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Development of Supplementary Instructional Material on Selected Topics in Geometry and Statistics for Grade Seven Students

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**DEVELOPMENT OF SUPPLEMENTARY INSTRUCTIONAL MATERIAL
ON SELECTED TOPICS IN GEOMETRY AND STATISTICS
FOR GRADE SEVEN STUDENTS**

A Seminar Paper Presented to the Faculty of the College of
Graduate Studies and Teacher Education Research
Philippine Normal University
Manila

In Partial Fulfilment of the Requirements for the Degree
Master of Arts in Teaching Mathematics

by

HAZALE G. TRAPANE

March 2016

APPROVAL SHEET

This seminar paper entitled “**DEVELOPMENT OF SUPPLEMENTARY INSTRUCTIONAL MATERIAL ON SELECTED TOPICS IN GEOMETRY AND STATISTICS**”, prepared and submitted by **Hazale G. Trapane**, in partial fulfilment of the requirements for the degree **Master of Arts in Teaching Mathematics**, has been examined and recommended for acceptance.

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To all of them, this piece of work is humbly and wholeheartedly dedicated.

HGT

ABSTRACT

NAME : Hazale G. Trapane

TITLE : Development of Supplementary Instructional
Material On Selected Topics in Geometry and
Statistics For Grade Seven Students

KEY CONCEPTS : Instructional Material
Geometry
Statistics

DEGREE : Master of Arts in Teaching

SPECIALIZATION : Mathematics

ADVISER : Allan S. Reyes, Ph. D.

The study sought to develop a supplementary instructional material for Grade Seven Students of Dr. Arsenio C. Nicolas National High School in the municipality of Calauag, Quezon.

The descriptive-developmental method of research was used. The instructional material was developed based on the least learned topics as showed by Fourth Quarter Examination result.

Two instructional modules were developed and evaluated. Module 1 consisted of lessons in Geometry, namely: triangles, polygons, quadrilaterals and circles. Likewise, Module 2 consisted of lessons in Statistics, namely: basic

terms in Statistics, kinds and uses of graphs and problem-solving on graphs.

The developed instructional material was evaluated by three mathematics teachers/experts. As to the assessment of Math Teachers/Experts on the proposed Instructional material, the criteria were as follows: objectives, content, language and style and evaluation. The evaluators' strongly agreed as evidenced by the overall mean values of 4.67, 4.20, 4.60 and 4.67 respectively.

The grand mean of 4.54 indicates that the respondents, the Mathematics teachers/experts strongly agreed and concurred that the material can help students in their mathematics learning, performance and achievement.

Based on the results, the researcher arrived at the following conclusions:

1) The result of the Fourth Quarter Examination revealed that four topics in Geometry namely triangles, polygons, quadrilaterals and circles and three topics in Statistics such as basic terms in statistics, kinds and uses of graphs and problem solving on graphs, were found to be the difficulties of the students and therefore they should be considered for the development of the supplementary instructional material. 2) An instructional material in Grade Seven Mathematics specifically for the Fourth Quarter was developed in order to improve and increase student's level of performance in Mathematics. 3) The math teachers/experts respondents assessed the instructional material in selected topics in Geometry and Mathematics for Grade Seven as highly acceptable in

terms of its objectives, contents, language and style and evaluation. Taking into consideration the conclusions, the following are hereby recommended: 1) The developed module should be tried out to the students hence, it should be used by teachers in their mathematics classes; 2) The developed module should be validated at Dr. Arsenio C. Nicolas National High School and in other schools to determine its effectiveness; 3) The instructional material can be further improved by adding more exercises and real life applications; 4) Regular updates and revisions on the developed modules is quite necessary; and 5) Mathematics teachers are also encouraged to develop their own supplementary materials or modules for any other topics or lessons and 6) School administrators should encourage and support teachers in developing instructional materials.

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Chapter 1

THE PROBLEM AND ITS BACKGROUND

1.1 Introduction

Mathematics is indispensable in learning. Today, there is no any place where mathematics is not used. Mathematics is one of the most important subjects that we study in school. However, mathematics as viewed by the students, is the most difficult subject to learn; the most challenging, the most boring, and the least liked, thus Mathematics is the least learned subject. It has been noted that various problems beset mathematics instruction specially in public schools; lack of textbooks, other learning materials and instructional aids, seems to be on top of the list, along with the shortage of classrooms and teachers. (Manila Times, 2007). As a consequence, students suffer and show poor academic performance in Mathematics, as noted by the National Achievement Test Ratings and other tests administered nationwide. Teaching and learning Mathematics has been the most difficult to resolve educational problem; the subject usually gets the lowest pass scores in proficiency test. Singham (in Selpa, 2012).

Teachers use various forms of instructional materials such as textbooks, modules, handouts and other learning kits to improve the quality of teaching-learning process. These materials serve as supplement to the normal processes

of instruction. Its importance is to improve students' knowledge, abilities and skills and to clarify important concepts and to sustain students interests. Instructional materials are excellent aid to students to have the best opportunity to keep the information provided to them. (Bone, n.d.) These materials improve, facilitate and make teaching/learning simple, easy, and active. As clarified by Salandanan (2001), instructional materials offer the best ways to the teachers to give direction in her students' everyday search for new knowledge and understandings. Unfortunately, the recurring problem of insufficiency or shortage of most instructional materials has been of great concern and burden to most teachers. Teachers should be resourceful to provide or develop relevant and appropriate materials applicable to the learners and objectives of the lesson. Finding the best learning materials is an important skill a teacher should possess. Secondly, poor achievement in Mathematics as evidenced by the 4th Quarter Examination results, has been a perennial problem. Most of these Grade Seven students, are not good in Mathematics. They have trouble in Mathematics because they are "poor in vocabulary", "poor in comprehension", and "they have poor retention". It is on these bases, that it becomes imperative for the researcher to provide instructional material for them, in the form of modules. It has been noted that they need more time to understand concepts in a more relaxed environment, and to learn effectively. Students learn faster when they enjoy the appropriate instructional material.

Instructional materials catch student's attention and encourage them to study their lessons. Students learn mathematics through the experiences the teachers provide. (Canonizado, 2009).

One significant skill that a teacher should have is the ability to form, prepare or create materials appropriate to the degree of student's readiness and understanding. Careful selection and preparation of relevant instructional material is one major concern if one intends to become a teacher for it is his/her role to prepare instructional material that would enhance the effectiveness of the learning process, according to Beronilla III (2006). Governed by the studies in developing logical thinking, simultaneously with the current drive in the particular discipline, a teacher should be able to prepare self-instructional materials because using self-instructional materials is particularly helpful as a strategy in introducing fundamental information to the whole class, encouraging for more discussions and less lecture; as an enrichment activity for bright students; a make-up strategy for absentee students and as a device in a remedial session. Therefore, modules and other self-instructional materials would benefit both the student and the teacher as well. (Macarandang, 2009). "Complete learning packages and home study modules are definitely here to stay for their use for either enrichment or remediation cannot be overemphasized." (Salandanan, 2001).

This study was conceived to respond to the unique learning pace of the

students of Dr. Arsenio C. Nicolas National High School, a school situated in a barangay outside the town proper of Calauag in the province of Quezon. Many of these students struggle with Mathematics, many of whom find even basic concepts difficult to understand. It has been observed that these students have an urgent need for a learning material that is simple, uses simple language and has simple presentation; easy to understand yet comprehensive and suited to their learning ability. It is the ultimate concern of the researcher to meet the needs of these learners, and that they will learn best. With the use of learning modules, the researcher hopes to help these students not only understand basic concepts but also to create the desire to learn and be more interested in learning and develop in them the thirst for knowledge, improve their confidence, and develop independence and most of all, for these learners to have a sense of commitment to their studies. The researcher believes that the proposed learning module will address the unique learning ability and style of her learners. In fact, numerous studies have been conducted and highlighted that responding to the unique learning style of the learners is a key to effective teaching and learning. The modular approach in Mathematics learning is proven effective to assist students learn Mathematics. According to Viernes (as cited in Torre Franca, 2009) results of her study on the modular method of teaching Number Theory confirmed the findings of other researches that modular instruction is

effective and learning occurs among the respondents as evidenced by an increase of more than 40% of the pre-test and the post-test mean score difference.

With the implementation of the new K to 12 curriculum effective School Year 2012-2013, the role of mathematics as a skill subject is stressed. "K to 12 has kindergarten as base, followed by six years of elementary (Grades 1-6), four years of junior high (Grades 7-10), and two years of senior high (Grades 11-12). The curriculum shall use the Spiral Progression Approach to ensure mastery of knowledge and skills after each level." ([http://philbasiceducation.blogspot.com/search/label/Spiral Approach](http://philbasiceducation.blogspot.com/search/label/Spiral%20Approach)). Mostly of the Math courses use a spiral philosophy of teaching. Same topics or subjects are covered successively in several years, progressing them slightly on each year level. Some students don't easily learn the principle or concept at once, and those who do many will not keep them. It is expected that after five or more years of exposure to the same topics, most students would have become proficient. (<http://www.learningpinesoftware.com/spiral.shtml>). The contents of Grade 7 Mathematics includes Geometry and Statistics in the Fourth Quarter. The focus of this study is to develop learning modules in this grading period.

Geometry is an area of mathematics involved with shape, size, figures and the properties of space.

Statistics, on the other hand, is the study of the collection, organization, analysis, interpretation and presentation of data. It is the science of learning from data.

It is the best intention of the researcher to provide a module on basic concepts and principles in Geometry and Statistics in its simplest manner, suited to the ability and level of understanding of her Grade Seven students. This module would get the attention of the students, eliminate the negative impression towards the subject and motivate them to study and improve their performance. Most importantly, the module will give the students the opportunity to explore, to learn, to enrich and later on to master the lessons presented. This material will boost their confidence and help them learn and love mathematics, as expected of them. Moreover, it is of the teachers' concern to cultivate the learners' favorable regard to the subject. They find ways and techniques to make mathematics likeable and fascinating to the learners. It is the researcher's hope that her students will find out that Mathematics is enjoyable and worthwhile. Learning mathematics can be fun and exciting! For as they say, teachers will not succeed in teaching Mathematics not until the students endure in mathematics and eventually realize that mathematics is a part of their lives - a great challenge for all teachers!

1.2 Background of the Study

Mathematics is a subject of great importance. However, teaching math is

not an easy task. At times, teachers find it difficult to teach Mathematics subject effectively to students. There is “no right way” to teach. Nevertheless, much is known about effective Mathematics teaching.

Teaching is exceedingly effective when administered in response to a felt need on the part of the learner. Bello (2004). The concept of individualized instruction is favorable for the development of individuality. This type of instruction provides the learners with self-instructive and self-corrective materials; it permits the slow, average and fast learners to progress at their own rate and complete the learning tasks according to their abilities and their best study time. through the use of modularized instruction, or simply through the use of modules. The researcher believes that modular learning is one of the effective teaching methods in which the teacher gives the students a module to use for certain lessons. In this study, the developed module is particularly for the Fourth Quarter, since the module is not yet readily available for the Grade Seven students. Manuals and modules are very essential tools to students learning and mastery. Teaching effectiveness is a major concern in the educational system. For the teaching and learning to be effective, the teacher must have a clear understanding of the nature of the learner’s needs according to Ribuca (2010). Teachers are the best persons in school who can directly assist the students. They are generally concerned about how and what the students learn. They strongly believe the students’ capacity to learn because teachers are

a school's greatest asset. (Wong, 2009). Jamarillo (in Morante, 2010) emphasized that from their experiences, teachers know that when students are properly motivated, learning happens. That's why teachers will always endeavor to provide a conducive learning environment and sustain students' high level of interest. Thus, teacher must use various motivation techniques, strategies and appropriate instructional materials. It is noted that teaching is complete when knowledge has been triumphantly transmitted usually not only attributed to teacher efficiency and teaching expertise but also to the instructional materials. (Jimoh, 2009).

Instructional materials can enhance the effectiveness of the teaching-learning process. Students learn faster when they enjoy the appropriate instructional materials. Instructional materials captures students interest and encourage them to study their lessons. The instructional material does not only promote independent learning but also helps the teachers prepare the daily activities because in the use of this material, the teacher acts only as a guide to every learner.

Experiences and studies have shown that different learners have different learning abilities, study habits, interest and mental capability. In view of this circumstances, the development of learning modules would be of great help to students and teachers as well. Instructional materials are helpful tools to translate the concepts and principles met with difficulty by the

learners in a manner understood and is within their level of comprehension. The researcher has observed a lot of problems in their school such as low interest and enthusiasm in the lessons, absenteeism, less cooperation and motivation from parents, lack of textbooks and learning materials, socio-economic difficulties, thus students are obliged to help their parents in their work specifically farming, raising livestock such as carabaos, cows, pigs and goats; and charcoal making. Since the K to 12 curriculum has just been newly implemented, modules provided for Grade 7 is not readily available for them specifically in the fourth quarter. It is essential for quality materials to be available to the students. It is the fervent hope of the researcher to provide one for them, carefully designed with simplicity and clarity. The researcher believed that this proposed supplementary material could be the response to the shortage of books and lack of necessary learning materials since these modules are simple and self-explanatory. In this way, the students still learn effectively, as what K to 12 curriculum envisions. With teacher's patience and dedication, the students are given the opportunity to learn well, and that they will improve and increase the level of performance in Mathematics.

1.3 Conceptual Framework

This study is premised on the concepts of Constructivist Learning Theory which assert that humans create meaning based from their experiences and their ideas. (http://en.wikipedia.org/wiki/Constructivism_philosophy_of_education).

Jerome Bruner is one of the most powerful constructivists. He was impressed of Piaget's ideas about cognitive development in children. His ideas have been extensively discussed among educators and teachers. "Some of Bruner's theoretical principles focus on these ideas:

- Nature of Learning and learning process
- Instructional scaffolding
- The intellectual development of the learner

Bruner also assert that any child can be instructed any subject in some Intellectually honest form any stage of development. This notion led Bruner to present his concept of the spiral curriculum which states that a curriculum should revisit basic ideas, building on them until the student had grasped the full formal concept". (Rhalmi, 2011)

Bruner adopts a different view and believes that, at any age, a child has the capability to understand new complicated information. This is attainable through the concept of spiral curriculum. Information are structured in such a way that at first, simple level only and later on, at a more complex level. Hence, subjects are of progressing level of difficulty or complexity. In this way, children are able to solve problems independently. From the constructivist viewpoint, learners should not only take in or accept knowledge but actively participate in the process of learning and constructing knowledge.

Hence, this study was also guided by the concept of discovery learning

which implies that students build knowledge for themselves. The task of the teacher should not be teaching by rote learning, but instead to make the learning process easier and simpler. As such, a good teacher will plan and devise lessons that help students find out the association or connection between bits of information. A teacher do this by giving students the information they need, but without necessarily arranging or structuring for them. Using the spiral curriculum support the process of discovery learning. (McLeod, 2008)

This study was envisioned to prepare a module intended for Grade Seven students of Dr. Arsenio C. Nicolas National High School in the Fourth Quarter. The conceptual paradigm shown in Figure 1, describes how the module was developed. It was conceived based on the Theory of Constructivism by Jerome Bruner. This study adopted the characteristics of Constructivism in developing the modules. As shown in the diagram, the two modules developed highlighted these characteristics:

1. Module is self-contained and self-pacing.
2. Students discover principles by themselves.
3. Allows learners to be active.
4. Evaluation serves as analysis tool.
5. Teachers serve as facilitators.
6. Contextual learning.
7. Adopts spiral curriculum.

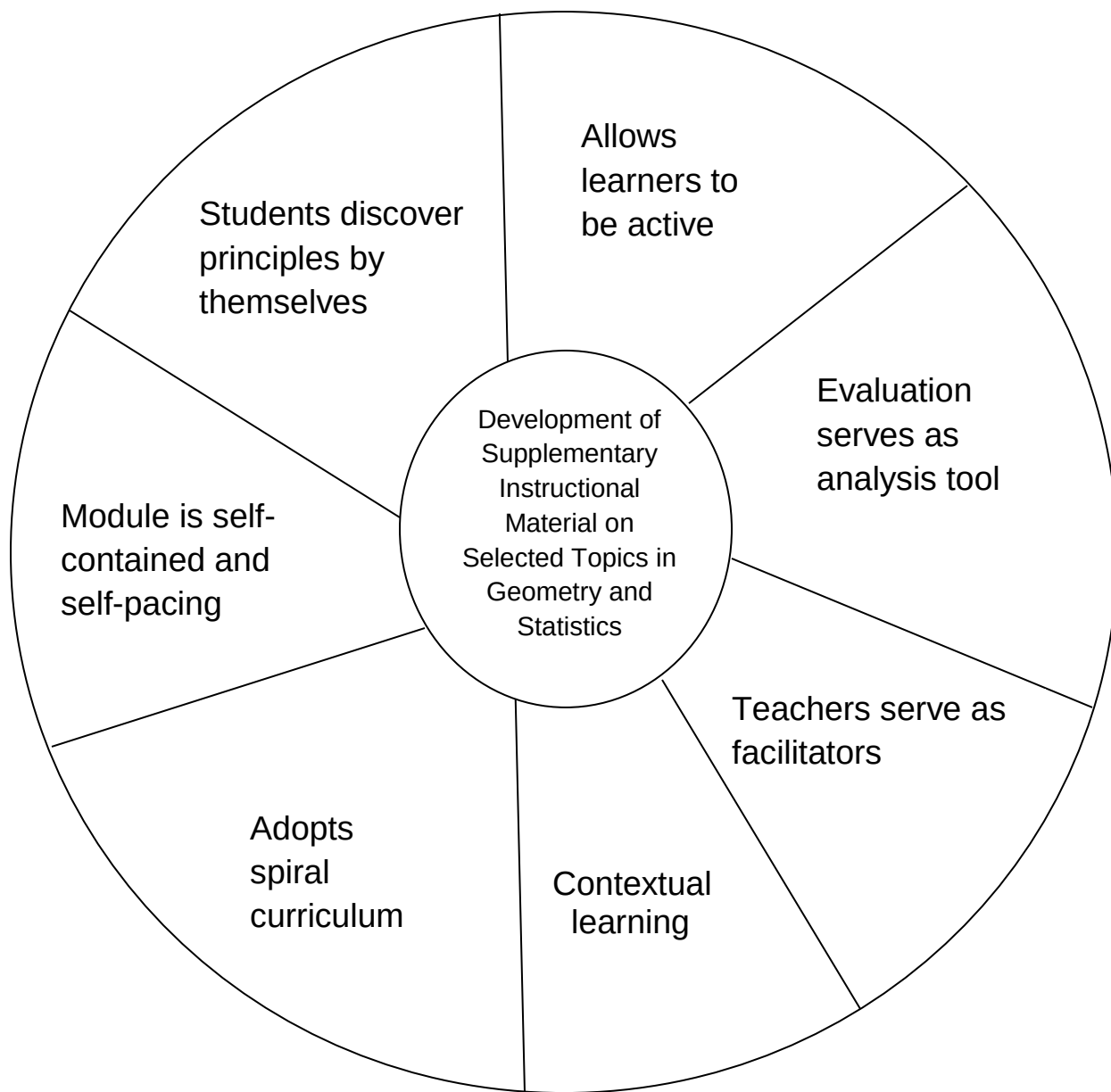


Figure 1
Conceptual Paradigm on the Development of the Modular Instructional Material

1.4 Statement of the Purpose

This study aims to develop a supplementary instructional material on selected topics in Geometry and Statistics intended for Grade 7 students of Dr. Arsenio C. Nicolas National High School in Calauag, Quezon. Specifically, it aims to :

1. Identify the topics to be included in the supplementary instructional material based on the results of the 4th Quarter Examination.
2. Develop the supplementary instructional material based on the selected topics.
3. Determine the assessment of math teachers on the proposed instructional material in terms of its:
 - 3.1 Objectives
 - 3.2 Contents
 - 3.3 Language and Style
 - 3.4 Evaluation

1.5 Significance of the Study

The study on developing supplementary instructional material on selected topics in Geometry and Statistics for Grade 7 students was undertaken by the researcher hoping that the findings would benefit the following:

Students - They are the beneficiaries of this study. This material will motivate them to patiently study their lessons and develop their

interest towards mathematics and appreciate its usefulness and importance. They will also develop sense of commitment and responsibility for their own learning.

Parents – The output of this study will build parents' trust and confidence to school authorities, knowing that their children's welfare is the top priority. This will also save parents from high cost of learning materials.

Teachers – This study will inspire other teachers to formulate or make make supplementary materials in their respective fields or subjects.

Administrators – This study will help administrators to become more aware of the needs of the teachers in promoting professional growth particularly in improving the teaching strategies and approaches or providing a relevant faculty development seminar in developing instructional materials or modules.

Other researchers – This will serve as reference for further study, to inspire them to devise their own module in their areas of specialization.

This study could be used to help solve the serious problem of lack of instructional material such as textbooks, workbooks and manuals.

1.6 Scope and Delimitations of the Study

This study focuses on the development of supplementary instructional material on selected topics in Geometry and Statistics for Grade 7 students of Dr. Arsenio C. Nicolas National High School, in Calauag, Quezon as respondents. The topics included are based on the K to 12 Curriculum Guide for the Fourth Quarter.

Module 1 covers topics in Geometry. The following topics are:

- Lesson # 1: Triangles
- Lesson # 2: Polygons
- Lesson # 3: Quadrilaterals
- Lesson # 4: Circles

Module 2 covers topics in Statistics. The following topics are:

- Lesson # 1: Basic Terms in Statistics
- Lesson # 2: Kinds and Uses of Graphs
- Lesson # 3: Problem Solving on Graphs

The researcher used varied textbooks and other reading materials as references for the discussion of each lesson. Some of the simplest presentations and explanations were adapted from said materials.

The research was conducted during the School Year 2013-2014.

1.7 Respondents of the Study

The participants of the study were 40 Grade Seven students of Dr. Arsenio C. Nicolas National High School, School Year 2013-2014. Also, there were three Mathematics experts who evaluated the acceptability of the modules in terms of its objectives, contents, language and style and evaluation.

1.8 Definition of Terms

The following terms are defined for a clearer understanding of this study.

Development - It pertains to the making of a new product. Specifically, this is referring to the making of module intended for Grade 7 students.

Fourth Quarter Test – This was used to find out the students difficulty in Grade Seven Mathematics. It is a 40-item multiple choice type of test for the fourth quarter only, covering the lessons in Geometry and Basic Statistics.

Least mastered skills – These are the topics with the least average number of correct responses in the 4th Quarter Examination.

Modular Approach - This is a method of instruction that makes use of modules or self-instructional materials.

Module - An independent self-contained unit of instruction which focuses on a well-defined few objectives. In this study, the developed material is for Grade 7 students specifically for the Fourth Quarter. The lessons in the following areas are as follows:

a. Geometry

Triangles

Polygons

Quadrilaterals

Circles

b. Statistics

Basic Terms in Statistics

Kinds and Uses of Graphs

Problem - Solving On Graphs

Supplementary Instructional Materials – It refers to paper-based handouts, which the teacher distributes to students during their classes at their discretion, to supplement the main coursebook. In this study, it refers to module developed for Grade Seven students intended for the fourth quarter only.

The developed modules uses simple language and uncomplicated activities for the students to easily read, understand, follow and perform the exercises and activities.

Chapter 2

REVIEW OF RELATED LITERATURE

This chapter presents the review of related literature and studies, both foreign and local, which have relevance to the current study and how they have helped the researcher gain insights. The cited studies were read and analyzed in order to gain a deeper and broad understanding of the task under study.

2.1 On Instructional Materials

Instructional materials are highly important for teaching. The role of instructional materials in promoting students' academic performance is undisputable. In teaching, these learning materials consists of all types of carriers of information, used to cultivate and nurture learning effectively. These serve essential purpose in the teaching and learning environment. Learning materials in teaching, in general, make the teaching activity easier. Using different learning materials helps the students to maximize learning and keep the information provided to them. (Bone, n.d.). Most self-instructional materials are built from a purpose and are structured to cater to the learners' needs. Prossner (in Espinas, 2004) said that the developers of instructional materials must be mindful of the need to include in their materials, discussions and source definitions that are appropriate to the learners. Instructional materials should include a number of concrete examples so that the learners can develop at least

a partial understanding of the content of the materials. To value the importance of these instructional materials in teaching–learning process, the following are the reasons for using them, as considered by (Heinich et al, 2001):

1. Earn and keep the attention of the learner
2. Provide visual appearance to a process or strategy
3. Concentrate on highlighting key points
4. Produce influence or effect
5. Make it easier to understand explanations that are abstract
6. Provide a common experience to learners
7. Vitalize reality

Wensley and Wronski (as cited in Cadag, 2009) have asserted that instructional materials have long been part of the educational system. According to them, these materials have been an important contribution to mankind's wisdom yesterday and today, and it can accomplish essential functions tomorrow.

Salazar (2001) also recognized the value of several kinds of instructional materials. According to her, mathematics is an abstract subject which requires a lot of effort for the teachers to input and hard for pupils to learn. Hence, she encouraged teachers to have various forms of instructional materials which are substantial, manipulative and properly developed based on concepts and

principles. Math teachers used instructional materials to create positive learning atmosphere for their students to learn.

The use of instructional material is an attempt to provide the optimism of the learning condition for each student. The material will benefit both the fast and slow learners and teachers as well, for it is assumed that the learners fully understand the preceeding topic before moving on to the next one. (Sabe, 2003)

According to Woolfolk (in Cadag, 2009) the use of instructional material does not only promote independent learning but also helps the teacher prepare the daily activities because in the use of this material, the teacher acts as a guide to every learner. Consequently, these materials must be made ready to help teachers in carrying out the teaching process and students with their independent learning, that is, acquiring, modifying, pondering on, appraising and practicing knowlwdge. (Mazgon & Stefanc, 2012).

The functions of instructional materials in teaching and promoting learning were highlighted by Okwudiba (2005), as follows:

1. Gain interest in learning
2. Keep the attention of the learner
3. Help the learners interact with their physical and social environment
4. Encourages independent and individualized learning
5. Provide ideas as basis for conceptual thinking
6. Motivates learners to develop their skills and abilities

7. Encourage acquiring and retaining of knowledge

Expressing something in words or verbalization has been noted to be insufficient for teaching effectively. Instructional materials serve as a means of transmission through which data, facts, ideas, information and knowledge are circulated with ease. Therefore, these can be used, seen, felt or shared with. These materials help teachers in facilitating learning. Jimoh (2009).

Reyes (in Alabaso, 2012) emphasized that one of the modern approaches suited to conventional teaching in individualized instruction and mastery learning is through the instructional modules.

In her study, Geneta (2007) noted that the use of instructional materials caused a big change on pupils' performance. A higher posttest results were obtained by students who used the instructional materials than those who were under traditional method of teaching. The instructional material got a composite mean of 4.12 which is considered as highly acceptable and yielded the impression of effectiveness.

2.2 On Modular Instruction Approach

Modular instruction was initially introduced by American educators depicted by John L. Hughes as an individualized instruction that provides bases for close influence between the learners and subject matter. With the help of the modules, the learners are expected to respond frequently to the instructional

program at their learning pace. (Balderas, 2012). Use of self learning modules in teaching is another form of individual instruction or the modular approach of teaching and learning. Jayasree (in Sadiq & Zamir, 2014). Modular approach is a complete in itself package concerning with one particular subject in convenient form, so that the learner can complete it at his own pace independently or in small groups. It is so structured that the learner can identify the objectives, select material and method, and evaluate his own accomplishment. (Charles & Rajasekar, 2014). Modular teaching is one of the most widespread and recognized teaching learning techniques in many countries like United States, Australia and many other Western countries including the Asian region. The modular approach is used in almost all subjects. It is a recent development based on programmed learning; it is also a well established and universally recognized phenomenon. (Sejpal, 2013).

The modular approach in mathematics learning has been tested and proven to be an effective tool in helping students learn mathematics themselves. Developing instructional materials is time consuming but its effectiveness can be assessed. (Charles and Rajasekar, 2014). Mathematics module is a single self-governing instruction unit, complete in itself with the main focus on a few clearly distinguished goals or objectives. Modules may be added to further units towards the achievement of long-term goals in Mathematics. Modules carry a wide variety of labels including unipack, individualized learning package and

learning activity package.

(http://www.academia.edu/534329/modular_approach_of...)

According to Ralf Carry (in Santomin, 2011), “The modular approach was programmed materials which are carefully organized in a logical sequence through which the learner advances at his own pace, with each of his responses confirmed or corrected immediately.

Hughes (in Santomin, 2011) collaborated Carry’s statement when he emphasized that individualized learning is useful in acquiring a particular skill or learning. Teachers help students by providing them more review materials for unassisted drill or practice.

Paulsson’s (in Morante, 2010) study, examined carefully the role of modularity in attaining a better fit of learning technology to teaching requirements. He argues that modularity promotes adaptability and adaptivity. This paper suggests that one may make use of modular in learning to help enhance the quality of learning.

LeBrun’s (2001) study inferred that modular instruction, if planned carefully to fit a technology education curriculum, can surely improve student learning. The research further indicated that when modules are used solely, instead of in groups, they come to be more productive tools for learning. Furthermore, the research also concluded that modular instruction enables the teacher to have much more close connection with the students than traditional

method.

Considering the study of Oli (2012), employing collaborative learning through modular instruction is as effective alternative in enhancing mathematics achievement among students as the traditional method in teaching mathematics.

Liangco (2006) developed and validated “Basic Education Curriculum (BEC)-based modules in Elementary Algebra”. She found out that modular approach as a mean of instruction was effective in teaching-learning process because it gained dual progress. It could be self-studied by the students as supplementary material while their teacher still monitors and facilitates learning. The modules and the teachers could work wonders to the performance of the student, because one visualizes while the latter clarifies.

Modularized instruction is a technique applied by some teachers in various subjects. It allows the students to learn in their own pace and discover their strengths and weaknesses in the course of this approach. In effect, it relieves the teacher from delivery lectures and aids the administration in case of qualified teachers. A great number of students can avail themselves of this teaching technique. (De Jesus, 2005).

David (2009) conducted study on the Development and Validation of Strategic Intervention Materials (SIMs) in Math II. The content of the SIMs was based on the least mastered on the Regional Achievement Test (RAT) results. He found out that students performed better using the SIMs as compared to

the students who used traditional method which was revealed by the significant difference between the post tests sources of both groups, in favor of the experimental group.

2.3 On the Nature and Characteristics of Modules

A module is a self-instructional kit and thus considered as a quite recent phenomena. It allows the student to direct his own learning and be held responsible for it. A module is a collection of learning opportunities, arranged systematically around well-defined topic which includes the essentials of instructions, general objectives, learning and teaching activities and evaluation. Thus, it should be independent, self-contained instruction, and contain well-defined systematically organized learning opportunities with clearly defined objectives along with evaluating the work. (Iqbal, 2011). Although there are no strict rules for the development of modules, it is necessary to have a common framework for the development.

Garcia (in Punzalan, 2003) cited some characteristics of a good module:

1. It should be self-contained and self-pacing.
2. Its topic or subject matters should be brief, not so long, but clearly defined.
3. It should be satisfactorily motivating.
4. It should give interaction with the learner.

5. Its objectives and activities should be in proper order or arrangement.
6. It should be clearly written, using right language applicable to the status of the target learner.
7. It should be accurate.
8. It should bear no false implications to or conflict with other subject areas or values.
9. It should make use of all possible opportunities to attain positive learning outcome.
10. It should consist all the required components of a module.
11. Elements of the module should corroborate with each other

Ornstein (1990) emphasized that the instructional module should be relevant to instruction. It must contain additional tasks to learners needing more exercises. The language used should be consistent; instructions must be clearly understood and easy to follow; the content must be accurate and precise and there should be a limit on the number of different activities used so as not to overload or confuse the learner.

Nepomuceno (in Balderas, 2012) characterize the modules as follows:

1. It concentrates on a distinguishable and identifiable skills or products.
2. It is short enough so that students may use their study time wisely.
3. It is basically self-teaching, however it may persuade group work.
4. It harmonizes theory and practice, and blends doing with reading and reflecting.

5. It supplies a list of further references or sources which are skills related.

2.4 On the Advantages and Uses of Modules

Creager and Murray (in Punzalan, 2003) emphasized the advantages and uses of modules. They contended that the utilization of modules:

1. provides for individual differences which are recognized in terms of intelligence , individual interest, abilities, rate and style of learning, emotional and social needs.
2. frees the learner from the routinary features of teaching allowing the teacher to have personal contact with other individuals.
3. facilitates the updating of study materials without major revisions through the independent nature of self-instructional units and
4. gives the learners explicit credit for what they had done.

Sejpal (2013) also enumerated the advantages of using modules:

1. Learning become more effective.
2. It establishes a system of assessment other than marks or grade.
3. Learners study the modules in their own working place or area.
4. Users can study without neglecting the normal tasks and obligations.
5. Modules can be conducted to single use, small group or large group.
6. Modules are adjustable so that it can be implemented with a various patterns.

7. It enables the learner to have a control over his learning.
8. It already got wider accessibility in the present educational scenario.

Creager and Murray enumerated several advantages of the use of instructional material using the modular means of teaching. These are: it provides multiple series reflecting teachers and students special interest; it permits the teacher to concentrate on the students deficiencies in the topic or lesson; it excludes covering of subject matter previously known to students. Utilizing these modules, the improvement of students is evaluated and the routinary or usual part of teaching is lessened allowing the teacher to have personal connection with the students.

According to Castanares (in Gammad, 2009) the use of modules not only arouse interest but it also helps the learners acquired a better understanding of other materials. The modules help the learners to analyze particular topics, do exercises and evaluate their own progress with less supervision.

Acero (as cited in Formeloza, 2010) declared that modules as self-instructional materials have proved true the principle of individual differences, because they allow students to progress at their own rate or pace. More intellegent students can complete more modules; less bright ones are can take up fewer modules.

Jamarillo (2012) emphasized that as teachers, they know that learning occurs when the students are encouraged or motivated. Consequently, teachers

will always endeavor to equip a conducive learning environment and maintain the pupils high degree of curiosity or interest. To accomplish this, the teacher uses a variety of motivation styles, teaching approaches or techniques, and instructional material. The uses of these materials contribute to the keen interest and eagerness for learning.

In her research, Urate (in Morante, 2010) found out that the experimental group, who was exposed to the instructional module performed significantly higher than the control group, who used the traditional lecture method. This was proven by the accepted significant difference between the posttest results of the two groups in favor of the experimental group. It is therefore safe to conclude that modular instruction is more effective in imparting lessons in Math.

2.5 On the Components of Modules

The policy in the use of instructional material place emphasis on the basic ideas, concepts and principles involved in an specific subject or course taught. It aims to align or make into agreement the students interpretation of the topic with current knowledge. It also teaches them to regulate and check their thought procedures and processes to facilitate learning. (Van Hooser, 2010).

Angelina Amonceda (in Torrefranca, 2009) suggested eight basic elements of an instructional module. These are:

- (1) overview – summary of what students can gain from the module
- (2) pretest – to check if the student is prepared to do the task

- (3) objectives – states what can students expect to know or learn from using the module
- (4) learning resources – specify references or sources like books, brochures, pamphlets, magazines, newspapers, and other media instruments.
- (5) learning activities – refers to what students will have to do or perform
- (6) enrichment activities – additional activities offered to students to pursue concepts further
- (7) self-evaluation exercise – given after every end of the lesson to find out if the objectives are met or achieved
- (8) post test – a test taken after completing the learning tasks in the module

Self-instructional materials must provide for the following components, as enumerated by Robert, et al (in Macarandang, 2009): “a)rationale; b) objectives; c) pre-test; d) learning activities; e) self-test items and f) posttest.” Moreover, self-instructional materials should observe specific guidelines as follows: 1.The module must have definite scope long enough to cover what is ordinarily covered in one class period; 2. Materials should always contain a review of pre-required content; 3. All items in the module should be simple and clearly defined; 4. Language should be clear, simple and easily understood by its users; 5. Teacher should present the lesson in detail and 6.

The material should be supplementary to other existing instructional materials.

2.6 Synthesis

All the aforementioned studies are connected to the present study because they all engaged with the evaluation of self-instructional materials. Summarizing the reviewed literature, the researcher noted the role and importance of modular instruction in promoting students' academic performance and as essential tool to help students learn effectively as highlighted from the studies of David, Salazar and Woolfolk. Generally, instructional materials make the teaching process easier. Likewise, it is noted that modules should match the mathematical ability of the learners for them to appreciate and value the importance of these materials. Based on the aforementioned studies, especially from the studies of Sabe, Geneta, Paulssons and LeBrun, it can be generalized that instructional materials can improve both teaching and learning process and can motivate the slow learners as well as the fast learners to learn. Hence, the researcher was highly motivated to develop modules for the Fourth Quarter for Grade Seven Students. With proper motivation and guidance, the researcher believes that students will be encouraged to study their lessons well and develop their skills and potentials.

The findings of the reviewed researches and studies confirmed that modules are effective instructional materials in facilitating learning that resulted in students' improved achievement in any particular field of study.

The previous researchers developed and validated their modules but the current study focused on the development and evaluation of modules only.

Chapter 3

METHODOLOGY

This chapter is presents the methodology and procedures of this research. This study focused on the development of Mathematics instructional modules for Grade Seven students.

3.1 The Research Design

The descriptive and developmental methods of research were utilized in the preparation of instructional modules in Mathematics for Grade 7 Students of Dr. Arsenio C. Nicolas National High School for the Fourth Quarter. Descriptive method was used in the analysis of least mastered concepts and skills in Grade 7 Mathematics. Developmental method was employed in the preparation of the Instructional material based on the identified difficulties of the learners.

The descriptive method of research as defined by Best & Khan (2003) is a means of describing, recording, analyzing and interpreting the data gathered to discover the relationship between existing non-manipulated variables.

“The main purpose of this kind of research is to describe the data and the characteristics of what is being studied. The idea behind this type of research is to study frequencies, averages, and other statistical calculations. Although this research is highly accurate, it did not look into the causes behind a situation”.

3.2 The Sample

The respondents of the study were composed of 40 Grade 7 students who were randomly selected from the two sections of Dr. Arsenio C. Nicolas National High School in Calauag, Quezon. The answers of the students formed the basis for item analysis in the Fourth Quarter. This was the basis for selecting the topics for the proposed supplementary instructional material. The teachers/ experts participated in the evaluation of the modules in terms of its objectives, contents, language and style, and evaluation.

3.3 Research Instruments

The researcher used the following instruments in the preparation of the supplementary instructional materials.

1. Fourth Quarter Examination

A 40 - item multiple choice test covering the competencies in Geometry and Statistics for Grade Seven students, (See Appendix B) evaluated by three mathematics teachers. (See Appendix C). This was used to find out the difficulties of students in Grade 7 Mathematics. Topics where few students got the correct answers were considered to be difficult.

2. Evaluation Questionnaire/Checklist

The questionnaire/checklist contains 20-item statements (See Appendix D) which were made to evaluate the module in terms of attainability of objectives, contents, language and style and evaluation. A five-point Likert scale was used in each item with its corresponding verbal interpretation: (1) Strongly Disagree; (2) Disagree; (3) Uncertain; (4) Agree; and (5) Strongly Agree.

3. The Module

This supplementary instructional material comes in the form of a Module intended for Grade Seven students specifically in the fourth quarter. Topics on Geometry and Statistics comprises this module.

3.4 Data Gathering Procedure

The preparation of the module consisted the following steps:

A. Development of the Module

1. The Fourth Quarter Examination was constructed based on the topics specified for the quarter (See Appendix A) and validated by three mathematics teacher/experts.

2. The Fourth Quarter Examination (See Appendix B) was given to selected Grade 7 students , results of which were statistically analyzed.
3. The researcher identified the topics that were used in the development of the supplementary instructional material. The correct responses in each item were tallied and the average for each topic was calculated and tabulated. Topics where few students got the correct answers were considered to be difficult for them.
4. The modules were developed, covering topics for the Fourth Quarter specifically, the identified least learned topics or difficulties of the students were considered. These are:

Module 1 - Geometry

- a. Triangles
- b. Polygons
- c. Quadrilaterals
- d. Circles

Module 2 - Statistics

- a. Terminologies, Uses and Importance of Statistics
- b. Kinds and Uses of Graphs
- c. Problem Solving on Graphs

B. Evaluation of the Developed Module

1. The researcher consulted several textbooks, references and relevant reading materials as guide in the preparation of the instructional material. The module was developed and the evaluation questionnaire/checklist (See Appendix E) were formulated. These questionnaires were used to assess the acceptability of the module, in terms of its objectives, contents, language and style, and evaluation.
2. Respondents were requested to read the developed learning module and answer the questions by placing a check mark on the spaces that corresponds to their honest opinion based on the criteria posted. This checklist was attached to the developed modules to facilitate the evaluation by the experts.
3. The questionnaire/checklist were retrieved personally by the researcher to ensure its safe and sure retrieval.
4. Data were collected, tallied, computed and presented in table form, summarized, and subjected to statistical treatment in consideration of the problem.

3.5 Statistical Treatment

The following statistical tools were used in the interpretation of results in the research study:

1. To determine the weakness on the performance of the respondents based on the results of the fourth quarter examination, frequency was used. After which, item analysis was employed. The difficulty level of each item, as well as the discrimination power of the items were determined.

The interpretation of the result of the indices of difficulty is based on the given equivalent below:

Difficulty Index

Index	Descriptive Level
.00 - .20	Very difficult
.21 - .80	Moderately difficult
.81 - 1.00	Very easy

Discrimination Index

Index	Descriptive Level	Recommendation
0.40 and up	Very Good item	Retain
0.30 to 0.39	Good item	Improve
0.20 to 0.29	Marginal item	Revise
0.19 and below	Poor item	Reject

2. To determine the level of acceptability of the developed supplementary Instructional material with respect to its objectives, contents, language and style, and evaluation, mean was used. A corresponding verbal interpretation to characterize the experts' assessment of the developed instructional material was given.

3.6 Data Analysis

In the interpretation and evaluation of results, the researcher used the interpretation suggested in an earlier study by Torre Franca (2009). The rating scale has the following interpretations of range:

Table 1
Verbal Interpretation of the Evaluation

Numerical Value	Interpretation
4.20 to 5.00	Strongly Agree
3.40 to 4.19	Agree
2.60 to 3.39	Uncertain
1.80 to 2.59	Disagree
1.00 to 1.79	Strongly Disagree

Table 1 shows that the highest verbal interpretation that the evaluator can give is strongly agree with the numerical value between 4.20 and 5.00. On the other hand, the lowest possible numerical value is between 1.00 and 1.79.

This table was used by the researcher to interpret the evaluation of experts on the developed module in terms of its objectives, content, language and style and evaluation.

Chapter 4

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the results and findings of the study accumulated to answer the problems stated in previous chapters. The data and statistical findings are presented and given implications to concretize the concepts.

4.1 Results and Discussion

1. The result of the Fourth Quarter Examination for Grade Seven Mathematics revealed the least learned lessons in Geometry and Statistics for Grade Seven students. There are four major topics in Geometry namely, triangles, polygons, quadrilaterals and circles, in which the students were found to be weak as revealed by the low mean of correct responses. Also, there are three major topics in Statistics which were found weak. These are as follows: basic terms in statistics, kinds and uses of graphs, and problem solving on graphs.

Table 2
Geometry Topics Having the Lowest Mean of Correct Responses

Topics	Number of items	Item Numbers	No. of Correct Responses	Mean	Rank
Triangles: Parts, Terms, Length of Sides, Properties	5	1,7,17,18,29	34	6.8	2
Interior/Exterior Angles of Polygons	5	8,9,19,30,31	38	7.6	4
Kinds and Properties of Quadrilaterals	5	2,10,20,32,33	36	7.2	3
Parts of a Circle	2	3, 21	13	6.5	1

Table 2 shows topics in Geometry with the corresponding mean of correct responses: parts of a circle, having the lowest mean (rank 1); triangles: parts, terms, length of sides, and properties (rank 2); kinds and properties of quadrilaterals (rank 3), and interior and exterior angles of polygons (rank 4).

Table 3
Basic Statistics Topics Having Lowest Mean of Correct Responses

Topics	Number of Items	Item Numbers	No. of Correct Responses	Mean	Rank
Basic Terms, Uses and Importance of Statistics	4	4,11,22,34	30	7.5	3
Kinds and Uses of Graph	3	13,24,36	18	6	2
Problem Solving on Graphs	4	16,28,39,40	22	5.5	1

Table 3 shows the topics in Basic Statistics with the corresponding mean of correct responses: problem solving on graphs having the lowest mean (rank1), kinds and uses of graphs (rank 2) and basic terms, uses and importance of Statistics (rank 3).

Based on the results of the 4th Quarter Examination in Grade 7 Mathematics, the aforementioned topics as revealed by Table 1 and Table 2 were identified to be included in the supplementary instructional material. Four (4) topics are considered in Geometry and three (3) topics in Statistics.

2. As soon as the topics were identified, the supplementary instructional was developed. As revealed in the 4th Quarter Examination results, the instructional materials consisted of the different topics in Geometry and Statistics

namely: Triangles, Polygons, Quadrilaterals and Circles; and Terminologies in Statistics, Kinds and Uses of Graphs and Problem Solving on Graphs. The instructional material was evaluated by three (3) mathematics teachers/experts in terms of its objectives, contents, language and style and evaluation.

3. As to the assessment of Math Teachers/ Experts on the proposed instructional material, the criteria were as follows: objectives, content, language and style and evaluation. The evaluators strongly agreed on the criteria/indicators mentioned as evidenced by the overall mean of 4.67, 4.20, 4.60 and 4.67 respectively.

The grand mean of 4.54, indicates that the respondents, the mathematics teachers/experts strongly agreed and concurred that the material can help students in their mathematics learning.

Table 4
Evaluation of Experts Pertaining to the Objectives of the Module

Quality Element of the Module	Mean	Verbal Interpretation
A. Objectives		
1. The module is accompanied by a list of specific objectives.	4.67	Strongly Agree
2. The objectives are clearly stated and grammatically correct.	4.67	Strongly Agree
3. The objectives are simple and specific.	4.67	Strongly Agree
4. The objectives are relevant to the lesson.	4.67	Strongly Agree
5. The objectives are attainable and measurable.	4.67	Strongly Agree
Overall	4.67	Strongly Agree

Table 4 shows that all the evaluators strongly agreed that the instructional module has of a list of specific objectives which are clearly stated and grammatically correct, simple and specific, relevant to the lesson and attainable and measurable.

Table 5
Evaluation of Experts Pertaining to the Contents of the Module

Quality Element of the Module	Mean	Verbal Interpretation
B.Contents		
1. The contents support the instructional objectives.	4.33	Strongly Agree
2. The contents adequately cover the objectives of the lesson.	4.00	Agree
3. The contents are relevant, interesting and self-motivating for the learners.	4.00	Agree
4. The instructional material contains sufficient number of exercises.	4.33	Strongly Agree
5. The directions are clear and easy to understand.	4.33	Strongly Agree
Overall	4.20	Strongly Agree

Table 5 shows that the evaluators strongly agreed that the instructional module has contents that support the instructional objectives, contains sufficient number of exercises, and directions are clear and easy to understand. Also, the evaluators agreed that the contents of the module adequately cover the objectives of the lesson, and that they are relevant, interesting and self-motivating to the learners.

Table 6
Evaluation of Experts Pertaining to the Language and Style of the Module

Quality Element of the Module	Mean	Verbal Interpretation
C.Language and Style		
1. The language is simple and easy to understand.	4.67	Strongly Agree
2. The vocabulary /terms used is familiar and appropriate to most G7 students.	4.67	Strongly Agree
3. It gives instructions that are clearly understood and followed.	4.67	Strongly Agree
4. It gives illustrations that are appropriate and relevant.	4.33	Strongly Agree
5.The structure, style and format are appropriate to the target level.	4.67	Strongly Agree
Overall	4.60	Strongly Agree

Table 6 shows that all the evaluators strongly agreed that the instructional module has language that is simple and easy to understand, vocabulary or terms used as familiar and appropriate to most G7 students, instructions are clearly understood and followed, illustrations are appropriate and relevant, and that the structure, style and format are appropriate to the target level.

Table 7
Evaluation of Experts Pertaining to the Evaluation of the Module

Quality Element of the Module	Mean	Verbal Interpretation
D. Evaluation		
1. Evaluation items are congruent with the Learning objectives.	4.67	Strongly Agree
2. Test items are presented in simple and Precise language.	4.67	Strongly Agree
3. The pretest and posttest are suited to the Objectives and goals of the curriculum.	4.67	Strongly Agree
4. Items form exercises are suited to the ability level of G7 students.	4.67	Strongly Agree
5. The test items are adequate to measure Students' mastery of the lesson.	4.67	Strongly Agree
Overall	4.67	Strongly Agree

Table 7 shows that all the evaluators strongly agreed that the instructional module has evaluation items that are congruent with the learning objectives, test items are presented in simple and precise language, pretest and posttest are suited to the objectives and goals of the curriculum, items from exercises are suited to the ability level of Grade Seven students, and that the test items are adequate to measure students' mastery of the lesson.

Table 8
Summary Table of Means of the Evaluators' Responses Pertaining to Objectives,
Content, Language and Style and Evaluation

Quality Elements of the Module	Mean	Verbal Interpretation
1. Objectives	4.67	Strongly Agree
2. Content	4.20	Strongly Agree
3. Language and Style	4.60	Strongly Agree
4. Evaluation	4.67	Strongly Agree
Overall	4.54	Strongly Agree

Table 8 shows the summary of means pertaining to objectives, content, language, format and style, and evaluation of the instructional module. The evaluators strongly agreed on the four aspects of the said material. Thus, the develop instructional materials can be described as strongly acceptable based on the aforementioned scale with overall mean of 4.54.

4.2 The Module

Learning Modules
on
Some Selected Topics
In Geometry and Statistics
for
Grade 7 Students

Hazale G. Trapane

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What is this Module About?

This is a module/ supplementary material covering the Learning Competencies required for Grade Seven Mathematics in the Fourth Quarter. It focuses on the basic concepts and skills development in some selected topics in Geometry and Statistics which are discussed and explained in simple language and in simple presentation.

This module has been specially written as a supplementary material for G7 students. This can also be used as a material for self-study, for all interested students at their own convenient time.

This module hopes to help students to understand the lessons better, to have positive attitude and interest towards Mathematics, and to motivate them to persevere in their studies and specifically to realize that Mathematics is worth-learning for!

Student's Guide in Using this Module

To use this module effectively, follow these guidelines:

1. Module is a self-paced learning material where you can proceed at your own pace and at your most convenient time.
2. Read first the overview of the learning module to have an idea about its content. The objectives cited in each lesson, tell what you should know and be able to do at the end of every lesson.
3. Take the Pretest, to find out what you already know, then check your answer by referring to the answer key provided before going through the lesson proper. If you get 9 out of 10 questions correctly, you may go to the next lesson. If you failed to answer 9 out of 10 questions correctly, return to the lesson and review the items which you failed to get. Kindly use any paper as your answer sheet, don't write anything on the module.
4. Read each lesson carefully. Be diligent and be patient. Your teacher will be more than willing to help you, if you do not understand any topic, or if you need clarifications, feel free to ask your teacher.
5. Each lesson consists of the following segments: Pretest, Lesson Proper, Example, Try This, and Remember. You must undergo all of these before taking the Posttest. Answer keys are provided.
6. Answer the Posttest after accomplishing what is required in each lesson to evaluate what you have learned.
7. If you performed well in the Posttest, you may proceed to the next lesson of the module. If not, you still need to study harder. Go back to the part where you failed to answer correctly.



Learning Module in Geometry

Lesson 1 : Triangles

Lesson 2 : Polygons

Lesson 3 : Quadrilaterals

Lesson 4 : Circles

Module 1

Lesson 4 -

Circles

About the Lesson:

This lesson will introduce you to the different terms associated with circles.

Objectives:

In this lesson, you are expected to:

1. Define, identify and name the terms related to the circle: radius, diameter, chord, center, arc and central angle.



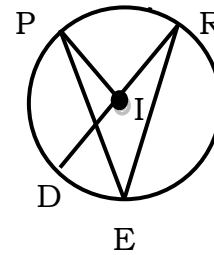
*Kindly take the Pretest before
going through the lesson.*

Ready? You may turn to next page now.

Pretest

Use $\odot I$ to conclude whether each statement is true or false.

1. $\overline{IP}$ is a radius of $\odot I$.
2. $\overline{DR}$ is a diameter of $\odot I$.
3. $\overline{PE}$ is a chord of $\odot I$.
4. $\overline{RE}$ is a diameter of $\odot I$.
5. $\overline{RE}$ is a chord of $\odot I$.
6. $\overline{DR} = 2(\overline{IR})$
7. $\overline{IP} = \overline{IR}$
8. A circle has exactly two radii.
9. A radius of a circle is a chord of the circle.
10. A diameter is half as long its radius.



*Are you ready to check
your answers?*

Refer to the answer key below.

Self Check

- | | |
|----------|-----------|
| 1. False | 6. True |
| 2. True | 7. True |
| 3. True | 8. True |
| 4. False | 9. False |
| 5. False | 10. False |



What's your score in the Pretest?

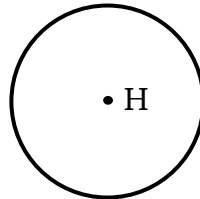
Did you get 9 out of 10 correctly? If yes, you might know the lesson well. If not, don't worry, that's just a Pretest. The learning activities that follows will help you a lot. Read thoroughly. Do the exercises. Learning is fun!

Lesson Starts Here



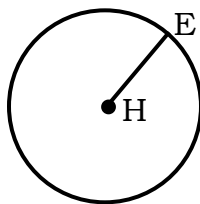
A. Circle and Its Segments

A circle is the set of all points in a plane where every point is equidistant from a fixed point, called the center. You name a circle by its *center*. Circle H ($\odot H$) is shown below:

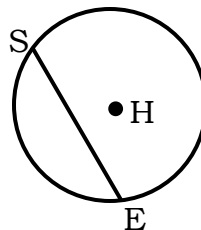


A circle is named by its center. The circle above is named circle H. In symbols, $\odot H$.

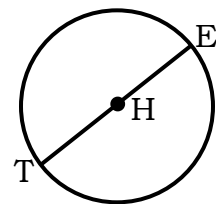
The three segments related to a circle are: A *radius* is a segment drawn from the center of the circle to any point on the circle. A *chord* is a segment whose endpoints are on the circle. A *diameter* is a chord containing the center.



HE is a radius
of $\odot H$



SE is a chord
of $\odot H$



TE is a diameter
of $\odot H$

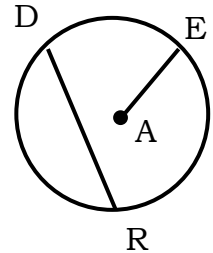
From the figure, you can note that the diameter is a chord that passes through the center.

Example A1

A. Use $\odot A$ to decide whether each statement is true or false.

1. $\overline{DR}$ is a diameter of $\odot A$.

False; $\overline{DR}$ does not go through the center A .
Thus, $\overline{DR}$ is not a diameter.



2. $\overline{AE}$ is a radius of $\odot A$.

True; the endpoints of $\overline{AE}$ are the center A and point on the circle, E . Thus, $\overline{AE}$ is a radius.

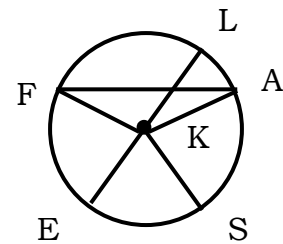
A. Refer to the figure at the right.

1. a. Name the circle.

The circle has its center at K , so it is named circle K or $\odot K$.

2. Name the radius of the circle.

Five radii are shown: $\overline{KF}$, $\overline{KL}$, $\overline{KA}$, $\overline{KE}$ and $\overline{KS}$.



3. Name a chord of the circle.

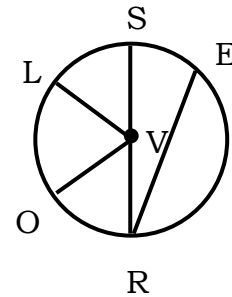
Two chords are shown: $\overline{FA}$ and $\overline{EL}$.

4. Name a diameter of the circle.

$\overline{EL}$ is the only chord that goes through the center, so $\overline{EL}$ is a diameter.

Try This

1. Name the circle, a radius, a chord, and a diameter of the circle.



By definition, the distance from the center to any point on a circle is always the same. Therefore, all radii r are congruent. A diameter d is composed of two radii r , so all diameters are congruent. Thus, $d = 2r$ and $r = d/2$ or $\frac{1}{2} d$.

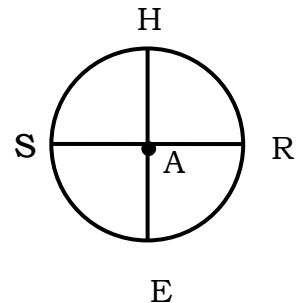
Example A2

1. Circle A has diameters $\overline{HE}$ and $\overline{SR}$.
 - a. If $\overline{HE} = 10$, find $\overline{AE}$.

$$\begin{aligned} r &= \frac{1}{2} d \\ &= \frac{1}{2} (10) \\ &= 5 \end{aligned}$$

- b. If $\overline{SA} = 12$, find $\overline{AH}$.

Since all radii are congruent, $\overline{SA} = \overline{AH}$. So $\overline{AH} = 12$.

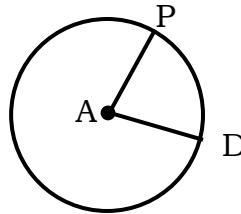


Try This

1. If $\overline{SA} = 7$, find $\overline{SR}$.
2. If $\overline{HE} = 15$, find $\overline{HA}$.

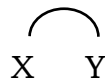
B. Central Angle and Arcs

A *central angle* is an angle whose vertex is at the center of the circle.



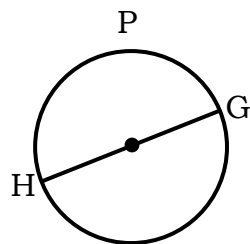
$\angle PAD$ is a central angle.

An *arc* is a part of a circle. An arc of a circle is two points on the circle and the continuous part of the circle between the two points. Arc measure is found by measuring the central angle.

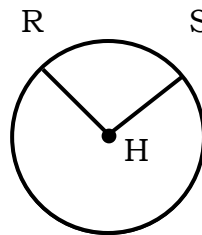


Arc XY is written as $\widehat{XY}$ or $\widehat{YX}$.

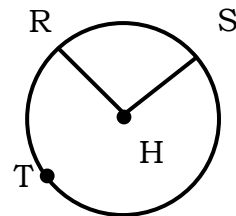
There are three types of arcs: a semicircle, a minor arc and a major arc.



HPG is a semicircle
 $m \widehat{HPG} = 180$



RS is a minor arc
 $m \widehat{RS} = m \angle RSH$



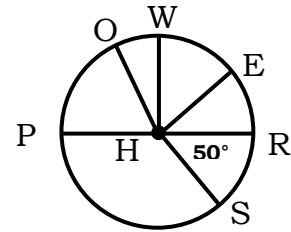
RTS is a major arc
 $m \widehat{RTS} = 360 - m \angle RSH$

A *semicircle* is half a circle. A semicircle measures 180. A *minor arc* is the measure of its corresponding central angle. A *major arc* is longer than a semicircle. The measure of a major arc is 360 minus the measure of its related minor arc.

What kind of arc can you name with only two points? What kind of arc must you name with three points? Why?

Example B

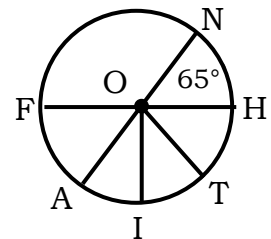
Refer to figure at the right.



- Name 2 semicircles.
The semicircles are: $\widehat{PWR}$ and $\widehat{RSP}$.
- Name at least 3 minor arcs.
The minor arcs are: $\widehat{PW}$, $\widehat{ES}$, and $\widehat{OE}$.
- Name at least 3 major arcs.
The major arcs are: $\widehat{PRS}$, $\widehat{WSP}$, and $\widehat{ESP}$.
- Find the arc measure of $\widehat{PRS}$.
The measure of arc $\widehat{PRS}$ is 230° .

Try This

Refer to the figure. Answer the following:



- Name 2 semicircles.
- Name at least 2 minor arcs.
- Name at least 2 major arcs.
- Find the arc measure of $\widehat{FHN}$.



Remember

- A circle is the set of all points in a plane that are equidistant from a given point called the center.
- There are three segments related to circle; a radius, a chord and a diameter.
- All radii of a circle are congruent.
- The measure of the diameter d of a circle is twice the measure of the radius r of the circle.

- A central angle has the center of the circle as its vertex, and its sides contain two radii of circle.



Are you ready to take the Post Test? Find out how much you have learned.

Post Test

A. State whether the statement is true or false.

1. A diameter is a chord.
2. A chord is a diameter.
3. A radius is a chord.
4. A radius is half of a diameter.
5. The center of the circle is an exterior point of the circle.

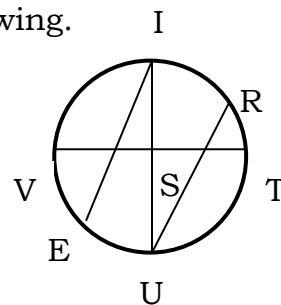
B. Match each term on the left with a definition on the right.

- | | |
|-------------|--|
| 1. circle | a. a chord containing the center |
| 2. radius | b. an arc of the circle that is larger than a semicircle |
| 3. diameter | c. an arc of the circle that is smaller than semicircle. |

- | | |
|------------------|--|
| 4. chord | d. an arc of a circle whose endpoints lie on a diameter |
| 5. central angle | e. an unbroken part of a circle consisting of two points called the endpoint and all the points on the circle between them |
| 6. semicircle | f. an angle whose vertex is the center of the circle |
| 7. arc | g. a line segment whose endpoints lie on the circle |
| 8. center | h. the set of all points in a plane, which is equidistant from a fixed point called the center |
| 9. minor arc | i. a segment whose endpoints are the center of the circle and a point on the center |
| 10. major arc | j. a fixed point of the circle |

C. In the figure at the right, identify the following.

- | | |
|--------------------|--------------------|
| 1. $\overline{SU}$ | 6. $\overline{EI}$ |
| 2. $\widehat{TUV}$ | 7. $\angle IST$ |
| 3. $\overline{VT}$ | 8. $\overline{IU}$ |
| 4. $\widehat{VIR}$ | 9. $\widehat{IUV}$ |



5. S

10. $\widehat{\text{TU}}$



How well did you perform?
Check your work honestly.

Refer to the answer key on the next page.

Answer Key

Try This

Example A1

name: circle V or $\odot V$

radius: $\overline{LV}$, $\overline{OV}$ or $\overline{RV}$

chord: $\overline{RE}$, $\overline{VI}$

diameter: $\overline{SR}$

Example A2

1. $SR = 14$

2. $HA = 7.5$

Example B

1. $\widehat{FOH}$, $\widehat{HIF}$

2. $\widehat{FN}$, $\widehat{NT}$, or $\widehat{TA}$, $\widehat{IF}$

3. $\widehat{FHT}$, $\widehat{HIN}$ or $\widehat{IFH}$, $\widehat{AFH}$

4. 245°

PostTest

- A. 1. True
2. False
3. False
4. True
5. False

- B. 1. h
2. i
3. a
4. g
5. f

6. d
7. e
8. j
9. c
10. b

- C. 1. radius
2. semicircle
3. diameter
4. semicircle
5. center

6. chord
7. central angle
8. diameter
9. major arc
10. minor arc



Congratulations! You did a great job!

You may move on to the next lesson.

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Learning Module in Statistics

Lesson 1 : Basic Terms in Statistics

Lesson 2 : Kinds and Uses of Graph

Lesson 3 : Problem Solving on Graphs

Module 2

Lesson 2

Kinds and Uses of Graphs

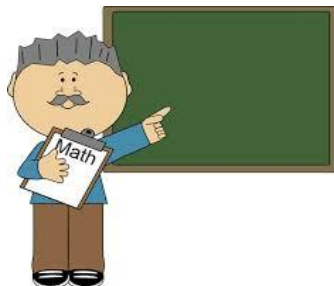
About the Lesson:

This lesson allows you to explore different ways of organizing and presenting data using graphs. Presenting data using graphs such as line graphs, bar graphs, and pie graphs or circle graphs will be studied.

Objectives:

In this lesson, you are expected to:

1. Make or construct different kinds of graph such as line graph, bar graph and circle graph from frequency distribution.
2. Use appropriate graphs to present particular type of data.



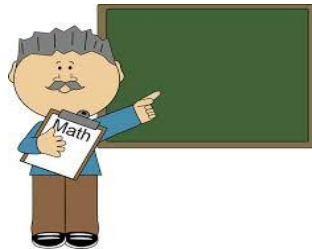
Kindly take the Pretest before going through the lesson.

Ready? You may turn to next page now.

Pre-Test

State whether the statement is True or False.

1. Graphs are useful for comparing facts.
2. A circle is the same as 360° .
3. A circle graph is also called a pie graph.
4. A bar graph is a graphical display of data using bars of the same heights.
5. The labels of the graph tells us what the graph is about.
6. Usual graphs make use of lines, bars or parts of a circle to show the data.
7. In a bar graph, the bars can be vertical or horizontal.
8. Data can be understood better when it is presented as a table rather than as a graph.
9. Line graph is a diagram that shows a line joining several points.
10. A graph is termed the simplest method to compare numbers.

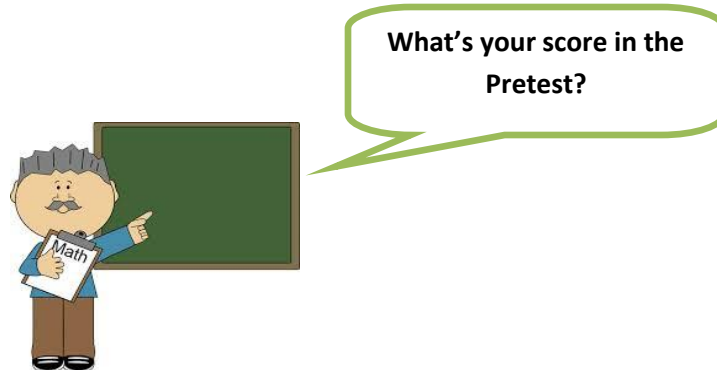


Are you ready to check
your answers?

Refer to the answer key below.

Self-Check

- | | |
|----------|----------|
| 1. True | 6. True |
| 2. True | 7. True |
| 3. True | 8. False |
| 4. False | 9. True |
| 5. False | 10. True |



Did you get 9 out of 10 correctly? If yes, you might know the lesson well. If not, don't worry, that's just a Pretest. The lesson that follows will help you a lot. Read thoroughly. Do the exercises. Learning is fun!

Lesson Starts Here



Graphs are pictorial representation of numerical data. They are pictures that help us understand data. Graphs are effective visual tool because graphs have the capacity to present the information quickly as well as easily. Data can be understood better when it is presented as a graph rather than as a table because the graphs have the ability to reveal a trend or a comparison.

There are many kinds of graph. These graphs generally fall into three different categories: line graphs, bar graphs and pie graphs or circle graphs. Each of these three has their own particular similarities and differences, each of which has its particular use.

The various parts of a graph are:

1. Title – The title of the graph tells us what the graph is about.
2. Labels – The labels tell us what kinds of facts are listed
3. Bars, points or circle – The bars, points, or pie show us the facts
4. Grid lines – Grid lines are used to create the scale.

Kinds of Graph:

A. Line Graph

A line graph shows points plotted on a graph. The points are then connected to form a line. A line graph is used to show changes between two quantitative data. Usually, one of the quantities under consideration is time. The relation between these data is graphed on rectangular coordinate plane. The quantity time is usually plotted along the horizontal axis while the other quantity is plotted along the vertical axis. Points are plotted based on the relationship of the quantities, and those points are connected by a line. A line graph is useful in displaying data or information that changes continuously over time. Another name for a line graph is a line chart.

Example A

The graph below shows Sam's weight in kilogram for 5 months



<http://www.mathgoodies.com/lessons/graphs/line.html>

Try This

Make a line graph summarizing the number of absentees per day in a week of a Grade 7-ABA class.

Day	Number of Absentees
Monday	6
Tuesday	4
Wednesday	5
Thursday	8
Friday	13

B. Bar Graph

A bar graph uses bars to show data. It uses vertical or horizontal bars to represent the frequencies of a distribution. It is used for making direct visual comparison of data. You can use bar graphs to display the relationship among groups. Any two items that you will be comparing need not necessarily influence each other in any way. It is useful for comparing facts. The bars provide a visual display for comparing quantities in different categories. It is also a quickest way to display huge (very big) difference. Bar graphs help us to see relationships quickly.

In order to draw the bar graph, we must have the data labeled in a frequency distribution. The following example explains the procedure for constructing bar graph.

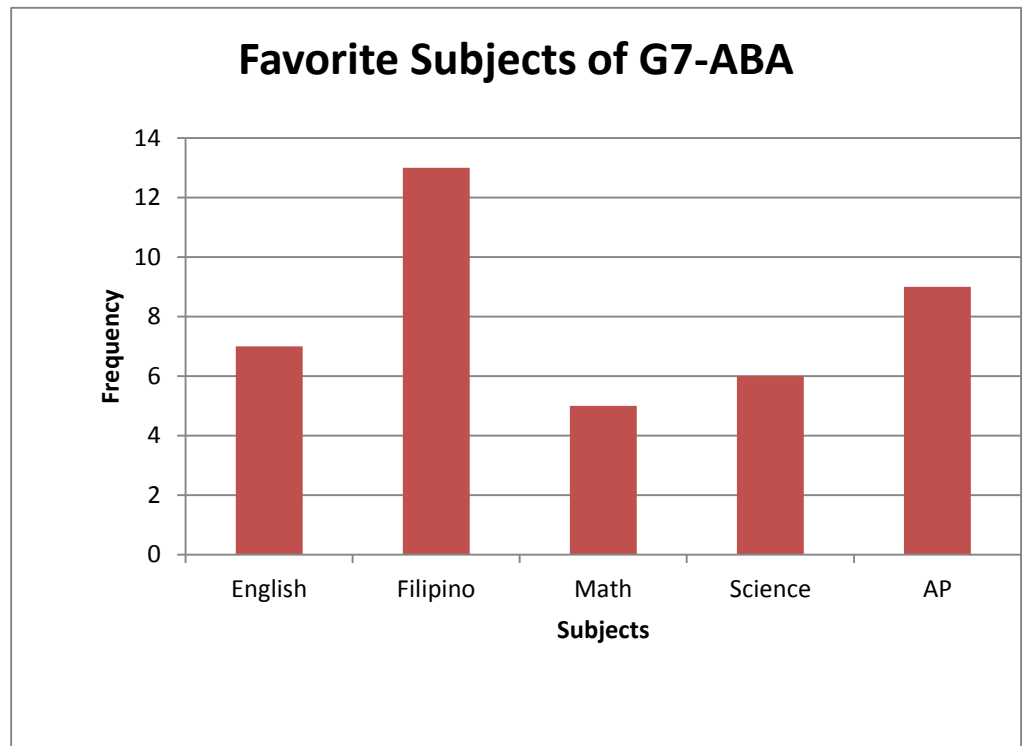
Example B

The table below shows the favorite colors of class G7-ABA. Construct a vertical bar graph for the data.

Subjects	Frequency
English	7
Filipino	13
Math	5
Science	6
AP	9

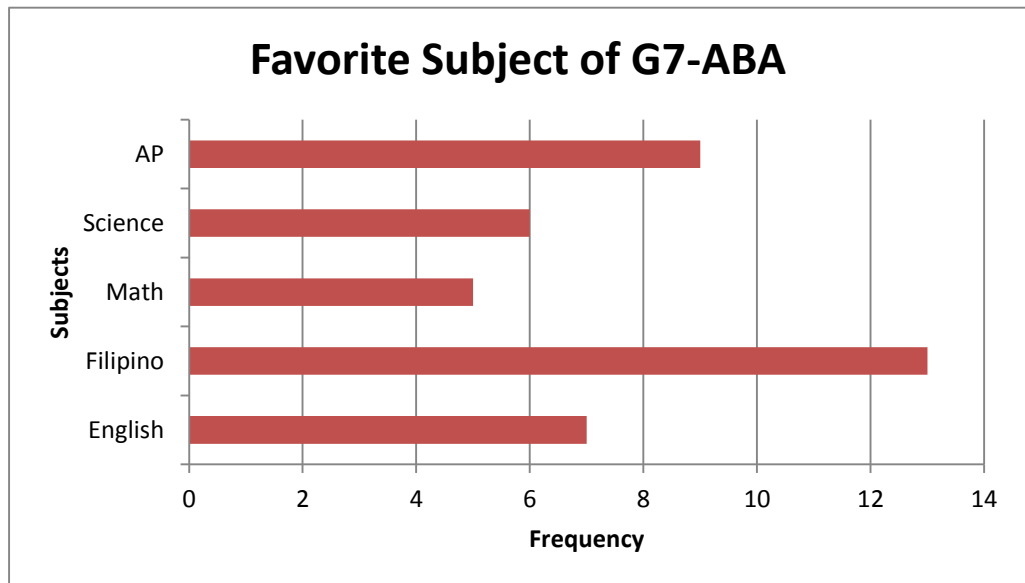
Steps in Constructing the Graph:

1. Draw and label the x and y axis.
2. Represent the subjects on the x axis and the frequency (number of students) on the y axis.
3. Draw the bars corresponding to the data, as shown in the figure below.



The graph shows that Filipino is the most favorite subject of the class.

Horizontal bar graphs are constructed by placing the frequency on the x axis and the categories on the y axis, as shown below.



Try This

The table shows the merienda foods usually served at the school canteen. Make a vertical bar graph summarizing the data below.

Merienda Foods	Number of Students
Niyubak (cassava roll)	9
Suman	7
Budin (cassava cake)	8
Banana Cue	12
Kalingking (camote strips)	10
Puto	6
Kutsinta	8

C. Circle or Pie Graph

A circle graph is shaped like a circle. It is divided into fractions that look like a piece of pie, so sometimes a circle graph is called a pie graph. Many times the fractional parts are different colors and a key explains the colors. A pie graph or circle graph will help you to display a part of something that relates to the whole. Usually, circle graphs are a key way to show percentages efficiently. It is probably the easiest chart to read.

Example C

Imagine you did a survey of your friends to find which kind of movie they liked best. Here are the results.

Favorite type of Movie				
Comedy	Action	Romance	Drama	SciFi
4	5	6	1	4

Steps in Constructing the Circle or Pie Graph

1. First, put your data into a table (like above), then add up all the values to get a total:

Comedy	Action	Romance	Drama	SciFi	Total
4	5	6	1	4	20

2. Next, divide each value by the total and multiply by 100 to get a percent:

Comedy	Action	Romance	Drama	SciFi	Total
4	5	6	1	4	20
$4/20=20\%$	$5/20=25\%$	$6/20=30\%$	$1/20=5\%$	$4/20=20\%$	100%

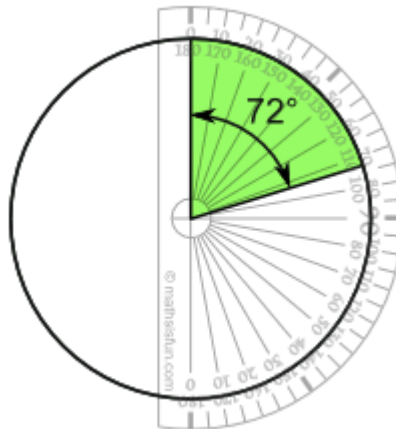
3. Now, you need to figure out how many degrees for each “pie slice”, or called sector.

A full circle has 360 degrees, so we do this calculation.

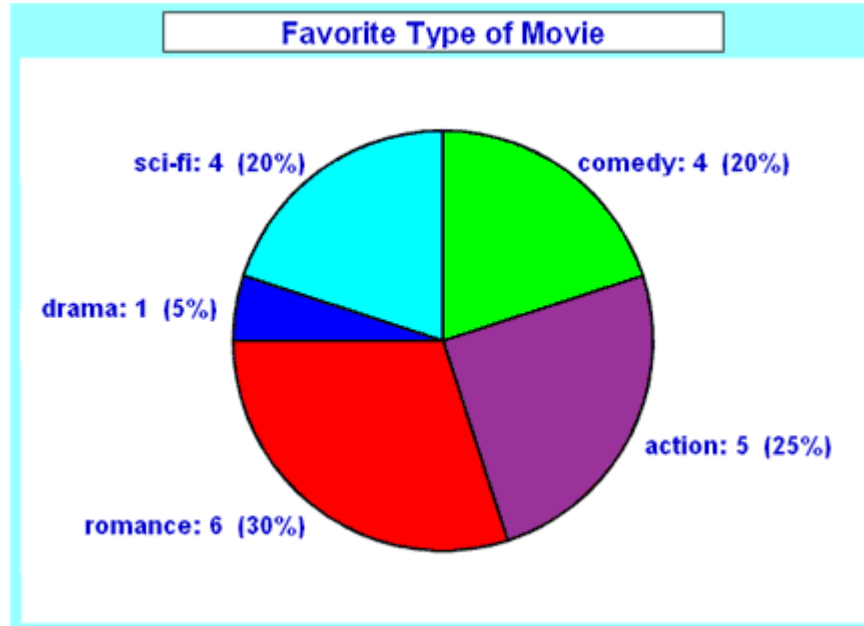
Comedy	Action	Romance	Drama	SciFi	Total
4	5	6	1	4	20
$4/20=20\%$	$5/20=25\%$	$6/20=30\%$	$1/20=5\%$	$4/20=20\%$	100%
$4/20 \times 360^\circ$ $=72^\circ$	$5/20 \times 360^\circ$ $=90^\circ$	$6/20 \times 360^\circ$ $=108^\circ$	$1/20 \times 360^\circ$ $=18^\circ$	$4/20 \times 360^\circ$ $=72^\circ$	360°

4. Now, you are ready to start drawing!
5. Draw a circle.
6. Then, use your protractor to measure the degrees of each sector.

Here, the first sector is shown,
.... you can do the rest.



Finally, the pie chart looks like this:



<https://www.mathisfun.com/data.pie-charts.html>

Try This

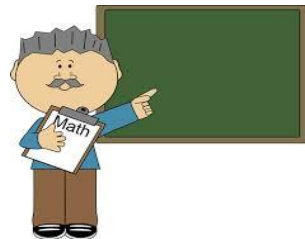
Josie made a survey among 100 Grade 9 students about their preference whether on academic tracks or livelihood courses for Senior High School under the K to 12 program. Show the result of her survey in a circle graph.

Business, Accountancy & Management (BAM)	- 20
Humanities, Education and Social Sciences (HESS)	- 16
Sciences, Technology, Engineering & Mathematics (STEM)	- 14
Commercial Cooking	- 11
Practical Electricity	- 10
Computer Servicing	- 12
Massage Therapy	- 7
Welding	- 10

Remember



1. A graph is a pictorial representation of numerical data.
2. You can use graphs to show several types of data.
3. There are simpler types of graph such as line graph, bar graph and circle graph.
4. A graph commonly consists of two axes called the x-axis (horizontal) and y-axis (vertical). Each axis corresponds to one variable.
5. A line graph is useful for displaying data or information that changes continuously over time.
6. A bar graph is a graphical display of data using bars of different heights.
7. A circle or pie graph is used to represent quantities that make up a whole.
8. A line graph is useful in displaying data or information that changes over a period of time.
9. Graphs are very effective visual tool because they have the capacity to present the information quickly as well as easily.

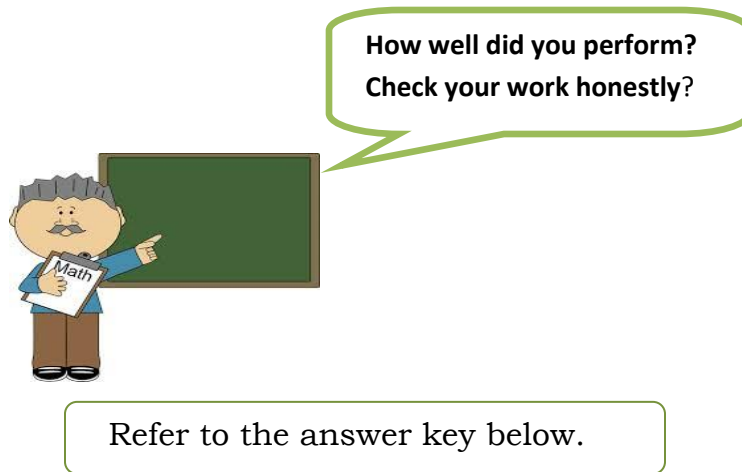


Are you ready to take the Post Test? Find out how much you learned.

Post Test

A. Identify the following. Choose the letter of the correct answer.

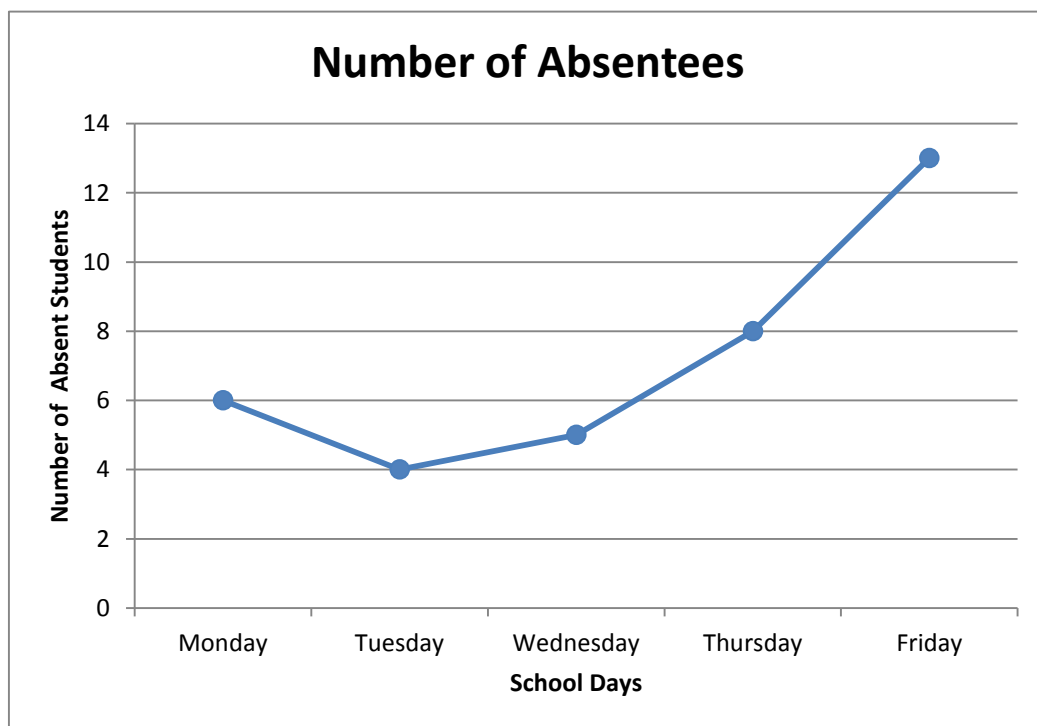
1. A pictorial representation of numerical data.
a. image b. table c. graph d. drawing
2. A graph that is shaped like a circle.
a. pie graph b. bar graph c. line graph d. pictograph
3. It uses bars to show data.
a. pie graph b. bar graph c. line graph d. pictograph
4. There are _____ in a circle.
a. 90° b. 180° c. 270° d. 360°
5. The part of the graph that tells us what the graph is about.
a. title b. labels c. scales d. points
6. It tells us what kind of facts are listed.
a. title b. labels c. scales d. points
7. In a bar graph, it shows the facts.
a. points b. grids c. bars d. sectors
8. Useful for displaying data that changes continuously over time.
a. bar graph b. line graph c. circle graph d. table
9. It compares data that are parts of a whole unit.
a. bar graph b. line graph c. circle graph d. table
10. A part of a circle/pie graph that explains the colors that represent each part or slice of the graph.
a. grid b. axis c. legend d. title



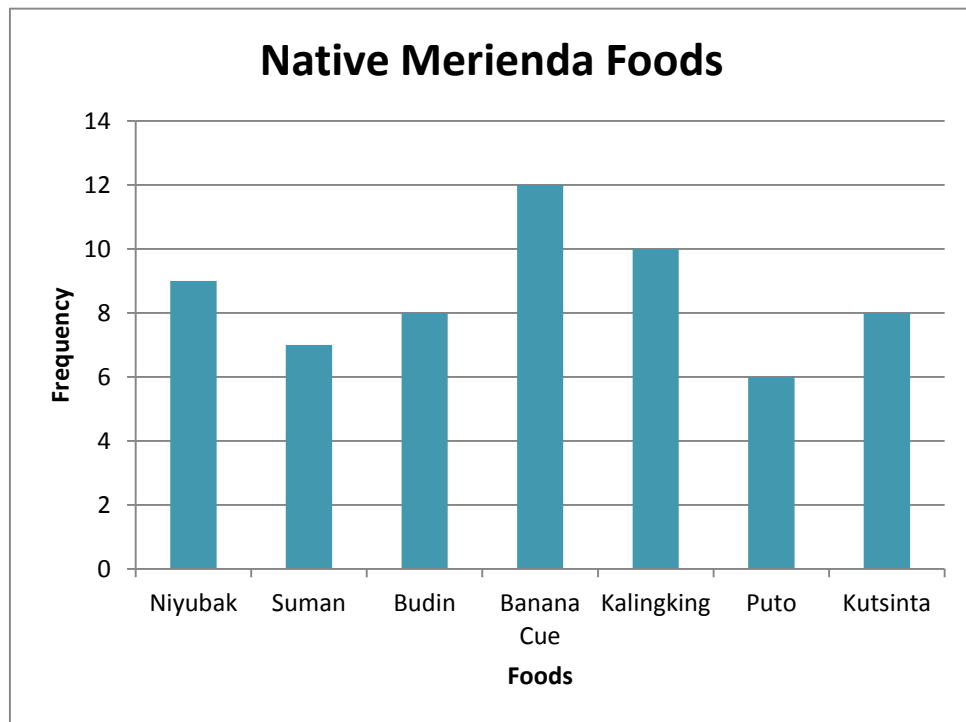
Answer Key

Try This

Example A



Example B



Post Test

1. c
2. a
3. b
4. d
5. a

6. b
7. b
8. b
9. c
10. c



Congratulations! You did a great job!
You may move on to the next lesson.

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Presented in this chapter is the summary of findings, conclusions and recommendations reached in the study.

5.1 Summary

The aim of this study is to develop a supplementary instructional material on selected topics in Geometry and Statistics intended for Grade Seven students of Dr. Arsenio C. Nicolas National High School in Calauag, Quezon.

Specifically, it aims to:

1. Identify the topics to be included in the supplementary material based on the results of the Fourth Quarter Examination
2. Develop the supplementary instructional materials based on the selected topics.
3. Determine the assessment of the mathematics teachers/experts on the proposed instructional material in terms of its objectives, content, language and style and evaluation.

5.2 Findings

The researcher's study arrived at the following findings:

The result of the Fourth Quarter Examination for Grade Seven Mathematics revealed that four major topics in Geometry, namely: triangles,

polygons, quadrilaterals and circles and three major topics in Statistics namely: basic terms in Statistics, kinds and uses of graphs, and problem solving on graphs were found to be difficulties of the students. These lessons were considered and included in the development of the supplementary instructional material. The instructional material was developed which has two modules. Modules 1 consisted of the four topics in Geometry and Module 2 consisted of three topics in Statistics. As to the assessment of Mathematics Teachers/Experts on the proposed instructional material, the criteria were as follows: objectives, content, language and style and evaluation. The evaluators' strongly agreed on the criteria / indicators mentioned as evidenced by the overall mean values of 4.67, 4.20, 4.60 and 4.67 respectively. The grand mean of 4.54, indicates that the respondents, the Mathematics teachers/experts strongly agreed and concurred that the material can help students in their mathematics learning, performance and achievement.

5.3 Conclusion:

Based on the result of the study, a conclusion is drawn:

1. The math teachers/experts respondents assessed the supplementary instructional material in selected topics in Geometry and Statistics for Grade 7 Students as highly acceptable in terms of its objectives, contents, language and style and evaluation.

5.4 Recommendations:

After a thorough analysis of the results of this study, the following recommendations are hereby suggested:

1. The developed module should be tried out to the students hence, it should be used by teachers in their mathematics classes.
2. The developed module should be validated at Dr. Arsenio C. Nicolas National High School and in other schools to determine its effectiveness.
3. The instructional material will further be improved by giving more exercises and real life applications
4. Regular updates, improvements and revisions on the developed modules is necessary.
5. Mathematics teachers are encouraged to develop their own supplementary materials for any other topics or lessons..
6. School administrators should encourage and support teachers in developing instructional materials.

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Appendix A

DR. ARSENIO C. NICOLAS NATIONAL HIGH SCHOOL GRADE 7 – FOURTH QUARTER EXAMINATION IN MATHEMATICS S.Y. 2013 – 2014

TABLE OF SPECIFICATIONS

TOPICS/LEARNING COMPETENCIES	PERFORMANCE LEVEL/LEVEL OF ASSESSMENT							
	KNOWLEDGE 15% (6 items)		PROCESS/SKILLS 25% (10 items)		UNDERSTANDING 30% (12 items)		PRODUCTS/ PERFORMANCE 30% (12 items)	
GEOMETRY :	No. of Items	Item No.	No. of Items	Item No.	No. of Items	Item No.	No. of Items	Item No.
Triangle: Parts, Terms associated with Triangle, Length of Sides, Properties	1	1	1	7	2	17,18	1	29
Interior and Exterior Angles of a Polygon			2	8,9	1	19	2	30,31
Kinds and Properties of Quadrilaterals	1	2	1	10	1	20	2	32,33
Parts of a Circle	1	3			1	21		
STATISTICS :								
History, Terminologies and Application of Statistics	1	4	1	11	1	22	1	34
Tabular Presentation of Data			1	12	1	23	1	35
Kinds and Uses of Graph			1	13	1	24	1	36
Graphical Presentation of Data: Pie Graph, Bar Graph, Line Graph, Pictograph	1	5	1	14	1	25	1	37
Measures of Central Tendency: Mean, Median, and Mode (Ungrouped Data)	1	6	1	15	2	26,27	1	38
Problem Solving on Graphs			1	16	1	28	2	39,40

TOTAL :	6 items		10 items		12 items		12 items	
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Appendix B
Grade 7 Mathematics
FOURTH QUARTER EXAMINATION

Name: _____

Section: _____

Directions: Read and analyze the following questions/problems. Write on the answer sheet the letter that corresponds to your answer.

KNOWLEDGE

1. What is the segment drawn from any vertex of a triangle perpendicular to the line containing the opposite side?

- A. altitude B. angle bisector C. median D. vertex

2. What kind of quadrilateral has no parallel sides?

- A. trapezoid B. rhombus C. parallelogram D. kite

3. It is a segment whose one of the endpoints is in the center of the circle and the other endpoint is at any point on the circle.

- A. radius B. chord C. diameter D. secant

4. What level of measurement is characterized by data that consist of names, labels, or categories?

- A. nominal level C. interval level
B. ordinal level D. ratio level

5. What type of graph uses picture or an icon to symbolize the quantities being represented?

- A. bar graph C. pie Graph
B. line graph D. pictograph

6. It is the value of the middle term when data are arranged in either ascending or descending order.

- A. mean B. median C. mode D. variance

PROCESS AND SKILLS

7. The three sides of a triangle have measures 8 cm, 9 cm, and 10 cm respectively. What type of triangle is it?

- A. Equilateral Triangle
B. Isosceles Triangle
C. Scalene Triangle
D. Equiangular Triangle

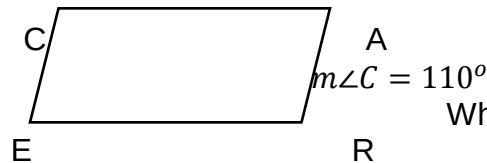
8. What is the sum of the measures of the interior angles of a triangle?

- A. 90°
B. 180°
C. 270°
D. 360°

9. What is the sum of the measures of the interior angles of a quadrilateral?

- A. 90°
B. 180°
C. 270°
D. 360°

10. Given:



What is the measure of $\angle E$?

- A. 180°
B. 80°
C. 70°
D. 360°

11. Teacher Rommel wants to select six of his thirty students to join a youth camp. He likes to do this by assigning a number to each student. Suppose, he chooses student number 3 as part of the team, then from student number 3, skip count by 6's repeatedly until all 30 students are taken. What basic method of sampling is done?

- A. Random Sampling
B. Systematic Sampling
C. Stratified Sampling
D. Cluster Sampling

12. The given data represent the number of high school graduates in the years shown

Year	Number of Graduates
2008	6000
2009	6750
2010	9000
2011	11250
2012	7500
2013	13500

What is the increase of the number of graduates from 2010 to 2011?

- A. 20 250
B. 2 250
C. 9 000
D. 11 250

13. This graph displays data by using vertical bars of various heights to represent the frequencies.

- A. histogram
B. frequency polygon
C. ogive
D. circle graph

14. What graph would most appropriately represent the situation?

The percentage of votes of each of the four candidates received in the last school election.

- A. line graph
B. pictograph
C. pie graph
D. bar graph

15. What is the mean of the given data?

Ages	f
25	3
24	5
23	7
22	12
21	3
20	5

- A. 21.37
B. 22.37
C. 23.37
D. 24.37

16. In a survey of 100 males concerning the sports they play, the following data were obtained.

Sports	Number
Golf	45
Tennis	20
Swimming	10
Badminton	25

Which of the following graphs would most appropriately represent the given situation?

- A. pictograph
B. bar graph
C. line graph
D. ogive

UNDERSTANDING

17. What is the measure of the third angle of the triangle given the following information?

- $m\angle 1 = 40$, $m\angle 2 = 60$, $m\angle 3 = \underline{\hspace{1cm}}$
A. 80
B. 70
C. 60
D. 50

18. What are the measures of the angle of the triangle given the following information?

$$m\angle 1 = x + 10, m\angle 2 = x, m\angle 3 = x + 20$$

- A. 55, 45, 65 B. 60, 50, 70 C. 65, 55, 75 D. 50, 40, 60

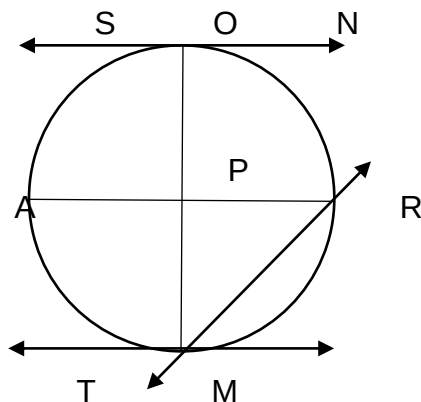
19. What is the measure of each angle in a regular octagon?

- A. 130° B. 135° C. 140° D. 145°

20. What is the measure of the fourth angle of a quadrilateral given the following measurements?

- $\angle 1$ and $\angle 2$ are right angles, $m\angle 3 = 95$, $m\angle 4 = \underline{\hspace{1cm}}$
A. 105 B. 95 C. 85 D. 75

21. Refer to circle P. Which of the following is the secant.



- A. AR
B. RM
C. TM
D. SN

22. Data that can be classified according to rank or order.

- A. ordinal B. ratio C. nominal D. interval

23. Students who applied for scholarship in a certain university were classified according to their year level: Freshman, Sophomore, Junior, and Senior. Which year level has the biggest frequency?

Year Level	Frequency
Freshman	10
Sophomore	5
Junior	8
Senior	7

A. Senior B. Junior C. Sophomore D. Freshman

24. Which of the following is a graph that represents the cumulative frequencies of the classes?

- A. Histogram C. Ogive
B. Frequency Polygon D. None of the Above

25. Which graph would most appropriately represent the given situation?
The frequency of each type of crime committed in a city during the year.

- A. Line Graph C. Bar Graph
B. Pie Graph D. Pictograph

26. The number of incorrect responses on a true-false test of 10 students were recorded as follows:

2, 3, 0, 4, 6, 4, 2, 1, 3 and 5

What is the mean of the above data:

- A. 2 B. 3 C. 4 D. 5

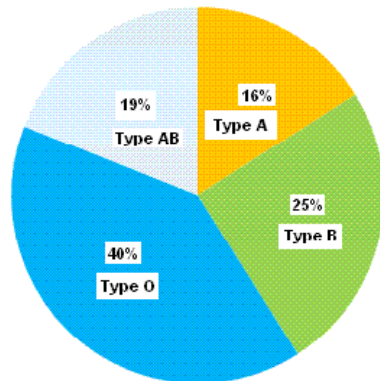
27. Seven mothers were selected and given a blood pressure check. Their systolic pressures were recorded below.

130 120 110 120 130 130 140

What is the mode of the above data?

- A. 110 B. 120 C. 130 D. 140

28. The pie chart below shows the percentages of blood types for a group of 200 people. How many people in this group, have blood type AB?



Blood Types for a group of 200 people
www.analyzemath.com

- A. 38 B. 50 C. 32 D. 80

PRODUCT AND PERFORMANCE

29. Mrs. Mateo has a triangular garden. The measures of the angles of her triangular garden are

x , $x + 45$, and $x - 15$. What are the angle measurements of her garden?

- A. 95, 50, 35 B. 105, 40, 35 C. 85, 60, 35 D. 95, 60, 25

30. The measure of each angle of a regular polygon plot of Lousse is 165. How many sides of the polygon are there?

- A. 22 B. 23 C. 24 D. 25

31. The measure of an interior angle of a regular polygon pool is 162° . How many sides does the polygon pool have?

- A. 19 B. 20 C. 21 D. 22

32. Two opposite angles of a parallelogram ground have measures $3x - 40$ and $2(x + 5)$, respectively. What are the measures of the angles?

- A. 86 & 94 B. 84 & 96 C. 76 & 104 D. 74 & 106

33. Three of the angles of a trapezoidal plot have measures 90° , 70° and 105° . What is the measure of the missing angle?

- A. 75° B. 85° C. 95° D. 105°

34. Frequency distribution, measures of central tendency (mean, median, mode) and graphs like

pie graph, and bar graph that describes the data are all examples of:

- A. Descriptive Statistics C. Quantitative
B. Inferential Statistics D. Qualitative

35. A bacteriologist chartered the growth of a certain bacterium over a period of 8 hours. The

data are shown below. What can be said about the given table?

Hour	1	2	3	4	5	6	7	8
Number of Cells	2	5	8	13	17	22	30	38

- A. The number of cells is directly proportional to the number of hours.
B. The number of cells is inversely proportional to the number of hours.
C. The number of cells varies jointly to the number of hours.
D. None of the above.

36. In a study of 100 women, the number given indicates the major reason why each women surveyed worked outside home. What is the most appropriate graph you should use?

Reason	Number
To support self/family	60
For extra money	20
For something different to do	15
Others	5

- A. Line Graph B. Pie Graph C. Bar Graph D. Pictograph

37. In a survey of 300 males concerning the sports they play, the following data were obtained:

soccer – 30	badminton - 75
basketball - 60	basketball - 135

Which of the following is the percentage of males concerned with badminton?

- A. 10% B. 20% C. 25% D. 45%

38. Eight novels were randomly selected and the number of pages were recorded as follows:

415 398 402 400 420 415 407 425

What is the median?

- A. 407 B. 411 C. 415 D. 420

For nos. 39 - 40. Use the given problem.

A survey of 500 families were asked the question “*Where are you planning to spend your vacation this summer?*” It resulted in the following distribution.

PLACE	NUMBER OF PEOPLE
Davao	50
Boracay	200
Palawan	125
Tagaytay	90
Baguio	35

39. What is the most appropriate graph to use in the problem?

- A. Pie Graph B. Bar Graph C. Line Graph D. Pictograph

40. How many degrees of the sector should be given for Palawan?

- A. 36° B. 65° C. 90° D. 144°

Appendix C
EXPERTS ASSESSMENT CHECKLIST

DEVELOPMENT & VALIDATION OF A PERIODICAL TEST IN
G7 MATHEMATICS

Dear Sir/Madam:

Listed below are the criteria for evaluating the various aspects of the developed periodical test in G7 Mathematics. Please rate each item by the corresponding equivalent on a 5-point scale as follows:

- 5 – Strongly Agree (SA)
- 4 – Agree (A)
- 3 – Undecided (U)
- 2 – Disagree (D)
- 1 – Strongly Disagree (SD)

	SA (5)	A (4)	U (3)	D (2)	SD (1)
1.Content					
A. The contents of the items are accurate.					
B. The contents of the items measure the knowledge of the students about G7 Mathematics.					
C. The contents of the items are clear & easy to understand.					
2. Format and Design					
A. The printing is clear to read and understand.					
B. The font used is appropriate and comprehensible.					
C. The directions are clear and well-stated.					
3. Organization					
A. The items are sequenced based on their level of difficulty.					
B. The distribution of topics on the test items is balanced and proportional.					
C. Items are categorically arranged based on the topics of Fourth Quarter G7 Mathematics.					

4. Usefulness					
A. The test is appropriate to the topics.					
B.The test measures the knowledge of students about Geometry and Elementary Statistics.					
C. The test helps the teachers determine the topics that need more concentration/time.					

February 2015

Dear Respondents,

Greetings!

The researcher is presently working on her seminar paper entitled, "Development of Supplementary Instructional Material on Selected Topics in Geometry and Statistics for Grade 7 Students."

In this regard, please respond to the attached evaluation questionnaire/checklist on the proposed instructional material. Kindly assess the acceptability of the developed module based on the criteria given. Rest assured that any information shared will only be utilized for the purpose of this investigation and your identity will be treated with utmost confidentiality.

Thank you in anticipation of your wholehearted cooperation.

Sincerely yours,

Hazale G. Trapane
Researcher

Endorsed by:

Allan S. Reyes, PhD
Adviser

Appendix E EVALUATION CRITERIA FOR THE INSTRUCTIONAL MATERIAL

Name of Evaluator : _____

Position: _____

Institution: _____

Number of Years in Teaching: _____

Direction: Listed below are the evaluation criteria for the various aspects of instructional material of selected topics in Geometry and Statistics for Grade Seven. Please check the appropriate column below that best fit or describe the module using the scale below:

- 5 - Strongly Agree
- 4 – Agree
- 3 – Uncertain
- 2 - Disagree
- 1 - Strongly Disagree

Quality Elements of the Module	Rating				
	5 (SA)	4 (A)	3 (U)	2 (D)	1 (SD)
A.Objectives					
1. The module is accompanied by a list of specific objectives.					
2. The objectives are clearly stated and grammatically correct.					
3. The objectives are simple and specific.					
4. The objectives are relevant to the lesson.					
5. The objectives are attainable and measurable.					
B. Contents					
1. The contents support the instructional objectives.					
2. The contents adequately cover the objectives of the lesson.					
3. The contents are relevant, interesting and self-motivating for the learners.					
4. The instructional material contains sufficient number of exercises.					
5. The directions are clear and easy to understand.					
C. Language and Style					
1. The language is simple and easy to understand.					
2. The vocabulary/ terms used is familiar and appropriate to most G7 students.					

3. It gives instructions that are clearly understood and followed.					
4. It gives illustrations that are appropriate and relevant.					
5. The structure style and format are appropriate to the target level.					
D. Evaluation					
1. Evaluation items are congruent with the learning objectives.					
2. Test items are presented in simple and precise language.					
3. The Pretest and Posttest are suited to the objectives and goals of the curriculum.					
4. Items from exercises are suited to the ability level of G7 students.					
5. The test items are adequate to measure students mastery of the lesson.					

Comments/Suggestions:



AUTHENTICITY RESULT

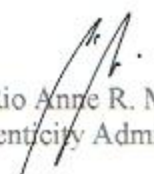
Date of Release: February 20, 2016
Result Code: 2016-079
Submission ID: 634318431
Title of Output: Development of Supplementary Instructional Material on Selected Topics In Geometry And Statistic For Grade Seven Students
Author(s): Hazale Trapane

Authenticity Report:

- **Similarity Report: 18%**
- **Interpretation:** A similarity report of 18% means that 18% of the whole paper is similar to sources in Turnitin's (authenticity software) online repository. The colored bibliographical references denote the sources of similarity to previously published work which maybe from internet sources (15%), publications (3%) and student papers (11%) for the remaining similarity percentage.
- **Highlighted text in the Manuscript:**
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 - Other color marks and highlights are set of text exactly copied from other sources (student papers and publications).

Recommendations:

- Use of quotations for exactly copied text is suggested.
- For assumed to be cited parts of the manuscript but highlighted, it is recommended that authors rephrase these portions.


Rio Anne R. Maño
(Authenticity Administrator)

Noted by: 
Dr. Marie Paz E. Morales
Director, Publications Office



APPROVAL SHEET

This seminar paper entitled **"DEVELOPMENT OF SUPPLEMENTARY INSTRUCTIONAL MATERIAL ON SELECTED TOPICS IN GEOMETRY AND STATISTICS"**, prepared and submitted by **Hazale G. Trapane**, in partial fulfilment of the requirements for the degree **Master of Arts in Teaching Mathematics**, has been examined and recommended for acceptance.

Date: September 10, 2015


ALLAN S. REYES, Ph.D.
Adviser

Accepted in partial fulfilment of the requirements for the degree Master of Arts in Teaching Mathematics.

Date: January 16, 2016


RENE R. BELECINA, Ph.D.
Program Coordinator

Date: February 20, 2016


TERESITA T. RUNGDUIN, Ph.D.
Director
Graduate Research Office

Date: 05 March 2016


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Teacher Education Research