

**IMPACT OF INSTRUCTIONAL MATERIALS ON MATHEMATICS  
ACHIEVEMENT IN MENSURATION**

**A  
THESIS  
BY  
GHURAN DAS**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF MASTER OF EDUCATION**

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TO  
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TRIBHUVAN UNIVERSITY  
KIRTIPUR, KATHMANDU**

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त्रिभुवन विश्वविद्यालय  
शिक्षा शास्त्र केन्द्रीय विभाग  
**गणित शिक्षा विभाग**

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**CERTIFICATE**

This is certify that **Mr. Ghuran Das** a student of academic year 2062/63 with Campus Roll Number: 483, Thesis Number 1186, Exam Roll Number: 280718 and T.U. Registration Number 5643-95 has completed this thesis for the period prescribed by the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. This thesis entitled “**Impact of Instructional Materials on Mathematics Achievement in Mensuration**” has been prepared based on the results of his investigation. I hereby recommend and forward that his thesis be submitted for the evaluation as the partial requirement to award the degree of Master of Education.

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A  
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By  
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Entitled

**Impact of Instructional Materials on Mathematics Achievement in  
Mensuration**

Has been approved in partial fulfillment of the requirements for the  
Degree of Master of Education

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Date:

Ghuran Das

## **ABSTRACT**

The objectives of this study entitled "Impact of Instructional Materials on Mathematics Achievement in Mensuration" were to compare the achievement of students teach with without use of instructional materials and to find the Impact of Instructional materials on teaching mensuration.

The design of this study was pre-test, post-test non-equivalent model. It is quantitative experimental research. In order to fulfill the objectives, the researcher selected two schools in Thaha municipality of Makwanpur district. From each school 22 students of grade VIII were selected for sample of the study. The experimental and control groups were determined by tossing a coin. Both experimental and control groups were taught by researcher on the topic mensuration at grade VIII. The experimental group was taught by using manipulative instructional materials and control group was taught without using instrumental materials. Pre-test was administered before the experiment start. The experiment run for the duration of 15 days. After 15 days post-test was administered on both groups and the mean scores standard deviation were calculated. The different in mean achievement score were tested by using t-test at 0.05 level of significant.

Finally, the researcher concluded that the achievement of students of experimental group is better than the achievement of control group. The result showed that there is significant difference in achievement of experimental group over control group while using of instructional materials in teaching mensuration at grade VIII.

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## Chapter I

### INTRODUCTION

#### Background of the study

Mathematics is intimately involved in everyday life. Right from the start of human existence on this earth, the use of mathematics has been a part of human activities. It has practical values in human life. We can neither know things correctly nor can we have knowledge of mathematics. It helps man to give exact interpretation to his ideas and conclusion. Benjamin pierce one of the American trained mathematics said “ mathematics is the science that draws necessary conclusion”.

Instruction materials can be used to built new mathematical knowledge, to solve problems that arise in mathematics and in other contexts to apply and adapt a variety of problem solving strategies, and to monitor and reflect on the mathematical problem –solving processes (Luhar, 2016)

Material that provide support for teacher need to be built into the programs. These materials should contain specific suggestions and illustrative examples of how the teacher can implement standard–based mathematics program (Luhar, 2016).

Agwagah (2000) had noted the mathematics teacher in most cases do not use instructional materials in their mathematics classroom, so most of the mathematics concepts are taught abstractly. This may be because some of the mathematics believed that instructional materials to be used for teaching these mathematics concepts are not in existence.

Johnson speaks of the importance of materials in the following line ‘  
Instructional materials are as essential for mathematics teacher as species as for the chief.’” They are necessary extra ingredients that makes teaching and learning



mathematics pleasant satisfying experience models, pamphlets, films given that would be difficult to obtain (Luhar, 2016).

Mathematics is generally regarded is difficult subject. Studies have been done related to the instructions materials and methods for the development of effective teaching learning situation. Mensuration, the act,process, or art of measuring,the branch of mathematics dealing with the determination of length, area, and volume etc.

In the recent year certain technical resources for written and pictorial communication have come into general use in elementary school like computer, overhead projector etc. They make team preparation work of visual documents much easier and provide while class with a good quality picture the use of some structural materials created with reform has also become more general some of their materials are technique embodies in materials from and are related to abacus for e.g. Multi-base block,counting frames,minicomputer and other are investigatory instruments. There after very expensive materials have been suggested as being expensive to new style of teaching.

Source of profit sophisticated materials make in class as the need arise,would probably be better suited in my cases. In this context instruction materials are essential for the mathematics teachers are spokes for the chief. They are necessary in learning mathematics pleasant; satisfying excellence models,pamphlets, films given that would be difficult topic to obtain in any other ways.

Thus mathematics like a language is a basic tool of communication. It is an essential part of the development of science and technology. It is also plays avital role for the development of science and technology. Mathematics is widely

famous and most useable subject in world. In the recent period ,it is highly develop in any field of human life. But most of the people have no good understanding about mathematics. Every teacher most uses mathematics materials for providing the good concept of mathematics by such activity student can develop their understanding and they were interested in learning mathematics.

Rickard (1994),pointed out that the important of the concrete mathematics in meaningful understanding of much abstract relationship in mathematics in teaching mathematics. These of visual materials plays an important role in mastering abstract or generates concepts. Thus facilitate learning because we can attend to concrete things. In the context of instructional materials. Dines says "the use of concrete materials in the classroom to buildup mathematical imagery once builds up, can be manipulated without the aid of concrete objects".

Teacher can develop students understanding and provide concrete concept about any topic by using teaching materials. Therefore mathematics is easy if it is taught by using materials. Teacher most provides concrete concepts about any mathematics activity with connection their daily activity by using instructional materials.

The mensuration is most famous topic in mathematics and uses every field of human life and any subject. So everyone can understand concretely about Mensuration solution. Most of the teacher provides the knowledge about topic by theoretically not dependent upon the concrete way. Therefore, every sector and every activity in mensuration most joined to other area and provide the concept of these topics with understanding.

### **Statement of the Problem**

This study is mainly concerned with the achievement of the students of grade VIII due to the effective teaching by using instructional materials for

mensuration teaching. Most of the researchers in mathematics only depends on theory of learning but they cannot join the mathematics concepts with instructional material.

For the natural and conceptual learning of mathematics, students must get good way of concept derived by their teacher at lower secondary level. Such activity of students increase their thinking and they develop their own concepts about any topic. So, the study intends to answer the following questions.

- Do the use of instructional materials in teaching mensuration effective than without using it?
- Do the use of instructional materials in teaching mensuration produce better performance?

### **Objectives of the Study**

The researcher has formulated the following objectives:

- To compare the achievement of students teach with and without use of instructional materials.
- To find the effect of instructional materials on teaching mensuration.

### **Significance of the Study**

Mathematics is an important part of every life. So every students studies it and gains better achievements. It is also said that the well grounded understanding of mathematics is an essential for every life as for higher study in the field of science. Students determine how and what aspect they could contrivable to welfare of the community and to the development of nation, The community further, mathematics learning helps the students understand and interpret several important quantitative aspect of living. Students need to construct their own understanding of each mathematical concept so the primary role of teaching is not to lecture ,explain ,to transfer mathematical knowledge ,but to create situation for

the students that will help to make necessary materials constructions. This study would helpful to get information about the effect of concrete materials in mathematics learning.

- This study would helpful to find out the effect of instructional materials in teaching mensuration.
- It would helpful to build of knowledge by concretely.
- Teaching materials would also help to give concept the mensuration.
- This study would also help to compare the achievement scores of mensuration teaching by using instructional materials and without instructional materials.

### **Statement of the Hypothesis**

Hypothesis is the assumption or guess about the population involved. Such assumptions that may or may not be true is called hypothesis. In other words, hypotheses as used in research refer to predictions of results made before a study is made (Pandit, 2006).

### **Null Hypothesis( $H_0$ )**

- There is no significance different between mean scores of the students taught by using concrete materials and without using materials. ( $H_0: \mu_1 = \mu_2$ )
- There is no effect of instructional materials on teaching mensurations.

### **Alternate Hypothesis ( $H_1$ )**

- There is significance difference between mean scores of the students taught by using concrete materials and without using materials. ( $H_1: \mu_1 \neq \mu_2$ ).
- There is effect of instructional materials on teaching mensuration.

### **Delimitation of the Study**

This study was handled in Makbanpur District. This was limited for only mathematics of grade VIII. This study was only depends finding the Area and volume. To government school of Makbanpur district was select purposively. The researcher was analyze by mean score achievement test.

### **Definition of the related terms of the study**

#### **Achievement**

The achievement on this study is defined in terms of the scores obtained by the learners.

#### **Experimental group**

The students who were taught by using instructional materials in considered as experimental group in this study.

#### **Control group**

The students who were taught by without using instructional materials is considered as control group in this study.

#### **Instructional materials**

The list of all those materials, which are used in teaching learning process are called instructional materials. In another sense the helping materials that are used in teaching and learning process is more meaningful. Anything used for teaching purpose, teaching , including textbook, supplementary reading materials, visual aids and other related materials are called instructional materials. (Sharma, 2007)

## **Chapter II**

### **REVIEW OF THE RELATED LITERATURE**

Review of the related literature helps to find out what work have been done and what work has not be done in the area of study being under taken. From the different research researcher finds mathematical materials are so importantfor increasing the achievement score. Teaching and learning are two way process.The related literature of this study is given below:

#### **Empirical Literature Review**

Empirical literature review deals with original research such as scientific experiment surveys and research studies in particular area ([www.google.com](http://www.google.com))

Adhikari (2014) did a research of the topic "Effectiveness of experimental verification in teaching geometry at secondary level". The main objectives of this study was to analyze the effect of experimental verification in learning mathematics. A pre-test, post-test equivalent group design was adopted for the study. Two groups were selected by stratified sampling method from two government schools of Chitwan district. A pre-test was administrated to both groups which resulted that the groups were comparable at 0.05 level of significance. Both experimental and control groups were taught by researcher for 3 weeks by using and without using experimental verification respectively. A sample of 40 student was selected for both experimental and control groups. After the completion of experiment, an achievement test was administrated for both groups. The result of the test was analyzed by using t-test at 0.05 level of significance. Researcher found that mean achievement, score of students taught by using experiment verification was better than the mean achievement score of the students taught without using experimental verification.

Ghimire (2009) conducted his study entitled of study on the "effectiveness of experimental verification in teaching the deductive profile of geometric theories at secondary level." The researcher studied the effect of prior use of experimental verification in proving geometric theories and the enhancement of understanding the facts, principles and concept of geometric ideas. Post - test equivalent group design was adopted. He taught both the groups on some selected units of grade IX geometry. The experimental task was provided to experimental group only. The t- test and f- test were applied and the results supported the conjecture that the experimental verification did have significant of teaching of geometry

Khanal (2014) did an experimental research on the topic "effect of reward in learning mathematics at basic level". The main objective of this study was to compare the mathematical achievement of grade- IV students taught by providing reward and without providing reward. A pre- test, post- test non- equivalent control group design was adopted for the purpose of the study. 18 students of Shree Navajyoti Lower Secondary School Nawalparasi were selected for experimental group. 20 students of Shree Kumarwati Higher Secondary School Nawalparasi were selected for control group. The experimental and control group of students were taught geometry through reward teaching strategy and conventional teaching strategy respectively for 20 periods. At the end of the experiment achievement test on the unit of geometry was conducted to both groups and mean scores were calculated. The difference in mean achievement scores was tested using t-test. In conclusion, researcher found that the mean score of experimental group was more than the control group. He was conducted that the mean achievement score of students taught by providing reward became

higher than mean achievement score of students taught without providing reward in teaching mathematics.

Sapkota (2017) conducted his study entitled "Effectiveness of manipulative materials in Teaching Mathematics at Primary Level". The main objective of his study was to compare the achievement of the students taught by using manipulative materials. The pre- test and post- test equivalent group design was adopted for the study. Two groups were selected by stratified random sampling method from two government schools of Chitwan district. This study was conducted on Narayani Higher Secondary School and Kanya Secondary School of Chitwan district only. This study was based on 15 days teaching study data was generated 20 experimental and 20 control group students. This study was focus on Algebra teaching. The t- test was applied and it could be concluded that students taught using manipulative materials performed significantly better than control group.

Shrestha (1991) did a research on “ A study of sex difference in achievement in mathematics of ninth grade students in Gorkha district” with aim to investigate whether sex influences achievement in mathematics well as to find out some possible reasons that might be responsible for the difference in the achievement.

Yadav (2047) did a research work on “A study on the use of visual aids in the instruction of mathematics in the primary schools of Dhanusha district” and conclude that the trained teachers used teaching aids more frequently than the untrained ones and more than 80% schools lacked the essential teaching aids such as geo-board ,geometry and cubic square models etc. He further concludes that in some of the schools even the available materials are not used.



Pandey (2042) did a experimental research work on “Use for visual aids in teaching fraction.Development of teaching models for teaching fraction in grade vi ‘’ with the aim develop a teaching models for teaching fraction in grade vi selection proper visual aids and see how effective the prepared model was.A teaching model with visual aids and a plan verbal exposition model were prepared. Sixty students were randomly chosen for twenty days. A pre-test and post-test research design was chosen and t-test was applied to conclude that the teaching model with visual aids found to the more effective than the plan verbal exposition model.

Mitra (2001) did a research on “A study on teaching materials and subject wise classroom observation.”With a view to investigate and availability and utilization of curriculum materials in public primary schools with the research questions. How have these curriculum materials used in the classroom? The research team visited fifty classes of mathematics, social studies and Nepali in each school. The tool for the study were interview schedule classroom observation for teaching material survey form, the researcher reflective diary notes.

Amatya (1978),Conducted a researcher on "A study of the effectiveness of teaching learning with and without the use of instructional materials" with the aims to find out whether instructional material are helpful to develop the mathematical concepts and to measure the difference in concept development among students in the experimental and control group of grade 3.

Sarma (2001),conducted a research on “ A study on the availability and use of instructional materials in teaching mathematics of the primary school of Parbat district in Nepal ‘’.In this research he aimed to investigate the availability and use of instructional materials in teaching mathematics at the primary level.For

this research, 25 teachers teaching primary level mathematics were interviewed. For collecting the data interview was the main tool for the study. For data analysis simple percentage reporting was applied to conclude that the availability of the materials was not found very encouraging. The using materials were meter-scale, compass, clock model and abacus etc.

Gautam (2005) conducted a research on effectiveness of instructional materials in teaching mensuration at secondary level to find out whether teaching materials are effective to develop the concept and to estimate the surface area and volume of cone, prism and pyramid. A pre-test least equivalent group design was adopted for the purpose of the study. Seventy six students of two schools were selected as experimental and control group. Both groups were taught by the researcher himself on unit mensuration with and without teaching aids for fifteen days. The t- test was applied and conclusion was that the achievement of the students taught with instructional materials was better than the achievement of the students taught without using instructional materials.

### **Theoretical Perspective: Cognition**

Cognition refers to the way we think and undergo processes to solve problems, make decisions, and understand new information and experiences. Cognitive views of learning refer to the happenings in a person's mind before, during and after learning takes place (Weinstein & Acee, 2008). The essence of this theory is that the most important part of learning takes place in a person's mind.

Jean Piaget defined 'the development of knowledge as a constructive process, one with an active exchange between the individual and his or her environment' (Bond, 2008). Although Piaget is most well known for his stages of

development for children, the focus here will be on his more general terms that are central in describing the process of cognitive development. Schema, assimilation and accommodation. A schema is the mental process we use to remember an object, idea, or event (Sullivan; 2009).

### **Constructivism**

Constructivism is one such learning theory that has been at the fore of education reforms, and it has rich and significant consequences for mathematics education (Learman, 1989).

The early roots of constructivism are from the educational theories of John Dewey and Jean Piaget (Brown & Green 2006). Dewey set the foundation for constructivism by identifying inquiry to be a fundamental part of learning. The Piagetian concepts of schema, assimilation and accommodation also contributed significantly in shaping constructivism. Constructivism is an educational philosophy that contends that learners are active in the construction of their own knowledge construction (Bruning, Schraw, Norby & Roning as cited in Woolfolk, 2007). Constructivism argues that students bring their own ideas to the learning situation and they continually refer to these ideas as they attempt to interpret the teacher's instructions (Cobb, 1988). The start of the learning process is signaled by a cognitive disequilibrium between the student's prior knowledge and the new knowledge; overcoming this contradiction results in new constructions (Piaget, 1975 as cited in Balacheff, 1991).

Bolick and others (2003) pointed to a good relationship between effective teaching and use of instructional materials. He argued that even if there are some educators who found the potential of IMS in enhancing teaching and learning, most of them are behind in utilizing these materials during instruction while others

expressed doubts that these will ever provoke teaching reform. Instructional materials are integral components of teaching –learning situations; it is not just to supplement learning but to component its process.

According to Bandura (1997), who first described the construction, ‘perceived self efficiency refers to beliefs in one’s capacities to organize and execute the courses of action required to manage prospective situations and to manage produce desired out comes’. Self efficacy is a belief that a person can do some thing to produce a specific outcome and second it is ‘a person’s estimate that a given behaviour will lead to certain outcome’. He explained that self efficacy beliefs determine the goals individuals set for themselves, how much effort they will persevere, and how resilient they will be in the face of failure and set backs.

Gagne (2005). According to Gagne et al, instructional material can be used to develop higher learning abilities to the learners through self-teaching or guided learning. This implies that the instructional materials mainly comprise "eliciting performance" and "providing feedback on performance correctness", in addition to providing learning guidance” for guided discovery learning. Many of Gagne’s 9 ideas have broad implications for secondary teachers in community secondary school in Rombo district. Many of these ideas have capacity building under stones with themes of students’ acquisition of critical thinking and problem solving skills. However, the theory does not students can think critically in what aspects or how they can solve a particular problem by themselves. However, I have the opinion that the purpose of instructional materials in education is to stretch students’ imagination and to encourage them to solve problems in their lives.

## Conceptual Framework

This study was focused to effect of instructional materials in teaching mensuration. From the given conceptual framework of the study, it was clear that equal number of students were taken for as control group and experimental group. Pre-test of both groups had taken and the result had analyzed. The researcher taught the control group students by without using instructional materials and the experimental group by using instructional materials and they were again tested. Then result was analyzed and findings had been drawn. The researcher adopted a conceptual framework of the study as present below:

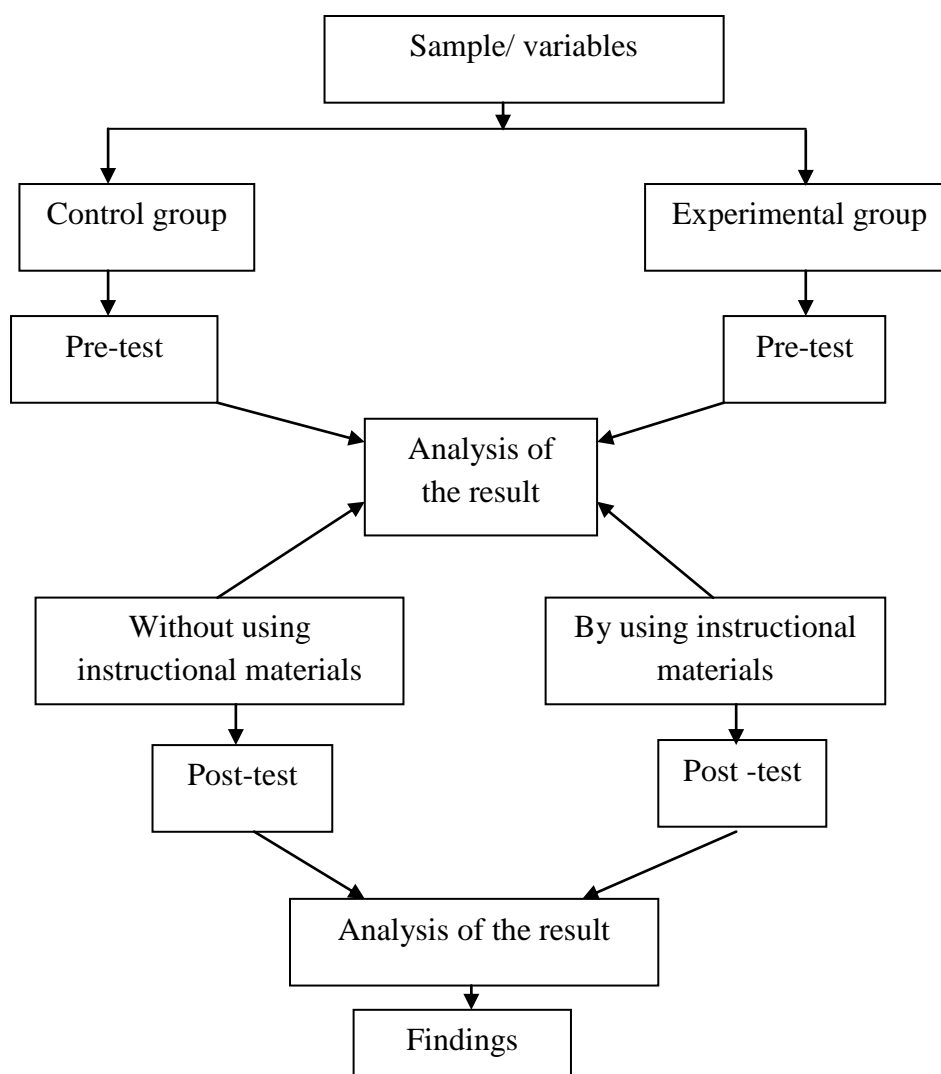


Fig. Conceptual Framework

(Thapa, 2016)

### Chapter III

#### METHODS AND PROCEDURES

This chapter was describe the design, plan and procedure of study. The present research was focus on 'Achievement of student in Mensuration by teaching using and without using teaching materials at grade VIII.

#### Design of the Study

A non-equivalent group, with pre-test , post-test research design (Oak & Feld man,2001) was choose for this study.

This experimental study was based on concept learning approach. This experimental research builds on descriptive data that had been collected in the field.The study was focus in the student achievement by teaching concept learning. This study was based on pretest and post-test model. The design of the study was as follows:

Group	Pretest	Treatment	Post-test
E	E <sub>1</sub>	Teaching by using Instructional materials	E <sub>2</sub>
C	C <sub>1</sub>	Teaching without using instructional materials	C <sub>2</sub>

E<sub>1</sub> and E<sub>2</sub> were pre-test and post-test of experimental group and C<sub>1</sub> and C<sub>2</sub> were pre-test and post-test of control group respectively.

For this study, two groups were make as nearly as possible on the basis of pre- test. Two groups were given an achievement test paper -1 before the treatment was given. With the establishment of two equivalent groups E and C in

this design, one group receives the experimental treatment, Where as the other group (control) was receive usual treatments.

The duration of instruction was 15 days, both groups will take achievement test paper –II (Post –test) on the same paper.

### **Population of the Study**

Population of the study was all the students studying in grade VIII in public lower secondary schools of Thaha municipality in Makbanpur district.

### **Sample of the study**

The researcher selected only two public schools Shree Indrayni Secondary School Moriya Thaha -8 and Shree Saraswati Secondary School Thaha -7 of Makwanpur district for the sample of the study. Both of the schools consisted the students of same socio –economic status. Most of them were Brahmins and Tamang. In grade VIII there were 22 students in Shree Indrayni Secondary School Moriya Thaha -8 and 22 students in Shree Saraswati Secondary School Thaha -7 were selected for the purpose of this study.

Experimental and control groups were determined by tossing a coin. In this way the group of 22 students were an experimental group and the group of 22 students were control group.

### **Variables**

Variables are the conditions or characteristics that the experimenter manipulates, controls or observes. Instructional materials, students achievement are examples of variables.

### **Independent variables**

The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his attempt to ascertain their relationship

to observed phenomena. Instructional materials, manipulating materials, teacher are examples of independent variables.

### **Dependent variables**

The dependent variables are conditions or characteristics that appear, disappear, removes or changes as the experimenter independent variables. Thus, the dependent variables are the measured changes in pupil performance attributable to the influence of the independent variables. Example students' achievement dependent variable. (Best and Kahn, 2018)

### **Control variables**

Controlled variables are variables that an experimenter keeps constant to prevent confounding with the independent variable. Here the researcher controlled these variables by managing same time duration, same contents, same teacher, same economic status of the students.

### **Data Collection Tools**

Achievement test paper consisting of subjective(very short, short and long questions) type questions prepared by the researcher was the main tools used in collecting data for this study. The researcher developed test on the basis of prescribed curriculum and text book of grade VIII on the topic of mensuration. The test consists of knowledge level questions, understanding level questions, skill level questions and problem solving questions. Researcher was intend to compare the student's motivation and their achievement in mathematics between the experimental and control groups.

### **Achievement test**

The pre –achievement test was determined the achievement level of students in both groups. This test was consist of some questions to be solved. The



post achievement test was contain some questions that have a slightly different with the question in the pre -achievement test, but the questions was in the same structure. Post-achievement test was used to measure the students' achievement after using instructional materials.

### **Validity and Reliability**

The content validity of the tools and instructional materials was established and approved by mathematics experts as well as school subject teachers and thesis supervisor. For this purpose researcher administered the test among 22 students of grade VIII of Shree Indrayani Secondary School Makwanpur district. The reliability of the tool and instructional materials was established by using split – half reliability of the test was found 0.40.

### **Scoring the Data**

For the scoring of the data researcher was made different level and types of questions. Each type of question varied according to difficulty level. Knowledge level question demand simple information carry 1 marks, the comprehensive level question demands the both the information and skill carry 2 marks and each where as the application type of questions are higher level which demands knowledge as well as comprehensive level of 4 marks.

### **Data Collection Procedure**

The experimental and control groups were taught by researcher himself 40 minutes per group everyday. The experimental group was taught by using instructional materials where as the control group was taught by without using instructional materials. At the end of instruction period, the achievement test was administered to both groups' students. The answer sheets was collected and scored by the researcher and then the scores was tabulated for the analysis. The

researcher was collected the data as class observation such as attendance, students participation, homework and class work of the students. The researcher taught the student with the basic of prepared episodes by researcher himself (See Appendix D).

### **Data Analysis Procedure**

The collected data were analyzed and interpreted by using statistical test by giving critical appraisal using the following procedures. Data were collected from various based on the data collection tools as well as procedures stated at the beginning of this chapter. In this study, the collected data was analyzed by using statistical analysis methods as follows:

- Mean, Standard deviation and Variance were calculated in both groups with their obtained marks in the test.
- T-test was used at 0.05 level of significance to find where the difference of means statistically significant or not.
- The appropriate test of the significance difference between two independent means , t- value was found  $n_1+n_2-2$  degree of freedom, by using the t-distribution table.
- The data obtained from questionnaire for student's teacher were analyzed descriptively.

## **Chapter –IV**

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

This is an experimental research. The main focus of this study is to explore the effectiveness of the use of instructional materials in teaching " mensuration" at lower secondary level. The main parameter to explore the effectiveness of teaching materials is performance/achievement of the students. For this purpose,achievement of lower secondary level students is collected. The statistical analysis of the obtained data has been presented in this chapter. The data of the achievement test scores are analyzed under the following heading:

- Comparison of mean achievement scores of control group and experimental group for pretest data.
- Comparison of mean achievement scores of control group and experimental group for posttest data.
- Comparative bar graph showing mean achievement scores of control group and experimental group for the pretest and posttest.
- Analysis of students perception on teaching and activities in the classroom.

#### **Comparison of Achievement Scores of Control and Experimental Group for Pretest Data**

The pretest scores of students of experimental and control group are presented in Appendix 3 and the summary of statistical calculation for both groups on the pretest is presented in the following Table:

**Table -1**

**Mean, Standard Deviation and C.V. of Pretest Result**

Group	N	Mean	S.D.	C.V.	t-value	Level of significance
Experimental	22	8.18	3.18	38.26	0.054	0.05
Control	22	8.04	2.27	28.23		

Table -1 presented the mean, S.D. and coefficients of variance and t –value of the score obtained by the students of experimental and control groups in pre-test. This shows that mean score of experimental group was 8.18 and the mean score of control group was 8.04 also the standard deviation of experimental group was 3.14 and the standard deviation of the control was 2.27. The calculated t-value in the test was 0.054 which was less than the corresponding tabulated value ( 1.96) at 0.05 level of significance with degree of freedom 42 ( $n_1 + n_2 - 2$ ). Therefore, the null hypothesis  $\mu_1 = \mu_2$  was accepted. Hence there is no significance difference between students achievement in mensuration teaching.

At this stage both the means and standard deviation of the experimental and control groups were nearly equal. Since coefficient of variance differs by 10.03 between two groups.

**Comparison of Achievement Scores of Control and Experimental Group for Post-test Data**

The post-test scores of students of experimental and control group are presented in Appendix -4 and the summary of statistical calculation for both

groups i.e. experimental and control groups on the post-test is presented in the following Table:

**Table -2**

**Mean, Standard Deviation and C.V. of Post –Test Result**

Group	N	Mean	S.D.	C.V.	t- value	Level of significance
Experimental	22	12	3.35	27.91	3.12	0.05
Control	22	9	3.08	34.22		

The table -2 presented that there were 22 sample students in both the experimental and control groups. The mean score obtained by experimental group students was 12 with standard deviation of 3.35 similarly the mean score of control group students was 9 with standard deviation of 3.08. The coefficient of variation of experimental group was found to be less than the coefficient of variance of control group. For the first hand inference it seems that the difference was really significant. The experimental group was more consistent than the control group. Therefore the mean score of experimental group is higher than the mean score of control group. To test whether the materials produce the better result. The calculated t- value was 3.12 on 5% level of significance at 42 degree of freedom. This shows that calculated t- value was greater than the tabulated t- value ( $t_{0.025,42}=1.96$ ).It indicates that there is significant difference between the mean achievement score of experimental group and control group. Hence the null hypothesis was rejected and alternate hypothesis was accepted. Therefore the researcher calculated that the student's achievement scores who were taught by using instructional materials was found significantly better than that of student who was taught by conventional method. Hence the researcher can calculate that

the students under the using of instructional materials perform better result than the student under conventional method and using instructional materials in teaching of mensuration is more effective than the traditional way of teaching mensuration in grade VIII.

### **Analysis of the Effectiveness of instructional Materials in Teaching**

#### **Mensuration**

For this research, researcher selected 44 students from two schools. One group was experimental group and another was control group. In experimental period, researcher wrote class note after teaching everyday on both groups. The researcher had found that his teaching was effective by the analysis of that class note of experimental group, because every students of experimental group were curious and interested to learn this topic seriously and all the students of that group were not making noise and also, they to me teach regular and to call me time to time to teach. Also, the researcher requested the class teacher to observe his class and take feedback from the teacher and he gave positive response about teaching. In experimental period, subject teacher and students had given thanks to me for teaching while teaching experimental group. The researcher concluded that it is possible due to the instructional materials. Similarly, the researcher had found that his teaching was no effective as much as experimental group by analysis of result of data, class observation, class activity and class note of control group because students of control group were not serious and interpreted to read this topic seriously. Hence the researcher found that there was significance effectiveness of instructional materials in teaching mensuration.

In the experimental group researcher found students regular in classroom and working in the group. The teacher and students had engaged their time to interest, sharing information each other openly by which they learn in the better way while solving their mathematical problem. Students were found more active, interested and to take part in the interaction. In the control group students were only passive listener and read parrotly get the change to interaction. Thus from the above, it seen that confidence of students increase in instructional materials.

### **Analysis of the Response Given by Teacher and Students about Instructional Materials in Teaching Mensuration**

In qualitative information to inter views were taken from the selected students and mathematics teacher to derive qualitative information. Then researcher asked some question and collected the answer which is given below;

**Researcher:** What type of effect did you find from the class conducted by using instructional materials?

**Subject teacher:** Students become active in teaching activities. They were interested in subject matter.

**Researcher:** What type of difference did you find in teaching between using instructional materials and without using instructional materials?

**Students 'a':** Teaching with instructional materials is easy to understand than teaching without using instructional materials.

**Students 'b':** I feel that learning remains long in memory by using instructional materials.

**Students 'c':** Instructional materials help students to understand subject matter.

The answer of the above questions shows that the use of instructional materials in teaching mensuration is effective than without using instructional material.

During experimental period researcher also found that every students of experimental group were curious and interested to learn mensuration seriously. Instructional material helps students to understand mensuration. It makes the teaching interesting and funny so students are motivated. Hence the researcher found that there was significant effectiveness of instructional materials in teaching mensuration.

### **Students Feeling While Teaching with materials**

Qualitative analysis is made on the basis of observation of students by researcher in their classroom activities. Observation is a kind of tool that helps to seek information and knowledge through the use of sense organs. In the research work, observation is an effective and suitable method for reliable primary data collection tools. On the basis of classroom instruction the researcher observed the students activities and noted them on his notebook. The researcher noted about activeness of students, participation in classroom activities, regularity and problem solving capacity. During the experimental period researcher found that every students of experimental group were curious and interested to learn. They were feeling easy for learning mathematics.

On the other hand, researcher found that his teaching was not effective in control group because students of that group were not because students of that group were not interested and curious to learn. They were feeling bore and difficult to learn. They were not excited to learn mathematics. They did not take



mathematics as interesting subject. They did not do their homework and class work regularly. The attendance rate of control group was lower than experimental group. Most of students in control group were passive in learning activities. In summary, most of the students of control group were inactive, not labourious and not concentrated. Very weak performance of students was observed. The students of control group did not interact with each other and even with the teacher. Only few students of control group were serious for their study.

Researcher entered his classroom. All the students were happy. They were waiting for his class. Environment of classroom was good. He started his lesson area and volume of cube by showing model of cube and die. He wrote total surface of all faces. He asked some questions to the students. What is the shape of the face of cube? How many faces does a cube have? All the students were curious to find out the answers. They were interested and curious to learn. According to the answers given by them, he completed this as: total surface area of the cube =  $6a^2$ . Showing the formulas chart, he clarified the students about the formulas. At that time they solved problems related to area and volume of cube easily. Students were involved in problem solving actively. They were motivated. Most of the students did the problem without hints. In this way, researcher completed his observation class. At last, he gave some problems related to cube for homework,

Finally, researcher found that students were participating actively in learning activities. They were encouraged to solve the answer of given question. Researcher and Students interaction were friendly in all classroom activities. It was also found that the systematic use of materials can have found effects on the role of teacher in teaching learning process. On the basis of the classroom

instruction, the teacher observed that the use of instructional materials in teaching mathematics concept was found motivating and interesting to facilitate for active participation in the classroom activities. On the other hand teaching without using materials was less interesting and to clarify the mathematical concepts.

To analyze the responses of students, the researcher conducted the interview of half an hour for them. Researcher asked following questions and collected the answer given by them.

Researcher asked to students, "What did you feel when I taught you using instructional and without using instructional materials."

Student A replied, " Teaching with instructional materials is easy than traditional methods."

Student B replied, " I felt learning became interesting."

Student C replied, " Instructional materials helped to all students to understand subject matter."

Student D replied, " I understood this lesson easily."

Student E replied, " All the classes were interesting."

Similarly other related questions were asked and students expressed positive view towards the use of instructional materials in teaching mathematics.

Hence, from the above information obtained from classroom observation and views of students about instructional materials, researcher found that instructional materials facilitate students to participate in classroom activities, to be regular in class and to interact with teaching on the other hand, teaching without materials was less effective, So instructional materials are effective in teaching mensuration at class VIII.

## **Chapter -V**

### **SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATIONS**

As stated in the introduction, the purpose of this study was to test the effect of instructional materials in teaching mensuration at grade VIII. In this chapter summary, conclusion and recommendations for further study have been presented under the following headings:

#### **Summary**

Since the mathematics as the science of abstract form and its importance is ever increasing. Mathematics is generally regarded as a difficult subject. Mathematics took place as a compulsory subject from elementary level, as its relation with a different discipline. Most of the people think mathematics is difficult subject. There are different areas on mathematics.

Mathematics learning achievement of students directly affected by some independent variables. It may be teaching methods textbook, parents education, instructional materials ,socioeconomic condition, school, teacher qualification,etc. This research directly motive to see the effect of independent variables i.e.instructional materials over dependent variables i.e.students achievement on the topic mensuration.

The researcher kept all independent variables as silent except materials. The main question over this researcher were to see, is there an effect of instructional materials on teaching of mensuration? Does achievement differ significantly when instructional materials are used? Over this researcher questions, this study has been done in Makwanpur district, period of 15 days and the unit of mensuration in grade VIII.The desire objectives of this researcher study were ; to identify the effectiveness of instructional materials on teaching mensuration and to compare

the achievement between the uses of instructional materials and without using instructional materials.

This study was given an evidence of the effectiveness of instructional materials in teaching mensuration. The study was experimental, in order to conduct the experimental study on the effectiveness of instructional materials in teaching mensuration at lower secondary level. The researcher developed the teaching module and taught by student of experimental group were taught by using instructional materials and the students of control group were taught by using conventional teaching method. At the end of teaching a standardized achievement test was administered on both the group. The pre-test, post-test control, equivalent group design were adopted for the purpose of this study. Mean, S.D. and variance were calculated in the both groups with their obtain marks, t-test was used 0.05 level of significance to find whether the difference of mean statistically significant. The scores obtained by the students in the test was analyzed and thus had the following finding:

### **Findings**

On the basis of the analysis of the scores obtained by those students, the researcher found that the mean achievement scores of students taught by using instructional materials is higher than the mean scores of students taught by without using instructional materials. The findings of the study were as follows;

- Statistically the difference between the mean scores was significant. Thus the researcher concluded that the use of instructional materials was effective in teaching mensuration at lower secondary level.

- From the result of this study it can be concluded that the instructional materials helps to understand the mensuration concepts clear to the students rather than traditional method of teaching.
- Use of instructional materials is effective in mensuration teaching and help to develops students self- confidence while solving the problems.
- The mean and standard deviation of experimental group students in pretest were 8.18 and 3.18 respectively.
- The mean and standard deviation of control group students in pre-test were 8.04 and 2.27 respectively.
- The mean and standard deviation of experimental group students in post-test were 12 and 3.35 respectively.
- The mean and standard deviation of control group students in post-test were 9 and 3.08 respectively.

### **Conclusion**

On the basis of the analysis of the data obtained from the achievement test, which has been describe in chapter IV, it was found that the mean score of the students of experimental group was greater than the mean score of the students of control group. Using instructional materials gives a positive impact in teaching as well as learning mathematics. Many researchers and teachers stated that instructional materials are solution in learning by understanding the concepts and application in real life. Students are involved in –depth learning to construct the conceptual of knowledge. The researcher also concluded that the instructional materials method develop self -confidence while solving problem of students. From the result of this study, it can be concluded that the instructional materials

method help to understanding the mensuration and performance in achievement test over traditional method.

### **Recommendation for Educational Implication**

On the basis of finding of this study some measure have been recommendation for the improvement of the teaching situation in grade VIII as given below:

- Mostly the mathematics teacher should try to use available materials in teaching mathematics.
- The mathematics teacher should be encouraged to use instructional materials in teaching mathematics.
- Training programmer should priority the using of materials.
- Teacher should develop to mensuration ideas and concepts.

### **Recommendation for Further Study**

- The largest research studies must be designed and carried out in order to investigate the effect of using instructional materials in sample in various school of different parts of Nepal.
- Similar empirical study may be suggested to conduct at different levels of school.
- It may be interesting to replicate this study in different subject and different classes.

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## Appendix-1

### Teaching Episode -1

School's name:

Date:

Class: VIII

Time:40 minutes

Subject: Mathematics

Unit: Mensuration

Topic: Review of related topic

1) Specific objective:

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

-Find out the right figure.

2) Teaching Materials: Related flash card.

3) Teaching learning activities:

-with the help of flash cards ,ask them to find out the right figure of triangle in the given below

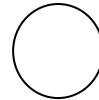
i)



ii)



iii)

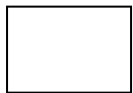


iv)



-Ask them to find out the right figure of quadrilateral in the given

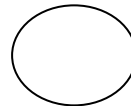
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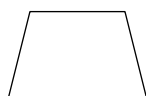


iv)

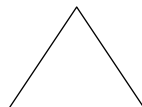


-Ask them to find the right figure of cube from the given below :

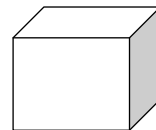
i)



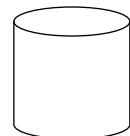
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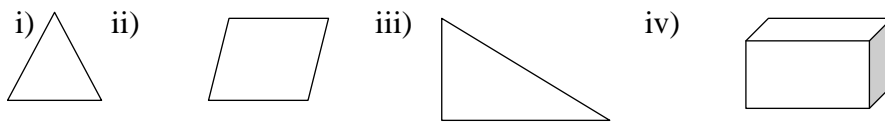
iii)



iv)



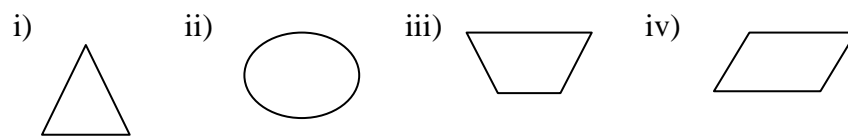
-Ask them to find the right figure of cuboids from the given figure :



-Teacher and students will discuss with the help of different geometrical figure in the flash cards.

4) Evaluation:

a) Which figure is parallelogram?



## Teaching Episode -2

School's name:

Date:

Class:

Time:40 m

Subject: Mathematics

Unit: Mensuration

Topic: Area of triangle

### 1) Objective:

After completion of this topic students will be able to:

-Find the area of triangle.

### 2) Teaching Materials;

-Flash cards in which different types of triangles are designed.

### 3) Teaching Learning Activities:

-First teacher will ask to the students about triangle and area of triangle

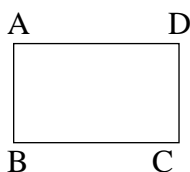
-Students can't tell fact meaning of triangle.

-Teacher will give the clear concepts of triangle.

-Teacher will ask to the students which is base and which is height of the triangle with the help of teaching material.

-If students can't give right answer then teacher will give clear concept.

-To drive the formula of area of triangle first teacher will give the concept of area of rectangle.

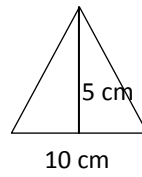


Area of rectangle =  $b \times h$

-If rectangle cut in half, we know have a triangle

So the area of triangle is one.half of the area of rectangle i.e.  $\frac{1}{2}b \times h$

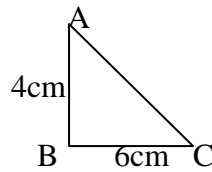
Example: Find the area of triangle



Base=10cm ,height=5cm

4) Evaluation:

Find the area of the triangle



Where AB=4cm , BC=

- To identify the height and base line of the triangle.
- Area of triangle= $\frac{1}{2}$  base  $\times$  height.

5) Homework:

Find out the area of triangle ABC from the given data where base (b) =7cm and height (h) =5cm

### Teaching Episode -3

School's name:

Date:

Class: VIII

Time: 40m

Subject: Mathematics

Unit: Mensuration

Topic: Area of Equilateral triangle.

1) objective:

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

-Find the area of equilateral triangle.

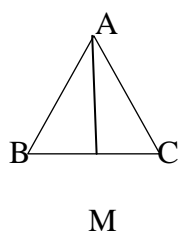
2) Teaching Materials:

Flash card ,daily used materials and models of equilateral triangle.

3) Teaching Learning Activities:

-With the help of flash card teacher will give the concept of a equilateral triangle.

-In the given figure



-Draw AM perpendicular to BC divides in two equal parts.

-Find AM by using Pythagoras theorem

$$BM = a/2, AM = \sqrt{AB^2 - BM^2}$$

$$= \frac{\sqrt{4a^2 - a^2}}{2}$$

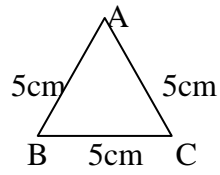
$$= \frac{\sqrt{3}}{2} a$$

-We know that area of triangle(A) =  $1/2 b \times h$

$$= 1/2 a \times \frac{\sqrt{3}}{2} a$$

$$= \frac{\sqrt{3}}{4} a^2 \text{ sq. unit}$$

-Find the area of given triangle



$$AB=BC=AC=5\text{cm}$$

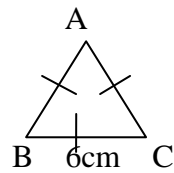
-We know that area of triangle  $= \frac{\sqrt{3}}{4} a^2$

$$= \frac{\sqrt{3}}{4} \times (5\text{cm})^2$$

$$= 25 \frac{\sqrt{3}}{4} \text{ cm}^2$$

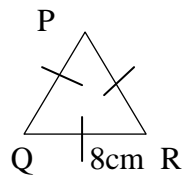
4) Evaluation:

Find the area of equilateral triangle



5) Home assignment:

-Find the area of triangle ABC from the given figure



## Teaching Episode -4

School's name:

Date:

Class: VIII

Time: 40m

Subject : Mathematics

Unit: Mensuration

Topic: Introduction of quadrilateral

1) Specific objective:

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

- Find the right figure of quadrilateral
- To introduce the different types of quadrilateral.

2) Teaching Materials:

Daily used materials and model quadrilateral.

3) Teaching Learning Activities:

- With the help of flash card teacher will ask to the students which is the right figure of quadrilateral? If student can't give right answer then teacher will give concept and describe about quadrilateral.
- Also teacher will discuss the different types of quadrilateral such as i) Rectangle ii) Square iii) Parallelogram iv) Rhombus v) Trapezium vi) Kite

4) Evaluation:

- what is quadrilateral?
- Draw the figure of rectangle.

They can categorize the different type of quadrilateral.

5) Homework:

Do this work

- Write the different types of quadrilater.
- Write the definition of different types of quadrilater.

## Teaching Episode -5

School's name :

Date:

Class: VIII

Time: 40m

Subject: Mathematics

Unit; Mensuration

Topic: Area of quadrilateral

1) objective :

At the end of this topic student will be able to:

-Find the area of quadrilateral.

2) Teaching material:

Flash card and models of area of quadrilateral.

3) Teaching Learning Activities:

-First teacher will ask to the students about quadrilateral and area of quadrilateral Formula then student can't tell fact meaning of quadrilateral.

-Teacher will give the clear concept of quadrilateral.

-Drive the formula of area of quadrilateral.

-After driving the area of quadrilateral

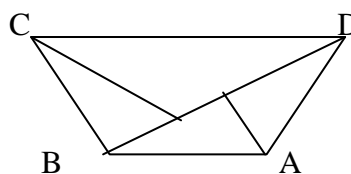
Which formula can we apply the area of triangle?

$$\text{Area} = \frac{1}{2} d(p_1 + p_2)$$

Where d is diagonal of quadrilateral  $P_1$  and  $P_2$  are perpendicular to the diagonal.

4) Evaluation:

- From the given quadrilateral find out the area of quadrilateral. Where  $BD=10\text{cm}$ ,  $AE=4\text{cm}$  and  $CF=6\text{cm}$ .





- They can categorize the different type of quadrilateral.

-The sum of quadrilateral is  $360^{\circ}$ .

5) Homework: From the given data find the area of quadrilateral if  
diagonal( $d$ )=15cm and perpendicular( $p_1$ )=5cm ,perpendicular( $p_2$ )=4cm

## Teaching Episode -6

School's name:

Date:

Class: viii

Time: 40m

Subject: Mathematics

Unit: Mensuration

Topic: Area of parallelogram

1) Objective:

After end of this class student will be able to:

-Find the area of parallelogram.

2) Teaching material:

Daily used material and model of area of parallelogram

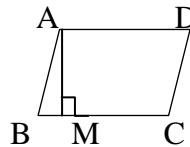
3) Teaching Learning Activities:

-First make ready to the students concentration and motivate them in learning today topic.

-First teacher ask to the students about parallelogram and area of parallelogram then student can't tell fact meaning of parallelogram

-Teacher will give the clear concepts of parallelogram.

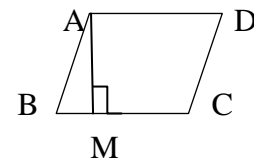
-Drive the formula of area of parallelogram.



Which formula can we apply the area of parallelogram?

4) Evaluation:

Find out the area of the given parallelogram:



Where  $BC=6\text{cm}$  and  $AM=4\text{cm}$

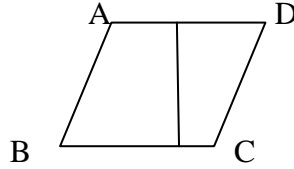
-To identify the height and the base line of the parallelogram.

- Area of parallelogram = base  $\times$  height

5) Homework:

Do the following problem:

a) In the given figure



Base (b) = 10cm and height (h) = 6cm, find the area of parallelogram ABCD

## Teaching Episode -7

School's name:

Date:

Class: VIII

Time: 40m

Subject: Mathematics

Unit: Mensuration

Topic: Area of Rhombus

1) Objective:

At the end of this topic student will be able to:

-Find the area of rhombus.

2) Teaching material:

Flash card and daily used materials and model of area of rhombus.

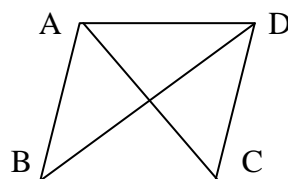
3) Teaching Learning Activities:

-First make ready to the students concentration and motivate them in learning today topic.

-First teacher will ask to the students about rhombus and area of rhombus formula then student can't tell answer.

-Teacher will give the clear concept of rhombus.

-Drive the formula of rhombus



ABCD is a rhombus and draw diagonals AC( $d_1$ ) and BD( $d_2$ ), where OA perpendicular to BD and CO perpendicular to BD.

Now, area of rhombus ABCD(A)=Area of triangle ABD + Area of triangle BCD

$$=1/2 BD \times OA + 1/2 BD \times OC$$

$$= 1/2 BD(OA+OC)$$

$$=1/2 BD \times AC$$

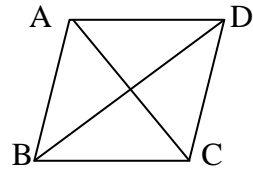
$$=1/2 d_1 \times d_2$$

4) Evaluation:

Find the area of rhombus where diagonal( $d_1$ )=12cm and diagonal( $d_2$ )=8cm

5) Homework:

Find the area of given rhombus



AC= 12cm, BD=15cm

## Teaching Episode -8

School's name:

Date:

Class: VIII

Time: 40m

Unit: Mensuration

Topic: Area of Trapezium

1) Objective:

At the end of this topic student will be able to:

-Find the area of trapezium.

2) Teaching materials :

Flash cards, daily used materials and model of area of trapezium.

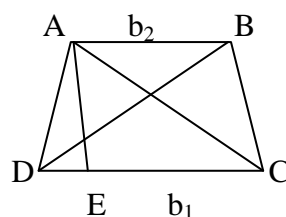
3) Teaching Learning Activities:

-First teacher will ask to the student about trapezium and area of trapezium if student will not give answer.

-Teacher will give clear concept about trapezium.

-Drive the formula of area of trapezium.

-



Now let, ABCD be a trapezium where AB parallel to CD. AE= $h$  is a height of the Trapezium. AC is a diagonal

Area of triangle (A) =  $\frac{1}{2} AB \times AE$

$$= \frac{1}{2} b_1 \times h$$

Again, area of triangle ACD =  $\frac{1}{2} b_2 \times h$

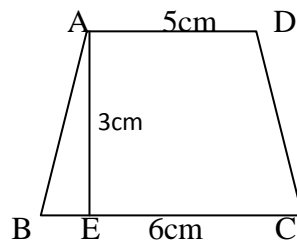
Now, area of trapezium ABCD = Area of triangle ABC + Area of triangle ACD

$$= \frac{1}{2} b_1 \times h + \frac{1}{2} b_2 \times h$$

$$= \frac{1}{2} h(b_1 + b_2)$$

4) Evaluation:

Find the area of trapezium ABCD from the given figure



5) Homework:

Do this question:

- a) Find the area of trapezium , where two parallel sides  $b_1$  and  $b_2$  are 7.5cm and 4.5 cm ,height =6cm

## Teaching Episode -9

School's name:

Date:

Class: VIII

Time:40m

Subject: Mathematics

Unit: Mensuration

Topic: Total surface area of cube

1) Objective:

At the end of this topic student will be able to:

-Find the total surface area of cube.

2) Teaching materials:

Daily used materials and different shape of solid cube models.

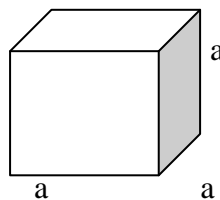
3) Teaching Learning Activities:

-First teacher will ask to the student about cube and after that teacher will discuss about cube

-Teacher will give the clear concept of cube.

- Definition of cube is a solid figure that has six identical squares faces.

-After that derive the formula of area of cube.



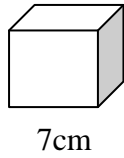
Area of one square face= $a^2$

Total surface area of cube= $6a^2$

Where a is the side of cube



Example:



Side  $a=7\text{cm}$

Total surface area of cube (T.S.A.)  $=6a^2$

$$=6 \times (7\text{cm})^2$$

$$=6 \times 49\text{cm}^2$$

$$=294 \text{ cm}^2$$

4) Evaluation:

-Find the total surface area of cube if length is 5cm.

-Cube of which area is  $72\text{cm}^2$  find the length of each side of the cube.

5) Homework:

Do the following questions:

- a) Cube of which total surface area is  $54\text{cm}^2$ , find the length of each side of the cube.
- b) Find the surface area of cube if length of each side is 7cm.

## Teaching Episode -10

School's name:

Date:

Class: viii

Time:40m

Subject: Mathematics

Unit:Mensuration

Topic: Volume of Cube

### 1) Objective:

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

-Find the volume of cube.

### 2) Teaching materials:

Daily used materials and different solid shape of cube.

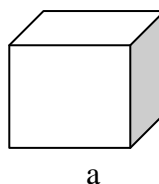
### 3) Teaching Learning Activities:

-First teacher will motivate the students by asking some questions about cube in previous class.

-Teacher will ask to the students about cube and after that teacher will discuss about cube.

-Teacher will give the clear concepts of cube.

-Drive the formula of volume of cube.



$$l=b=h=a$$

$$\text{Volume (V)} = l \times b \times h$$

$$=a \times a \times a$$

$$=a^3$$

Where 'a' is the each side of cube.

4)Evaluation:

Find the volume of cube if each side of length is 6cm.

5)Homework:

Do the following questions:

- a) Find the volume of cube if each side is 4cm.
- b) If volume of cube is  $729\text{cm}^3$ , then find the length of cube.

## Teaching Episode -11

School's name:

Class : viii

Subject : Mathematics

Topic: Surface area of Cuboid

Date:

Time:40m

Unit: Mensuration

1)Objective:

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

-Find the surface area of cuboid.

2)Teaching materials:

Daily used materials, models of cuboid.

3)Teaching Learning Activities:

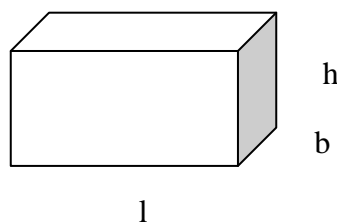
-First make ready to learn for all the students looking towards the board.

-The teacher will ask to the students about cuboid.

-Teacher will give the clear concepts of cuboid.

-Definition of cuboid is a box shaped solid figure bounded by six rectangular faces. The opposite faces are congruent and parallel

-Derive the formula of surface area of cuboid.



Surface area of cuboid =  $2(lb) + 2(bh) + 2(lh)$  square unit.

=  $2(lb+bh+lh)$  square unit.

4)Evaluation:

- Find the surface area of cuboid whose length is 14cm ,breadth 5cm and height 8cm.

5) Homework:

Do this question

Find the surface area of cuboid whose length 15cm, breadth 10cm and height 5cm

## Teaching Episode -12

School's name  
Class: viii  
Subject: Mathematics  
Topic: Volume of cuboid

Date:  
Time: 40m  
Unit: Mensuration

### 1)Objective:

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

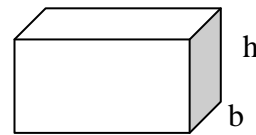
-Find the volume of cuboid.

### 2)Teaching materials:

Daily used materials and models of cuboid shape solid.

### 3) Teaching Learning Activities:

- Teacher motivate the students by asking some questions about cuboid.
- Teacher will give the clear concept of cuboid.
- Definition of cuboid is a box shaped solid figure bounded by six rectangular faces. The opposite faces are congruent and parallel.
- Derive the formula of volume of cuboid



l

Volume of cuboid( $V$ )= $l \times b \times h$

Example:

Find the volume of cuboid if  $l=10\text{cm}$ ,  $b=8\text{cm}$  and  $h=4\text{cm}$

By the formula,

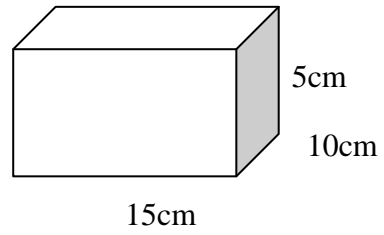
$$V = l \times b \times h$$

$$= 10\text{cm} \times 8\text{cm} \times 4\text{cm}$$

$$=320\text{cm}^3$$

4) Evaluation:

Find the volume of given solid object.



5) Homework:

Do this question.

Find the volume of cuboid if  $l=12\text{cm}$ ,  $b=8\text{cm}$  and  $h=4\text{cm}$

## Teaching Episode 13

School's name:

Date:

Class: VIII

Time: 40m

Subject: Mathematics

Unit: Mensuration

Topic: Area of Rectangle

1)Objective:

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

-Find the area of rectangle.

2) Teaching materials:

Flash cards, daily used materials and model of rectangle.

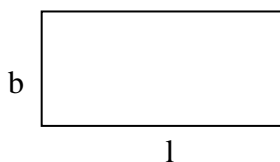
3) Teaching learning activities:

- First make ready to the students concentration and motivate them in learning today topic.

-Teacher will ask to the students about rectangle and area of rectangle formula if students will not give answer.

-Teacher will give clear concept of rectangle.

-Drive the formula of area of rectangle.



$l$ =length of rectangle

$b$ =breadth of rectangle

$A = l \times b$  ,where  $A$  is area of rectangle.

Example:

If length of rectangle is 10cm and breadth 5cm, then find the area of rectangle.

Solution:

Here,

Length of rectangle(l) =10cm

Breadth of rectangle (b) =5cm

Area of rectangle (A) = ?

By the formula,

Area of rectangle (A) =l ×b

= 10cm ×5cm

= 50cm<sup>2</sup>

4) Evaluation:

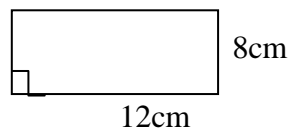
a) What is the formula of area of rectangle ?

b) Find the area of rectangle if length is 15cm and breadth is 10cm.

5) Homework:

Do this question

-Find the area of given figure





### Appendix -3

The pre-test result of experimental and control group

Pre-test result		
Pair	Experimental group	Control group
1	12	13
2	14	8
3	10	7
4	13	8
5	9	7
6	12	12
7	6	7
8	12	6
9	6	11
10	3	13
11	7	5
12	3	8
13	8	7
14	8	6
15	7	10
16	7	7
17	5	7
18	8	6
19	8	6
20	8	7
21	5	9
22	9	7
Sum	180	177

#### Appendix -4

The post-test result of experimental and control group

Post-test result		
Pair	Experimental group	Control group
1	19	13
2	20	11
3	16	7
4	15	6
5	10	8
6	17	14
7	12	9
8	14	6
9	10	19
10	10	8
11	10	4
12	10	10
13	14	8
14	11	9
15	11	10
16	10	8
17	9	8
18	10	9
19	10	9
20	10	8
21	9	8
22	8	6
Sum	264	198

## Appendix -5

### Pre-test result

Experimental(X)	Control (Y)	XY	X <sup>2</sup>	Y <sup>2</sup>	(X-X) <sup>2</sup>	(Y-Y) <sup>2</sup>
12	13	156	144	169	14.59	24.60
14	8	112	196	64	33.87	0.002
10	7	70	100	49	3.31	1.08
13	8	104	169	64	23.23	0.002
9	7	63	81	49	0.67	1.08
12	12	144	144	144	14.59	15.64
6	7	42	36	49	4.75	1.08
12	6	72	144	36	14.59	4.16
6	11	66	36	121	4.75	8.76
3	13	39	9	169	26.83	24.60
7	5	35	49	25	23.23	9.24
3	8	24	9	64	26.83	0.002
8	7	56	64	49	0.03	1.08
8	6	48	64	36	0.03	4.16
7	10	70	49	100	1.39	3.84
7	7	49	49	49	1.39	1.08
5	7	35	25	49	10.11	1.08
8	6	48	64	36	0.03	4.16
8	6	48	64	36	0.03	4.16
8	7	56	64	49	0.03	1.08
5	9	45	25	81	10.11	0.92
9	7	63	81	49	0.67	1.08
( $\Sigma X$ )=180	$\Sigma Y$ =177	$\Sigma XY$ =1445	$\Sigma X^2$ =1666	$\Sigma Y^2$ =1537		
( $X$ ) <sup>2</sup> =32440	( $\Sigma Y$ ) <sup>2</sup> =31329					

Mean of X=8.18 Mean of Y=8.04

## Appendix - 6

### Post-test

Experimental X	Control Y	XY	X <sup>2</sup>	Y <sup>2</sup>	(X - $\bar{X}$ ) <sup>2</sup>	(Y - $\bar{Y}$ ) <sup>2</sup>
19	13	247	361	169	49	16
20	11	220	400	121	64	4
16	7	112	256	49	16	4
15	6	90	225	36	9	9
10	8	80	100	64	4	1
17	14	238	289	196	25	25
12	9	108	144	81	0	0
14	6	84	196	36	4	9
10	19	190	100	361	4	100
10	8	80	100	64	4	1
10	4	40	100	16	4	25
10	10	100	100	100	4	1
14	8	112	196	64	4	1
11	9	99	121	81	1	0
11	10	110	121	100	1	1
10	8	80	100	64	4	1
9	8	72	81	64	9	1
10	9	81	81	81	9	0
10	9	90	100	81	4	0
10	8	80	100	64	4	1
9	8	72	81	64	9	1
8	6	48	64	36	16	9

$$\sum X = 264, \sum Y = 198, \sum XY = 2433, \sum X^2 = 3416, \sum Y^2 = 1992$$

$$\bar{X} = 12, \bar{Y} = 9 \quad \sum (X - \bar{X})^2 = 248, \sum (Y - \bar{Y})^2 = 210$$

## Appendix - 7

### Statistical formula used for Data Analysis

1. Mean ( $\bar{x}$ ) =  $\frac{\sum x}{N}$
2. Standard Deviation (S.D.) ( $\sigma$ ) =  $\sqrt{\frac{\sum(x-\bar{x})^2}{N}}$
3. Coefficient of Variation (CV) =  $\frac{\sigma}{\bar{x}} \times 100\%$
4.  $t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$

Where,

$\bar{X}_1$  = Mean of first sample

$\bar{X}_2$  = Mean of second sample

$N_1$  = No. of students in first sample

$N_2$  = No. of students in second sample

$S_1$  = Standard Deviation of first sample

$S_2$  = Standard Deviation of Second sample

Degree of freedom =  $N_1 + N_2 - 2$

5. Pearson's correlation coefficient

$$r_{xy} = \frac{N \sum XY - \sum X \times \sum Y}{\sqrt{(N \sum x^2 - (\sum X)^2) (N \sum Y^2 - (\sum Y)^2)}}$$

Where,

X and Y are paired scores

N = Number of paired scores

6. Reliability of whole test ( $r_{xy}$ ) =  $\frac{2 \times r_{xy}}{1 + r_{xy}}$

## Appendix -2

### Pre Test Questions Menstruation

कक्षा: ८

मिति :

विषय अ. गणित

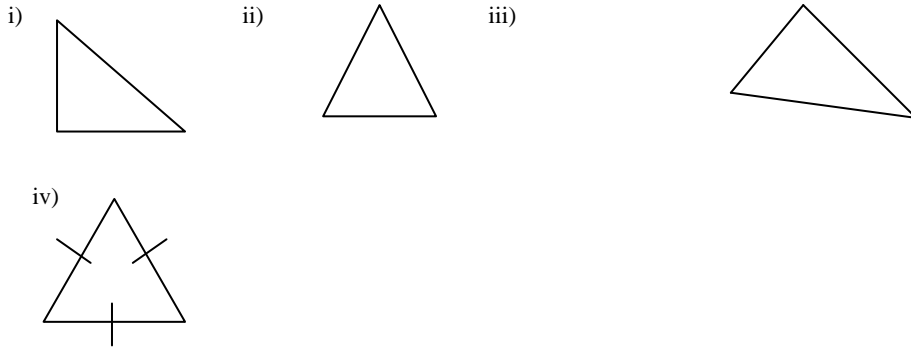
रोल नं.

समय : १ घण्टा

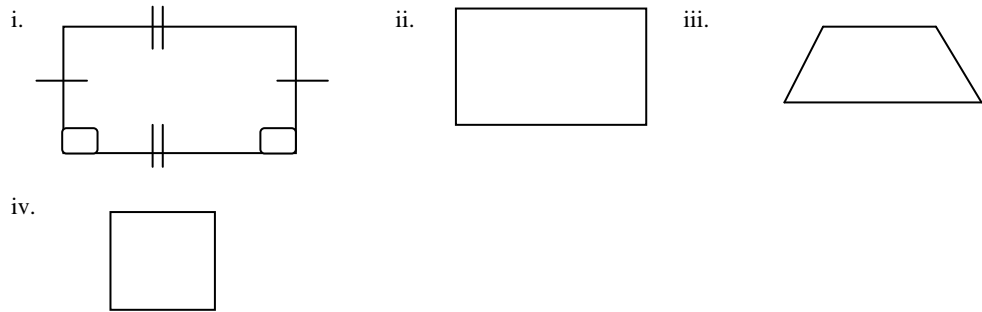
समूह 'क'

१. सबै भन्दा मिल्ने उत्तर कुन हो ? १

क. तल दिइएको चित्रमा कुन चाही समबाहु त्रिभुज हो ?



ख. तल दिइएको चित्रमा कुन चाही आयत हो ? १



ग. त्रिभुजको क्षेत्रफल निकाल्ने सूत्र कुन हो ? १

- क्षेत्रफल = आधार  $\times$  उचाई
- क्षेत्रफल =  $\frac{1}{2}$  आधार  $\times$  उचाई
- क्षेत्रफल =  $2$  (आधार  $\times$  उचाई)
- क्षेत्रफल = लम्बाइ  $\times$  चौडाइ  $\times$  उचाई

२. आधारके लम्बाइ 20 cm र उचाई 15 cm भएको त्रिभुजको क्षेत्रफल कति हुन्छ ? १

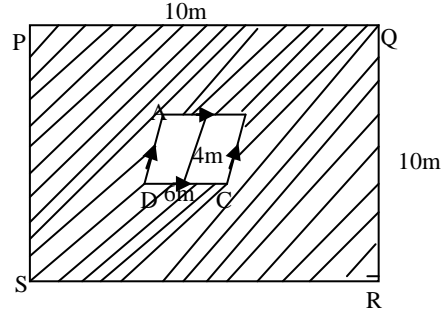
३. एउटा भुजा 8cm भएको वर्गको क्षेत्रफल कति हुन्छ ? १

४. एउटा किनारा 9 cm भएको धनको आमतन कति हुन्छ ? १

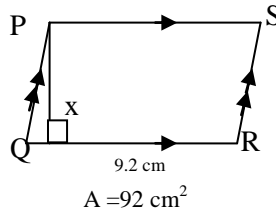
समूह 'ख'

३×२=६

५. तल दिइएको शिखमा छाया पारिएको भागको क्षेत्रफल कति हुन्छ ?



६. तल दिइएको चित्रमा  $x$  को मान पत्ता लगाउन



७. एउटा बाकसको लम्बाइ 10cm, चौडाइ 8cm र उचाइ 4cm छन् भने उक्त बाकस आयतन कति होला ?

समूह 'ग'

२×४=८

८. एउटा 240ft. लम्बाइ र 180 ft. चौडाइ भएको आयताकार खेतको विचमा 16ft. किनारा भएको एउटा वर्गाकार पोखरी छ भने पोखरी बाहेकको खेतको क्षेत्रफल कति होला ?
९. एउटा षडभुजाको चौडाइ 9cm, उचाई 8cm र आयतन  $720\text{cm}^3$  भए षडभुजाको लम्बाइ पत्ता लगाऊ ।

**Post Test**  
**Menstruation**

कक्षा: ८

मिति :

विषय अ. गणित

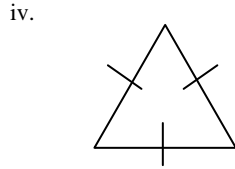
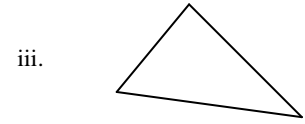
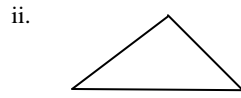
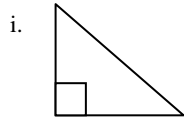
रोल नं.

समया : १ घण्टा

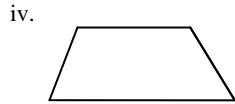
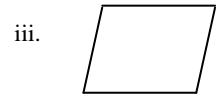
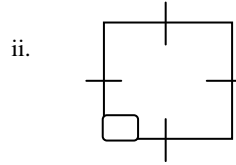
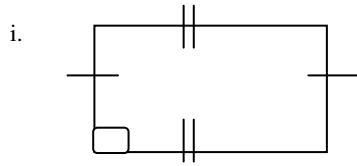
समूह 'क'

१. सबै भन्दा मिल्दो उत्तर कुन हो ? १

क. तल दिइएको चित्रमा कुन चाहिं समकोनी त्रिभुज हो ?



ख. तल दिइएको चित्रमा कुन चाहिं वर्ग हो ? १



ग. समानान्तर चतुर्भुजको क्षेत्रफल निकाल्ने सूत्र कुन हो ? १

i. क्षेत्रफल=आधार  $\times$  उचाई

ii. क्षेत्रफल= $\frac{1}{2}$  आधार  $\times$  उचाई

iii. क्षेत्रफल= $2$  आधार  $\times$  उचाई

iv. क्षेत्रफल= लम्बाइ  $\times$  चौडाइ

२. आधारको लम्बाइ 30 cm र उचाइ 20 cm भएको त्रिभुजको क्षेत्रफल कति हुन्छ ? १

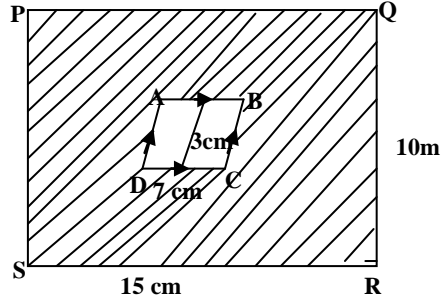
३. एउटा भुजा 10cm भएको वर्गको क्षेत्रफल कति हुन्छ ? १

४. एउटा किनार , 8cm भएको घनको आयतन कति हुन्छ ? १



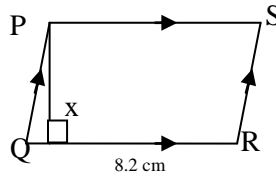
५. तल दिइएको चित्रमा छाया पारिएको भागको क्षेत्रफल कति हुन्छ ?

२



६. तल दिइएको चित्रमा  $x$  को मान पताल गाउन ।

२



७. एउटा वाकसको लम्बाइ 15cm, चौडाइ 10cm र उचाइ 5cm छन् भन्ने उक्त वाकसको आमतन कति होला ?

८. एउटा 120 cm लम्बाइ र 100m चौडाइ भए आयताकार खेतको विचमा 10m किनारा भएको एउटा वर्गाकार पोखरी छ, भने पोखरी बाहेक को खेतको क्षेत्रफल कति होला ?
९. एउटा षडमुखाको लम्बाइ 10cm, चौडाइ, 8cm र उचाइ 5cm हुन भने षडमुखा को पूरा सतहको क्षेत्रफल कति हुन्छ ?