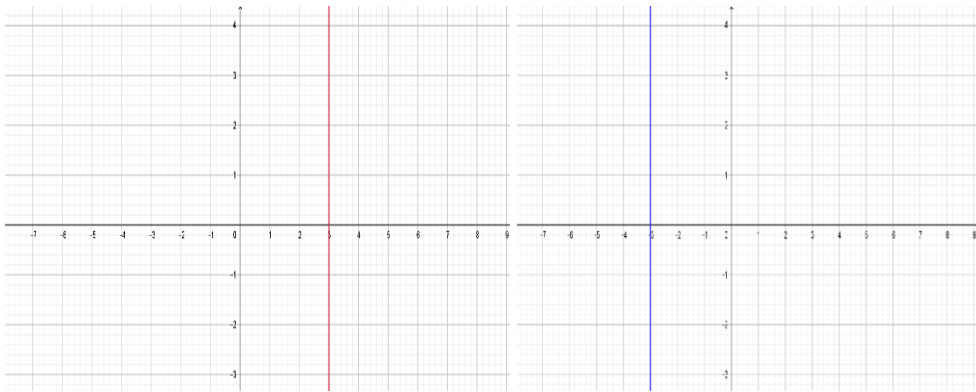
- a) (2, 4) b) (4,4) c) (3,2) d) (-4,2)

QN3: Which point represent coordinate (2,4) ?

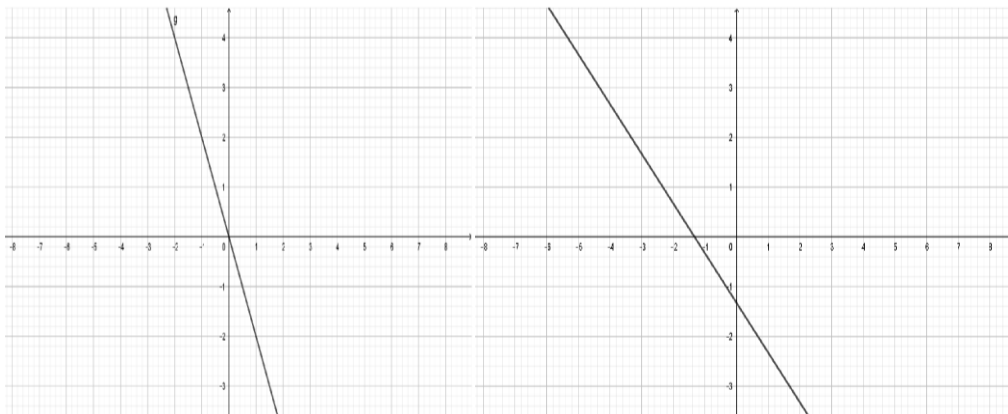


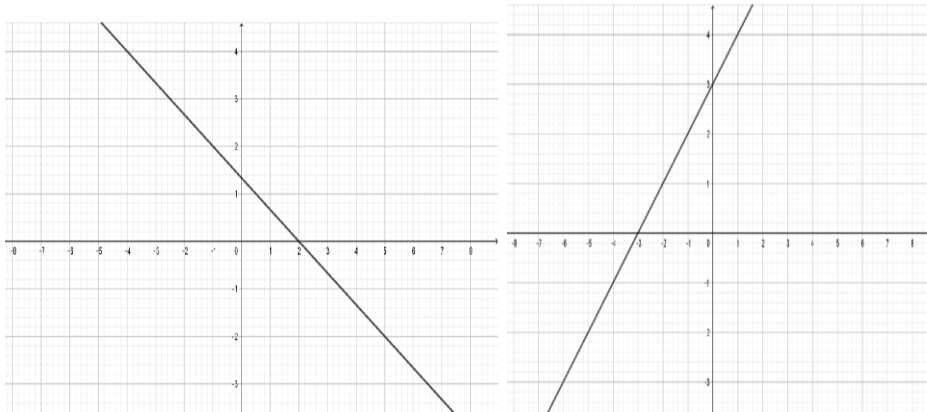
- (a)A (b)B (c)C (d)D

QN4: Which is true for $x-3=0$

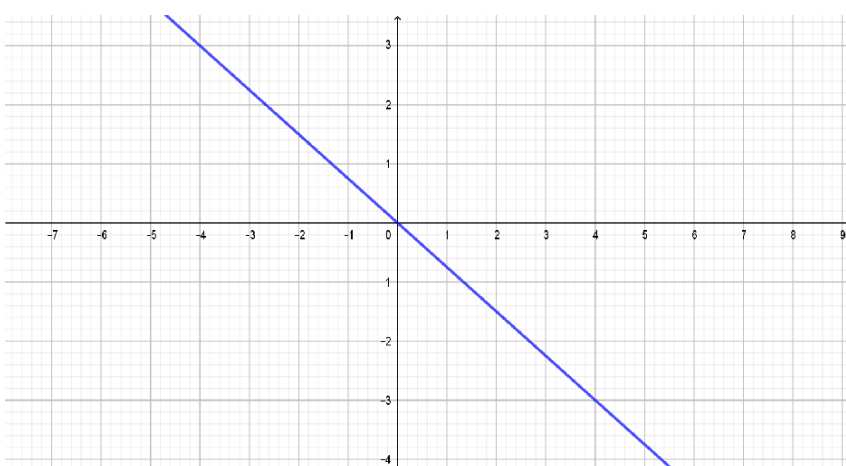


QN5: Plot the line $3x + y = 4$.





QN6: Which equation is true for given graph?

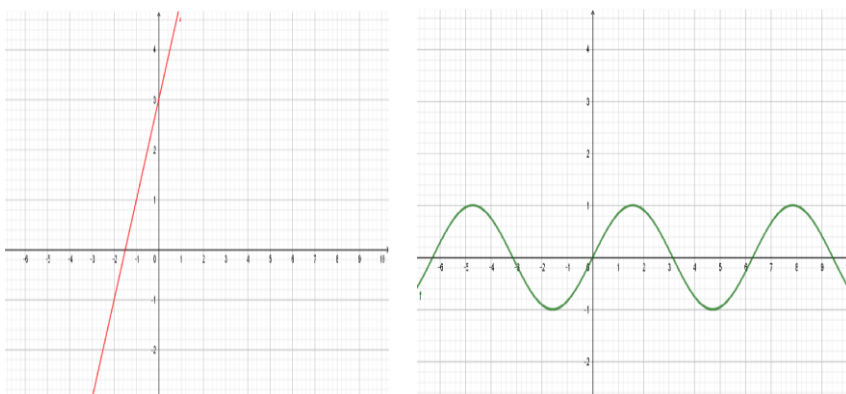


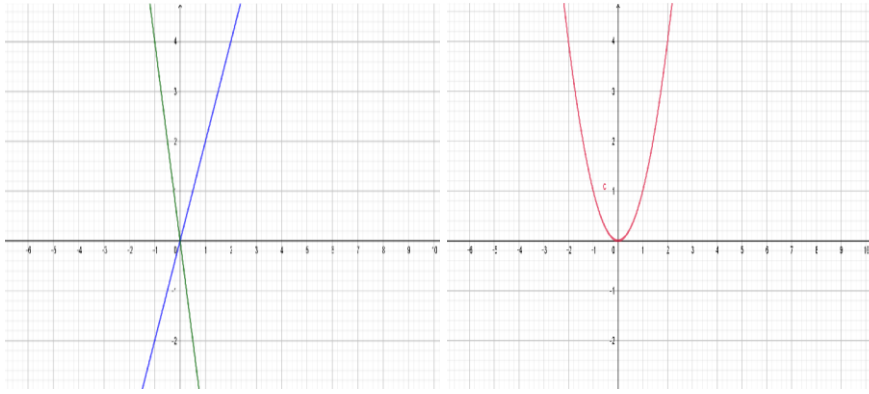
- a) $2x+2y=0$ b) $2x+3y=0$ c) $y=2x$ d) $3x+4y=0$

QN7: which of the given linear equation passes through origin?

- a) $y=2x+1$ b) $y=2x$ c) $y=2$ d) $y=3x+5$

QN8: which graph represent the linear equation passes through origin?





QN9: If $y = x + 2$ What is the ordinate of A (0,?) point that is above the Y-axis?

- a) 0 b) 2 c) -2 d) 1

QN10: Solve $2x - y = 4$ and $x - y = 3$, graphically.

- a. (2,-1) b. (2, 1) c. (1, -2) d. (-1, 2)

QN11: Which of the following linear equations is given, explains the relationship between x and y values in the table?

X	1	2	3	4
Y	4	7	0	3

- a) $y = 3x + 1$ b) $y = x + 7$ c) $y = 3x - 2$ d) $y = 2x + 4$

QN12: $4x - 3y + 12 = 0$ In fact, line cuts the x-axis at point B and y-axis at A.

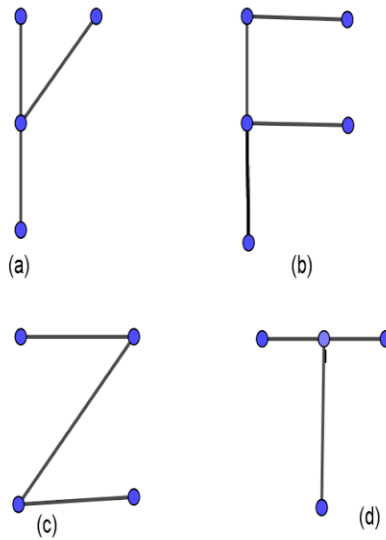
According to this, what are the coordinates of point A and B?

- a A(-3,0) ,B (0, 4)
 b A(4,0), B(0,-3)
 c A(4,-3), B(-3,4)
 d A(0,-4), B(3,0)

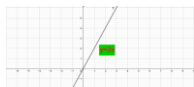
QN13: Which letter occurs in the coordinate plane when the following steps are followed?

Step 1: Draw the correct part with end points A (2, 1) and B (2, -1).

Step 2: Combine point C (3, 2) with point A. Step 3: Combine D (1, 2) with point A.



QN14: : which table is true while plotting the given coordinates in graph?



(a)

(b)

(c)

(d)

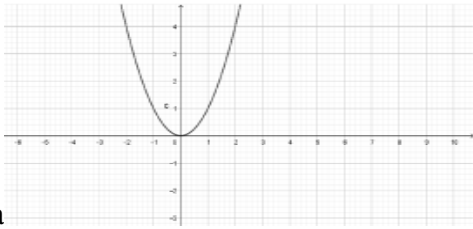
x	y
0	1
1	3
2	5

x	y
0	1
1	2
2	3

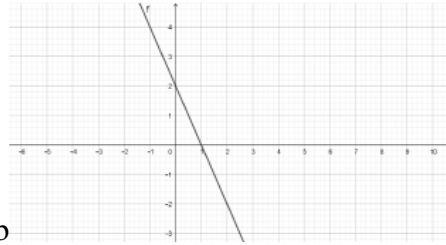
x	y
0	0
1	2
2	4

x	y
0	2
1	4
2	6

QN15: Which of the following graphs represents a linear relationship?



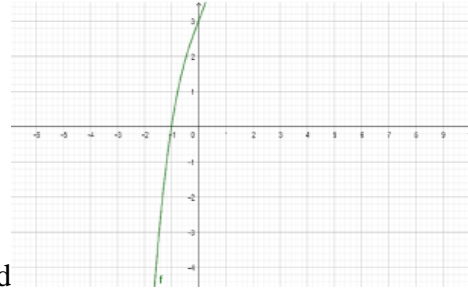
a



b



c



d

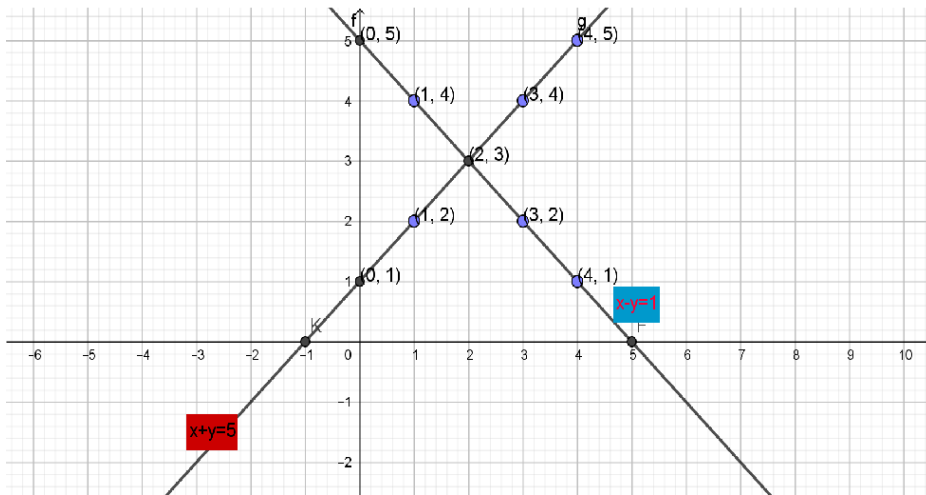
(a)

(b)

(c)

(d)

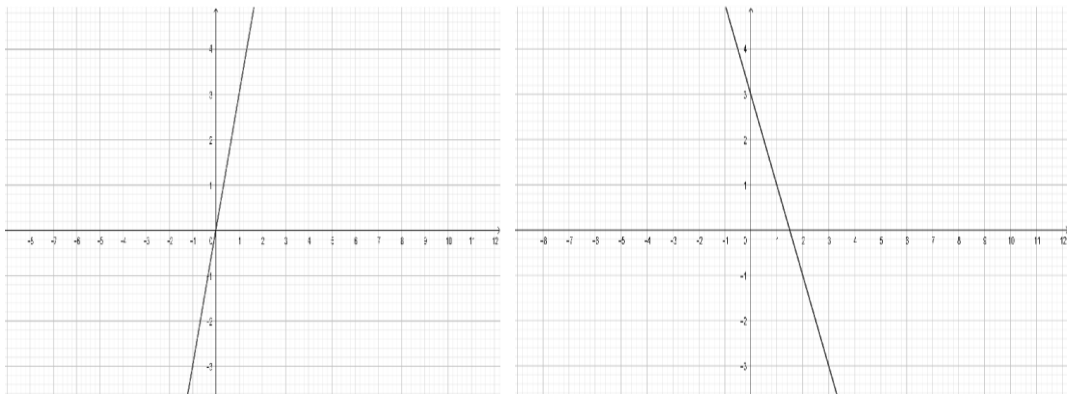
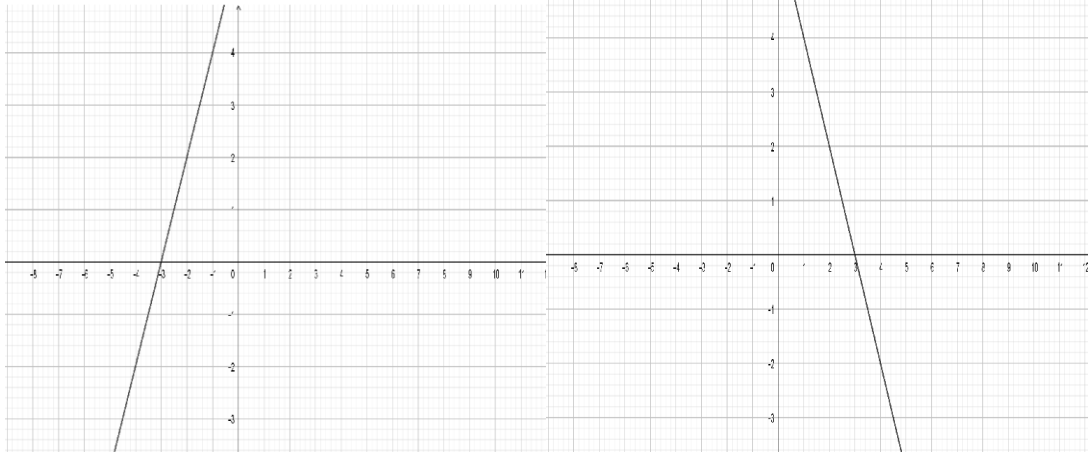
QN16 : Which is the common solution of the equations $x+y= 5$ and $x-y=1$?



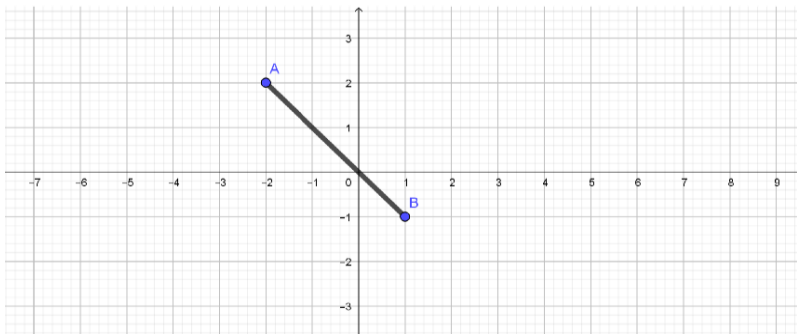
a)(3,2) b) (2,3) c) (1,4) d) (3,4)

QN17: The equation expressed in the table below chart is one of the following options?

X	0	1	2	3	4
Y	6	4	2	0	2



QN18: It is marked as two of the corner points of a right triangle to be drawn in the Coordinate plane. Which of The third corners of this right triangle can be the following coordinates?

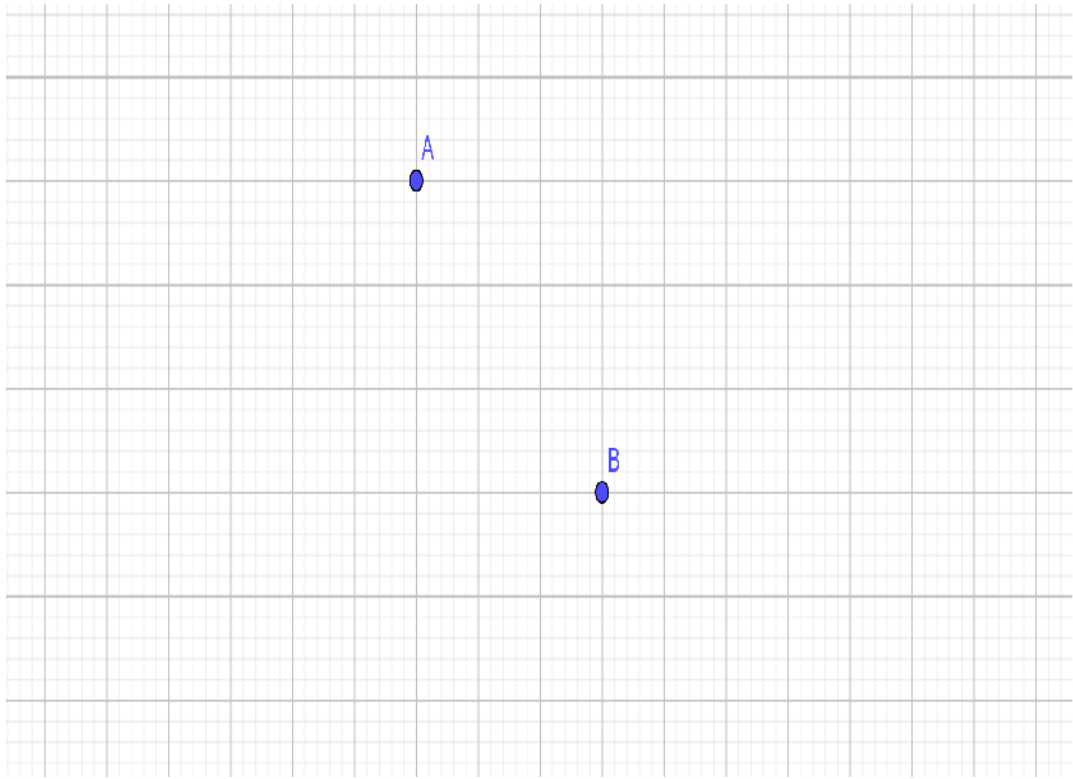


- a) (-1, 1) b) (-1, -2) c) (1, 1) d) (1, 2)

QN19: If the sum of two numbers is 15 and their difference is 3, then which numbers represent the solution?

- a) (9,6) b) (10,5) c) (8,7) d) (11,4)

QN20: If the coordinates of point A are (-1,2), what are the coordinates of point B?



- a) (3,-1) b) (2,-1) c) (6,-4) d) (-1, 3)

Thankyou

Appendix-C

Tool for the perception of student towards Geogebra.

Name: - Class: 8 School: - Subject:- Mathematics

Roll No.:-

S.N.	Items	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	At the beginning, I didn't like GeoGebra software					
2	I liked GeoGebra software while learning Linear equation					
3	GeoGebra helped me a lot to learn the Mathematics concept					
4	GeoGebra is essential and important for the teaching Mathematics					
5	GeoGebra software helps easy to understand Mathematical problems					
6	I felt confident to solve the problems using the GeoGebra.					
7	GeoGebra software helps to make me more creative					
8	I enjoyed learning mathematics much more using GeoGebra.					
9	GeoGebra helps to visualize mathematical content.					

Appendix -D

Results of Pre- test and Post-test

	<i>Experimental</i>		<i>Control</i>	
RO NO	Pre test	Post test	Pre test	Post test
1	9	19	7	15
2	6	14	9	11
3	5	15	5	14
4	8	17	9	20
5	9	18	7	9
6	9	18	8	17
7	5	12	7	13
8	8	20	9	19
9	4	17	9	20
10	5	16	8	16
11	8	16	3	10
12	3	13	4	6
13	8	17	7	18
14	9	20	7	12
15	3	14	5	7
16	7	16	4	8
17	7	18	10	18
18	9	19	6	16
19	8	15	8	13
20	9	18	8	14

Appendix-E

Teaching Episode 1

Time: 40 min

1. Specific Objectives:

At the end of the class student will be able to:

- a) Define Cartesian coordinates of points.
- b) Plot the coordinate on the graph.

2. Instructional Materials:

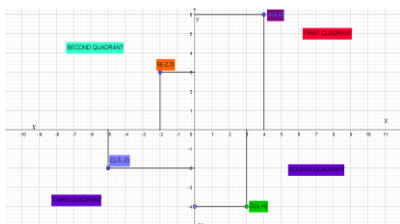
GeoGebra program, PowerPoint slides, Projector and Laptop

3. Teaching Learning Activities:

Activity: 1

At first, I will introduce the topic coordinates of points by PowerPoint slides with the concept of coordinate.

- a) Draw a perpendicular line from axis. It will meet at 4 as in the adjoining figure
- b) Draw a perpendicular line from A and y-axis. It will meet at 6 as in the adjoining figure.



So, the coordinate of the point A is the value of Y by a comma (,) with a small bracket which is known as ordered pair. Point B of ordered pair (-2, 3) lie on te second quadrant which lie on second quadrant on 2 units left and 3 units up. Similarly C (-5,-2) lie on the third quadrant and D (3,-4) on the fourth quadrant. Remember in a ordered pair of two number 1st shows on horizontal axis and 2nd one on vertical axis.

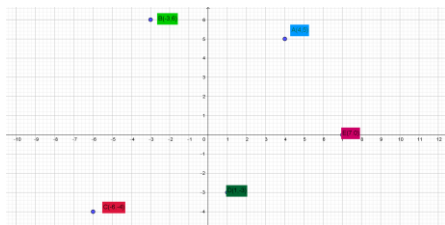
Activity 2

At the beginning last phase, I will connect students focus in plot the coordinate on the graph.

Q. N. plot the following coordinate on the graph.

A(4,5) , B(-3,6), C(-6,-4), D(1,-3) and E (7,0)

Soln



4. Evaluation I will ask question randomly to the students related to subject matter.

5. Assignment: Plot the coordinate on the graph

A(5,5), B(0,5), C(4,-4) and D(-7,-2)

Teaching Episode -2

Time : 40 min

1. Specific Objectives:

2. At the end of this class students will be able to:

Find the coordinates of points .

2. Instructional Materials:

GeoGebra Program, Projector and Laptop.

3. Teaching Learning Activities:

Activity: 1

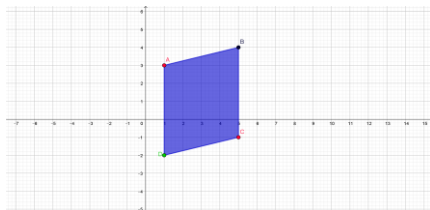
I will review previous concept and ask few questions to the few students randomly.

The problems will solve occur to the students again.

Activity: 2

Then, I will show the question and explain the calculation idea to find solution. Also, give the concept. Here, I will show one solution.

QN: Find the coordinate of points from the given graph.

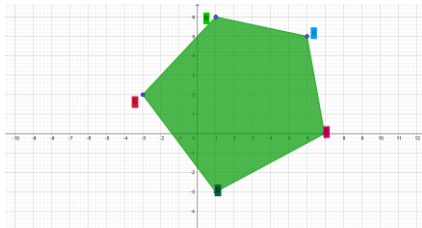


Solution

A= (1,3) B=(5,4) C=(5,-1) D=(1,-2)

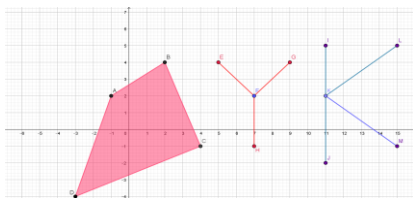
Activity3

Asking students to find the coordinate of points from the given graph.



4. Evaluation: I will ask 1 question randomly to the students related to subject matter.

5. Assignment: Find the coordinate of points A,B,C,D,E,F,G,H,I,J,K,L and M from the given graph.



Teaching Episode -3

Time : 40 min

1. Specific

At the end of this class students will be able to:

a) Find the shape of the figure when join the coordinate.

2. Instructional Materials:

GeoGebra Program, Projector and Laptop.

3. Teaching Learning Activities:

Activity: 1

I will review previous concept and ask few questions to the few students randomly.

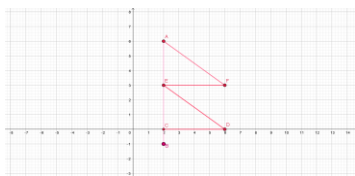
The problems will solve occur to the students again.

Activity: 2

Then, I will show the question and explain the calculation idea to find solution. Also, give the concept. Here, I will show one solution.

Q.N. Plot the following points on the graph paper, then join them in order. What type figure did you draw?

A(2,6), B(2,-1), C(2,0), D(6,0), E(2,3), and F(6,3)



It is shape of national flag of Nepal

Activity: 3

Asking students to solve the given problems;

QN: Which letter occurs in the coordinate plane when the following steps are followed?

Step 1: Draw the correct part with end points A (2, 1) and B (2, -1).

Step 2: Combine point C (3, 2) with point A.

Step 3: Combine D (1, 2) with point A.

4. Evaluation: Plot the following points on the graph, and then join them in order.

What type figure did you draw?

A (2,2), B(2,5), and C(6,3)

5. Assignment: Plot the given points in the graph and join them. What type of figure do you get?

1. A(-3,-2), B(5,-2), C(5,4) and D(-3,2)

2. W(1,3), X(5,4), Y(5,-1)and Z(1,-2)

Teaching Episode -4

Time: 40 min

1. Specific Objectives:

At the end of the class the students will be able to:

- a) Define linear equation with examples.
- b) Plot the equation on graph.

2. Instructional Materials:

GeoGebra Program, Projector and Laptop

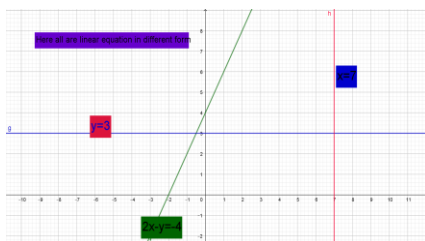
3. Teaching Learning Activities:

Activity: 1

At first, I will check the homework which had been given previous day and make more clear concept of students' difficulties.

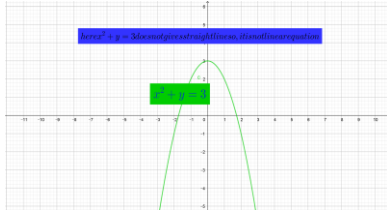
Activity: 2

Then, without doing any late I will define linear equation and show the figure to make clear understanding of Linear equation.



Activity: 3

I will give example and concepts of linear equation to students for clear understanding as.



4. Evaluation:

1. What is the linear equation?
2. Write different examples of linear equations and non-linear equation.
3. Plot the following equation on the graph
 - a) $x+2y=3$
 - b) $y=2x$
 - c) $x=3$
 - d) $y+5=0$

5. Assignment: plot the equation on the graph.

- 1) $2x+4y=4$
- 2) $2.5x+3.5y=6$
- 3) $x=3y+1$

Teaching Episode -5

Time : 40 min

1. Specific Objectives:

At the end of the class the students will be able to:

- a) Define different form of linear equation with examples.
- b) Plot the equation on graph.

2. Instructional Materials:

GeoGebra Program, Projector and Laptop

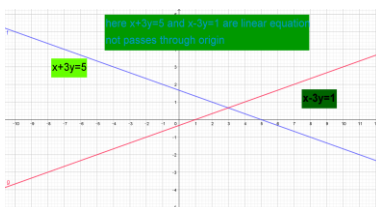
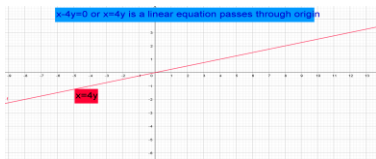
3. Teaching Learning Activities:

Activity: 1

At first, I will check the homework which had been given previous day and make more clear concept of students' difficulties.

Activity: 2

Then, without doing any late I will define different form of linear equation and show the figure to make clear understanding of Linear equation.



4. Evaluation: I will ask 1 question randomly to the students related to subject matter.

5. Assignment: plot the following equation in graph and describe which of these passes through origin or not?

- a) $5x-y=10$ b) $4x-y=0$ c) $x=4$ $y=-3$ d) $3x=4y+1$

Teaching Episode – 6

Time : 40 min

1. Specific Objectives:

At the end of the class the students will be able to:

Find the unknown value of one variable equations

2. Instructional Materials:

GeoGebra program, Projector and Laptop

3. Teaching Learning Activities:

Activity: 1

I will review previous concept and ask few questions to the few students randomly.

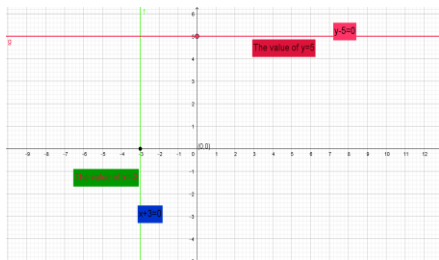
The problems will solve occur to the students again.

Activity: 2

Then, I will show the question and explain the calculation idea to find solution. Also, give the concept. Here, I will show one solution.

Q.N. Find the value of Y and Yby using GeoGebra

a) $X+3=0$, b) $Y-5=0$



4. Evaluation: I will ask 1 question randomly to the students related to subject matter.

5. Assignment: Exercise 12.2, Q. No. 2'b', 'd' and 4 'a' and 'c'

Teaching Episode -7

Time : 40 min

1. Specific Objectives:

At the end of the class the students will be able to:

Find the unknown value of linear equations with two variables.

2. Instructional Materials:

GeoGebra program, Projector and Laptop

3. Teaching Learning Activities:

Activity: 1

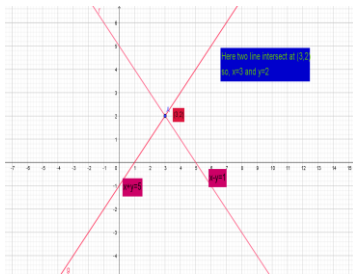
I will review previous concept and ask few questions to the few students randomly. The problems will solve occur to the students again.

Activity: 2

Then, I will show the question and explain the calculation idea to find solution. Also, give the concept. Here, I will show one solution.

Q.N. Find the value of x and y by using graph

$$x+y= 5 \text{ and } x-y=1$$



4. Evaluation: I will ask 1 question randomly to the students related to subject matter as

QN. Find the value of x and y by using graph

- a) $2x - y = 4$ and $x - y = 3$ b) $2x - 3y = 1$ and $x + 2y = 18$

5. Assignment: Exercise 12.4, Q. No. 1'b', and 'c'

Teaching Episode -8

Time : 40 min

1. Specific Objectives:

At the end of the class the students will be able to:

- a) Find the linear relationship with coordinate.

2. Instructional Materials:

GeoGebra program, Projector and Laptop

3. Teaching Learning Activities:

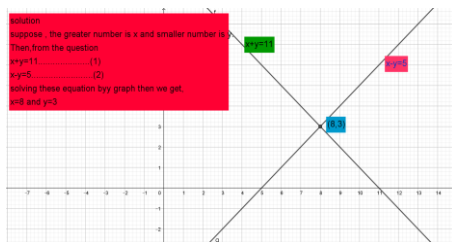
Activity: 1

I will review previous concept and ask few questions to the few students randomly. The problems will solve occur to the students again.

Activity: 2

Then, I will show the question and explain the calculation idea to find solution. Also, give the concept. Here, I will show one solution.

Q.N. The sum of two numbers is 11 and difference is 5, find the numbers.



4. Evaluation: I will ask 1 question randomly to the students related to subject matter as

QN. The difference of the ages of a father and his son is 25 years. If five years go , he was six times of his son's age, find their present ages.

5. Assignment: Exercise 12.5, Q. No (A) and (B)

Teaching Episode -9

Time : 40 min

1. Specific Objectives:

At the end of this class students will be able to:

- a) Find the coordinates of points .

2. Instructional Materials:

GeoGebra Program, Projector and Laptop.

3. Teaching Learning Activities:

Activity: 1

I will review previous concept and ask few questions to the few students randomly.

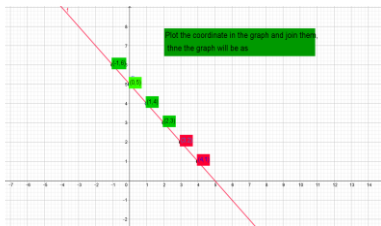
The problems will solve occur to the students again.

Activity: 2

Then, I will show the question and explain the calculation idea to find solution. Also, give the concept. Here, I will show one solution.

ON. Plot the given coordinate in the graph and find the linear relationship of them.

x	-1	0	1	2	3	4
y	6	5	4	3	2	1



Activity3

Asking students to solve the following

QN. Plot the given coordinate in the graph and find the linear relationship of them

X	0	1	2	3	4
Y	6	4	2	0	2

4. Evaluation: I will ask 1 question randomly to the students related to subject matter.

5. Assignment: Exercise 12.6, Q. No (A) and (B)

Teaching Episode -10

Time : 40 min

1. Specific Objectives:

At the end of this class students will be able to:

a) Find the coordinates of points from equation .

2. Instructional Materials: GeoGebra Program, Projector and Laptop.

3. Teaching Learning Activities:

Activity: 1

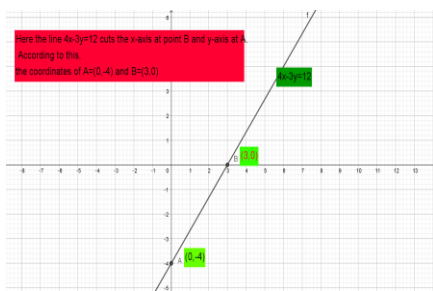
I will review previous concept and ask few questions to the few students randomly. The problems will solve occur to the students again.

Activity: 2

Then, I will show the question and explain the calculation idea to find solution. Also, give the concept. Here, I will show one solution

QN : $4x-3y + 12 = 0$ In fact, line cuts the x-axis at point B and y-axis at point A.

According to This, what are the coordinates of point A and B?



Activity 3

Asking students to solve the following

$6x-3y = -12$ In fact, line cuts the x-axis at point P and y-axis at point Q. According to

This, what are the coordinates of point P and Q?

4. Evaluation: I will ask 1 question randomly to the students related to subject matter.

5. Assignment: $2x-y = -4$ In fact, line cuts the x-axis at point P and y-axis at point Q.

According to This, what are the coordinates of point P and Q?