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**EFFECTS OF SONGS ON PUPILS
ACHIEVEMENT AND RETENTION IN
SOME PRIMARY SCHOOL
MATHEMATICS**

BY

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TITLE PAGE

**EFFECTS OF SONG ON PUPILS ACHIEVEMENT AND
RETENTION IN SOME PRIMARY SCHOOL
MATHEMATICS**

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AUGUST, 2002.

APPROVAL PAGE

This project of OJIAKO NGOZI C. has been read and approved for
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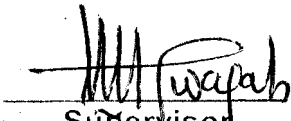
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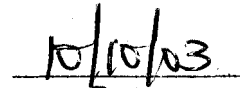
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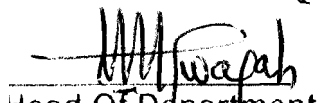
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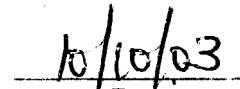
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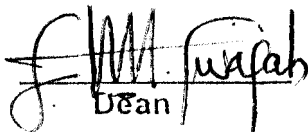

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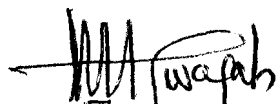
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CERTIFICATION

OJIAKO NGOZI .C., a postgraduate student in the Department of Science Education with Registration number PG/ MED/ SD/ 99/ 26075 has satisfactorily completed the requirement for masters in mathematics education. The work embodied in this project is original and has not been submitted or presented in part or full in any other degree of this or any other university.



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DEDICATION

This work is dedicated to my beloved parents MR. and MRS. OJIAKO SYLVANUS and my brother OJIAKO RAPHAEL (NZE RALPH).

ACKNOWLEDGEMENT

The researcher wishes to express his gratitude and appreciation to her father in heaven who made it possible for her to start and accomplish this work. My appreciation also goes to my supervisor DR. (Mrs) U. N. V. Agwagah for her patience, advice and for making time to read and make the necessary correction in this work. She is equally grateful to Prof. (Mrs) V. F. Habor – Peters, the management and staff of Megley children's school, Suru-lere Lagos, Mr. Obot. M; the English teacher for his editing jobs.

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ABSTRACT



This study was a quasi, - experimental research designed to investigate the effects of songs on pupils achievement and retention in some primary school mathematics. The study also sought to find out if any particular gender benefits more in learning through the use of songs. Specifically, the study was a non- equivalent control group design. Four- research questions and three hypotheses were used as a guide in the study. The population for the study comprised all the 1,084 pupils in the senior primary classes of primary schools in Suru-lere local government area of Lagos State. Forty pupils were used for the study. Mean and standard deviation were used to answer the research questions while the analysis of covariance (ANCOVA) was use to test the null hypothesis ,at the 0.05 level of significance.

The result of the study revealed, among others, that songs can be composed for the teaching and learning of primary school mathematics, and the mean performance of pupils taught with songs was significantly higher than that of those taught without songs in both the achievement and retention test.

Based on the result of the study, it was recommended among others, that the federal and state ministries of education, and professional association should organize workshops for primary school teachers use of songs in teaching primary school mathematics.

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CHAPTER ONE

INTRODUCTION

Background of the Study

No one knows what the future will bring in mathematics education. The only thing certain is that the discipline will continue to change. It should be recognized that the discipline of mathematics education is only an infant. Most mathematics educators suggested that the real revolution lies a head. Each mathematics educators has special interest and strong feelings about forthcoming changes. All mathematics users and mathematicians must make every effort to know the present status and trends of our discipline and make worthwhile contributions for the future because no nation can hope to achieve any measure of scientific or technological advancement without proper foundation in school level. But unfortunately mathematics is one of the most poorly taught, widely hailed and abysmally understood subject in Nigeria schools.

Every individual in the world is aware of the benefits derived from mathematics which makes it a core subject at both primary and secondary school levels even in the post secondary level. Some think that mathematics is isolated from their everyday activities and problems. But mathematics is a service course for every activities of life, to pure and applied science, politics, music, economics, agricultural science etc. Both

pupils and teachers should recall at any point in time during mathematics lesson and beyond that when students leave school, they are likely to take up careers which require basic numeracy and or specialized techniques in mathematics.

A mathematics teacher can x- ray the application of mathematics concept in varied fields of life and activities as a good instrument to be used in generating and sustaining students interest and retention in mathematics. One of the major weaknesses associated with learning of mathematics is their lack of interest in the subject (Ali 1982). This contributed more than anything else to their poor achievement in mathematics as observed by Oloyede (1984). This increasing wane of interest is culminating into real hatred of mathematics.

Some authors have blamed pupils' poor performance and lack of interest on the methods of teaching mathematics, which according to them are dull, and unrelated to the life and interest of the pupils. So many students easily forget formula and rules when they leave their present classes/ session due to poor presentation or use of learning/ teaching activities. To correct this error, Debyster (1979) pointed out that since the early stage of learning mathematics is largely concerned with acquisition of skills, a process which involves repetition, strategies and drill at frequent intervals are necessary and pupil should practice it everyday to

enhance retention. This project work presents an ideal about what the future holds for mathematics. Rivers in Oforma (1991) wrote that songs were very important to pupils in primary school level because it help them to incorporate the sense of reality into the classes. He stated that it must not be used in a class merely as a kind of end- of – class relaxation. Mackey (1978) emphasized that songs help to capture the spirit of learning. Also to carter for individual differences, different songs could mean to have different effects on the pupils (probably gender wise) during the teaching and learning situation. The research composes different songs from different topics of primary school mathematics, which will be introduced into our primary school system, bearing in mind that they could have some effects on the pupil's performance and retention with respect to gender.

Asiegbo (1989) stated that songs are the main tool used to capture the attention of the children and forms the background of most of their activities.

Mathematics concepts/ formulas and rules can be developed and accompanied by songs at the primary school level. Children enjoy songs, concentrated and could learn more effectively when songs are used as tool for teaching. It is also through these learning that children discover

concept, relationship, learn to observe, compare, communicate orally and gradually construct in a practical way logical connections.

Some teachers see songs as an exercise used to quieten the children while making noise, some use it for recreation or as a mere singing exercise probably towards the end of the school day. This is a narrow and brief over- view of what song can do in mathematics and entire education of the total child. Since our schools lack some audiovisual, oral and other types of teaching aids in mathematics. These songs must be very carefully and critically examined to see that they correspond with the content of the lesson (Offorma 1991). Songs can be used by the teachers to achieve the same objectives as the other lacking instructional materials can use Songs. Since song can be sung over and over again, it provides an interesting way to execute drills in mathematics skills. It is upon the above premises that the researcher decided to embark on this work whose aims include:

1. Selection and composition of songs which can help children to acquire skills (stated objectives) in mathematics with ease
2. Experiment on some of the activity songs with pupils in primary school level and find out their reaction towards them.
3. Locate the problems encountered and progress achieved in combining the two subjects while teaching.

4. Recommendation that may help to solve some of the problems arising in using songs as a tool in teaching and learning of mathematics.

Statement of the Problem

Educational researchers worldwide have focused on identifying ways and means of reversing the deteriorating school pupils achievement in mathematics. They dealt in many areas but there is no evidence in Nigeria about the effect of songs in teaching and learning of mathematics. Therefore the problem of this study posed as a question, what effect has songs on pupils achievement and retention in some primary school mathematics?

Purpose of the Study

The overall purpose of this study was to ascertain the effect of songs on pupils achievement and retention in some primary school mathematics topics. Specifically the objectives of this study were to:

1. Compose some songs, which can be used for teaching and learning of some mathematics concepts;

retention;

3. Determine the effect of the songs on pupils retention of some selected mathematics topics;
4. Find out if a particular gender benefited more from the use of songs in learning mathematics.

Significance of the Study

This study will provide alternative models of teaching mathematics to teachers. Such teachers will be able to apply the use of songs effectively in the teaching of some mathematics concepts.

Pupils will also benefit from the finding of this work, since the use of songs will likely affect their attitudes and achievements towards mathematics positively, most of the time; songs are used to commit all the learning to his memory. Mathematics educators will find the findings of this work used as a resource to modify and /or include in teaching/ learning mathematics successfully in their mathematics classes. The mathematics book writers may want to include the songs to explain concepts and also as a recitation in their books. If the uses of songs aid retention, then they will be largely explored since that is the essence of learning.

To the curriculum planners this work will aid their choice of songs for teaching some mathematics topics. If the use of songs affects pupils retention positively, they will encourage it as memory verse like in Christian religious knowledge, English language, social studies and other subjects where they have memory verse in the text books and in the primary school curriculum module to enhance retention and recall abilities in applying mathematical fomulars/ concepts in solving related problems. If the use of songs has different effects on the males and females then the positive effects will be encouraged (the use of songs) for the benefiting gender that did not benefit.

Finally, the mathematics association within and outside Nigeria will benefit from the songs composed in this work. It will urge the association to research into, develop and composed more songs for topics not covered. These will be enrichment programmes at conferences and workshop to help eliminate monotony of teaching methods and abstract nature of mathematics.

Scope of the Study

This study was restricted, specifically, to the use of songs in teaching some topics in senior primary school mathematics in Suru-Iere

local government area of Lagos state for adequate teaching and supervising of the pupils.

The mathematical topics covered are:

1. Roman numerals
2. Simple interest
3. Angles
4. Properties of triangles
5. Area and perimeter of plane shape: -
 - Square
 - Rectangle
 - Triangle
 - Circle

Research Questions

To investigate the problem of this study the researcher formulated the following research questions:

1. Can songs be composed for the study of mathematics?
2. What are the mean achievement scores of those taught with songs and those taught without songs on the selected topics?
3. What are the mean retention scores of the pupils taught with songs and those taught without songs on the learned concepts?

4. Which particular gender benefited more from learning the mathematics concepts with songs?

Hypotheses

The following hypotheses are postulated at the 0.05 level of significance.

Hypothesis 1:

There is no significant difference in the mean achievement score of pupils taught mathematics with songs and those taught without songs as measured by the test on the selected mathematics topics.

Hypothesis 2:

There is no significant difference between the mean retention scores of pupil taught some mathematics topics with songs and those taught without songs in the test.

Hypothesis 3:

There is no significance different between the mean achievement score of the male and female pupils taught with songs in the mathematics tests.

CHAPTER TWO

LITERATURE REVIEW

The literature review generated the theoretical work for this study and it is organized into two major headings:

Conceptual framework.

Importance of mathematics

General nature of primary school mathematics.

Some problems of teaching and learning of mathematics.

Meaning and kinds of songs

Rational for the use of songs in teaching and learning of mathematics

Principles/ rules in composing songs and the use of songs.

Empirical studies

Studies on pupils achievement in mathematics

Related studies on gender issues.

Conceptual Framework

Importance of Mathematics

Mathematics is a language used to express ideals, thought and reasoning (Offurum 1996). According to Dedron in Okeke (1997) "it arose from the need for counting and for calculating areas and volumes, but it has over centuries become less concerned with practical matters and has

turned instead towards logic and pure intellectual speculation. However, the pure intellectual speculations still find application in or even open vistas for science and technology". Okeke (1997) also observed that the great mathematics has played part in the evolution of science and philosophers and scientists themselves... It must be imagined that the sole function of mathematics (the handmaiden of the science) is to serve science.

Grossnickle in Odigwe (1994) noted that the purpose of instruction in mathematics in the primary school is to develop an intelligent understanding of basic mathematics ideas. According to Fehr in Odigwe (1994), the general purpose of mathematics education are derived from three broad consideration:

- Mathematics is a necessary component in the formation of a liberally educated person. If an educated person is to understand mathematics, he must not be left few hundred years behind in its content and conceptualization.
- In the past and to an even greater extent today, the usefulness of mathematics in practical matters has been the important factor in its vitality as a school subject. We now recognize that if mathematics had not been useful, it would long have disappeared from our school curriculum.

Mathematics has a light and wisdom of its own, above any possible application to science. It is because of the vital importance of mathematics in life, creative, arts, science and technology that mathematics finds a crucial position in our curricula, especially the primary school curriculum.

General Nature of Primary School Mathematics.

The most pressing issue in mathematics education in Nigeria was concerning with deciding on what mathematics should be taught and how it should be taught in our schools. With the National Policy on Education, this problem was resolved.

The Nigeria's philosophy of Education, according to the National Policy (FRN 1981) "is based on the integration of the individual into a sound and effective citizens. The policy defined primary education "as education given in an institution for children aged 6 to 11+. Since the rest of the education system is built upon it the primary level is the key to the success or failure of the whole system"

This being the case, the objectives of primary school mathematics as identified by Obodo (1997) were as follows:

- Acquisition of functional numeracy relating to how and when to use arithmetic operation on both whole numbers a decimal fraction numbers.

- Acquisition of certain mental attitudes, which facilitates the development of problem solving attitudes and strategies.
- Acquisition of techniques of representation and interpretation of numerical and other data.
- Indication of abilities in measurement, approximation and estimation of number and quantity.
- Development of spatial concepts and the ability to represent these using such as maps and scale drawings.

These objectives of primary school mathematics have influenced the nature of primary school mathematics. The primary school mathematics curriculum in Nigeria according to Harbor-Peters (Mimeograph), indicates the number and numeration, basic operation and measurement are started in primary one and studied all through the six years of primary school.

On the other hand, practical and descriptive geometry and every statistics are started in primary many two and primary four, respectively.

The topic "number and numeration" cover the whole numbers. Numerations system and decimal fractions. "Basic operation" deals with the operations of addition, subtraction, multiplication and division. Measurement embraces the measurement of money- simple interest, area and perimeter, volume, length, weight, and time. Geometry is seen as

being practical and descriptive-three dimensional objects triangle and angles. Last, everyday statistics graphs, frequency tables, mean, median, and mode. All these concepts are introduced and done in the senior primary classes.

These curricula was planned in other to achieve the above objectives. Mathematics is seen as a united subject and almost all concepts are initiated right from the primary school and gradually developed to higher levels.

For students of mathematics, it is essential that they should have acquired the faculty of being able by their own to learn more mathematics, to solves new problems, to adopt their past knowledge to new knowledge and new points of view. Every pupil should be given the opportunity to learn mathematics as much as he can in order that he can participate effectively in our culture, everyday life, any level of education, which may be characterized as being scientific. Mathematics helps us to understand the natural environment and the world around us. It also equips us with certain tools such as computational and numerical competences in critical and logical thinking.

It could be observed that acquisition and application of these competencies is what is posing problem to the pupils and there is need to

device strategies in order to apply these competencies in problem solving situations.

Some Problem of Teaching and Learning of Mathematics

The teaching and learning of mathematics have been of some concern to various people in this country. This concern is as a result of the difficulties associated with the subject. It is to the opinion of many mathematics educators and experts that there must be some reasons for these difficulties.

Fakuade in Odigwe (1994), had asked the inevitable questions, what is wrong with mathematics and why are there many intelligent children who cannot do well in the mathematics? Grossinckle in Odigwe (1994) observed that the reason why, some concepts are difficult to the pupils is that meaning and understanding were not given adequate consideration. Also the relationship among operations and topics were not developed.

According to Bayc in Onuoral (1993) the difficulties posed by mathematics and mathematics teaching in Nigeria have generated a lot of discussion. Many people including our educators do not realize that one of the major reasons pupils perform poorly in mathematics is that they are badly taught in the primary schools. He also said that those who teach

mathematics in the primary schools do not have a good grasp of the concepts and methods of the subjects from their various teacher's colleges.

Ohuche (1989: 50) in his contribution to formation of mathematics concepts concluded that the manner in which mathematics concepts are being taught presents mathematics as a dreadful subject. That is the reason more attention must be paid to simplifying the teaching and learning of mathematics especially in primary school level. Thus, the use of songs might be seen relevant.

Meaning and Kinds of Songs

According to Apel (1970), song can be defined "as a short composition for solo voice, usually but not necessarily accompanied, based on a poetic text, and composed in a fairly simple style so designed as to enhance rather than to overshadow the significance of the text".

Dobson and Harris (1979), also defined song "as a work of collaboration between a musicologist and a philosopher, each aiming to use his specialized knowledge toward the one end of producing text of music and words which fit each other and be singable as to the best of our beliefs the original authors and composers intended them to be sung"

Nwamkpa in Asiegbu (1991) defined song as “a properly articulated order and organized sound, caused by a vibrations of voice or other instrument in combination with the musical fundamentals used to express emotions”. Eleanor in Okpala (1991) said that “song is the art of combining sound whether vocal or instrumental involving one or all of these elements, melody, harmony, rhythm and timbre”.

Long man primary Dictionary (1999) defined song “as a piece of music with words that are song. Oxford Advanced Learners Dictionary of current English (1999) defined Song as “a music for the voice, short poem or number of verse set to music and intended to be sung” While Oguoma and Auforom in Asugbu (1991), conceptualized song as “the art of combining sound/words to effect one’s emotions”. To the researchers, song is a natural and instinctive means of self-expression, usually used to pass a message to an audience.

Kinds of Songs

Folk songs are restricted to the song of a personal creation aiming at artistic perfection. Concert song is a companion in drama during classical period.

Recital songs, which can be written in various languages, are for recitation purpose. It can be in form of rhythms, poem, dramatics, and

translating stories into action, formulae and concepts into songs, singing games, vocal songs, social songs etc.

A song can be in the form of strategy or reinforcement or both. A song in form of strategy helps the learner to develop plans to achieve a specified goal either to progress faster or to suppress his opponents progress. While the reinforcement songs are designed or composed to assist learning in applying concepts already introduced.

The Use of Songs in Teaching and Learning of Mathematics

Omiron (1991), observed in his survey with a perfect interest questionnaire about 126 pupils out of 189 disagreed in response to a statement "Mathematics is interest" while 153 out 189 agreed in their response to another statement that "Mathematics is difficult"

Some authors have blamed pupils poor performances and lack of interest in the method of teaching mathematics which according to them are dull and unrelated to life of the pupils. To correct this erroneous thoughts/beliefs, Debyster (1979), pointed out that since the early stage of learning is largely concerned with acquisition of skills, a process which involve repetition, strategies, and drill at frequent intervals is necessary. It becomes imperative to practice the use of songs in teaching and learning especially in mathematics.

Rivers in Oforma (1987), wrote that songs were very important to pupils in primary schools because its help them to incorporate the sense of reality into the class. He stated that song must not be used in a class merely as a kind of end-of-class relaxation. Mackey (1978), emphasized that song help to capture the spirit of learning.

Asiegbu (1989), stated that song is the main tool used to capture the attention of the children and form the background of most of their attention. Mathematics rules, formular and concepts can be developed and accompanied with songs at the Nursery/Primary school level for retention.

Conversely, these days some teachers see songs as an exercise used to quieten the children while making noise or a mere singing exercise probably towards the end of school day. This is a narrow and myopic over-view of the use of songs in learning. It is a cogent factor of retention of teaching and learning in Mathematics.

To the researcher, songs in general serve the purpose of generating excitements and to express themselves, and in the process to acquire a skill of communication in mathematics unobtainable in any other way.

Memorization and transferring of mathematics songs to real mathematical application is the crankshaft upon which the understanding of any mathematics concept taught will rotate.

Hilda (1952) in his book wrote, "Efficiency in teaching depends on the teacher's understanding of the personality and capacity of the students, and in his ability to relate these in a practical way to the word of musical thought and activity.

In Academic star (May 1976), an anonymous writer quoted Shakespeare's as saying that "Song has the power to act as a catalyst to the memory". In the same articles, Pythagoras's was quoted as having said that song is highly therapeutic for certain nervous disorder.

Boyd and King (1995), stated the role of songs in the history of the ancient World. In Sparta, it was only through the music associated with religious ceremonies that the artistic side of life was represented and the moral spirit of people reflected. In Athenian schools, a training in songs went synonymously with gymnastics. Also for training in right habit of mental choice, one should consider songs to serve as recreation, and disciplines the mind. Also argued is that, musical rhythms and melodies have likeness of anger and gentleness, thus proving the as songs have the power to modify the character of that soul, we must certainly use it in educating the young ones.

Muriel Hart in Okpala (1991), stated "True integration of song happens most easily and naturally within the pre-secondary schools levels where it can be accepted into the whole curriculum. It can then be interspersed throughout the day in any of its aspects and correlated as and when it seems most suitable".

Devyck (1989), in his book "The language of music" stated that when we speak of the architecture of a figure (imitative entry of voice at different pitch levels), we are making an objective statement that its composer has constructed it by methods analogous to those of the architect that he has grouped masses of non-representational materials (tone instead of stone) into significant form, governed by the principles of proportion, balance and symmetry, and this throws some light on a particular types of song.

According to Reebeck-Wheeler is Asiegbu (1989), "Throughout the busy day that comprises life in primary school, we find that songs, can be experienced as an expression of patriotic feeling as a means for individuals growth, as a group efforts and as an aid in understanding an area of mathematics. In these as in many other ways, song play many faceted roles, because it is intrinsically an art which can serve the human being dynamically in many ways, throughout life, we discover in songs,

unlimited sources of usefulness as we initiate programs to cultivate the growth of the child.

Song according to Nye and Nye (1981) should become an integral part of every area of the curriculum "To support their arguments they said that song should be related to and result from simple, concrete and first-hand experience. Song can assist each child in the realization of his physical, emotional and intellectual potentialities. Children grow by moving their bodies and reacting to sound. Song provides fascinating opportunity for them to do this in a creative way.

Leaper in Michael (1984), emphasized the importance of songs in young children when he stated that song can contribute in many ways by offering opportunities for listening, creating, singing, rhythmic responses, and playing instruments. Through these activities the child experiences pleasure, joy, and creative expression, develops listening skills and auditory discrimination, gains in physical development and use of his body, and increases the range and flexibility of his voice. The child grows in his appreciation of songs and can learn to be discriminating.

In addition, songs aid in remembering of the contents. They heighten interest of the learners, in the lesson (Offorma 1987) "Difficult learning experiences are made easier to learn through use of songs. They

concretize information and therefore, aid retention of learned materials. They introduce variation in teaching”.

The important thing here is that rhythm and songs are involved as an aid to the acquisition of the skill. Avnold (1972) said “Since it is song that provides all the fascinated opportunities for children, the following should therefore serves as some of the importance of song in mathematics education in primary school level” it serves as a motivating factor to the children hence song awakens the spirit of children. It arouses their interest to engage into mathematical skills. It helps the children to learn formular and theoretical skills with ease. Songs serves as a variety of learning activity since children have very short span of sitting and listening at a place. Songs encourage creativity and imaginative art in children, thereby helping them to work out their own modalities of doing things. For instance the song titled “Areas and Perimeter” developed by the researcher and used in this study, helps the children to apply the formular in solving any problem involving areas, length, breadth, width and perimeter/circumference of plane shapes.

It is upon the above premise that the researchers decided to embark on this project work.



Principles/Rules in the use of songs in Teaching and learning

In using songs as learning activities, the teacher uses the concept(s) in a content or the entire content and composes a song or songs, with them. In this situation, students learn the song. For instance, nursery rhymes for teaching the letter of the alphabets A, B, C, D.... 1, 2, 3,4, Numbers of days in a week, seconds in minutes, millimeter in centimeter etc.

Generally, use of songs depend on the subjects or topic and age of the learners.

Songs may be useful as a means of revision. If simple and shorts, such can be used at the end of the lesson but after, a separate period will be needed. Children learn a lot of memory work in scripture during singing practice. Hymns connected with the birth of Jesus Christ, Christmas season, Easter songs and also harvest songs are really useful for children during story telling, children learn a lot of songs which actually help them to remember a lot of stories which they have been taught. Similarly, there can be no difference in the use of song(s) in teaching and learning of mathematics.

Demerits of Using Songs

It could be noisy if not handled by a skillful teacher. When the tune is forgotten, there is difficulty in remembering the song and therefore, the content. Complex content may not be easily taught through song(s). Teacher's voice may be a problem to the use of song(s).

Ways of Improving the Use of Songs

The teacher needs to plan well in advance in terms of learning the song and noting when to apply them. The teachers has to adopted to the lesson. The teachers should encourage the pupils to develop their own songs using content areas because behaviour caught are better retained than behaviour taught and this will enable them to "Think Mathematics, Talk Mathematics, and sing Mathematics" Elssa Slogan (1998).

Finally Apel (1960) defined song as a short composition for solo voice, usually but not necessarily accompanied, based on a poetic text, and composed in a fairly simple style so designed as to enhance rather than to overshadow the significance of the text" with this definition, the teacher should ensure that the song is well planed and related to the objectives of the educational domain based on the content. The teachers must administer the song in such a way that the pupils should not be

carried away with the tone or deviate from the purpose and objectives of the techniques of songs.

Empirical Studies

Studies on pupils achievement in mathematics

Mathematics, though one of the core subject studied in both primary and secondary schools has recorded the greatest number of failures among the pupils and students than other subjects.

The front of the dilemma of the failing standard of education in the country, is the standard of pupils performance in mathematics at all levels, but most especially at the primary schools level. This could be as a result of poor foundation in mathematics at the primary school level. The chief Examiners of National Common Entrance Examination (NCEE) lamented on the pupils poor performance in mathematics which they attributed to lack of understanding of basic operations as well as poor manipulations of arithmetical and algebraic calculation owing to inadequate practice.

In an interview conducted in my school for the intakes of new pupils from primary school to junior secondary class one, it was discovered that the average range of scores of the pupils in mathematics was between 28% to 42%. Thus the over all performance of the pupils in mathematic was very low and discouraging.

This sorry state of pupils performance in mathematics also triggered off some more research work involving the students in the junior secondary schools. Abadom in Odun (1996) in his evaluation study of junior secondary student discover to his amazement that both J.S.S 1 and J.S.S 3 students had not mastered their primary school. Mathematics. The mean score for J.S.S 1 and J. S.S 3 student were 32.2% and 40% respectively on a modified Oyo state first School leaving Mathematics examination.

Ali, Osibodu, Lassa in Omirum (1991) explored the problems of poor achievements in mathematics among Nigerian school. It then becomes obvious that of all the factors which contributed to students' poor altitude, motivation, interest towards mathematics and poor achievement in mathematics, quality of mathematics teaching, are probably the most serious contributory factors to poor achievement in Mathematics teaching, are probably the most serious contributory factors to poor achievement in Mathematics (Ali, 1987). A school of thought holds the view that the students are responsible for whatever might have befallen them.

Another school of thought is of the opinion that poor mathematics achievement is the result of the teachers ineffectiveness and their poor attitude to work.

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Another school of thought is of the opinion that poor mathematics achievement is the result of the teachers ineffectiveness and their poor attitude to work.

The members of the earlier group found out that poor performances of students was as a result of their poor attitude and lack of interest in the subject. These students believe that mathematics seems an impossible magic and a subject to be avoided at all costs. Consequently, no matter what effort the teacher might put forth, it is most unlikely to yield any fruitful dividend. If these are to be true, the question then is what means can a teacher of mathematics adopt to make the teaching and learning of mathematics more interesting? Can the use of songs aid mathematics teachers and pupils in reducing their problem?

Gender Issues in pupils Performance

Gender is a variable that is widely believed to relate to achievement. Hence several studies have been done to find out its effects on pupils achievement in mathematics. Furthermore, gender discrepancies existed in the school curriculum for boys and girls.

For instance girls were made to do subjects like needle work, home management, domestic science. Odigwe (1994). This implies that these subjects would prepare the girls for their future role as mothers and housewives. And this was seen as perceived future, because education for girls at that time was to be in relation to a domestic vocation. Within

this framework girls seemed to fail to think beyond becoming wives and mothers which is the societal expectation of them.

But Nigeria's philosophy of Education FRN (1981) is based on the integration of the individual into a sound and effective citizen and equal educational opportunities for citizens of the nation at the primary and other levels both inside and out schools system. This implies that it involves a mobilization effort of men and women to accord the nation the full contributions of its citizens. However, building on the data contained in Okeke (1997) as well as casual observations of proportion of girls in science classes in secondary and tertiary institutions or employed as scientists, one certainly concludes that female participation in sciences and technology in Nigeria is quite low. The question that arises from this observed phenomenon is whether the poor achievement of women in science is a biological function, or environmentally determined. And is there a science gene?

Some researchers have actually tried to advance a biological evidence for girls poor achievement in science basing their arguments on references in intelligence (Okeke 1997). For instance, Hacker (1992) includes that real gender differences do exist but that they cannot be explained fully in terms of the social environment. However, Linn and Peterson (1989) had earlier described the genetic argument as basically a

blank box propositions since the mechanism for the effect is not specified. We know that even environmental differences for the sexes emerge from birth and continue through life span, according to Okeke (1997), any genetic explanation for gender difference in science will remain controversial and unacceptable. Hacker (1992) equally stated that the field of education has been dominated by 'nurture' theories, with many theoretical ideas drawn from disciplines of anthropology, psychology and sociology assuming that human beings are blank states at birth upon which social learning is written. The Hacker's implication is that the field of Education is dominated by subscribers to a blank state theory of learning, which have contradiction with the current educational learning theories such as constructivism, that in no way resemble or advocate a blank slate theory of learning. Also Hacker's (1992), single focus on gender differences which he illustrated with physiological difference such as the superiority of males for visual-spatial tasks and the superiority of female for verbal performance tend to support the argument that 'clear cut' differences of exist between male and female. But Tyler in Akukwe (1990) discovered in his study that females were superior to males in a study of memory tasks and songs, which required recall of digits and the reproduction of geometrical patterns and formulars from memory.

Since there is a bit of disagreement among these researchers on the superiority of boys over girls in mathematical thinking, the researcher decided to clarify whether the use of songs will have any effect on the children's achievement and retention test in numeration system, simple interest, Angles, triangles, Area and perimeter of plane shapes, and whether these effects are gender related.

Summary

The necessity of this has been clearly seen through the review of related literature. Through songs, poems and rhythems have been developed, they are not yet enough to cater for the senior primary and individual differences of pupils. The effects of these songs on pupils could differ depending on the nature of songs and the manner of administration. Also the effect of such songs on pupils in respect to gender needs further investigation, thus the necessity for the pursuit of the present study.

CHAPTER THREE

RESEARCH METHOD

This chapter deals with the research procedures and methodology.

The discussion is done under the following: -

Research Design

Area of the Study

Population

Sample and Sampling Techniques

Instrument for Data Collection

Validation of the Instrument

Reliability of the Instrument

Conduct of the Study

Method of data Collection

Method of data Analysis

Research Design

The research design used in this study was the Quasi-experimental design. It is used to offer less well and less rigorous control compared to the true experimental design (Ali, 1996).

Specifically, the non-equivalent control group design was used which involves the experimental and control groups both given a pretest

and a post test. The pretest is to ensure homogeneity or equivalence of subject in the different groups at the beginning of the proposed study. In the non-equivalent control group design, there is usually non-randomization of subjects, rather intact classes are randomly assigned to the treatment and control groups. The design is as shown in table 1.

Table 1

Non-equivalent control group design

Group	Pretest	Research condition	Post test
Treatment GP	0	Treatment	0
Control GP	0	Control	0

Note: GP implies Group
0 implies observation

Area of the Study

This study used all the thirty-two thousand and twenty pupils in primary five in all the one thousand, and eighty-four primary schools in Surulere local government area.

Sample and Sampling Techniques

From the one thousand and eighty-four primary schools in Surulere, two schools were randomly selected. From the schools, two intact primary

four classes (one from each school) were used. The number of pupils used for the study was forty (twenty for the treatment and twenty for the control group).

Instrument for Data Collection

The instrument used in this study for data collection was the 20 structured multiple-choice test items. Primary four and five module/curriculum, Mathematics textbooks and other Entrance Examination books were used as a guide in the construction of the test items. The instrument was used for both the pretest, posttest and retention test. However, the retention test was a disorganised arrangement of pre-test and post-test. The retention test was administered two weeks after the post-test.

Validation of the Instrument

The instrument was sent to four experts (two in mathematics Education and two in measurement and evaluation) to carefully examine and give face-validation. They were requested to look at the objectives, contents, the levels of language used and the suitability of the instrument. Content validation of the instrument was also ensured by constructing a test blue print as shown in table 2.

Table 2**Test Blue print for the test**

Content Dimension		Ability process Dimension		Total
Topic	%	Lower cognitive level question	Higher thinking process	
	%	60	40	100
Roman Numerals	15	1	2	3
Simple interest	20	2	1	3
Angles	15	2	2	4
Properties of Triangles	15	2	1	3
Area and perimeter of plane shape	35	5	2	7
Total	100	12	8	20

The test blue print was used as a guide in constructing the items of the instrument.

Reliability of the Instrument

A field trial was employed. This gave the researcher the opportunity to determine whether the test is usable, valid, reliable, well spaced in terms of the time allowed for the test (Ali, 1998).

The test scripts were carefully administered to an equivalent group of primary six pupils, the scripts were collected, marked, scored, collated and analyzed using the Ruder-Richardson (K-R20) to estimate the reliability, since a single test is administered to a group of test takers less or equal to twenty (Uzoagulu, 1998). The reliability coefficient for the test is 0.945 and this showed a high degree of relationship between the scores for the test, the test items are reliable.

Conduct of the Study

Two lesson plans for teaching each topic to the groups were drawn out and used by the researcher to avoid bias in using different teachers. The topic was taught for a period of four weeks for each group (twenty periods each lasting for 45 minutes per period).

The control group was taught using the traditional or conventional methods/strategies, while the treatment group was taught using the composed songs. To avoid contamination, the songs were sang in the class only, and the pupils were warned not to teach others the songs till after one month and to be punctual. They sang the songs during lesson, at the end of the lesson and when they had free periods. The achievement test was administered at the end of the experiment, and after two weeks, the retention test was administered to the two groups of pupils, sufficient

time was given to respond to the test items as was determined by the trial test.

Method of Data Collection

The pupils responses to the test items were collected and marked by the researcher. Each of the set of test items was scored out of twenty. The questions had the same weight assigned to them (1 mark each) the questions had options A-E from which the correct answer(s) were chosen.

Method of Data Analysis

Mean and standard deviation were used to answer the research questions, while research hypotheses were treated to Analysis of covariance (ANCOVA) using the pretest as the covariate, at 0.05 level of significance.

CHAPTER FOUR

RESULTS

In this chapter, the data were presented according to research questions and hypotheses.

Research Question 1

Can songs be composed for the study of mathematics?

Songs composed for teaching and learning of the selected mathematics topic: -

1. Roman Numerals

Roman Numerals I, V, X, L, C, D, M, I, V, X,

Which represent 1, 5, 10, 50, 100, 500, and 1000 50, 100, 500, and 1000.

(2 times)

2. Simple Interest

Simple interest (2 times)

The formular for simple interest is $\frac{PRT}{100}$

P is for Principal

R is for Rate and

T is for Time (2 times)

The formular for principal is $\frac{S.I \times 100}{RT}$ (2 times)

The formular for Rate is $\frac{S.I \times 100}{PT}$ (all over PT) 2 times

The formular for Time is $\frac{S. I \times 100}{PR}$ (2 times)

The amount is the principal + the interest (2 times)]

3. Angles

An angle is formed when 2 straight lines. An angle is the amount of rotation. Types of angles are:

Acute angle. Angles that are less than 90°

Right angles is equal to 90°

Obtuse angles are greater than 90° but less than 180°

Straight angle is equal to 180°

Reflex angles are greater than 180° , but less than 360°

One revolution is angle at a point, that gives us one complete circles, that gives us 360°

4. Properties of triangles

Triangle is a 3 sided figure, with total angle of 180° (i.e. 2 times) we have 3 types of triangle.

Equilateral triangle has 3 equal sides, 3 equal angles, and 3 lines of symmetry

Isosceles triangle has 2 equal sides, 2 equal angles, and 1 line of symmetry

Scalene triangle has unequal sides, unequal angles, no line of symmetry

Right-angles triangle has the hypotenuse, that face the angle of the triangle (2 times)

5. Area and Perimeter of plane shapes

Area and perimeter (2 times)

The area of a square is $L \times L$ (side x side)

The area of a rectangle is $L \times b$

The area of a triangle is $\frac{1}{2} b \times h$

The area of a circle is πr^2

Perimeter of a square is $4 \times L$

Perimeter of a triangle is sum of all sides

Circumference of a circle is $2\pi r$

Perimeter of a rectangle is $(L + b) \times 2$

While the volume is $L \times b \times h$ (2 times)

Research Question 2

What are the mean achievement scores of the pupils taught mathematics with songs and those taught without songs in the selected topics?

Table 3

The mean scores and standard deviation of the control and treatment groups in the pretest and post-test

Groups	Pretest $\bar{X}$	SD	Post test $\bar{X}$	S.D	Different in $\bar{X}$
Experimented	3.2	1.77	14.55	2.76	11.35
Control	3.3	1.78	9.85	3.65	6.55
Different in $\bar{X}$	0.1		4.70		4.80

Table 3 shows that the pupils taught mathematics with songs had means achievement score of 3.2 and S.D of 1.77 in pretest, while the control group had a pretest means score of 3.3 and S.D of 1.78. In the posttest, the pupils taught with songs had means achievement score of 14.55 and S.D of 2.76, while the control group had mean achievement score of 9.85 and S.D of 3.65.

Hypothesis 1:

There is no significant difference between the mean achievement scores of pupils taught mathematics with songs and those taught without songs as measured by the test on the selected topic. ($P \leq 0.05$).

Table 4

The Analysis of covariance table for the mean achievement scores for the control and treatment groups.

Source variation	df	Sum of square (SS)	Mean squares (Ms)	F. cal	Fcri	Result	Decision
B/w group	1	224.72	224.72	22.71	4.13	Significant	Reject H_{0_1}
Within group	38	375.97	9.89				
Total	39	600.69					

From the table Fcal (22.71) is greater than Fcri (4.13) at 0.05 level of significance. Thus, the null hypothesis (H_{0_1}) is rejected.

Research Question 3:

What are the mean retention scores of the pupils taught selected Mathematics topic with songs and those taught without songs on the learned concepts?

Table 5

The mean scores and Standard deviation of the control and treatment groups in the retention test.

Retention test	Control group	Treatment group	Differences
$\bar{X}$	10.30	13.45	3.15
S.D	3.11	2.95	

Table 5 shows that those taught with songs had mean retention score of 13.45 and S.D of 2.95, while those taught without songs had 10.30 mean retention score and S.D of 3.11.

Hypothesis 2:

There is no significant difference between the mean retention scores of pupils taught some mathematics topics with songs to that of those taught without songs in the test.

Table 6

The Analysis of covariance table for the mean retention scores for both the control and treatment groups.

Source variation	Def or es tat io	Sum of square (SS)	Mean squares (Ms)	F.cal	F.cri	Result	Decision

	n						
B/w group	1	102.36	102.36	12.21	4.13	Significant	Reject H ₀
Within group	38	318.58	8.38				
Total	39	420.94					

From the table, F_{cal} (12.21) is greater than F_{cri} (4.13) at 0.05 level of significance thus, the null hypothesis is rejected.

Research Question 4:

Which particular gender benefited more from learning the selected mathematical concepts with songs?

Table 7

The mean achievement scores and standard deviation of the male and female pupils in the treatment group.

Groups	Pretest $\bar{X}$	SD	Post test $\bar{X}$	S.D	Different in $\bar{X}$
Male	3.0	1.49	13.90	2.99	10.90
Female	3.4	2.06	15.20	2.49	11.80
Difference	0.4		1.30		

Table 7 shows that the mean achievement score of the female is 3.4 with S.D of 2.06 in the pretest, while that of the male is 3.0 with S.D of 1.49. In the post-test, the mean achievement score of the female is 15.20 with S.D of 2.49, while that of the male is 13.90 with S.D of 2.99.

Hypothesis 3:

There is no significant difference between the mean achievement scores of the male and female pupils taught selected mathematics topics with songs.

Table 8

Analysis of covariance table for the mean achievement scores of the male and female pupils taught some selected mathematics topics with songs.

Source variation	Df	Sum of square (SS)	Mean squares (Ms)	F.cal	F.cri	Result	Decision
B/w group	1	5.32	5.32	0.86	4.41	Not Significant	Accept H ₀₃
Within group	18	111.51	6.19				
Total	19	116.83					

The Fcal (0.86) is less than the Fcri (4.41) at 0.05 levels of significant. Thus, we fail to reject the null hypothesis.

Summary of Findings

The composed songs had significant effect on the pupils performance on both the achievement and retention test.

No particular gender benefited more from the composed songs. Though the female mean achievement score is a bit higher but the difference 1.30 is not significant.

CHAPTER FIVE

DISCUSSION AND INTERPRETATION OF RESULTS

Discussion of Finding

In this study, it has been found out that songs can be composed and used for the teaching and learning of mathematics. Rivers in Oforma (1987), wrote that songs were very important to pupils in primary schools because it helps them to incorporate the sense of reality into the class. This implies that songs can be composed and used in our educational system to enhance the conceptualization and retention of facts, rules, formulars, and skills.

The mean achievement scores of the pupils taught mathematics with songs in the selected topics is higher than that of those taught without songs as measured by the test on the same selected topic (table 3). And there is significant difference between the mean achievement scores of pupils taught mathematics with songs and that of those taught without songs (table 4). This conforms with Mackey's (1978) view that songs stimulate and maintain student's interest and performance in the study of languages. Through songs the pupils are able to pronounce basic words and articulate it in calculations and problem solving (Muriel Hart in Okpala, 1991).

On the pupils retention of learned concepts and skills also, this study reveals that the pupils taught with songs performed significantly higher than those taught with traditional or conventional methods (table 5 & 6). This finding is perfectly in agreement with Evans (1979) who maintained that songs create active participation and help in remembrance.

The study also reveals that there is no significant difference between the mean achievement scores of the male and female pupils taught with songs in the selected mathematics topics (table 7 & 8). This is in agreement with the finding of Okolo (1990) who in his research found out that there was not much difference in the performance of the boys and girls in drawing the graphs of inequalities.

It can be concluded that songs can be composed and used in educational system to enhance conceptualization and retention of facts, rules, formulars and skills. Also it can be composed to carter for both male and female such that none would benefit more at the expense of other.

Educational Implication of the Findings

This study shows that songs can be composed and used for teaching and learning of mathematics. The use of songs serves as a high motivating force in the study and learning of same. This study is meant to

challenge mathematics Educators to develop more interest in composing and using songs in teaching some mathematical concepts in the Nigerian Educational system. Care should be taken however, in doing this because wrong usage of songs may have negative effects on the pupils learning.

This study also reveals that the pupils taught with songs performed significantly better than those taught without songs in both the achievement and retention test. This has a lot to tell on mathematics educators and curriculum planners. The use of songs in our classrooms will significantly improve pupils performances and retentions.

Findings from this study show that no particular gender benefited significantly more than the other from the use of songs in teaching and learning of that selected topics in mathematics. Though the female had higher mean score in the achievement test but the difference in the mean score is significant. This implies that well composed and articulated songs may not have any gender bias in learning.

Recommendations

The following recommendations are made based on the findings of this study: -

1. The use of songs in teaching and learning of Mathematics should be introduced in to the Nigerian school system. It should be

reflected in the mathematics curriculum (module). For any composed songs to be used in schools. It must be tried out in a class. This can be done through the joint efforts of mathematics experts in all level of education to avoid the chances of introducing the wrong kind of songs that will not enhance the teaching and learning of mathematics. The implications of wrong use songs should be made known to the mathematics teachers.

2. Workshops on the presentation of composed songs and the use of the songs in the teaching of any concept in mathematics should be organized by the federal, the state ministries of Education and professional associations such as the Mathematical Associations of Nigeria (MAN) for Mathematics teachers especially at the primary level of Education in the country.
3. The use of songs for teaching and learning of mathematics should also be included in the programmes of television and radio stations.

Summary of the Study

The purpose of this Quasi-experimental study was to compose some songs for teaching and learning – Roman Numerals, – Simple Interest, – Angles, – properties of triangles, – Area and Perimeter of plane shapes.

To try out these composed songs for senior primary schools pupils and observe the effects on the immediate achievement and retention test.

To find out if any particular gender benefited more from the composed songs.

The pupils, both the treatment and the control groups were taught by the researcher for two weeks each, after a pretest. The posttest was administered after the experiment and again two weeks later for retention.

The data was treated to ANCOVA (F-ratio) using the pretest as the covariant.

The major findings of this study are:

Songs can be composed and used for the study of some mathematical concepts.

Pupils taught some mathematics topics with songs performed significantly higher than pupils taught without songs in both the achievement and retention test.

There is no significant difference between the male and female performance in the treatment group.

Conclusion

Apart from introducing these songs into our schools curricular they can also be presented in the television and no radio stations, composed

and published for peoples interest learning and retention. This helps to confirm the (ESSAN, 2000) statement "Think science, talk science and sing science" the songs composed by the researcher can be songs at home by the pupils for recreation, in the assembly ground as a recitation, during matching for leisure and also for learning.



Suggestions for Further Research

Based on this study, the following have been suggested for further researcher:

1. A similar study could be carried out using students in secondary schools
2. Similar study could be carried out using other mathematics topics
3. A similar study could be conducted on the pupils/students ability as one of the factors, to see if it is responsible for the high means score on both the achievement and retention test.
4. A study could be carried out on gender difference in secondary schools level.

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APPENDIX 3

**Department of Mathematics Education
Faculty of Education
University of Nigeria, Nsukka.**

Introduction:

Dear respondent,

I am a post-graduate student in the department of Mathematics Education University of Nigeria Nsukka. I am conducting a research for an award of Master's Degree in Education (M.ED). The purpose of this research is to find out the effects of songs in the teaching and learning of mathematics at primary school level.

You are being randomly selected for this study and your co-operation will be highly appreciated.

Please follow the instructions and answer the question carefully.

Instructions:

1. Do not write anything until you are told to do so.
2. Use pencil throughout
3. Indicate your sex by ticking X in box

M

☐

F

☐

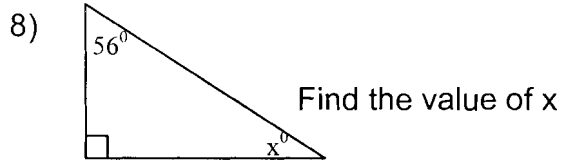
4. Think carefully before you underline the answer erase completely any answer you wish to change.

5. If you underline more than one answer for a question you will score zero on that question.

Questions

- 1) Express the Roman numeral XLIV in Arabic
(a) 1054 (b) 144 (c) 104 (d) 44 (e) 54
- 2) Five hundred in Roman figures is
(a) XV (b) L (c) C (d) D (e) M
- 3) Find the sum of MMII and XXV
(a) 1165 (b) 20025 (c) 2027 (d) 2225 (e) 2025
- 4) The formular for finding the simple interest is
- (a) $S.I = \frac{PR \times 100}{T}$ (b) $S.I = \frac{RPT}{100}$ (c) $S.I = \frac{100 \times R}{PT}$
- (d) $S.I = \frac{PRT \times 100}{1}$ (e) $S.I = \frac{PR \times 1}{100 \times T}$
- 5) How much money must I invest in order to collect N600 interest at the end of $2^{1/2}$ years, the rate of interest being 8% per annum?
(a) N500 (b) N1, 00 (c) N1, 500 (d) N2, 500 (e) N3, 000.
- 6) Find the time in which N500 will gain an interest of N125 at the rate of 5%
- (a) $2^{1/2}$ years (b) 4 years (c) 5 years (d) 8 years (e) 10 years

- 7) An angle can be defined as the (a) Joining of two points (b) Product of the turning point (c) Sum of the lines in a plane shapes (d) Total revolution of the clock hand (e) Amount of rotation



- (a) 14 (b) 24 (c) 34 (d) 54 (e) 114.
- 9) Which of the following is an example of an acute angle
(a) 300° (b) 290° (c) 190° (d) 90° (e) 9°
- 10) The supplementary angle of 45° is
(a) 180° (b) 135° (c) 90° (d) 45° (e) 35°
- 11) If the ratio of the angles of a triangle are 2: 3: 3. What type of triangle is that
a) Equilateral (b) scalene (c) isosceles (d) obtuse (e) right angle.
- 12) An equilateral triangle is a triangles which has
(a) Three lines of Symmetry (b) Unequal sides (c) Two lines of symmetry (d) One line of symmetry (e) each angle is 90° .
- 13) How many lines of symmetry has a scalene triangle
(a) 0 (b) 1 (c) 2 (d) 3 (e) 4.

14) The distance round the edge of a figure is called the (a) Area (b) Perimeter (c) length (d) volume (e) centimeter square

15) The formular for finding the area of circle can be written as

(a) $2 \times \pi \times r \times r$

(b) $2 \times \pi \times r$

(c) $\pi \times r \times r$

(d) $\pi \times r$

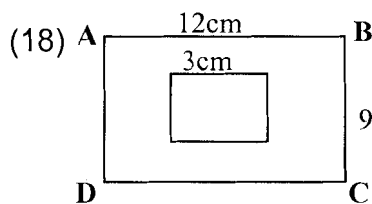
(e) $\pi \times \frac{22}{7} \times r$

16) What is the perimeter of a rectangular shape of breadth 5cm and length 7cm respectively

(a) 35cm^2 (b) 35cm (c) 24cm^2 (d) 24cm (e) 12cm

17) Find the area of a triangle whose base is 14cm with height 7cm

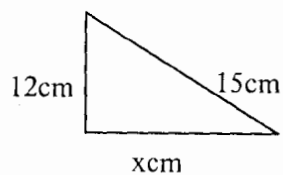
(a) 14cm^2 (b) 35cm^2 (c) 45cm^2 (d) 47cm^2 (e) 49cm^2



Find the area of the shaded portion in the

(a) 108cm^2 (b) 99cm^2 (c) 117cm^2 (d) 19cm^2 (e) 24cm^2

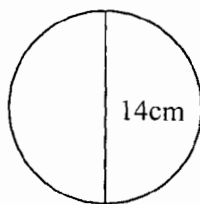
19)



Find the length of the side marked x in the triangle

- (a) 7cm (b) 9cm (c) 11 cm (d) 13cm (e) 27cm

20)



Find the circumference (Take pie $\pi = 22/7$)

- (a) 44cm^2 (b) 88cm^2 (c) 154cm^2 (d) 198cm^2 (e) 352cm^2

Thank you,

Yours

Ojiako Ngozi

APPENDIX 4

Instruction: Choose only the correct answer from the options A – D don't choose more than one answer.

1. Express the Roman numeral MCDIX in Arabic

- (A) 1054 (B) 1409 (C) 104 (D) 44

2. Forth seven in Roman figure is

- (A) IIIIVII (B) LXVII (C) XLVII (D) CXVII

3. Take away DCCCXXVIII from CMLII

- (A) 584 (B) 324 (C) 224 (D) 124

4. The formular for finding the principal is

- (A) $S.I = \frac{PRT}{100}$ (B) $P = \frac{S.I}{T} \times \frac{100}{R}$ (C) $P = \frac{S.I \times RT}{100}$ (D) $P = \frac{S.I \times 100}{PT}$

5. Find the simple interest on N2500 for 2 years at 5% rate per annum

- (A) N5000 (B) N3000 (C) 500 (D) 250

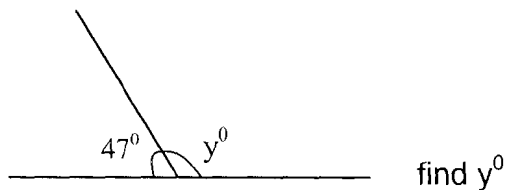
6. Find the time in which N2000 will become N2500 at the rate of 5%.

- (A) $2\frac{1}{2}$ years (B) 4 years (C) 5 years (D) 8 years

7. The gap formed where two straight lines meet is called _____

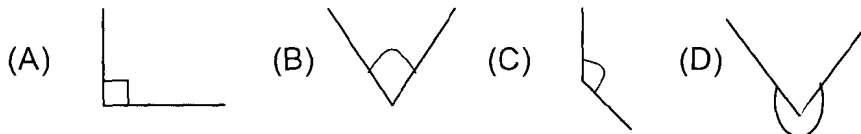
- (A) a line (B) an angle (C) Area (D) Triangle

8.



- (A) 33° (B) 43° (C) 133° (D) 143°

9. Which of the diagram represent obtuse angle?



10. The complimentary angle of 50° is _____

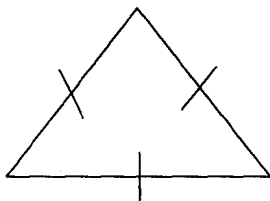
- (A) 180° (B) 130° (C) 90° (D) 40°

11. A three sided closed shape with two equal angles is known as

_____ triangle

- (A) Equilateral (B) Right angle (C) Scalene (D) Isosceles

12.



The figure is called _____ triangles

- (A) Equilateral (B) Right angle (C) Scalene (D) Isosceles

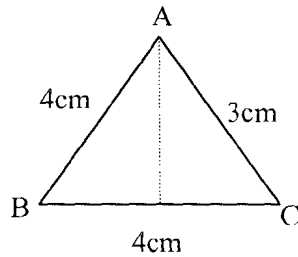
13. A triangle whose angles are different is called _____

- (A) Equilateral (B) Quadrilateral (C) Scalene (D) Isosceles

14. The correct formula for calculating the circumference of a circle is ____

- (A) πr^2 (B) $2\pi r^2$ (C) $2\pi r$ (D) $\frac{22}{7} \times r$.

15.



The perimeter of the figure is

- (A) 6cm (B) 7cm (C) 10cm (D) 11cm

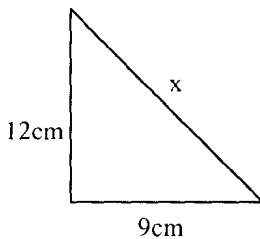
16. What is the perimeter of a rectangle of length 8m and breadth 5m.

- (A) 40m (B) 26m (C) 12m (D) 3m

17. Find the length of a square whose area is 25cm^2

- (A) 625cm (B) 21cm (C) 15cm (D) 5cm

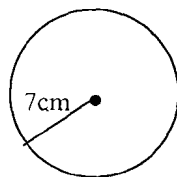
18.



Find the length marked x.

- (A) 7cm (B) 9cm (C) 11cm (D) 15cm

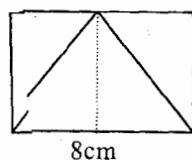
19.



Find the area of the circle

- (A) 154cm^2 (B) 88cm^2 (C) 44cm^2 (D) 22cm^2

20.



5cm

The area of the shaded portion is _____

- (A) 40cm^2 (B) 20cm^2 (C) 13cm^2 (D) 26cm^2

APPENDIX 5

Marking Scheme/Answers

Pretest /Achievement test		Retention test	
1.	D - 44	1.	B - 1409
2.	D - D	2.	C - XLVII
3.	C - 2027	3.	D - 124
4.	$B - S.I = \frac{RPT}{100}$	4.	$B - P = \frac{S.I}{T} \times \frac{100}{R}$
5.	E - N3,000	5.	D - N250
6.	C - 5 years	6.	C - 5 year
7.	E - Amount of rotation	7.	B - An angle
8.	C - 34	8.	B - 43°
9.	E - 9°	9.	C - 
10.	B - 135°	10.	D - 40°
11.	C - Isosceles	11.	D - Isosceles
12.	A - Three lines of Symmetry	12.	A - Equilateral
13.	A - O	13.	C - Scalene
14.	B - Perimeter	14.	C - $2\pi r$
15.	C - $\pi \times r \times r$	15.	D - 11cm
16.	D - 24cm	16.	B - 26cm
17.	E - 49cm^2	17.	D - 5cm
18.	B - 99cm^2	18.	D - 15cm
19.	B - 9cm	19.	A - 154cm^2
20.	A - 44cm^2	20.	B - 20cm^2

APPENDIX 6

Scores

Scores of the pupils in the pretest, achievement test and retention test on the selected topics, the scores are out of twenty.

Control Group				Treatment Group		
S/No	Pretest y	Achievement X_A	Retention test X_R	Pretest y	Achievement test X_A	Retention test X_R
				Male		
1.	4	11	8	5	19	16
2.	1	15	11	4	15	13
3	5	17	17	1	12	17
4.	5	07	07	3	09	09
5.	3	06	07	2	16	14
6.	1	08	12	5	14	13
7.	2	11	10	3	10	12
8.	3	07	13	1	16	17
9.	2	08	08	4	15	15
10.	5	15	13	2	13	10
				30	139	136
				Female		
11.	1	07	07	4	17	18
12.	6	06	10	3	15	15
13.	4	09	10	5	17	12
14.	4	05	08	0	15	09
15.	4	13	12	1	10	11
16.	2	05	07	3	18	18
17.	3	10	07	2	13	13
18.	6	10	16	4	15	10
19.	0	13	09	7	18	16
20.	5	14	14	5	14	11
				34	152	133
Σ	66	197	206	64	291	269

PLAN OF WORK FOR TEACHING THE EXPERIMENTAL GROUP (TEACHING WITH SONGS)

Subject: Mathematics

Class: Primary five pupils

Topics: (i) Roman numerals

(ii) Simple interest

(iii) Angles

(iv) Triangle

(v) Area and perimeter of plane shapes

Duration: Total of 4 weeks (45 minutes each period)

Instructional

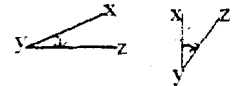
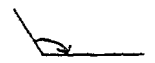
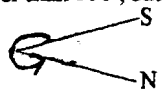
Area of perimeter Objectives: At the end of the lesson, the pupils should be able to:

- 1) Explain the meaning of Area and perimeter.
- 2) Find the Area and Perimeter of - Square, Rectangle, Triangle and Circle
- 3) Derive formular for Area and Perimeter/ Circumference of a Circle, Rectangle and Square.
- 4) Sing a song with the formular of area and perimeter of the above shapes.
- 5) Find the area and perimeter of irregular shapes/ borders and shaded portions.

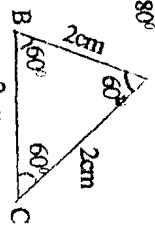
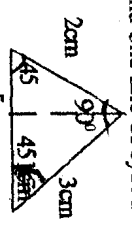
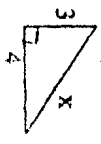
Entry behaviour: The pupils should be asked to identify and name shapes like. Square Rectangle, Triangle, Circle, Trapezium, Kite and their properties.

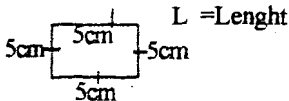
Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remarks
At the end of the lesson, the pupils should be able to.	Roman Numerals I= 1, V= 5, X=10 L= 50, C= 100, D=500 and M= 1000.	The teacher asks questions on the basic numerals of Hindu Arabic, that is 0,1,2,3,4,5, 6,7,8, and 9.	Charts and Text Books.	They pupils follows the teachers guide to form Roman numerals 1- x using their fingers.	Questioning, use of examples, illustration, demonstration, repetition, explanation, use of songs: The song ! Roman numerals IVX, LCDM, IVX which represents 1,5,10, 50, 100, 500 and 1000 (2 times)	Classwork Write the following in Roman 1. 27= 2. 385= 3. 1999= 4. 2002= 5. 479	45 minutes x 2
1. Read Roman numerals up to 1000. 2. Write up to 1000 3. Write the place value of each numeral in normal form. 4. Sing a song using the key (basic) numerals I, V, X, L, C, D, M. 5. Apply the songs in working exercises involving Roman numerals.	Repetitive property: I = 1, xx=20 II = 2, CCC = 300 III = 3, MM = 2000. Subtractional property III = 4 = IV = 5 -1 or I before 4, IX =9 XL = 40, XC = 90 CD = 400 and CM =900 Combination of both properties. <u>Examples</u> 1. 34 = XXXXIV 2. 44 = 40 + 4 = XLIV 3. 29 = 20 + 9 = XXIX 4. 345 = 300 + 40 + 5 = CCC XLV 5. 923 = 900 + 20 +3 = CMXXIII 6. 2999 = 2000 + 900 + 9 = MMCMXCIX 7. 1378 = 1000 + 30 + 70 +8 = MCCCLXXVIII	Then introduces the basic numerals of Roman figures as I, V, X, L, C, D, M and use them to sing a song. The teacher also explain the closeness of Roman numerals to nature, that is, V= 5 for the hand and X= 10 for double. The teacher demonstrates this with her hands. The teacher also explains with illustrations the subtractional and repetitive property and the use of the combination properties. Examples and exercises are given which will require the application of the songs.		They practise reading and singing the Roman basic numerals. They also pronounce the numerals with subtractive property thus: 4=IV 9=IX 40=XL 90=XC 400=CD 900=CM		Express in Arabic 1. XIX = 2. CMX= 3. XLIV = 4. DCLXV= 5. MCDVII= 6. Sing the song "Roman Numeral"	

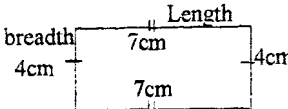
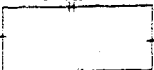
Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Empt: used	Evaluation	Remark
At the end of the lesson, the pupils should be able to. 1. Explain interest. 2. Identify the principal, Rate and time in a given problem. 3. Calculate simple interest. 4. Calculate the amount. 5. Sing a song Titled "Simple interest" and use it to solve problems involving the calculation of simple interest principal, Rate, Time and Amount.	Simple interest: Interest is always reckoned as a percentage to be paid every year on the sum of money borrowed or lent. It is called the rate per cent annum. The sum of money lent or borrowed is called principal. The length or period of the loan or money borrowed is called time. Interest = $\frac{P \times R \times T}{100}$ or $P \times \frac{R}{100} \times T$ Where P= principal, R = rate and T = Time. Amount = P + S.I $P = \frac{S.I \times 100}{R \times T}$ $R = \frac{S.I \times 100}{P \times T}$ $T = \frac{S.I \times 100}{P \times R}$ <u>Example:</u> Find the simple interest on ₦300 for 3 years, 6 month at 3% $S.I = \frac{PRT}{100}$ P= ₦300 R= 3%, T = 3 1/2 = 7/2 years Note: Always change months to year(s) by dividing with 12 $S.I = \frac{₦300 \times 3 \times 7}{100 \times 2} = \frac{₦63}{2}$ = ₦36.5 interest	The teacher explains the term simple interest, principal, rate and time and also teach them how to device the formular for each of them by making them the subject of the formular. The teacher also work more examples on how to calculate the interest, principal, rate, time and amount. The teacher then uses the formular to teach a song titled "simple interest".	Text Books.	They repeat the song after the teacher in groups. Pupils also sing the song individually to know how far they have memories the song. They also recite the song and apply the formulars in solving problems involving simple interest, principal, rate, time and amount. They also work some exercises.	Examples, illustrations, explanations, questioning, non- verbal communication and verbal communication, songs: Simple interest (2 times). The formular for simple interest is $\frac{PRT}{100}$ P is for principal R is for Rate and T is for Time (2 times). The formular for P is $\frac{S.I \times 100}{RT}$ (2 times) The formular for R is $\frac{S.I \times 100}{PT}$ (2 times) The formular for T is $\frac{S.I \times 100}{PR}$ (2 times) The amount is the principal + interest (2 times).	1. Find the simple interest on ₦100 for 2 years at 5% rate. 2. Find the amount when ₦200 is deposited in a bank for 2 years at 2% rate. 3. Find the principal which will gain ₦50 in a year at 10%. 4. For how long will I leave ₦4000 in a bank to earn and interest of ₦480, the rate being 3% per annum simple interest? 5. Write the formular for finding the rate.	45 minutes x2

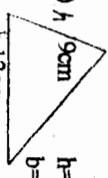
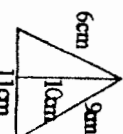
Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphasis	Evaluation/Remarks
At the end of the lesson, the pupils should be able to.	Angle: An angle is the amount of rotation/turning. It is formed when two straight lines meet. Example  Angle	The teacher draw the clock face to illustrate and explain the meaning of an angles and use it to show different types of an angle.	Samples of plane shapes cut-out from cardboard paper. The square, triangle, trapezium, kites, etc.	Pupils makes square corners following the teacher guide to illustrate angles in plane shapes.	Questioning, use of examples, explanations, illustration, re-enforcement, non-verbal communication, the use of song. An angle is formed when 2 straight lines meet.	Oral What type of angle does each of the following belong to:
1. Identify acute, right, obtuse, straight and reflex angles.	Types of an Angle 1. Acute angles: This is an angle which is less than 90°  xyz is less than 90°	 30° Acute angle		Examples: square for right angle, Triangle for acute angle, kites and Trapezium for obtuse.	An angle is the amount of rotation. Types of an angle are: Acute angel: Angles that are less than 90°	1. 8° 2. 100° 3. 79°
2. Draw right angles, acute angles, obtuse and reflex angles.	2. Right angle is angle at 90°  It is formed at a point where the vertical line meets the horizontal line	90° Right angle		They also draw each type of angles locating angles in the classroom and outside the school environment using the compass to measure them.	Right angle is equal to 90° Obtuse angles are greater than 90° , but less than 180° straight angles are greater than 180° , but less than 360°	4. 90° 5. 360° 6. 253° 7. 180° 8. 89.4°
3. Sing a song using an angle and its type.	3. Obtuse angle: Angle greater than 90° , but less than 180° .  4. Straight angle is angle at 180°  $180^\circ = 2$ right angles	120° Reflex 120° Obtuse		They also sing the song with angles and memorise it to enable them solve problems involving angles and its type.	One revolution is angle at a point that gives us 360° (2 times).	9. What is the complementary angle of 85° 10. $\frac{2^\circ}{35^\circ}$ Find the value of 2°
	5. Reflex angle: This is an angle greater than 180° , but less than 360°  6. Complimentary angle: When the sum of 2 angles = 90° $\angle a + \angle b = 90^\circ$ 7. Supplementary angle: When the sum of 2 angles = 180° $\angle x + \angle y = 180^\circ$ 8. Angles at a point /one revolution gives $360^\circ = 4$ right angle = 2 straight angles	One revolution or complete circle. $= 360^\circ$ The teacher uses the angle to sing a song. And also work some exercises and ask the pupils some questions.				11. Sing the song "An angle".

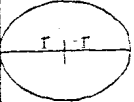
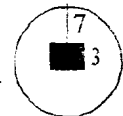
45 minutes x 2

Objectives:	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Strategy Emphasised	Formative Evaluation	Remarks
At the end of the lesson the pupils should be able to: 1. Define a triangle 2. Identify different types of triangle 3. Write at least two properties of each triangle. 4. Draw different type of triangle using ruler, set square or T-square. 5. Use pythagora's theorem to find the length/ sides of triangle. 6. Sing a song using the properties of triangles.	Properties of a Triangle. Triangle: A triangle is a three sided figure with total angle of 180°. Types of triangle 1. Equilateral triangles: This is a triangle with 3 equal side 3 equal angles and 3 lines of symmetry. each angle is 60 with total of 180°  2. Isosceles triangle: An isosceles triangle has two equal sides, two equal base angles and one line of symmetry.  3. Scalene triangle: This type of triangle has unequal sides and angles it has no line of symmetry.  Right angle triangle has one right angle (90°) that face the hypotenuse. Opposite Adjacent Hypotenuse (longest side) For and given right angle triangle: The area of the square on the hypotenuse is equal to the sum of areas of the square on the other two sides. $a^2 = b^2 + c^2$ OR $a = \sqrt{b^2 + c^2}$	The teacher introduces the different type of triangle after giving the definition. The teacher guides the pupils in measuring different types of triangle with different length sides. Work exercise involving pythagora's theorem. The teacher introduces the song and asks questions to know how far the pupils understands the songs and how to apply it.	Ruler, Pencil, T-set, set square, cardboard, paper model charts.	The pupils participate actively in measuring and cutting the shapes, they also draw triangular shapes in their note books. They contribute in naming the properties of each triangle based on their observation. They also fold the cardboard papers to identify the lines of symmetry. They repeat the song after the teacher and memorise the verses of the songs. The pupils sing the song by groups, in rows and later one after the other	Illustration, examples, questioning, explanation, repetitions, songs, figure, with total angle of 180° (2 times). We have 3 types of triangle Equilateral triangle has 3 equal sides 3 equal angles 3 lines of symmetry Isosceles triangle has 2 equal sides 2 equal angles 1 line of symmetry scalene triangle has unequal sides unequal angles no line of symmetry. Right-angle triangle has the hypotenuse that face the right angle of the triangle (2 times).	1. Draw an equilateral triangle with sides 5cm and measure the angles. 2. Cut-out a scalene triangle of sides 5cm, 7cm and 9cm. 3. Calculate the length x in the figure.  Oral Questions 1. How many lines of symmetry has an isosceles triangle? 2. Which type of triangle has three lines of symmetry? 3. What type of triangle is this?  4. Sing the song "Triangle"	45 minutes x 2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Emphasized/ Strategy	Formative Evaluation	Remark
Area and Perimeter Area: The area of any given shape is the amount of surface covered by all the sides of that shape. Basic unit of Area is square. Perimeter: The perimeter of any shape is the length of the outer boundary of that shape. That is the distance round the edge of the shape or figure. In other words Area means product of the sides while perimeter is the totality of all the sides. Area and perimeter of a square A square is a shape with 4 equal sides E.g  Area of a square = side x side or $L \times L$ $\text{Area} = L^2 = 5\text{cm} \times 5\text{cm} = 25\text{cm}^2$ Perimeter of a square = $L + L + L + L$ (Totality of all the 4 sides) = $4L$ Perimeter of a square = $4 \times L = 4L$ since the side = 5cm, = $5\text{cm} + 5\text{cm} + 5\text{cm} + 5\text{cm}$ Perimeter = $4 \times 5\text{cm} = 20\text{cm}$ Example (2): Find the length of a square whose area is 81m^2 <u>Solution</u> Area of a square = $L \times L$ $81\text{m}^2 = L^2$ $\sqrt{81\text{m}^2} = \sqrt{L^2}$ $\sqrt{9 \times 9\text{m}} = L$ $9\text{m} = L$ Eg 3: The perimeter of a square is length 64cm^2. Find its area. <u>solution</u> Perimeter = $4 \times L = 4L$ $\frac{64\text{cm}}{4} = \frac{4 \times L}{4}$ (Divide both sides by 4) $16\text{cm} = L$ Area = $L \times L = 16\text{cm} \times 16\text{cm} = 256\text{cm}^2$	The teacher explains the meaning of Area and perimeter of shapes with of shapes with diagrams for illustration The teacher gives some examples to explain area and perimeter of a square and then introduce the song titled "Area and Perimeter" Area and perimeter (2times) The area of a square is $L \times L$ perimeter of a square is $4 \times \text{length}$.... The teacher gives more exercises based on the treated topic.	Cut- out cardboard paper with different four equal sides (squares) Understanding mathematics Book 5&6, mathematics inside out for schools and all entrance Examinations. Square cardboard of length 5cm Model of a square	The pupils read out the meaning of Area and perimeter They cut-out a square shapes of different lengths and calculate their areas and perimeter and also derive formula to find the length of a square. They repeat the song following teachers tone and memorize it. They work more exercises on their own.	Higher-order question, lower order questions, examples, illustrations, explanations, eye contact, re-enforcement variety:-songs of a square The area of a square = $L \times L$ perimeter of a square = $4 \times L$...	Class work 1. Define area of a shape. If the length of a square is 7cm. Find 2. Its area 3. Its perimeter 4. Find the length of a square whose perimeter is 16cm. 5. Find the perimeter of a square with area 25cm^2 6. Sing the song "Area and perimeter"	45 minutes x 2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
Area and perimeter of a Rectangle. A rectangle is a four sides shape with 2 opposite sides equal.  Area of a rectangle = Length x breadth = $L \times b$ Area of the rectangle = $7\text{cm} \times 4\text{cm}$ = 28cm^2 Perimeter of a rectangle = $L + b + L + b$ = $L + L + b + b$ (collection of like terms) = $2L + 2b = 2(L + b)$ factorization) = $2(7\text{cm} + 4\text{cm}) = 2(11\text{cm})$ = 22cm. E.g (2) if the area of a rectangle is 128m^2 and its length is 16m. Find its perimeter. Solution Area of a rectangle = $L \times b$ $128\text{m}^2 = 16\text{m} \times b$ (Divide via by 16) $16\text{m} \quad 16\text{m}$ $8\text{m} = b$ Perimeter = $2(L + b)$ = $2(8\text{m} + 16\text{m})$ = $2(24\text{m}) = 48\text{m}$.	The teacher work more examples to illustrate how to find the area, perimeter, length and breadth of a rectangle. The teacher writes and sing a song thus: Area and perimeter (2 times) The area of a square = $L \times L$ The area of a rectangle = $L \times b$ Perimeter of a square = $4 \times L$ perimeter of a rectangle is $L + b \times 2...$ The teacher ask the pupils to sing the song in rows, boys and girls.	Rectangular cut- out cardboard paper with different length and breadth sizes. Model of rectangle.	The pupils cut out a rectangular shapes with different sizes of length and breadth. They derive the formular for area and perimeter of rectangle and use it to find the area and perimeters of the cut out shapes. They sing the song using area and perimeter and use the formular to solve problems involving area and perimeter of plane shapes (rectangle).	Higher order questions, lower order questions, examples, illustrations, reinforcement, songs, repetitions.	<u>Home work</u> - Find the area and perimeter of the figure.  - Find the breadth of a rectangle whose area is 63m^2 with length 9m. - A table has an area of 1.44m^2. If its length is 1.2m finds its breadth. - Find the perimeter of a rectangle football field 100m long and 60m wide.	45 minutes x2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphasised	Formative Evaluation	Remark
Area and Perimeter of a Triangle. Triangle: A triangle is a three (3) E.g (1)  $h = \text{height}$ $b = \text{base}$ Area of a triangle $= \frac{1}{2} b \times h$ $= \frac{b \times h}{2}$ $A = b \times h$ (cross and multiply) $2A = b \times h$ $2A = \frac{b \times h}{2}$ (Divide both sides by $\frac{b}{2}$) $2A = h$ and $\frac{2A}{2} = \frac{b}{2} \times h$ From the above, Area $= \frac{1}{2} b \times h$ $= \frac{6\text{cm} \times 9\text{cm}}{2} = 54\text{cm}^2$ E.g (2) The area of triangle is 56m^2. If the height is 8m, find the base. Area of a triangle $= \frac{b \times h}{2}$ $56\text{m}^2 = \frac{b \times 8\text{m}}{2}$ (cross and multiply) $56\text{m}^2 \times 2 = b \times 8\text{m}$ $112\text{m}^2 = b \times 8\text{m}$ (Divide both sides by 8m) $14\text{m} = b$ E.g (3) calculate the perimeter of the figure below  Perimeter = total length of the triangle $= 6\text{cm} + 9\text{cm} + 11\text{cm}$ $= 26\text{cm}$	The teacher presents different shapes of different cut-out from cardboard and model and also measure the height, length and the base length of the triangles, use them to calculate their areas and perimeter. The teacher also sing the song that will lead to memorization of the formula for the pupils to sing and memorize. The teacher work more examples for the pupils to follow and copy. The teacher asks and answer questions to the pupils.	Model of triangles and cut-out triangles shapes from cardboard.	The pupils practise finding area and perimeter of triangles They practise breaking gives figures into rectangle and triangle and finding the areas. They sing the songs by groups (boys and girls) rows and one after the other following the teachers guide and tone.	Questioning, use of examples, illustration, explanations, variety, eye contact, re-enforcement, songs:- Areas and perimeter (2 times) The area of a square is $L \times L$. The area of a rectangle $= L \times b$ The area of a triangle $= \frac{1}{2} b \times h$ perimeter of a square is $4 \times L$ perimeter of a triangle = sum of all sides perimeter of a rectangle is $2L + 2b$. repetition skill	1. Find the area of the unshaded portion  2. What is the perimeter of a triangles with sides 5cm by 7cm 9cm? 3. The area of triangle 24m^2, if the base is 6cm, find its height. 4. Write down the formula for finding the area of a triangle. 5. Write the formula for finding the base of a triangle.	45 minutes x 2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased Strategy	Formative Evaluation	Remark
Circle: circle is a perfect round plane figure. Examples of a circle are: coins, wheels, rings, tyres, tins etc.  Area of a circle $= r \times r \times \pi$ $= \pi r^2$ where $\pi = \frac{22}{7}$ Note: $r + r = D$ (diameter) $2r = D$ $r = \frac{D}{2}$ Area of a circle $= \pi r^2$ or $\pi \left(\frac{D}{2}\right)^2$ Perimeter of a circle $= (r+r) \times \pi$ $= 2r \times \pi$ $= 2\pi r$ or $= \pi D$  Area $= \pi r^2 = \frac{22}{7} \times 7 \times 7 \text{cm}$ $= 154 \text{cm}^2$ Perimeter $= 2\pi r = \frac{2 \times 22}{7} \times 7 \text{cm}$ $= 44 \text{cm}$  Area $= 616 \text{cm}^2$ Find x $A = \pi r^2$ $616 \text{m}^2 = \frac{22}{7} \times r^2$ {Divide both sides} $\frac{616 \text{m}^2 \times 7}{22} = \frac{22 \times r^2}{7}$ $616 \text{m}^2 \times \frac{7}{22} = \frac{22 \times r^2}{7}$ $196 \text{m}^2 = r^2$ $\frac{196 \text{m}^2}{22} = \frac{22 \times r^2}{7}$ $196 \text{m}^2 = 14 \text{m} = r$	The ask the pupils to name other circular objects. The teacher also guide them in drawing circles and measuring the diameter and the radius The teacher sing the whole songs comprising area and perimeter of plane shapes (square, rectangle, triangle and circle) thus: Area and perimeter (2 times). The area of a square is $= L \times L$ The area of a rectangle $= L \times b$ The area of triangle $= \frac{1}{2} b \times h$ The area of a circle $= \pi r^2$ Perimeter of a square $= 4 \times L$ Perimeter of a triangle = sum of all sides. Circumference of a circle $= 2\pi r$ perimeter of a rectangle $= (L+b) \times 2$ while the volume is $L \times b \times h$ (2 times). The teacher work more examples to illustrate how to apply the formular in the songs for caculations.	Model circles cut-out from cardboard with different diameter and radius. Model of semi-circle, ruler, scissors, razor blade, protractor.	The pupils follows the teacher's guide and derive formular for area and perimeter or circumference of a circle. They sing the songs and memorize it. They retrive the formulars in the songs to solve problems involving area and perimeter of plane shapes. The notes the formular of pie (π) as $\frac{22}{7}$. They also work some execrises by skeching circle and identifying the raduis and diameter.	Illustrations, examples, questioning, re-enforcement, varieties- song, repetitions.	1. Write the relationship between circumference and diameter  2. Find the area of the unshaded portion.  3. Circulmference $= 88 \text{cm}$. Find the value of r. 4. Find the area of a circle whose circumference is 154cm. 5. Write the formular for finding the area of a circle.	45 minutes x 2

PLAN OF WORK FOR TEACHING THE CONTROL GROUP (TEACHING WITHOUT SONGS)

Subject: Mathematics

Class: Primary five pupils

Topics:

- (i) Roman numerals
- (ii) Simple interest
- (iii) Angles
- (iv) Triangle
- (v) Area and perimeter of plane shapes

Duration: Total of 4 weeks (45 minutes each period)

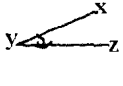
~~Area of perimeter~~ Objectives: At the end of the lesson, the pupils should be able to:

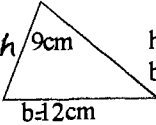
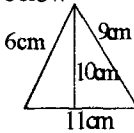
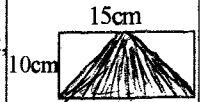
- 1) Explain the meaning of Area and perimeter.
- 2) Find the Area and Perimeter of - Square, Rectangle, Triangle and Circle
- 3) Derive formular for Area and Perimeter/ Circumference of a Circle, Rectangle and Square.
- 4) Find the area and perimeter of irregular shapes/ borders and shaded portions.

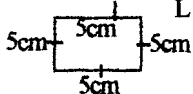
Entry beahaviour : The pupils should be asked to identify and name shapes like. Square Rectangle, Triangle, Circle, Trapezium, Kite and their properties.

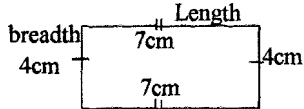
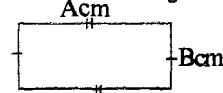
Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remarks
At the end of the lesson, the pupils should be able to. 1. Read Roman numerals up to 1000. 2. Write up to 1000 3. Write the place value of each numeral in normal form. 4. Working exercises involving Roman numerals.	Roman Numerals I = 1, V = 5, X = 10 L = 50, C = 100, D = 500 and M = 1000. Repetitive property: I = 1, xx = 20 II = 2, CCC = 300 III = 3, MM = 2000. Subtractional property IIII = 4 = IV = 5 - 1 or I before 4, IX = 9 XL = 40, XC = 90 CD = 400 and CM = 900 Combination of both properties. <u>Examples</u> 1. 34 = XXXIV 2. 44 = 40 + 4 = XLIV 3. 29 = 20 + 9 = XXIX 4. 345 = 300 + 40 + 5 = CCC XLV 5. 923 = 900 + 20 + 3 = CMXXIII 6. 2999 = 2000 + 900 90 + 9 = MMCMXCIX 7. 1378 = 1000 + 30 + 70 + 8 = MCCCLXXVIII	The teacher ask questions on the basic numerals of Hindu Arabic, that is 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. Then introduces the basic numerals of Roman figures as I, V, X, L, C, D, M and use them to sing a song. The teacher also explain the closeness of Roman numerals to nature, that is, V = 5 for the hand and X = 10 for double. The teacher demonstrates this with her hands. V ^ The teacher also explains with illustrations the subtractional and repetitive property and the use of the combination properties. Examples and exercises are given.	Charts and Text Books.	They pupils follows the teachers guide to form Roman numerals 1- x using their fingers. They practise reading and singing the Roman basic numerals. They also pronounce the numerals with subtractive property thus: 4 = IV 9 = IX 40 = XL 90 = XC 400 = CD 900 = CM	Questioning, use of examples, illustration, demonstration, repetition, explanation.	Classwork Write the following in Roman 1. 27 = 2. 385 = 3. 1999 = 4. 2002 = 5. 479 Express in Arabic 1. XIX = 2. CMX = 3. XLIV = 4. DCLXV = 5. MCDVII =	45 minutes x 2

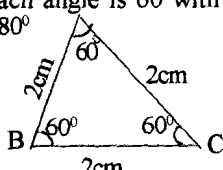
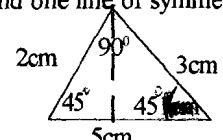
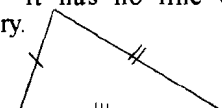
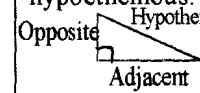
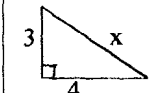
Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
At the end of the lesson, the pupils should be able to. 1. Explain interest. 2. Identify the principal, Rate and time in a given problem. 3. Calculate simple interest . 4. Calculate the amount.	Simple interest: Interest is always reckoned as a percentage to be paid every year on the sum of money borrowed or lent. It is called the rate per cent annum. The sum of money lent or borrowed is called principal. The length or period of the loan or money borrowed is called time. $\text{Interest} = \frac{P \times R \times T}{100} \text{ or } \frac{P \times R \times T}{100}$ Where P= principal, R = rate and T = Time. $\text{Amount} = P + S.I$ $P = \frac{S.I \times 100}{R \times T}$ $R = \frac{S.I \times 100}{P \times T}$ $T = \frac{S.I \times 100}{P \times R}$ <u>Example:</u> Find the simple interest on ₦300 for 3 years , 6 month at 3% $S.I = \frac{PRT}{100} \quad P = ₦300$ $R = 3\%, T = 3\frac{1}{2} = 7/2 \text{ years}$ Note: Always change months to year(s) by dividing with 12 $S.I = \frac{₦300 \times 3 \times \frac{7}{2}}{100} = ₦63$ = ₦36.5 interest	The teacher explains the term simple interest, principal, rate and time and also teach them how to device the formular for each of them by making them the subject of the formular. The teacher also work more examples on how to calculate the interest, principal, rate, time and amount.	Text Books.	They apply the formulars in solving problems invovling simple interest, principal, rate, time and amount. They also work some exercises.	Examples, illustrations, explanations, questioning, non- verbal communication and verbal communication, repetition.	1. Find the simple interest on ₦100 for 2 years at 5% rate. 2. Find the amount when ₦200 is deposited in a bank for 2 years at 2% rate. 3. Find the principal which will gain ₦50 in a year at 10%. 4. For how long will I leave ₦4000 in a bank to earn an interest of ₦480, the rate being 3% per annum simple interest? 5. Write the formular for finding the rate.	45 minutes x2

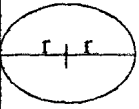
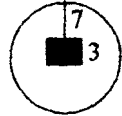
Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation/Remarks
At the end of the lesson, the pupils should be able to. 1. Identify acute, right, obtuse, straight and reflex angles. 2. Draw right angles, acute angles, obtuse and reflex angles.	Angle: An angle is the amount of rotation/turning. It is formed when two straight lines meet. Example  Angle Types of an Angle 1. Acute angles: This is an angle which is less than 90°  $\angle XYZ$ is less than 90° 2. Right angle is angle at 90°  It is formed at a point where the vertical line meets the horizontal line 3. Obtuse angle: Angle greater than 90°, but less than 180°.  4. Straight angle is angle at 180°  $180^\circ = 2$ right angles 5. Reflex angle: This is an angle greater than 180°, but less than 360°  6. Complimentary angle: When the sum of 2 angles $= 90^\circ$  $\angle a + \angle b = 90^\circ$ 7. Supplementary angle: When the sum of 2 angles $= 180^\circ$  $\angle x + \angle y = 180^\circ$ 8. Angles at a point / one revolution gives $360^\circ = 4$ right angle $= 2$ straight angles	The teacher draw the clock face to illustrate and explain the meaning of an angles and use it to show different types of an angle.  30° Acute angle 90° Right angle 180° Straight angle 240° Reflex 120° Obtuse One revolution or complete circle. $= 360^\circ$ The teacher work some exercises and ask the pupils some questions.	Samples of plane shapes cut-out from cardboard paper. The square, triangle, trapezium, kites, etc.	Pupils makes square corners following the teacher guide to illustrate angles in plane shapes. Examples: square for right angle, Triangle for acute angle, kites and Trapezium for obtuse. They also draw each type of angles locating angles in the classroom and out side the school environment using the compass to measure them.	Questioning, use of examples, explanations, illustration, re-enforcement, non-verbal communication.	Oral What type of angle does each of the following belong to: 8° 100° 79° 90° 360° 253° 180° 89.4° - What is the complementary angle of 85° 2° / 35° Find the value of a° 45 minutes x 2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased Strategy	Formative Evaluation	Remark
Area and Perimeter of a Triangle. Triangle. A triangle is a three (3) E.g (1)  h= height b= base b=2cm Area of a triangle = $\frac{1}{2} b \times h$ = $\frac{b \times h}{2}$ A = b x h (cross and multiply) 2A = b x h $\frac{2A}{2} = \frac{b \times h}{2}$ (Divide both sides by b) $\frac{2A}{b} = h$ and $\frac{2A}{h} = b$ From the above, Area = $\frac{1}{2} 12\text{cm} \times 9\text{cm}$ = $6\text{cm} \times 9\text{cm} = 54\text{cm}^2$ E.g (2) The area of triangle is 56m². If the height is 8m, find the base. Area of a triangle = $\frac{b \times h}{2}$ 56m² = $\frac{b \times 8\text{m}}{2}$ (cross and multiply) 56m² x 2 = b x 8m $\frac{112\text{m}^2}{8\text{m}} = \frac{b \times 8\text{m}}{8\text{m}}$ (Divide both sides by 8m) 14m = b. E.g (3) calculate the perimeter of the figure below  Perimeter = total length of the triangle = 6cm + 9cm + 11cm = 26cm.	The teacher presents different shapes of different cut-out from cardboard and model and also measure the height, length and the base length of the triangles. use them to calculate their areas and perimeter. The teacher work more examples for the pupils to follow and copy. The teacher asks and answer questions to the pupils.	Model of triangles and cut-out triangles shapes from cardboard.	The pupils practise finding area and perimeter of triangles of examples, They practise breaking given figures into rectangle and triangle and finding the areas.	Questioning, use of examples, illustration, explanations, variety, eye contact, re-enforcement,	1. Find the area of the unshaded portion  2. What is the perimeter of a triangles with sides 5cm by 7cm 9cm?. 3. The area of triangle 24m², if the base is 6cm. find its height. 4. Write down the formular for finding the area of a triangle. 5. Write the formular for find-the base of a triangle.	45 minutes x 2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Emphased/ Strategy	Formative Evaluation	Remark
Area and Perimeter Area: The area of any given shape is the amount of surface covered by all the sides of that shapes. Basic unit of Area is square. Perimeter: The perimeter of any shape is the length of the outerboundary of that shape. That is the distance round the edge of the shape or figure. In other words Areas means product of the sides while perimeter is the totality of all the sides. Area and perimeter of a square A square is a shape with 4equal sides E.g  Area of a square = side x side or $L \times L$ Area = $L^2 = 5\text{cm} \times 5\text{cm} = 25\text{cm}^2$ Perimeter of a square = $L + L + L + L$ (Totality of all the 4 sides) = $4L$ Perimeter of a square = $4 \times L = 4L$ since the side = 5cm, = $5\text{cm} + 5\text{cm} + 5\text{cm} + 5\text{cm}$ Perimeter = $4 \times 5\text{cm} = 20\text{cm}$ Example (2): Find the length of a square whose area is 81m^2 <u>Solution</u> Area of a square = $L \times L$ $81\text{m}^2 = L^2$ $\sqrt{81\text{m}^2} = L$ $\sqrt{9\text{m} \times 9\text{m}} = L$ $9\text{m} = L$ Eg 3: The perimeter of a square is length 64cm^2. Find its area. <u>solution</u> Perimeter = $4 \times L = 4L$ $\frac{64\text{cm}}{4} = \frac{4 \times L}{4}$ (Divide both sides by 4) $16\text{cm} = L$ Area = $L \times L = 16\text{cm} \times 16\text{cm} = 256\text{cm}^2$	The teacher explains the the meaning of Area and perimeter of shapes with of shapes with diagrams for illustration The teacher gives some examples to explain area and perimeter of a square	Cut- out carboard paper with different four equal sides (squares) Understanding mathematics Book 5&6, mathemtics inside out for schools and all entrance Examinations. Square cardboard of length 5cm Model of a square	The pupils read out the meaning of Area and perimeter They cut-out a square shapes of different lengths and calculate their areas and perimeter and also derive formular to find the length of a square. They work more exercises on their own.	Higher-order question, lower order questions, examples, illustrations, explanations, eye contact, re-enforcement	Class work 1. Define area of a shape. If the length of a square is 7cm. Find 2. Its area 3. Its perimeter 4. Find the length a square whose perimeter is 16cm. 5. Find the perimeter of a square with area 25cm^2	45 minutes x 2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
Area and perimeter of a Rectangle. A rectangle is a four sides shape with 2 opposite sides equal.  Area of a rectangle = Length x breadth = L x b Area of the rectangle = 7cm x 4cm = 28cm² Perimeter of a rectangle = L + b + L + b = L + L + b + b (collection of like terms) = 2L + 2b = 2(L + b) factorization) = 2(7cm + 4cm) = 2(11cm) = 22cm. E.g (2) if the area of a rectangle is 128m² and its length is 16m. Find its perimeter. Solution Area of a rectangle = L x b 128m² = 16m x b (Divide via by 16) 16m 16m 8m = L Perimeter = 2(L + b) = 2(8m + 16m) = 2(24m) = 48m.	The teacher work more examples to illustrate how to find the area, perimeter, length and breadth of a rectangle.	Rectangular cut- out cardboard paper with different length and breadth sizes. Model of rectangle.	The pupils cut out a rectangular shapes with different sizes of length and breadth. They derive the formular for area and perimeter of rectangle and use it to find the area and perimeters of the cut out shapes. They use the formular to solve problems involving area and perimeter of plane shapes (rectangle).	Higher order questions, lower order questions, examples, illustrations, re-enforcement, repetitions.	<u>Home work</u> - Find the area and perimeter of the figure.  - Find the breadth of a rectangle whose area is 63m² with length 9m. - A table has an area of 1.44m². If its length is 1.2m finds its breadth. - Find the perimeter of a rectangle football field 100m long and 60m wide.	45 minutes x2

Objectives:	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Strategy Emphased	Formative Evaluation	Remarks
At the end of the lesson, the pupils should be able to: - Define a triangle - Identify different types of triangle - Write at least two properties of each triangle. - Draw different type of triangle using ruler, set square or T- square. - Use pythagora's theorem to find the lenght/ sides of traingle.	Properties of a Triangle. Triangle: A triangle is a three sided figure with total angle of 180°. Types of triangle Equilateral triangles: This is a triangle with 3 equal side 3 equal angles and 3 lines of symmetry. each angle is 60 with total of 180°  Isosceles triangle: An isosceles triangle has two equal sides, two equal base angles and one line of symmetry.  Scalene triangle: This type of triangle has unequal sides and angles it has no line of symmetry.  Right angle triangle has one night angle (90°) that face the hypoethemous.  For and given right angle triangle: The area of the square on the hypothenuse is equal to the sum of areas of the square on the other two sides $a^2 = b^2 + c^2 \text{ or } a = \sqrt{b^2 + c^2}$	The teacher introduces different type of triangle after giving the definition. The teacher guides the pupils in measuring different types of triangle with different lenght sides. Work exercise involving pythagora's theorem.	Ruler, Pencil, T-set, set square, cardboard paper model charts.	The pupils participate actively in measuring and cutting the shapes, they also draw triangular shapes in their note books. They contributes in naming the properties of each triangle based on their observation. They also fold the cardboard papers to identify the lines of symmetry.	Illustration, examples, Questioning, explanation, repetitions.	- Draw an equilateral triangle with sides 5cm and measure the angles. - Cut-out a scalene triangle of sides 5cm, 7cm and 9cm. - Calculate the length x in the figure.  Oral Questions - How many lines of symmetry has an - Isosceles triangle? - Which type of triangle has three lines of symmetry? - What type of triangle is this? 	45 minutes x 2

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased Strategy	Formative Evaluation	Remark
Circle: circle is a perfect round plane figure. Examples of a circle are: coins, wheels, rings, tyres, tins etc.  Area of a circle $= r \times r \times \pi$ $= \pi r^2$ where $\pi = \frac{22}{7}$ Note: $r + r = D$ (diameter) $2r = D$ $r = \frac{D}{2}$ Area of a circle $= \pi r^2$ or $\pi \left(\frac{D}{2}\right)^2$ Perimeter of a circle $= (r+r) \times \pi$ $= 2r \times \pi$ $= 2\pi r$ or $= \pi D$  Area $= \pi r^2 = \frac{22}{7} \times 7 \times 7 \text{ cm}$ $= 154 \text{ cm}^2$ Perimeter $= 2\pi r = \frac{2 \times 22}{7} \times 7 \text{ cm}$ $= 44 \text{ cm}$  Area $= 616 \text{ cm}^2$ Find x $A = \pi r^2$ $616 \text{ m}^2 = \frac{22}{7} \times r^2$ {Divide both sides} $\frac{616}{7} = \frac{22}{7} \times r^2$ {by $\frac{22}{7}$} $616 \text{ m}^2 \times \frac{7}{22} = \frac{22}{7} \times \frac{7}{22} \times r^2$ $196 \text{ m}^2 = r^2$ $\frac{616}{22} \times \frac{7}{7} = \frac{22}{22} \times \frac{7}{7} \times r^2$ $196 \text{ m}^2 = 14 \text{ m} = r$	The ask the pupils to name other circular objects. The teacher also guide them in drawing circles and measuring the diameter and the radius The teacher work more examples to illustrate how to apply the formular for caculations.	Model, circles cut-out from cardboard with different diameter and radius. Model of semi -circle, ruler, scissors, razor blade, protractor.	The pupils follows the teacher's guide and derive formular for area and perimeter or circumference of a circle. They notes the formular of pie (π) as $\frac{22}{7}$. They also work some execrises by skeching circle and identifying the raduis and diameter.	Illustrations, examples, questioning, re-enforcement, varieties-repetitions.	1. Write the relationship between circumference and diameter 2.  Find the area of the unshaded portion. 3.  Circumference $= 88 \text{ cm}$. Find the value of r. 4. Find the area of a circle whose circumference is 154 cm. 5. Write the formular for finding the area of a circle.	45 minutes x 2

APPENDIX 1

PLAN OF WORK FOR TEACHING THE TREATMENT GROUP (TEACHING WITH SONGS)

Subject: Mathematics

Class: Primary five pupils

Topics: (i) Roman numerals

(ii) Simple interest

(iii) Angles

(iv) Triangle

(v) Area and perimeter of plane shapes:

- Square
- Rectangle
- Triangle
- Circle

Duration: Total of 4 weeks (45 minutes each period)

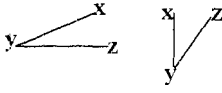
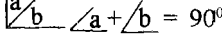
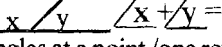
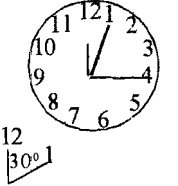
Roman Numerals

Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remarks
At the end of the lesson, the pupils should be able to. 1. Read Roman numerals up to 1000. 2. Write up to 1000 3. Write the place value of each numeral in normal form. 4. Sing a song using the key (basic) numerals I, V, X, L, C, D, M. 5. Apply the songs in working exercises involving Roman numerals.	Roman Numerals I= 1, V= 5, X=10 L= 50, C= 100, D =500 and M= 1000. Repetitive property: I = 1, xx=20 II = 2, CCC = 300 III = 3, MM = 2000. Subtractional property IIII = 4 = IV = 5 -1 or I before 4, IX=9 XL = 40 , XC = 90 CD = 400 and CM =900 Combination of both properties. <u>Examples</u> 1. 34 = XXXXIV 2. 44 = 40 + 4 = XLIV 3. 29 = 20 + 9 = XXIX 4. 345 = 300 + 40 + 5 = CCC XLV 5. 923 = 900 + 20 +3 = CMXXIII 6. 2999 = 2000 + 900 90+ 9= MMCMXCIX 7. 1378 = 1000 + 30 + 70 +8= MCCCLXXVIII	The teacher ask questions on the basic numerals of Hindu Arabic, that is 0,1,2,3,4,5, 6,7,8, and 9. Then introduces the basic numerals of Roman figures as I, V, X, L, C, D, M and use them to sing a song. The teacher also explain the closeness of Roman numerals to nature, that is, V= 5 for the hand and X= 10 for double. The teacher demonstrates this with her hands. The teacher also explains with illustrations the subtractional and repetitive property and the use of the combination properties. Examples and exercises are given which will require the application of the songs.	Charts and Text Books.	They pupils follows the teachers guide to form Roman numerals 1- x using their fingers. They practise reading and singing the Roman basic numerals. They also pronounce the numerals with subtractive property thus: 4=IV 9=IX 40=XL 90=XC 400=CD 900=CM	Questioning, use of examples, illustration, demonstration, repetition, explanation, use of songs: The song Roman numerals IVX, LCDM, IVX which represents 1,5,10, 50, 100, 500 and 1000 (2 times) I- 1 V = 5 X= 10 L= 50 C= 100 D= 500 M= 1000	Classwork Write the following in Roman 1. 27= 2. 385= 3. 1999= 4. 2002= 5. 479 Express in Arabic 1. XIX= 2. CMX= 3. XLIV= 4. DCLXV= 5. MCDVII= 6. Sing the song "Roman Numeral"	45 minutes x 2

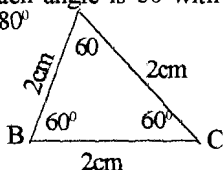
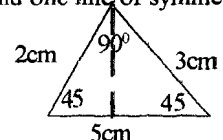
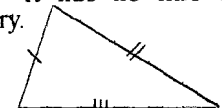
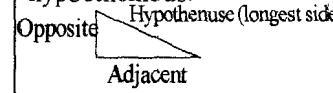
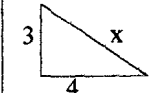
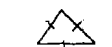
Simple Interest

Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
At the end of the lesson, the pupils should be able to. 1. Explain interest. 2. Identify the principal, Rate and time in a given problem. 3. Calculate simple interest. 4. Calculate the amount. 5. Sing a song Titled "Simple interest" and use it to solve problems involving the calculation of simple interest principal, Rate, Time and Amount.	Simple interest: Interest is always reckoned as a percentage to be paid every year on the sum of money borrowed or lent. It is called the rate per cent annum The sum of money lent or borrowed is called principal. The length or period of the loan or money borrowed is called time. Interest = $\frac{P \times R \times T}{100}$ or $P \times \frac{R \times T}{100}$ Where P= principal, R = rate and T = Time. Amount = P + S.I $P = \frac{S.I \times 100}{R \times T}$ $R = \frac{S.I \times 100}{P \times T}$ $T = \frac{S.I \times 100}{P \times R}$ <u>Example:</u> Find the simple interest on ₦300 for 3 years, 6 month at 3% $S.I = \frac{PRT}{100}$, P= ₦300 $R = 3\%$, $T = 3\frac{1}{2} = 7/2$ years Note: Always change months to year(s) by dividing with 12 $S.I = \frac{₦300 \times 3 \times \frac{7}{2}}{100} = \frac{₦63}{2}$ = ₦36.5 interest	The teacher explains the term simple interest, principal, rate and time and also teach them how to device the formular for each of them by making them the subject of the formular. The teacher also work more examples on how to calculate the interest, principal, rate, time and amount. The teacher then uses the formular to teach a song titled "simple interest".	Text Books.	They repeat the song after the teacher in groups. Pupils also sing the song individually to know how far they have memories the song. They also recite the song and apply the formulars in solving problems involving simple interest, principal, rate, time and amount. They also work some exercises.	Examples, illustrations, explanations, questioning, non- verbal communication and verbal communication, songs: Simple interest (2 times). The formular for simple interest is $\frac{PRT}{100}$ P is for principal R is for Rate and T is for Time (2 times). The formular for P is $\frac{S.I \times 100}{RT}$ (2 times) The formular for R is $\frac{S.I \times 100}{PT}$ (2 times) The formular for T is $\frac{S.I \times 100}{PR}$ (2 times) The amount is the principal + interest (2 times).	1. Find the simple interest on ₦100 for 2 years at 5% rate. 2. Find the amount when ₦200 is deposited in a bank for 2 years at 2% rate. 3. Find the principal which will gain ₦50 in a year at 10%. 4. For how long will I leave ₦4000 in a bank to earn and interest of ₦480, the rate being 3% per annum simple interest? 5. Write the formular for finding the rate.	45 minutes x2

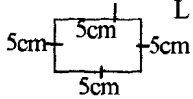
Angles

Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation/Remarks
At the end of the lesson, the pupils should be able to. 1. Identify acute, right, obtuse, straight and reflex angles. 2. Draw right angles, acute angles, obtuse and reflex angles. 3. Sing a song using an angle and its type.	Angle: An angle is the amount of rotation/turning. It is formed when two straight lines meet. Example  Angle Types of an Angle 1. Acute angles: This is an angle which is less than 90°  xyz is less than 90° 2. Right angle is angle at 90°  It is formed at a point where the vertical line meets the horizontal line 3. Obtuse angle: Angle greater than 90°, but less than 180°.  4. Straight angle is angle at 180°  $180^\circ = 2$ right angles 5. Reflex angle: This is an angle greater than 180°, but less than 360°  6. Complimentary angle: When the sum of 2 angles $= 90^\circ$  $\angle a + \angle b = 90^\circ$ 7. Supplementary angle: When the sum of 2 angles $= 180^\circ$  $\angle x + \angle y = 180^\circ$ 8. Angles at a point /one revolution gives $360^\circ = 4$ right angle $= 2$ straight angles	The teacher draw the clock face to illustrate and explain the meaning of an angles and use it to show different types of an angle.  Acute angle Right angle Straight angle Reflex Obtuse One revolution or complete circle. $= 360^\circ$ The teacher uses the angle to sing a song. And also work some exercises and ask the pupils some questions.	Samples of plane shapes cut-out from cardboard paper. The square, triangle, trapezium, kites, etc.	Pupils makes square corners following the teacher guide to illustrate angles in plane shapes. Examples: square for right angle, Triangle for acute angle, kites and Trapezium for obtuse. They also draw each type of angles locating angles in the classroom and outside the school environment using the compass to measure them. They also sing the song with angles and memorise it to enable them solve problems involving angles and its type.	Questioning, use of examples, explanations, illustration, re-enforcement, non-verbal communication, the use of song: An angle is formed when 2 straight lines meet. An angle is the amount of rotation. Types of an angle are: Acute angel: Angles that are less than 90° Right angle is equal to 90° Obtuse angles are greater than 90°, but less than 180° straight angles are greater than 180°, but less than 360° One revolution is angle at a point that gives us 360° (2 times).	Oral What type of angle does each of the following belong to: 1. 8°- 2. 100°- 3. 79°- 4. 90°- 5. 360°- 6. 253°- 7. 180°- 8. 89.4°- 9. What is the complementary angle of 85° 10. $\frac{a^\circ}{35^\circ}$ Find the value of a° 11. Sing the song "An angle". 45 minutes x 2

Properties of a Triangle

Objectives:	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Strategy Emphasized	Formative Evaluation	Remarks
At the end of the lesson, the pupils should be able to: 1. Define a triangle 2. Identify different types of triangle 3. Write at least two properties of each triangle. 4. Draw different type of triangle using ruler, set square or T- square. 5. Use pythagora's theorem to find the lenght/ sides of traingle. 6. Sing a song using the properties of triangles.	Properties of a Triangle. Triangle: A triangle is a three sided figure with total angle of 180°: Types of triangle 1. Equilateral triangles: This is a triangle with 3 equal side 3 equal angles and 3 lines of symmetry. each angle is 60 with total of 180°  2. Isosceles triangle: An isosceles triangle has two equal sides, two equal base angles and one line of symmetry.  3. Scalene triangle: This type of triangle has unequal sides and angles it has no line of symmetry.  Right angle triangle has one right angle (90°) that face the hypoethemous.  For and given right angle triangle: The area of the square on the hypothenuse is equal to the sum of areas of the square on the other two sides. $a^2 = b^2 + c^2 \text{ or } a = \sqrt{b^2 + c^2}$	The teacher introduces different type of triangle after giving the definition. The teacher guides the pupils in measuring different types of triangle with different lenght sides. Work exercise involving pythagora's theorem. The teacher introduces the song and asks questions to know how far the pupils understands the songs and how to apply it.	Ruler, Pencil, T-set, set square, cardboard paper model charts.	The pupils participate actively in measuring and cutting the shapes, they also draw triangular shapes in their note books. They contributes in naming the properties of each triangle based on their observation. They also fold the cardboard papers to identify the lines of symmetry. They repeat the song after the teacher and memorise the verses of the songs. The pupils sing the song by groups, in rows and later one after the other	Illustration, examples, Questioning, explanation, repetitions, songs, "Triangle is a 3 sided figure, with total angle of 180° (2 times). We have 3 types of triangle Equilateral triangle has 3 equal sides 3 equal angles 3 lines of symmetry Isosceles triangle has 2 equal sides 2 equal angles 1 line of symmetry scalene triangle has - unequal sides - unequal angles - no line of symmetry. Right -angle triangle has the hypothenuse that face the right angle of the triangle (2 times).	1. Draw an equilateral triangle with sides 5cm and measure the angles. 2. Cut-out a scalene triangle of sides 5cm, 7cm and 9cm. 3. Calculate the length x in the figure.  Oral Questions 1. How many lines of symmetry has an Isosceles triangle? 2. Which type of triangle has three lines of symmetry? 3. What type of triangle is this?  4. Sing the song "Triangle"	45 minutes x 2

Area and Perimeter of a Square

Intent	Teacher Activity	Instructional Materials	Pupils Activity	Emphasized/ Strategy	Formative Evaluation	
Area and Perimeter Area: The area of any given shape is the amount of surface covered by all the sides of that shape. Basic unit of Area is square. Perimeter: The perimeter of any shape is the length of the outer boundary of that shape. That is the distance round the edge of the shape or figure. In other words Area means product of the sides while perimeter is the totality of all the sides. Area and perimeter of a square A square is a shape with 4 equal sides Eg  L = Length Area of a square = side x side or $L \times L$ $\text{Area} = L^2 = 5\text{cm} \times 5\text{cm} = 25\text{cm}^2$ Perimeter of a square = $L + L + L + L$ (Totality of all the 4 sides) = $4L$ Perimeter of a square = $4 \times L = 4L$ since the side = 5cm, = $5\text{cm} + 5\text{cm} + 5\text{cm} + 5\text{cm}$ Perimeter = $4 \times 5\text{cm} = 20\text{cm}$ Example (2): Find the length of a square whose area is 81m^2. <u>Solution</u> Area of a square = $L \times L$ $81\text{m}^2 = L^2$ $\sqrt{81\text{m}^2} = L$ $\sqrt{9\text{m} \times 9\text{m}} = L$ $9\text{m} = L$ Eg 3: The perimeter of a square is length 64cm^2. Find its area. <u>solution</u> Perimeter = $4 \times L = 4L$ $\frac{64\text{cm}}{4} = \frac{4 \times L}{4}$ (Divide both sides by 4) $16\text{cm} = L$ Area = $L \times L = 16\text{cm} \times 16\text{cm} = 256\text{cm}^2$	The teacher explains the meaning of Area and perimeter of shapes with of shapes with diagrams for illustration The teacher gives some examples to explain area and perimeter of a square and then introduce the song titled "Area and Perimeter". Area and perimeter (2times) The area of a square is $L \times L$ perimeter of a square is $4 \times \text{length}$.... The teacher gives more exercises based on the treated topic.	Cut- out cardboard paper with different four equal sides (squares) Understanding mathematics Book 5&6, mathematics inside out for schools and all entrance Examinations. Square cardboard of length 5cm Model of a square	The pupils read out the meaning of Area and perimeter They cut-out a square shapes of different lengths and calculate their areas and perimeter and also derive formula to find the length of a square. They repeat the song following teachers tone and memorize it. They work more exercises on their own.	Higher-order question, lower order questions, examples, illustrations, explanations, eye contact, reinforcement variety:-songs of a square The area of a square = $L \times L$ perimeter of a square = $4 \times L$...	Class work 1. Define area of a shape. - If the length of a square is 7cm. Find 2. Its area 3. Its perimeter 4. Find the length of a square whose perimeter is 16cm. 5. Find the perimeter of a square with area 25cm^2 6. Sing the song "Area and perimeter"	45 minutes x 2

Instructional Objectives:

At the end of the lesson,
the pupils should be able
to:

1) Explain the meaning of
Area and perimeter.

2) Find the Area and
Perimeter of - Square,
Rectangle, Triangle and
Circle

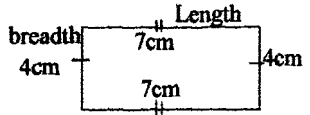
3) Derive formulae for
Area and Perimeter/
Circumference of a
Circle, Rectangle and
Square.

4) Sing a song with the
formulae of area and
perimeter of the above
shapes.

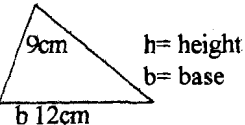
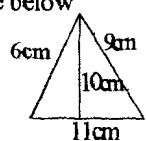
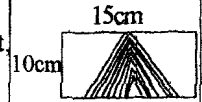
5) Find the area and
perimeter of irregular
shapes/ borders and
shaded portions.

Entry behaviour : The
pupils should be asked to
identify and name
shapes like. Square
Rectangle, Triangle,
Circle, Trapezium, Kite
and their properties.

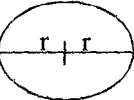
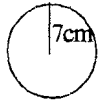
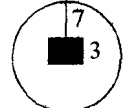
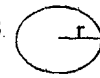
Area and Perimeter of a Rectangle

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
Area and perimeter of a Rectangle. A rectangle is a four sides shape with 2 opposite sides equal.  Area of a rectangle = Length x breadth = $L \times b$ Area of the rectangle = $7\text{cm} \times 4\text{cm}$ = 28cm^2 Perimeter of a rectangle = $L + b + L + b$ = $L + L + b + b$ (collection of like terms) = $2L + 2b = 2(L + b)$ factorization) = $2(7\text{cm} + 4\text{cm}) = 2(11\text{cm})$ = 22cm. E.g (2) if the area of a rectangle is 128m^2 and its length is 16m. Find its perimeter. Solution Area of a rectangle = $L \times b$ $128\text{m}^2 = 16\text{m} \times b$ (Divide via by 16) $16\text{m} \quad 16\text{m}$ $8\text{m} = b$ Perimeter = $2(L + b)$ = $2(8\text{m} + 16\text{m})$ = $2(24\text{m}) = 48\text{m}$.	The teacher work more examples to illustrate how to find the area, perimeter, length and breadth of a rectangle. The teacher writes and sing a song thus: Area and perimeter (2 times) The area of a square = $L \times L$ The area of a rectangle = $L \times b$ Perimeter of a square = $4 \times L$ Perimeter of a rectangle is $L + b \times 2$... The teacher ask the pupils to sing the song in rows boys and girls.	Rectangular cut- out cardboard paper with different length and breadth sizes. Model of rectangle.	The pupils cut out a rectangular shapes with different sizes of length and breadth. They derive the formular for area and perimeter of rectangle and use it to find the area and perimeters of the cut out shapes. They sing the song using area and perimeter and use the formular to solve problems involving area and perimeter of plane shapes (rectangle).	Higher order questions, lower order questions, examples, illustrations, re-enforcement, repetitions and songs.	<u>Home work</u> - Find the area and perimeter of the figure.  - Find the breadth of a rectangle whose area is 63m^2 with length 9m. - A table has an area of 1.44m^2 .If its length is 1.2m finds its breadth. - Find the perimeter of a rectangle football field 100m long and 60m wide.	45 minutes x2

Area and Perimeter of a Triangle

Intent	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased Strategy	Formative Evaluation	Remark
Area and Perimeter of a Triangle. Triangle. A triangle is a three (3) E.g (1)  h= height b= base b 12cm Area of a triangle = $\frac{1}{2} b \times h$ = $\frac{b \times h}{2}$ A = b x h (cross and multiply) 2A = b x h $\frac{2A}{2} = \frac{b \times h}{2}$ (Divide both sides by b) $\frac{2A}{b} = h$ and $\frac{2A}{h} = b$ From the above, Area = $\frac{1}{2} 12\text{cm} \times 9\text{cm}$ = $6\text{cm} \times 9\text{cm} = 54\text{cm}^2$ E.g (2) The area of triangle is 56m^2. If the height is 8m, find the base. Area of a triangle = $\frac{b \times h}{2}$ $56\text{m}^2 = \frac{b \times 8\text{m}}{2}$ (cross and multiply) $56\text{m}^2 \times 2 = b \times 8\text{m}$ $\frac{112\text{m}^2}{8\text{m}} = \frac{b \times 8\text{m}}{8\text{m}}$ (Divide both sides by 8m) $14\text{m} = b$ E.g (3) calculate the perimeter of the figure below  Perimeter = total length of the triangle = $6\text{cm} + 9\text{cm} + 11\text{cm}$ = 26cm	The teacher presents different shapes of different cut-out from cardboard and model and also measure the height, length and the base length of the triangles. use them to calculate their areas and perimeter. The teacher also sing the song that will lead to memorization of the formular for the pupils to sing and memorize. The teacher work more examples for the pupils to follow and copy. The teacher asks and answer questions to the pupils.	Model of triangles and cut-out triangles shapes from cardboard.	The pupils practise finding area and perimeter of triangles. They practise breaking gives figures into rectangle and triangle and finding the areas. They sing the songs by groups (boys and girls) rows and one after the other following the teachers guide and tone.	Questioning, use of examples, illustration, explanations, variety, eye contact, re- enforcement, songs:- Areas and perimeter (2 times) The area of a square is L x L. The area of a rectangle = L x b The area of a triangle = $\frac{1}{2} b \times h$ perimeter of a square is 4 x L perimeter of a triangle = sum of all sides perimeter of a rectangle is L x b x 2. repeation skill	1. Find the area of the unshaded portion  15cm 10cm 2. What is the perimeter of a triangles with sides 5cm by 7cm 9cm?. 3. The area of triangle 24m^2, if the base is 6cm. find its height. 4. Write down the formular for finding the area of a triangle. 5. Write the formular for find- the base of a triangle.	45 minutes x 2

Area and Circumference of a Circle

Intent	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased Strategy	Formative Evaluation	Remark
Circle: circle is a perfect round plane figure. Examples of a circle are: coins, wheels, rings, tyres, tins etc.  Area of a circle $= r \times r \times \pi$ $= \pi r^2$ where $\pi = \frac{22}{7}$ Note: $r + r = D$ (diameter) $2r = D$ $r = \frac{D}{2}$ Area of a circle $= \pi r^2$ or $\pi \left(\frac{D}{2}\right)^2$ Perimeter of a circle $= (r+r) \times \pi$ $= 2r \times \pi$ $= 2\pi r$ or $= \pi D$  Area $= \pi r^2 = \frac{22}{7} \times 7 \times 7 \text{cm}$ $= 154 \text{cm}^2$ Perimeter $= 2\pi r = \frac{2 \times 22}{7} \times 7 \text{cm}$ $= 44 \text{cm}$  Area $= 616 \text{cm}^2$ Find x $A = \pi r^2$ $616 \text{m}^2 = \frac{22}{7} \times r^2$ {Divide both sides} $\frac{616}{7} = \frac{22}{7} \times r^2$ {by $\frac{22}{7}$} $616 \text{m}^2 \times \frac{7}{22} = \frac{22}{7} \times \frac{7}{22} \times r^2$ $196 \text{m}^2 = r^2$ $22 \quad 7 \quad 22, \quad 196 \text{m}^2 = 14 \text{m} = r$	The ask the pupils to name other circular objects. The teacher also guide them in drawing circles and measuring the diameter and the radius The teacher sing the whole songs comprising area and perimeter of plane shapes (square, rectangle, triangle and circle) thus: Area and perimeter (2 times). The area of a square is $= L \times L$ The area of a rectangle $= L \times b$ The area of triangle $= \frac{1}{2} b \times h$ The area of a circle $= \pi r^2$ Perimeter of a square $= 4 \times L$ Perimeter of a triangle = sum of all sides. Circumference of a circle $= 2\pi r$ perimeter of a rectangle $= (L + b) \times 2$ while the volume is $L \times b \times h$ (2 times). The teacher work more examples to illustrate how to apply the formular in the songs for caculations.	Model, circles cut-out from cardboard with different diameter and radius. Model of semi -circle, ruler, scissors, razor blade, protractor.	The pupils follows the teacher's guide and derive formular for area and perimeter or circumference of a circle. They sing the songs and memorize it. They retrieve the formulars in the songs to solve problems involving area and perimeter of plane shapes. The notes the formular of pie (π) as $\frac{22}{7}$. They also work some excercises by skeching circle and identifying the raduis and diameter.	Illustrations, examples, questioning, re-enforcement, varieties- song, repetitions.	1. Write the relationship between circumference and diameter  2. Find the area of the unshaded portion.  3. Circulmference $= 88 \text{cm}$. Find the value of r. 4. Find the area of a circle whose circumference is 154cm. 5. Write the formular for finding the area of a circle.	45 minutes x 2

APPENDIX 2

PLAN OF WORK FOR TEACHING THE CONTROL GROUP (TEACHING WITHOUT SONGS)

Subject: Mathematics

Class: Primary five pupils

Topics: (i) Roman numerals

(ii) Simple interest

(iii) Angles

(iv) Triangle

(v) Area and perimeter of plane shapes:

- Square
- Rectangle
- Triangle
- Circle

Duration: Total of 4 weeks (45 minutes each period)

Roman Numerals

Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remarks
At the end of the lesson, the pupils should be able to. 1. Read Roman numerals up to 1000. 2. Write up to 1000 3. Write the place value of each numeral in normal form. 4. Working exercises involving Roman numerals.	Roman Numerals I= 1, V= 5, X=10 L= 50, C = 100, D =500 and M= 1000. Repetitive property: I = 1, xx=20 II = 2, CCC = 300 III = 3, MM = 2000. Subtractional property IIII = 4 = IV = 5 -1 or I before 4, IX =9 XL = 40 , XC = 90 CD = 400 and CM =900 Combination of both properties. <u>Examples</u> 1. 34 = XXXIV 2. 44 = 40 + 4 = XLIV 3. 29 = 20 + 9 = XXIX 4. 345 = 300 + 40 + 5 = CCC XLV 5. 923 = 900 + 20 +3 = CMXXIII 6. 2999 = 2000 + 900 90+ 9= MMCMXCIX 7. 1378 = 1000 + 30 + 70 +8= MCCCLXXVIII	The teacher ask questions on the basic numerals of Hindu Arabic, that is 0,1,2,3,4,5, 6,7,8, and 9. Then introduces the basic numerals of Roman figures as I, V, X, L, C, D, M and use them to sing a song. The teacher also explain the closeness of Roman numerals to nature, that is, V= 5 for the hand and X= 10 for double. The teacher demonstrates this with her hands. V ^ The teacher also explains with illustrations the subtractional and repetitive property and the use of the combination properties. Examples and exercises are given.	Charts and Text Books.	They pupils follows the teachers guide to form Roman numerals 1- x using their fingers. They practise reading and singing the Roman basic numerals. They also pronounce the numerals with subtractive property thus: 4=IV 9=IX 40= XL 90= XC 400= CD 900= CM	Questioning, use of examples, illustration, demonstration, repetition, explanation.	<u>Classwork</u> Write the following in Roman 1. 27= 2. 385= 3. 1999= 4. 2002= 5. 479 Express in Arabic 1. XIX = 2. CMX= 3. XLIV = 4. DCLXV= 5. MCDVII=	45 minutes x 2

Simple Interest

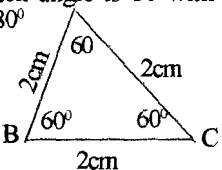
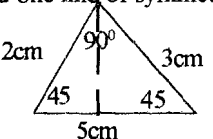
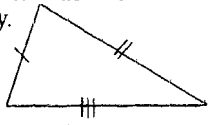
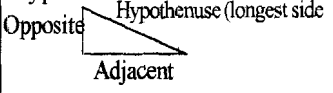
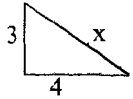
Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
At the end of the lesson, the pupils should be able to. 1. Explain interest. 2. Identify the principal, Rate and time in a given problem. 3. Calculate simple interest. 4. Calculate the amount.	Simple interest: Interest is always reckoned as a percentage to be paid every year on the sum of money borrowed or lent. It is called the rate per cent annum. The sum of money lent or borrowed is called principal. The length or period of the loan or money borrowed is called time. Interest = $\frac{P \times R \times T}{100}$ or $P \times \frac{R \times T}{100}$ Where P= principal, R = rate and T = Time. Amount = $P + S.I$ $P = \frac{S.I \times 100}{R \times T}$ $R = \frac{S.I \times 100}{P \times T}$ $T = \frac{S.I \times 100}{P \times R}$ <u>Example:</u> Find the simple interest on ₦300 for 3 years, 6 month at 3% $S.I = \frac{PRT}{100}$ $P = ₦300$ $R = 3\%$, $T = 3\frac{1}{2} = 7/2$ years Note: Always change months to year(s) by dividing with 12 $S.I = \frac{₦300 \times 3 \times 7}{100 \times 2} = \frac{₦63}{2}$ = ₦36.5 interest	The teacher explains the term simple interest, principal, rate and time and also teach them how to device the formula for each of them by making them the subject of the formula. The teacher also work more examples on how to calculate the interest, principal, rate, time and amount.	Text Books.	They apply the formulas in solving problems involving simple interest, principal, rate, time and amount. They also work some exercises.	Examples, illustrations, explanations, questioning, non-verbal communication and verbal repetition.	1. Find the simple interest on ₦100 for 2 years at 5% rate. 2. Find the amount when ₦200 is deposited in a bank for 2 years at 2% rate. 3. Find the principal which will gain ₦50 in a year at 10%. 4. For how long will I leave ₦4000 in a bank to earn and interest of ₦480, the rate being 3% per annum simple interest? 5. Write the formula for finding the rate.	

45 minutes x2

Simple Interest

Objectives	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
At the end of the lesson, the pupils should be able to. 1. Explain interest. 2. Identify the principal, Rate and time in a given problem. 3. Calculate simple interest. 4. Calculate the amount.	Simple interest: Interest is always reckoned as a percentage to be paid every year on the sum of money borrowed or lent. It is called the rate per cent annum. The sum of money lent or borrowed is called principal. The length or period of the loan or money borrowed is called time. Interest = $\frac{P \times R \times T}{100}$ or $P \times \frac{R \times T}{100}$ Where P= principal, R = rate and T = Time. Amount = P + S.I $P = \frac{S.I \times 100}{R \times T}$ $R = \frac{S.I \times 100}{P \times T}$ $T = \frac{S.I \times 100}{P \times R}$ <u>Example:</u> Find the simple interest on ₦300 for 3 years, 6 month at 3% $S.I = \frac{PRT}{100}$ P= ₦300 R= 3%, T = $3\frac{1}{2} = 7/2$ years Note: Always change months to year(s) by dividing with 12 $S.I = \frac{₦300 \times 3 \times \frac{7}{2}}{100} = \frac{₦63}{2}$ = ₦36.5 interest	The teacher explains the term simple interest, principal, rate and time and also teach them how to device the formular for each of them by making them the subject of the formular. The teacher also work more examples on how to calculate the interest, principal, rate, time and amount.	Text Books.	They apply the formulars in solving problems invovling simple interest, principal, rate, time and amount. They also work some exercises.	Examples, illustrations, explanations, questioning, non- verbal communication and verbal communication, repetition.	1. Find the simple interest on ₦100 for 2 years at 5% rate. 2. Find the amount when ₦200 is deposited in a bank for 2 years at 2% rate. 3. Find the principal which will gain ₦50 in a year at 10%. 4. For how long will I leave ₦4000 in a bank to earn and interest of ₦480, the rate being 3% per annum simple interest? 5. Write the formular for finding the rate.	45 minutes x2

Properties of a Triangle

Objectives:	Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Strategy Emphasized	Formative Evaluation	Remarks
At the end of the lesson, the pupils should be able to: 1. Define a triangle 2. Identify different types of triangle 3. Write at least two properties of each triangle. 4. Draw different type of triangle using ruler, set square or T-square. 5. Use pythagora's theorem to find the length/ sides of triangle.	Properties of a Triangle. Triangle: A triangle is a three sided figure with total angle of 180°: Types of triangle 1. Equilateral triangles: This is a triangle with 3 equal side 3 equal angles and 3 lines of symmetry. each angle is 60 with total of 180°  2. Isosceles triangle: An isosceles triangle has two equal sides, two equal base angles and one line of symmetry.  3. Scalene triangle: This type of triangle has unequal sides and angles it has no line of symmetry.  Right angle triangle has one right angle (90°) that face the hypotenuse.  For and given right angle triangle: The area of the square on the hypotenuse is equal to the sum of areas of the square on the other two sides $a^2 = b^2 + c^2 \text{ or } a = \sqrt{b^2 + c^2}$	The teacher introduces different type of triangle after giving the definition. The teacher guides the pupils in measuring different types of triangle with different length sides. Work exercise involving pythagora's theorem.	Ruler, Pencil, T-set, set square, cardboard paper model charts.	The pupils participate actively in measuring and cutting the shapes, they also draw triangular shapes in their note books. They contributes in naming the properties of each triangle based on their observation. They also fold the cardboard papers to identify the lines of symmetry.	Illustration, examples, Questioning, explanation, repetitions.	1. Draw an equilateral triangle with sides 5cm and measure the angles. 2. Cut-out a scalene triangle of sides 5cm, 7cm and 9cm. 3. Calculate the length x in the figure.  Oral Questions 1. How many lines of symmetry has an isosceles triangle? 2. Which type of triangle has three lines of symmetry? 3. What type of triangle is this? 	45 minutes x 2

Instructional Objectives:

At the end of the lesson, the pupils should be able to:

1) Explain the meaning of Area and perimeter.

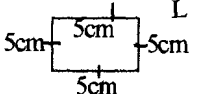
2) Find the Area and Perimeter of - Square, Rectangle, Triangle and Circle.

3) Derive formulae for Area and Perimeter/ Circumference of a Circle, Rectangle and Square.

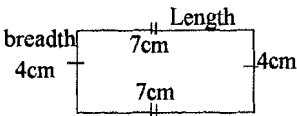
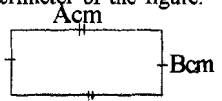
4) Find the area and perimeter of irregular shapes/ borders and shaded portions.

Entry behaviour : The pupils should be asked to identify and name shapes like. Square, Rectangle, Triangle, Circle, Trapezium, Kite and their properties.

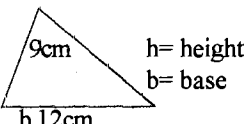
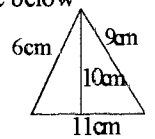
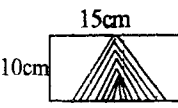
Area and Perimeter of a Square

Content	Teacher Activity	Instructional Materials	Pupils Activity	Emphasized/ Strategy	Formative Evaluation	Remark
Area and Perimeter Area: The area of any given shape is the amount of surface covered by all the sides of that shape. Basic unit of Area is square. Perimeter: The perimeter of any shape is the length of the outer boundary of that shape. That is the distance round the edge of the shape or figure. In other words Area means product of the sides while perimeter is the totality of all the sides. Area and perimeter of a square A square is a shape with 4 equal sides E.g  L = Length Area of a square = side x side or $L \times L$ $\text{Area} = L^2 = 5\text{cm} \times 5\text{cm} = 25\text{cm}^2$ Perimeter of a square = $L + L + L + L$ (Totality of all the 4 sides) = $4L$ Perimeter of a square = $4 \times L = 4L$ since the side = 5cm, = $5\text{cm} + 5\text{cm} + 5\text{cm} + 5\text{cm}$ Perimeter = $4 \times 5\text{cm} = 20\text{cm}$ Example (2): Find the length of a square whose area is 81m^2 Solution Area of a square = $L \times L$ $81\text{m}^2 = L^2$ $\sqrt{81\text{m}^2} = L$ $\sqrt{9\text{m} \times 9\text{m}} = L$ $9\text{m} = L$ Eg 3: The perimeter of a square is length 64cm^2. Find its area. solution Perimeter = $4 \times L = 4L$ $\frac{64\text{cm}}{4} = \frac{4 \times L}{4}$ (Divide both sides by 4) $16\text{cm} = L$ Area = $L \times L = 16\text{cm} \times 16\text{cm} = 256\text{cm}^2$	The teacher explains the meaning of Area and perimeter of shapes with diagrams for illustration The teacher gives some examples to explain area and perimeter of a square	Cut- out cardboard paper with different four equal sides (squares) Understanding mathematics Book 5&6, mathematics inside out for schools and all entrance Examinations. Square cardboard of length 5cm Model of a square	The pupils read out the meaning of Area and perimeter They cut-out a square shapes of different lengths and calculate their areas and perimeter and also derive formula to find the length of a square. They work more exercises on their own.	Higher-order question, lower order questions, examples, illustrations, explanations, eye contact, re-enforcement	Class work 1. Define area of a shape. - If the length of a square is 7cm. Find 2. Its area 3. Its perimeter 4. Find the length of a square whose perimeter is 16cm. 5. Find the perimeter of a square with area 25cm^2	45 minutes x 2

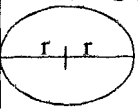
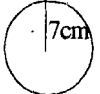
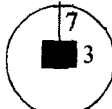
Area and Perimeter of a Rectangle

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased	Evaluation	Remark
Area and perimeter of a Rectangle. A rectangle is a four sides shape with 2 opposite sides equal.  Area of a rectangle = Length x breadth = $L \times b$ Area of the rectangle = $7\text{cm} \times 4\text{cm}$ = 28cm^2 Perimeter of a rectangle = $L + b + L + b$ = $L + L + b + b$ (collection of like terms) = $2L + 2b = 2(L + b)$ factorization) = $2(7\text{cm} + 4\text{cm}) = 2(11\text{cm})$ = 22cm. E.g (2) if the area of a rectangle is 128m^2 and its length is 16m. Find its perimeter. Solution Area of a rectangle = $L \times b$ $128\text{m}^2 = 16\text{m} \times b$ (Divide via by 16) $16\text{m} \quad 16\text{m}$ $8\text{m} = L$ Perimeter = $2(L + b)$ = $2(8\text{m} + 16\text{m})$ = $2(24\text{m}) = 48\text{m}$.	The teacher work more examples to illustrate how to find the area, perimeter, length and breadth of a rectangle.	Rectangular cut- out cardboard paper with different length and breadth sizes. Model of rectangle.	The pupils cut out a rectangular shapes with different sizes of length and breadth. They derive the formular for area and perimeter of rectangle and use it to find the area and perimeters of the cut out shapes. They use the formular to solve problems involving area and perimeter of plane shapes (rectangle).	Higher order questions, lower order questions, examples, illustrations, re-enforcement, repetitions.	Home work - Find the area and perimeter of the figure.  - Find the breadth of a rectangle whose area is 63m^2 with length 9m. - A table has an area of 1.44m^2. If its length is 1.2m finds its breadth. - Find the perimeter of a rectangle football field 100m long and 60m wide.	45 minutes x2

Area and Perimeter of a Triangle

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased Strategy	Formative Evaluation	Remark
Area and Perimeter of a Triangle. Triangle. A triangle is a three (3) E.g (1)  Area of a triangle = $\frac{1}{2} b \times h$ $= \frac{b \times h}{2}$ $A = b \times h$ (cross and multiply) $2A = b \times h$ $\frac{2A}{2} = \frac{b \times h}{2}$ (Divide both sides by b) $\frac{2A}{b} = h$ and $\frac{2A}{h} = b$ From the above, Area = $\frac{1}{2} 12\text{cm} \times 9\text{cm}$ $= 6\text{cm} \times 9\text{cm} = 54\text{cm}^2$ E.g (2) The area of triangle is 56m^2. If the height is 8m, find the base. Area of a triangle = $\frac{b \times h}{2}$ $56\text{m}^2 = \frac{b \times 8\text{m}}{2}$ (cross and multiply) $56\text{m}^2 \times 2 = b \times 8\text{m}$ $\frac{112\text{m}^2}{8\text{m}} = \frac{b \times 8\text{m}}{8\text{m}}$ (Divide both sides by 8m) $14\text{m} = b$ E.g (3) calculate the perimeter of the figure below  Perimeter = total length of the triangle $= 6\text{cm} + 9\text{cm} + 11\text{cm}$ $= 26\text{cm}$	The teacher presents different shapes of different cut-out from cardboard and model and also measure the height, length and the base length of the triangles. use them to calculate their areas and perimeter. The teacher work more examples for the pupils to follow and copy. The teacher asks and answer questions to the pupils.	Model of triangles and cut-out triangles shapes from cardboard.	The pupils practise finding area and perimeter of triangles They practise breaking given figures into rectangle and triangle and finding the areas.	Questioning, use of examples, illustration, explanations, variety, eye contact, re-enforcement,	1. Find the area of the unshaded portion  2. What is the perimeter of a triangles with sides 5cm by 7cm 9cm?. 3. The area of triangle 24m^2, if the base is 6cm. find its height. 4. Write down the formular for finding the area of a triangle. 5. Write the formular for find the base of a triangle.	45 minutes x 2

Area and Circumference of a Circle

Content	Teacher Activity	Instructional Materials	Pupils Activity	Skills/Emphased Strategy	Formative Evaluation	Remark
Circle: circle is a perfect round plane figure. Examples of a circle are: coins, wheels, rings, tyres, tins etc.  Area of a circle $= r \times r \times \pi$ $= \pi r^2$ where $\pi = \frac{22}{7}$ Note: $r + r = D$ (diameter) $2r = D$ $r = \frac{D}{2}$ Area of a circle $= \pi r^2$ or $\pi \left(\frac{D}{2}\right)^2$ Perimeter of a circle $= (r+r) \times \pi$ $= 2r \times \pi$ $= 2\pi r$ or $= \pi D$  Area $= \pi r^2 = \frac{22}{7} \times 7 \times 7 \text{cm}$ $= 154 \text{cm}^2$ Perimeter $= 2\pi r = \frac{2 \times 22}{7} \times 7 \text{cm}$ $= 44 \text{cm}$  Area $= 616 \text{cm}^2$ Find x $A = \pi r^2$ $616 \text{m}^2 = \frac{22}{7} \times r^2$ {Divide both sides by $\frac{22}{7}$} $616 \text{m}^2 \times \frac{7}{22} = \frac{22}{7} \times \frac{7}{22} \times r^2$ $196 \text{m}^2 = r^2$ $196 \text{m}^2 = 14 \text{m} = r$	The ask the pupils to name other circular objects. The teacher also guide them in drawing circles and measuring the diameter and the radius The teacher work more examples to illustrate how to apply the formular for caculations.	Model, circles cut-out from cardboard with different diameter and radius. Model of semi -circle, ruler, scissors, razor blade, protractor.	The pupils follows the teacher's guide and derive formular for area and perimeter or circumference of a circle. They notes the formular of pie (π) as $\frac{22}{7}$. They also work some execrises by skeching circle and identifying the raduis and diameter.	Illustrations, examples, questioning, re-enforcement, varieties-repetitions.	1. Write the relationship between circumference and diameter  2. Find the area of the unshaded portion.  3. Circulmference $= 88 \text{cm}$. Find the value of r. 4. Find the area of a circle whose circumference is 154cm. 5. Write the formular for find-ing the area of a circle.	45 minutes x 2

67

Appendix 3

Department of Mathematics Education
Faculty of Education
University of Nigeria, Nsukka.

Introduction:

Dear respondent,

I am a post-graduate student in the department of Mathematics Education University of Nigeria, Nsukka. I am conducting a research for an award of Master's Degree in Education (M.Ed)) . The purpose of this research is to find out the effects of songs in the teaching and learning of mathematics at primary school level.

You are being randomly selected for this study and your co-operation will be highly appreciated. Please follow the instructions and answer the questions carefully.

Instructions:-

- 1) Do not write anything until you are told to do so.
- 2) Use pencil throughout
- 3) Indicate your sex by thicking **X** in box
M ☐ F ☐
- 4) Think carefully before you underline the answer, erase completely any answer you wish to change.
- 5) If you underline more than one answer for a question you will score zero on that question.

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Department of Mathematics Education
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Introduction:

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You are ^{being} ~~been~~ randomly selected for this study and your co-operation will be highly appreciated. Please follow the instructions and answer the questions carefully.

Thank you.

Yours

Ojiako Ngozi

Instructions:-

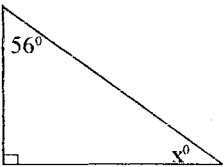
- 1) Do not write anything until you are told to do so.
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- 3) Indicate your sex by thickening in box
M ☐ F ☐
- 4) ~~Indicate your Group in the box~~

Pupils taught without songs ☐ C

~~Pupils taught with songs~~ ☐ E

- 5) Think carefully before you underline the answer, erase completely any answer you wish to change
- 6) If you underline more than one answer for a question you will score zero on that question.

68 Questions

- 1) Express the Roman numeral XLIV in Arabic
(a) 1054 (b) 144 (c) 104 (d) 44 (e) 54
- 2) Five hundred in Roman figure is
(a) XV (b) L (c) C (d) D (e) M
- 3) Find the sum of MMII and XXV
(a) 1165 (b) 20025 (c) 2027 (d) 2225 (e) 2025
- 4) The formular for finding the simple interest is
(a) $S.I = \frac{PR \times 100}{T}$ (b) $S.I = \frac{RPT}{100}$ (c) $S.I = \frac{100 \times R}{PT}$
(d) $S.I = \frac{PRT \times 100}{1}$ (e) $S.I = \frac{PR \times 1}{100 \times T}$ =
- 5) How much money must invest in order to collect N600 interest at the end of $2\frac{1}{2}$ years, the rate of interest being 8% per annum?
(a) N500 (b) N1,000 (c) N1,500 (d) N2,500 (e) N3,000.
- 6) Find the time in which N500 will gain an interest of N125 at the rate of 5%
(a) $2\frac{1}{2}$ years (b) 4 years (c) 5 years (d) 8 years (e) 10 years
- 7) An angle can be defined as the (a) Joining of two points
(b) Product of the turning point (c) Sum of the lines in a plane shapes
(d) Total revolution of the clock hand (e) Amount of rotation
- 8)  Find the value of x
(a) 14 (b) 24 (c) 34 (d) 54 (e) 114.
- 9) Which of the following is an example of an acute angle
(a) 300° (b) 290° (c) 190° (d) 90° (e) 9°
- 10) The supplementary angle of 45° is.....
(a) 180° (b) 135° (c) 90° (d) 45° (e) 35° .
- 11) If the ratio of the angles of a triangle are 2: 3:3 . What type of triangle is that
(a) Equilateral (b) scalene (c) isosceles (d) obtuse (e) right angle.
- 12) An equilateral triangle is a triangles which has (a) Three lines of symmetry (b) Unequal sides (c) Two lines of symmetry (d) One line of symmetry (e) each angle is 90° .

Appendix 3

XLIV

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3) Find the sum of MMII and XXV
(a) 1165 (b) 20025 (c) 2027 (d) 2225 (e) 2025

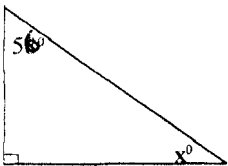
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(d) $S.I = \frac{PRT \times 100}{1}$ (e) $S.I = \frac{PR \times 1}{100 \times T}$

5) How much money must I invest in order to collect ₦600 interest at the end of $2\frac{1}{2}$ years, the rate of interest being 8% per annum?
(a) ₦500 (b) ₦1,000 (c) ₦1,500 (d) ₦2,500 (e) ₦3,000.

6) Find the time in which ₦500 will gain an interest of ₦125 at the rate of 5%
(a) $2\frac{1}{2}$ years (b) 4 years (c) 5 years (d) 8 years (e) 10 years

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12) An equilateral triangle is a triangles which has (a) Three lines of symmetry (b) Unequal sides (c) Two lines of symmetry (d) One line of symmetry (e) each angle is 90° .

13) How many lines of symmetry has a scalene triangle
(a) 0 (b) 1 (c) 2 (d) 3 (e) 4.

14) The distance round the edge of a figure is called the (a) Area (b) perimeter (c) length (d) volume (e) centimeter square.

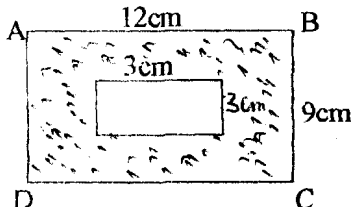
15) The formular for finding the area of circle can be written as

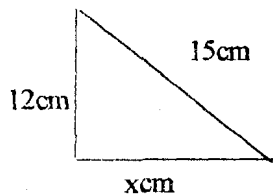
- (a) $2 \times \pi \times r \times r$
- (b) $2 \times \pi \times r$
- (c) $\pi \times r \times r$
- (d) $\pi \times r$
- (e) $\pi \times \frac{22}{7} \times r$

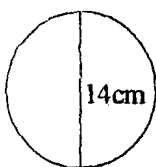
16) What is the perimeter of a rectangular shape of breadth 5cm and length 7cm respectively.
(a) 35cm^2 (b) 35cm (c) 24cm^2 (d) 24cm (e) 12cm

17) Find the area of a triangle whose base is 14cm with height 7cm

- (a) 14cm^2 (b) 35cm^2 (c) 45cm^2 (d) 47cm^2 (e) 49cm^2

18)  Find the area of the shaded portion in the figure
(a) 108cm^2 (b) 99cm^2 (c) 117cm^2 (d) 19cm^2 (e) 24cm^2

19)  Find the length of the side marked x in the triangle
(a) 7cm (b) 9cm (c) 11cm (d) 13cm (e) 27cm

20)  Find the circumference (Take $\pi = \frac{22}{7}$)
(a) 44cm^2 (b) 88cm^2 (c) 154cm^2 (d) 198cm^2 (e) 352cm^2

- 3) How many lines of symmetry has a scalene triangle
 (a) 0 (b) 1 (c) 2 (d) 3 (e) 4.

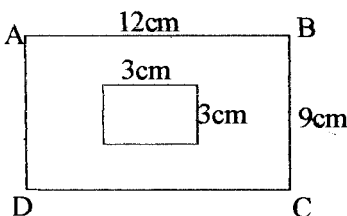
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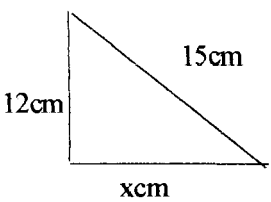
- (a) $2 \times \pi \times r \times r$
 (b) $2 \times \pi \times r$
 (c) $\pi \times r \times r$
 (d) $\pi \times r$
 (e) $\pi \times \frac{22}{7} \times r$

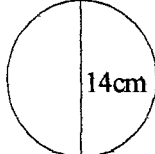
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 (a) 44cm^2 (b) 88cm^2 (c) 154cm^2 (d) 198cm^2 (e) 352cm^2

Thank you.

Yours

Ojiako Ngozi

Scores

Scores of the pupils in the pretest, achievement test and retention test on the selected topics, the scores are out of twenty

Sno	Control Group			Treatment Experimental Group		
	Pretest	Achievement test	Retention test	Pretest	Achievement test	Retention test
	γ	X_A	X_R	γ	X_A	X_R
1	4	11	8	male 5	19	16
2	1	15	11	4	15	13
3	5	17	17	1	12	17
4	5	07	07	3	09	09
5	3	06	07	2	16	14
6	1	08	12	5	14	13
7	2	11	10	3	10	12
8	3	07	13	1	16	17
9	2	08	08	4	15	15
10	5	15	13	(3) 2	13 (139)	10 (136)
11	1	07	07	female 4	17	18
12	6	06	10	3	15	15
13	4	09	10	5	17	12
14	4	05	08	0	15	09
15	4	13	12	1	10	11
16	2	05	07	3	18	18
17	3	10	07	2	13	13
18	6	10	16	4	15	10
19	0	13	09	7	18	16
20	5	14	14	(34) 5	14 (152)	11 (133)
	66	197	206	64	291	269

Marking Scheme / Answers

<u>Pretest / Achievement test</u>	<u>Retention test</u>
1. d - 44	1. B - 1409
2. d - D	2. C - XLvii
3. C - 2027	3. D - 124
4. b - $S \cdot I = \frac{RPT}{100}$	4. B - $P = \frac{S \cdot I}{T} \times \frac{100}{R}$
5. e - \$3,000	5. D - \$250
6. C - 5 years	6. C - 5 years
7. e - Amount of rotation	7. B - An angle
8. C - 34	8. B - 43°
9. e - 9°	9. C - 
10. b - 135°	10. D - 40°
11. C - Isosceles	11. D - Isosceles
12. a - Three lines of Symmetry	12. A - Equilateral
13. a - 0	13. C - Scalene
14. b - Perimeter	14. C - $2\pi r$
15. C - $\pi \times r \times r$	15. D - 11cm
16. d - 24cm	16. B - 26cm
17. e - 49cm^2	17. D - 5cm
18. b - 99cm^2	18. D - 15cm
19. b - 9cm	19. A - 154cm^2
20. a - 44cm^2	20. B - 20cm^2

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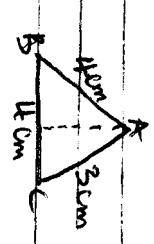
Control Group			Experimental Treatment Group		
Pretest	Achievement test	Retention test	Pretest	Achievement test	Retention test
γ	X_A	X_R	γ	X_A	X_R
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1	15	11	4	15	13
5	17	17	1	12	17
5	07	07	3	09	09
3	06	07	2	16	14
1	08	12	5	14	13
2	11	10	3	10	12
3	07	13	1	16	17
2	08	08	4	15	15
5	15	13	(32) 2	13 (139)	10 (136)
1	07	07	female 4	17	18
6	06	10	3	15	15
4	09	10	5	17	12
4	05	08	0	15	09
4	13	12	1	10	11
2	05	07	3	18	18
3	10	07	2	13	13
6	10	16	4	15	10
0	13	09	7	18	16
5	14	14	(34) 5	14 (152)	11 (133)
66	197	206	64	291	269

Instruction: Choose only the correct answer from the options A-D. Do not choose more than one answer.

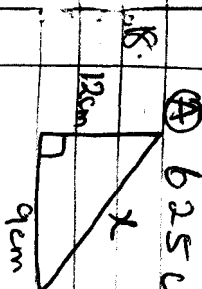
1. Express the Roman numeral MCDIX in Arabic
 (A) 1054 (B) 1409 (C) 104 (D) 44
2. Forty seven in Roman figure is
 (A) IIVII (B) LXVII (C) XLVII (D) CXVII
3. Take away DCCXXIII from CMLII
 (A) 584 (B) 324 (C) 224 (D) 124
4. The formula for finding the principal is
 (A) $S.I = \frac{P \times R \times T}{100}$ (B) $P = \frac{S.I \times 100}{R \times T}$ (C) $P = \frac{S.I \times R \times T}{100}$ (D) $P = \frac{S.I \times 100}{R \times T}$
5. Find the simple interest on \$2500 for 2 years at 5% rate per annum
 (A) \$500 (B) \$3000 (C) \$500 (D) \$250
6. Find the time in which \$2000 will become \$2500 at the rate of 5%
 (A) 2 1/2 years (B) 4 years (C) 5 years (D) 8 years
7. The gap formed where two straight lines meet is called
 (A) a line (B) an angle (C) Area (D) Triangle
8.  find 'y'
 (A) 33° (B) 43° (C) 133° (D) 143°
9. Which of the diagram represent obtuse angle?
 (A)  (B)  (C)  (D) 
10. The 'supplementary angle of 50° is
 (A) 100° (B) 130° (C) 90° (D) 40°

11. A three sided closed shape with two known as _____ triangle
 (A) Equilateral (B) right angle (C) scalene
12.  The figure is called
 (A) Equilateral (B) right angle (C) scalene
 (D) A triangle whose angles are different
 (E) Equilateral (F) Equilateral (G) Scalene

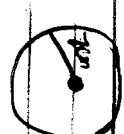
14. The correct formula for calculating area of a circle is
 (A) πr^2 (B) $2\pi r^2$ (C) $2\pi r$ (D) 22



15. The perimeter of the triangle is
 (A) 6 cm (B) 7 cm (C) 10 cm
16. What is the perimeter of a rectangle length 8 cm and breadth 5 cm.
 (A) 14 cm (B) 26 cm (C) 12 cm (D) 3 cm
17. Find the length of a square is 25 cm².
 (A) 6.25 cm (B) 21 cm (C) 15 cm (D) 5



18. Find the length marked 'x'
 (A) 7 cm (B) 9 cm (C) 11 cm (D) 5



19. Find the area of the circle
 (A) 154 cm² (B) 88 cm² (C) 44 cm² (D) 22



20. The area of the trapezium is
 (A) 40