DEVELOPMENT AND VALIDATION OF MODULE IN MATHEMATICS I (FRACTIONS) FOR SECONDARY SCHOOLS

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APPROVAL SHEET

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The researcher

FVMJR

DEDICATION

This humble work is lovingly and sincerely dedicated to

my dearest wife

GLORIA SABIT MACABARE

And to our children

GERALDINE, FERRYLOU,
FERNANDO III and JENNIFER

For their prayers, unfailing love

And inspiration.

FVMJR

ABSTRACT

This study focused on the development and validation of Module in Mathematics, to meet the needs and difficulties of students in High School Mathematics I of St. Mary's College of Catbalogan, particularly on Fractions. This study used the experimental method using the randomized pretest and posttest control group design. According to Math grade in Grade VI, the computed absolute t-values were 0.396 for the experimental group and 1.270 for the control group. These values proved to be lesser than the tabular value of 2.101 at 0.05 level of significance and df= 18. Thus, the null hypothesis of no significant difference between the posttest mean scores of the experimental and control groups according to Math grade in Grade VI was accepted. There is significant improvement in the performance of the students in the experimental group as shown in their pretest and posttest results. This improvement was brought about by the modular approach of teaching fraction. The modular approach of teaching is more effective than the traditional lecture/discussion method as far as the topic in fraction in mathematics 1 is concerned. It is a fact that the students can go through the module and learn its contents at his own rate, check and repeat same topics of his work if needed, discover process and technique to learn the lesson until the feeling of self-satisfaction is attained. The module is valid in terms of content validity, construct validity and face validity. It is also appropriate and interesting to the first year high school students. The posttest performance of the experimental group and control group did not vary when the subjects were grouped according to sex, age, math grades in grade VI and entrance results. This indicated that the developed module in Mathematics I (fraction) could be used among students regardless of their sex, age, previous Math performances.

TABLE OF CONTENTS

Chapter 1

THE PROBLEM AND ITS SETTING

Introduction

Society is in constant change, and this necessitates that educational programs like the high school program must keep pace. The contemporary world demands a kind of mathematics knowledge that is very different from that required in the past. In previous generations, people needed to be able to calculate efficiently and accurately. But now, much of the task of calculations is being taken over by the machine. Consequently, basic skills in mathematical computation become a problem in every school. Thus, schools need to redefine their roles in an advancing technological society. Today, and even more in the future, the need is for individual who can, through discipline imagination define significant problems and discover ways to solve them, and therefore the person is still the key for this purpose.

Understanding the concept of numbers is the same as understanding mathematics itself. According to cognitive psychologists when a student says "five plus five equals ten", that is mathematics, but when a student says "two plus two equals five" that is now psychology. But it does not imply that psychologists cannot add numbers correctly, instead it was a fact that psychologists have studied errors in human's performance to understand how the human mind works.

According to Smith, (1979: 367) "the ability to do Math is inborn". This points out that all everyone has the capacity of understanding mathematics to the fullest, but it is sad to say that there are still students who cannot understand Math. The common difficulty encountered by students in high school and even in the elementary years is Mathematics. (Mathematics Reviewer,1984:3). Different factors can be attributed to this problem such as: previous math grades, proficiency in English, teacher's educational qualifications, parents' occupation and involvement in children's assignment, attitude towards math and the level of self-concepts (Balagapo, 1996:20) The answer to these should not be blamed to all these factors, hence, it must be helped and recognized for improvement.

To be consistent with the DECS program, "Quality education through the advancement of Science and Technology, demands that Mathematics be properly taught and handled by a qualified and competent math teachers." As a response to the call for quality education through quality instruction and modern instructional materials, the researcher wanted to improve Mathematics instruction by developing an instructional material which is self-contained and self-sufficient that could provide students a chance to improve or progress at their own rate and develop their potential capacities to the fullest. This is possible through an instructional material that could be managed independently by students and thereby help them direct their own learning capabilities.

The researcher developed and validated a module in fractions, based on relevance and applicability of the topic to real life situations of the first year high school students of Saint Mary's College of Catbalogan, Catbalogan, Samar.

As a subject teacher in math in the first year high school for more than five years, the researcher observed that basic knowledge on fractions is not properly internalized by students from elementary, which for them, they find it difficult to understand and much more on computation. It is because they have not fully grasped the basic concept and ideas of a fraction. With this situation, the researcher developed a module which is made simple, clear and easy to understand which students can read and study even without the presence of a teacher.

The researcher believes that through this module students could overcome their difficulties in Mathematics especially on Fractions since the lessons are broken down into simple lessons; every skill is learned one at a time from simple to complex including its application to worded problems.

The researcher also believed that the prepared module could play an important role in the teaching- learning process in Mathematics which could complement that of the teacher, whose responsibility is to develop and nurture the student's love, appreciation and interest for numbers. Teachers must employ techniques, revise and update the methods of instruction, which will suit to the needs of the students.

Statement of the Problem

This study focused on the development and validation of Module in Mathematics, to meet the needs and difficulties of students in High School Mathematics I of St. Mary's College of Catbalogan, particularly on Fractions.

Specifically, this study attempted to answer the following questions:

1. What is the profile of students in Mathematics of the first year high school of St. Mary's College of Catbalogan, Catbalogan, Samar in terms of:

   1.1 sex;

   1.2 age;

   1.3 Math grade in Grade VI, and

   1.4 Math performance in entrance test?

2. What is the readability and interesting level of the module based on the Flesch Formula?

3. What is the level of validity of the module as perceived by the Mathematics teachers from public and private schools along the following:

   3.1 content validity;

   3.2 construct validity, and

   3.3 face validity?

4. Is there a significant relationship between the responses of the Mathematics teachers from public and private schools relative to the validity of the module along the three aforementioned aspects?

5. Is there a significant difference in the mean scores of the control group and experimental group per:

5.1 pretest, and

5.2 posttest?

6. Is there a significant difference between the mean scores in the pretest and posttest of the:

6.1 control group, and

6.2 experimental group?

7. Is there a significant difference between the posttest mean scores of the experimental and control groups according to the following variates:

7.1 sex;

7.2 age;

7.3 Math Grade in Grade VI; and

7.4 Math performance in Entrance test?

Hypotheses

Based on the aforelisted specific questions, the following hypotheses were tested in this study:

1. There is no significant relationship between the responses of the mathematics teachers from public and private schools relative to the following aspect:

1.1 content validity;

1.2 construct validity, and

1.3 face validity.

2. There is no significant difference between the mean scores of the control group and experimental group per:

2.1 pretest, and

2.2 posttest.

3. There is no significant difference between the mean scores in the pretest and posttest of the:

3.1 control group, and

3.2 experimental group.

4. There is no significant difference between the posttest mean scores of the control and experimental group according to the following variates:

4.1 sex;

4.2 age;

4.3 Math grade in grade VI, and

4.4 Math performance in the entrance test.

Theoretical Framework

This study is anchored on a learning principle of John Dewey (1988:39) which states that learning take place by doing. It points out that learning through doing is recognized as sound educational procedure. The principle of self-activity in teaching means that it is the function of the teacher to develop the

quality in the students/ individual by gradually giving more responsibility upon the learner for initiating and carrying out through successful conclusion of work that should be done.

According to the theory of Abraham Maslow, which was introduced by Dizon, et.al (1998:223), which states that self-actualization, is a growth concept. Students move toward their goal as they understand and enjoy learning. In other words students see meaning in knowledge, skills, and attitudes when they themselves discover things. As Gotango (1999: 8) states that true learning involves a process of self-discovery, exploration and experimentation, which stimulates, empower and changes an individual.

Furthermore, Aquino (1988: 113) says learning is a relatively permanent change in behavior that can be explained in terms of experience or practice. This principle was made possible to its maximum adjustment in terms of the individual needs, capabilities and interest. It is only in actual doing that a learner can fully understand the meaning of learning by experience; like doing his own, thinking, analyzing, organizing, concluding and even making his own decisions. It also enables each learner to progress at his own best rate or speed without hindering the progress of others.

Conceptual Framework

This study comprises four stages of development designed to improve Mathematics performance of students, showing the conceptual framework of the

study in Figure 1. The stages are: Stage I – Development of the Module, Stage II – Validation of the Module, Stage III – Output-Validated Module in Mathematics I (Fraction), Stage IV – Improved Mathematics Performance of Students.

Stage I focused on the development of module in Mathematics I (Fraction) based on the relevance and meaningfulness of the topic to the real life situation. This also included the school and the students under study.

Stage II concerned on the Validation of Module - expert validation, computation of Flesch Formula and determination of the effectiveness of the module using the pretest – posttest control group design. In undertaking expert validation, a questionnaire was distributed and answered by two groups of teachers from public and private schools in Catbalogan, such as: Samar State Polytechnic College, Samar National school, Samar College, St. Mary's College of Catbalogan and St. Michael High School of Gandara. The Flesch Formula was applied in determining the reading ease score (RES) and the human interest score (HIS) of the developed modules.

The effectiveness of the developed module was determined by conducting an experiment using pretest posttest control, design. Two groups of students were utilized in the experiment – the control and experimental groups. The control group was taught using lecture – discussion method while the experimental group was taught using the module developed by the researcher. Before the start of instruction, the pretest was administered to the two groups.

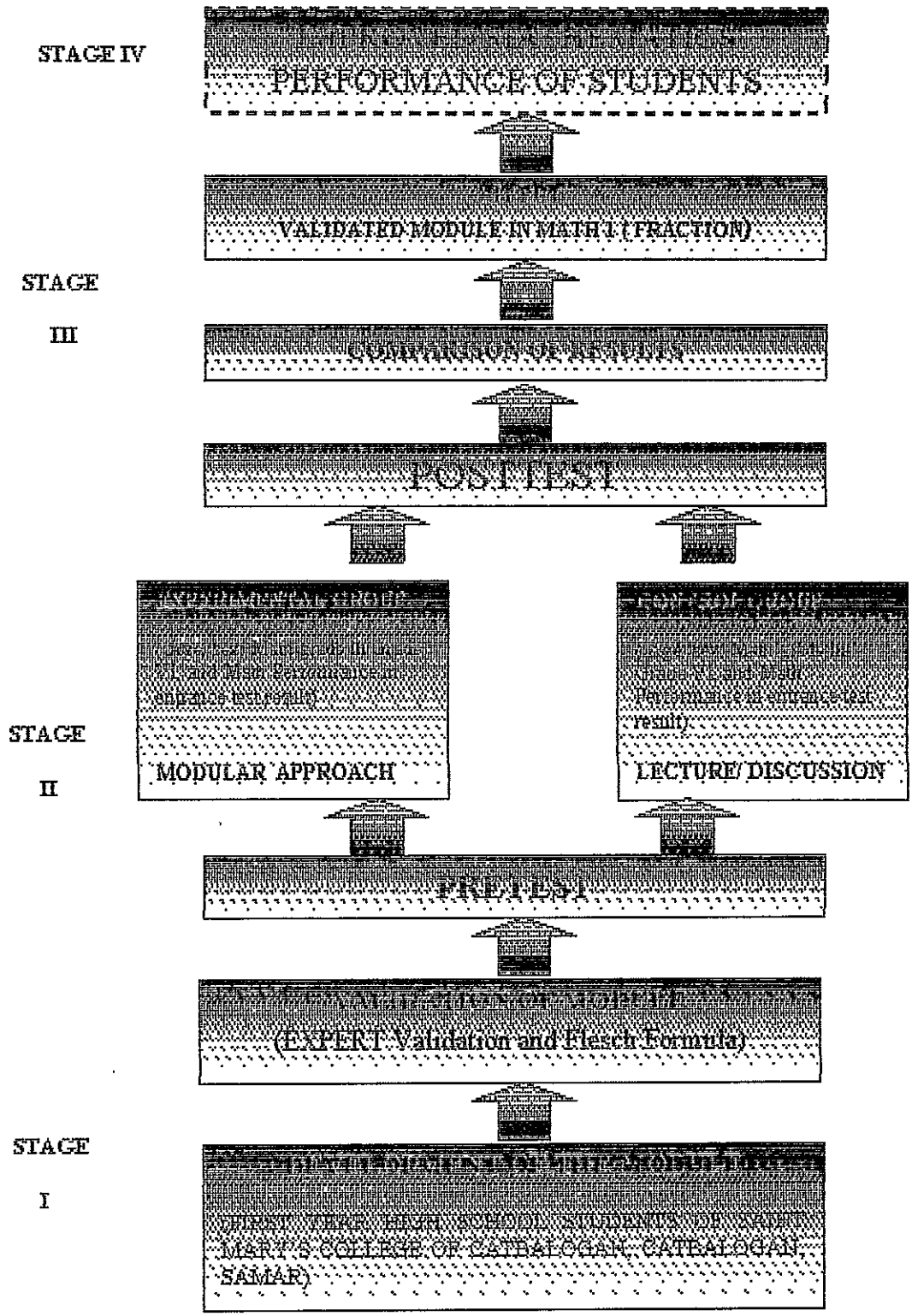


FIGURE 1. The Conceptual Framework of the Study

Significance of the Study

The final goal of teaching is to promote the general understanding of the structure of a subject matter. In the context of this situation, instructional module forms a part of the teaching-learning process that could promote quality performance and achievement in mathematics. It cannot be denied that teachers are always presumed to be knowledgeable in concept and in art of teaching and are therefore expected to display excellence in teaching of the subject in conformity with their instructional needs, demands and convenience.

This study on development and validation of module on Mathematics 1 (fraction) was undertaken by the researcher hoping that the findings would benefit the students, teachers, parents and administrators or the educational system in general.

To the students. This module would help develop independent learners based on their own potentials and improve learning capabilities through self-discovery and self-realization at their own speed. This would also provide the students a reference material in times that they do not understand the topic on fraction based on the prescribed textbooks of the school. It cannot be avoided also, that there are students who are absent, during classes, students could learn the lesson through the module to cope up with the lesson discussed during class hours. This would also provide the students as a source of a reading material, self-learning kit and reference and material for the subject in Mathematics 1.

To the teachers. Modular approach of teaching means lesser or lighter task to be done. First, preparing lesson plans could be minimized since the teacher may use a logbook to record the subject matter or topic the students are doing. Second, the teacher would not be exerting effort in discussing or explaining the lesson and he/she could give attention to the slow learners and fast learners. Lastly, the result of this study could provide Mathematics teachers new information on effective methods and techniques in teaching mathematics.

To the parents. While most of the parents can provide individual textbook to their children in St. Mary's College, oftentimes students need additional references/books from their parents for better understanding and clarity of presentation of different subjects/topics. In this regard, since the developed module could be mass-produced in school, it is then expected that this could be an answer for the betterment of the learning process especially on fractions.

To the administrators. The module provides a solution to the problem on increasing student population (public) faced by administrators, which creates shortage of classrooms, buildings, textbooks, references and qualified and competent teachers, to both public and private schools. This could contribute to the development of more or better instructional materials, which could consequently improve the quality of mathematical instruction.

Scope and Delimitation

This study is limited to the development and validation of Module in Mathematics 1, particularly on fractions intended for first year high school students of Saint Mary's College of Catbalogan, Catbalogan, Samar for school year 2000- 20001. The respondents comprised the two lower sections of first year high school of Saint Mary's College of Catbalogan with twenty student-respondents per section, with a total of forty student-respondents that were selected based on their Mathematics grade in Grade Six and Math performance in entrance test. Students who were chosen as samples were those who obtained grades of 75% and above in the entrance examination at Saint Mary's College of Catbalogan, with the assumption that these students are mathematically literate with respect to the fundamental operations in arithmetic.

From the total number of respondents, 20 were assigned in the control group and the other 20 were assigned in the experimental group. The researcher personally handled both groups. The try-outs of the module were given on August 15 to September 22, 2000. The subject was scheduled for a forty minute-period. For the first two weeks of experimentation, the experimental group had their classes from 1:00 to 1:40 in the afternoon, while the control group was scheduled in the morning from 8:10 to 8:50 daily. For the remaining weeks of experimentation, the schedule of the two groups was interchanged. Thus, the classes for the experimental group were recited during 8:10 to 8:50 A.M. while that of the control group were done during 1:00 to 1:40 P.M. daily.

Definition of Terms

To facilitate better understanding of this study, the following terms are herein defined conceptually and/or operationally.

Content validity. Generally, this refers to the extent to which the content of the test is truly a representative of the content of the course (Calmorin 1994: 256)

Control group. The group in a research study that was subjected to the traditional method of teaching (Fraenkel and Wallen, 1993:549). In this study, control group pertains to a group of students who were taught using the traditional method of teaching Mathematics that is, lecture/discussion method.

Construct validity. Conceptually, this refers to the extent to which the test measures a theoretical trait (Calmorin, 1994:256).

Experimental group. Generally, this is the group in a research study that receives the treatment/ method of special interest in the study (Fraenkel and Walen, 1993:550). In this study, experimental group pertains to the group of 20 first year high school students subjected to modular instruction.

Evaluation. This term refers to the process of determining the knowledge of student at the beginning and the end of experimentation (Lardizabal, et. al., 1995:284). In this study, this was used through the pretest and posttest of the achievement test.

Face validity. The apparent validity of a test that seems fair to and appropriate for the individual being measures. The extent to which a test is made

up of items that seems related to the variable being tested (Aquino and Garcia, 1974: 238).

Fraction. A number that is a part of a whole (Oden, et. al., 1993:56). In this study, this was the topic under study that was made into a module that was used by the students in the entire study.

Flesch formula. This refers to the instrument used in determining the readability level of the developed instructional material. It consists of the human interest score (HIS) and the reading ease score (RES). The evaluation of the readability level of the developed module includes the test for appropriateness and how the module was prepared.

Mathematics 1. This term refers to the course I in the new secondary Math Program (SEDP handouts: 1992) which deals with the basic concepts, knowledge, and skills in arithmetic, algebra, geometry, business math, and statistics intended for the first year high school students.

Modular instruction. This refers to the instruction that uses a module as an instrument in the teaching- learning process. This type of instruction is in the form of module that is made simple, self-explained and easy to understand on the part of the students being tested.

Module. This is an instructional material that is a self-contained and independent unit of instruction with the primary focus on a well defined objectives (Creager and Murray, 1971: 28). In this study, this refers to self-paced,

form of module that is made simple, self-explained and easy to understand on the part of the students being tested.

Module. This is an instructional material that is a self-contained and independent unit of instruction with the primary focus on a well defined objectives (Creager and Murray, 1971: 28). In this study, this refers to self-paced, self-contained instructional material used in the teaching of Mathematics I particularly on fractions.

Posttest. This refers to the test given after instruction has been taken up or studied which aims to evaluate the students' achievement through the total application of skills and knowledge that have been sequenced for the module. In this study, posttest contains the same 50 items test found in the pretest was also administered to both the experimental and control group designed to compare modular approach and lecture- discussion method in teaching mathematics.

Pretest. Generally, this refers to a formative test given before instruction to determine what the students already know and what they are ready to learn (Woolfolk, 197897:586). In this study, this refers to a 50-item test in Mathematics administered to both experimental and control group prior to the actual experimentation designed to determine the initial knowledge of the students under study.

Readability level. This refers to the state of being legible or easy and pleasant to read to the reading comprehensive level of the students (Webster,

1992). This is determined by evaluating the reading ease score (RES) and Human Interest Score (HIS) of the developed module using the Flesch formula.

Validation of module. Generally, this refers to the process of testing the effectiveness of the module. It starts from teacher's validation: its content validity, construct validity and face validity, followed by student validation through a given pretest to both experimental and control groups. The results were expressed in terms of mean scores of both groups, which were compared.

Sacred Heart College. This refers to a Catholic school managed by the Religious of Virgin Mary. This is the school where the researcher identified the respondents under study. At present its name was changed to Saint Mary's College of Catbalogan, last September 12, 2000.

Chapter 2

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter consists of the review of literature and related studies, which were considered pertinent and relevant to the study. It also deals with the relationship with the present study that gives emphasis on effectiveness and appropriateness on modular approach used in the teaching and learning process.

Related Literature

Education is one of the principal means by which society carries out its national improvement, objectives, and literacy. The implementation of the DECS program "Education for all" that aimed at reducing illiteracy rate of the country, becomes the greatest challenge to Filipino educators. Teachers, at this point, must first of all be knowledgeable in their field of education (Gonzales, 1999: 412); they must be equipped with academic know how and teaching strategies to meet the needs of their students. It is thus expected that student's capabilities toward each subject areas be at the same level.

The present educational system is deteriorating and pupils/students learn only fifty-five percent or even less of what must be learned at every grade level (EDCOM Report, year:page). This pressing problem has moved educators/teachers to formulate reforms aimed at improving pupils and students' achievement in all academic areas that includes mathematics.

Students' learning is affected by many factors such as parents, peers, teachers, school and most of all, the students themselves (Centra and Potter, 1980:47). On the other hand, Tsai and Walberg (1983:48) said that factors most closely connected with learning may be divided into nine categories. These factors are students' age, ability, motivation, amount and quality of instruction, psychological environment of the home, school and peer groups outside school, and exposure to mass media.

Good and Caslin (1992:48) contend that students' learning is largely unaffected by teachers and school variables, but for the past years convincing evidence prove that certain teacher-variables, combined with other sources of variation greatly influence students' learning. Taking into considerations this specific factor that influences the performance of students, specifically Mathematics, it only shows that mathematics learning is greatly influenced by these factors mentioned.

According to Salandanan, Santos, and Diaz (1988:46), one of the major purposes of mathematics instruction is to arouse and develop among students the appreciation for mathematics. This appreciation will make them realize how mathematics can be used to solve daily problems. Mathematics teachers must be familiar with different methodology and techniques of teaching strategies for students to enjoy and appreciate numbers. On the other hand, true learning involves a process of self-discovery, exploration, and experimentation that stimulates, empowers and changes an individual. It is the development of a

whole personality: mental, physical, spiritual, emotional and social faculties (Gotangco, 1999:8)

These subjects possess impression of hard work in exploring possibilities and alternatives on how to teach mathematics effectively and profitably. A key issue in achieving quality in teaching is the selection of methods that will most effectively enhance the learning of the students (Kelley, 1968:271). One is through personalized system of instruction that replaces lecture-based instruction. Personalized system of instruction had the following features: a) It has a unit mastery requirement, b) It involves student self-pacing, c) Teacher serves as student proctors, d) Reliance on written instruction and, e) De-emphasis on lecture method.

Programmed instruction is a technique of self-instruction where lessons are given bit by bit in small segment which require the learner to answer each bit in the learning module before going to the next learning task (Lardizabal, 1995:187). This is also a method of independent study that makes use of programmed textbook and teaching machines. Programmed textbook are primarily concerned with a programmed exercises not through as machine but requiring the pupils/ students to read a specially prepared book. Students/pupils are required to perform the steps of a learning experience all at the same time: a) presentation, b) response, c) reinforcement. Programmed machines are mechanical device which presents the learning material to the pupils/students, test him on his mastery of this material and provides for the

intermediate correction of his wrong responses. Programmed instruction proves helpful to the teachers particularly in diagnosing pupils' difficulties and drill exercises, and in the enrichment of the total-teaching processes.

Moreover, programmed instructional material could be used by students to teach themselves about a particular topic (Woolfolk, 1987:188-191). Students often benefit from programmed instruction because it is clear, well organized, and allow the students to repeat parts they do not understand the first time through.

Harbison and Myer (1973:3-5) say that programmed instruction is one of the methods that are useful in teaching mathematics where a teacher follows a prearranged schedule of the topics in details. The program describes not only what is be taught but also specific procedures of teaching which is taken into many forms, and one which is by modular instruction of teaching.

Creager and Murray (1971:28) a module is a self-contained and independent unit of instruction with a primary focus on well-defined objects. Whose essential parts consist of materials and instruction needed to accomplish the desired objectives. Its limitations are definable only in terms of stated objectives. But Murray himself felt that his definition is inadequate and he would need more analysis of different types of module to have it properly defined.

Hughes (1962:6) describes that modular instruction as a special kind of individualized instructions that provides a basis for a class interaction between the learner and the teacher, because students are encouraged to ask questions.

He also says, "The learner is called upon to respond frequently in the interaction with an instructional program and the rate at which instruction proceeds is governed individually by each learner responses.

Program instruction was also proven effective by the use of a modern instructional media such as computer- assisted- instruction (CIA) or multimedia.

Woodfolk (1987:254) says that computer literacy and programming skill have become supplemental teaching tools in such traditional subjects as Math, Geography, History and English grammar. Thus microcomputer has taken on the role of personal tutor, aiding students in sharpening their skills and increasing their understanding of basic curriculum mainstay. He also added that computer-assisted-instruction hade great advantages as follows: a) students can precede at his/ her own pace, b) constantly interactive forcing students to respond to make choices to participate. It does not allow students to become passive recipient of information, c) this was found to be more efficient than traditional instruction, in that, it significantly reduced the amount of time the students need for learning, d) tends to promote achievement, motivation, and a spirit of cooperation – an extremely powerful academic mix, and e) provides simulations of activities the students otherwise might never experience.

Aquino(1989:483) also pointed out that the actual classroom use and the finding of educational experimentation have supported the conclusion that the use of appropriate multi media in various teaching-learning situations promotes effectiveness in teaching.

Butler and Wren (1965:206) said that instruction can be improved through a program of testing and associated activities. Mathematics teachers should be familiarized with ways in which they can test to contribute to the improvement of their teaching and in selection and constructive use of the module. Tests enable teachers to determine whether the goals of instruction are satisfactorily attained or not.

Collete (1973:519) stressed that the problem on individual differences is not solved by acceleration and retardation of grades because students who are given this form of a treatment are forced with many social adjustment problems. He pointed out that opportunities could be provided with-in the framework of a program to take care of individual differences of the students. Certain forms of groupings, independent work and individualized instruction can be used for both rapid and slow learners when facilities permit.

The review of related literature made the researcher aware and realized the importance of the modular instruction to the present educational system. Modular instruction is more beneficial to the learner because this will develop their skills and potentials through self-discovery at their own rate. The learners are encouraged to assume responsibilities for learning and mastery of that module. Students also find that textbooks are not the only source of learning and reduce competition for grades among students. To the teacher, this is likewise advantageous for they will be encouraged to prepare modules and present mathematical instruction in modular form. Teachers have more time to pay

attention to individual learning problems and are free to serve as resource persons, to answer questions, and to help those who need help, and promote better cooperation between teachers and students. The related literature mentioned above and the present study stresses the importance and significance of the individualized learning. Thus, there is a need for educational program, which are flexible enough to accommodate the various individual differences that exist in any group of learners. Module is then the answer to the need. Moreover, the present study, which is the development of module, is made based on the difficulties or weaknesses of the students as perceived by the researcher in teaching the subject.

Related Studies

Development of instructional materials has been the subject of a large numbers of studies in the past. Most of these studies catered to the objectives or output of developing an instructional material that will suite to the present needs of our educational system, where teachers are only facilitators of learning, therefore towards self-learning activity. The survey and review of related studies provides materials for this study that serves as its foundation.

Español (1994) in his study "Effectiveness of Teacher-Made Textbook/Workbook in Teaching Basic Mathematics" revealed that the textbook/ workbook aided instruction was more effective than the traditional approach as shown in the posttest mean scores of the experimental and control

group. The group subjected to the teacher-made textbook/ workbook gained knowledge on Basic mathematics as evidence by the fact that their posttest mean scores were found to be significantly higher than their pretests mean scores. She further said that the use of textbook/workbook as instructional material provided a solution to the following problems: a) Inadequacy of instructional materials, b) Increasing student population, c) shortage of teachers as well as declining student achievement. She further stressed that the use textbook/workbook gave the fast learners a better grasp and widen the scope of coverage of the subject and give the slow learner a time to learn at their own pace without putting time pressure. Finally, she recommended that the students should be exposed to material-centered instruction like textbook/workbook to develop in them the feeling of independence and self-confidence in learning a lesson without the teacher's aid.

Gordove (1993) in his study on " Effectiveness of Self- Learning Kits in Grade V Mathematics" revealed that the mean score of 26.2 of the experimental group in the posttest compared with that in the control group mean score of 20.65 connotes that the experimental group performed better that the control group. It can be said that the individualized approach in teaching geometry through self-learning kits to the grade V pupils is better than the use of the traditional lecture method. He concluded that based on the foregoing findings of his study, teaching with the use of self-learning kits is more effective than the lecture/discussion method based on the result of the posttest. The experimental

group performed better than the control group. He recommended the use of self-learning kits since it develops proper mathematical abilities and skill in the pupils.

Villanueva (1995) on her study "Effectiveness of the Instructional Module in Teaching Integers" also revealed that the performance of the experimental group in the posttest was significantly better that the performance in the pretest and that learning through the modular instruction took place. And also, the two groups of respondents had the same level of performance at the end of the experimental lecture instruction and modular instruction can produce impressive results as attested to by the gains from pretest to the posttest results. The use of any of the teaching methods is it modular or lecture methods in teaching integers were effective. But what is more impressive is on the result in the respondent, first year high school students found the module of integer interesting and fairly difficult. She also recommends that the developed module on integers should be used and evaluated in SSPC and other schools foe its maximum use in the future. The teachers and students may use the module as an effective remedial material. Moreover, the teachers to remedy his/ her problem on students who are slow learners while for the students who are away from classes due to reasons beyond their control they can utilize the module to catch up the lessons should use it. More modularized material on different areas on Math 1 should be developed and validated to alleviate the lack of textbook and reference materials in the different schools. And seminars should be conducted

on the module making so that teachers who are planning to use the modular approach can make/ prepare their own modules.

Malindog, Jr (1993) in his study " Effectiveness of Comparative Analogy Approach in Teaching Chemistry" revealed that the experimental group subjected to comparative analogy learned the concepts on the particular nature of matter and the two laws of chemical change, and more importantly, the experimental group, comparative analogy approach is more effective than the traditional approach of teaching. He further recommended that Self-instructional material such as module be developed on the use of the comparative analogy approach.

Calapre (1994), in her study " the Effects of Modular Instruction on the Achievement in Rational Numbers of Grade VI Pupils", revealed that whether the students taught by the use of the modular or not, pupils still improved their performance during the duration of the experiment. However, the pupils who analyzed and solve exercises in modules showed higher mathematics achievement than the pupils exposed solely to the conventional method of teaching. This implies that the use of modules in teaching rational numbers is effective among grade VI pupils. It is probably, because the use of modules allows self-pacing, enabling the pupils to progress at his own rate or pace. Furthermore, modules allow pupils who have been absent to catch up on the lessons they have missed. She further recommends more modules in other areas of math could be constructed and utilized in mathematics classes.

The study conducted by Español, Gordove, Villanueva, Malindog,Jr and Calapre have similarities to the present study because they all make use on the effectiveness and appropriateness of a developed instructional material as well as the pretest and posttest results in gathering the data needed in the study.

However, the present study differs from the studies cited above in terms of setting, place, math content, focus and the respondents. This study was conducted to the First year High school of St. Mary's College especially on the topic Fraction for Mathematics 1.

Uy (1992), in her study on "Development and Validation on Circular trigonometric Function and Fundamental Identities", found out that there was a significant amount of learning after the respondents were exposed to modularized instructions based on the results of the posttest. Her findings proved that the experimental group performed better than the control group in the posttest. She then concluded that the modular approach or material centered instruction was more effective than the traditional lecture/ discussion method. She recommends the use of module for it serves as an effective remedial resource material for students.

Dacula (1995) in her study on " Development and Validation of Modules on Percent and Ratio for Mathematics" found out that there is a highly significant improvement in the performance of the students in the experimental group as reflected in their pretest and posttest results. This improvement was brought about by the modular approach of teaching percent and ratio. She then

concluded that the modular approach of teaching is more effective than the traditional method as far as the topic on percent and ratio is concerned. She strongly recommended modular instruction as one of the teaching strategy for it helps the students learn to be independent, responsible, self-reliant, and hard working.

Labine (1996), in his study on the " Assessment of the Computational and Problem Solving Skills in Math of Special Class Freshmen students in Samar National School", revealed that in general the respondent of study, special class of SNS, encountered learning difficulties in the following subtopics, addition of dissimilar fractions, division of fractions, changing fraction to percent, finding rate of discount, angles of any quadrilaterals, sides of polygons , circumference of sphere, and the volume of rectangular solid, given decimal numbers. He also recommends that more time should be allotted and more emphasis in class instructions should be given to the difficult learning areas in math to improve the competency level of the students.

Alandino (1996) in his study, "Development and Validation of Modules on Exponents and Radicals in Mathematics III", found out that the experimental group whose members were taught using the modularized instruction has better retention than the control group which was taught using the lecture-discussion method. He therefore concluded that the modular approach of teaching is more effective than the lecture-discussion method in so far as the sub-topics exponent and radicals are concerned. The fact is that students can go through the module

even outside the classroom; they can repeat some sections of the work if need, discover the lessons by themselves and progresses at his own rate until the feeling of self-satisfaction and accomplishment are attained. He then recommended that the slow learners and those who have encountered difficulties in Mathematics should be given learning materials like module to give them time to study even outside the classroom and to catch up with their lessons which are not clear to them.

The study conducted by Uy, Dacula, Labine, and Alandino have similarities as well as differences with the present investigation. The setting and scope covered by each of the foregoing studies differ from each other as well as the setting and scope of the present study. The cited studies and the present study make use of instructional materials, development and validation as well as the pretest and postiest result as the bases for determining the difficulties of the developed materials. The related studies cited, somehow provided valuable and clear insights and directions in the proper conduct of the study.

Almost all the above-cited researchers came out with identical findings that the use of instructional materials in mathematics and other academic subjects had significant positive effect on the performance of students.

Chapter 3

METHODOLOGY

This chapter presents the methods and procedure used in the conduct of the study. It includes the research design, instrumentation, validation of the instrument, sampling procedure, data gathering procedure and the statistical measures used in the treatment of the data gathered.

Research Design

This study used the experimental method using the randomized pretest and posttest control group design prescribed by Franklin and Wallen (1990:248), as follows:

Treatment Group				
(Experimental group)	R	O_1	X_1	O_2
(Control group)	R	O_3	X_2	O_4

In the given formula, R refers randomization, the horizontal line stands for the measure undertaken to equate experimental group and control group; O_1 and O_2 are the pretest and posttest of the experimental group, O_3 and O_4 are the pretest and posttest of the control group. The symbol X_1 is the treatment used

for the experimental group and X_2 is the treatment used for the control group. The treatment represented by X_1 is for the modular approach in the experimental group. The treatment represented by X_2 is the traditional approach used in the control group. The independent variables in this study were the modular approach and the lecture/ discussion methods of teaching Mathematics 1 (fraction). The independent variable was the scores of the subjects in the pretest and posttest.

The measuring instrument used to gather the necessary data from the respondents of the study was a self-made achievement test in Mathematics 1. The achievement test in Mathematics 1 was represented by a posttest mean scores of the control and experimental groups. The posttest mean scores of the control group and experimental groups were compared using the t-test for uncorrelated means to find out which group performed better. The t-test for dependent sample was also used to compare the differences between the pretest and posttest of the control and experimental groups. Flesch formula was also used to determine the readability level of the developed instructional material, which consisted of the human-interest score (HIS) and reading ease score (RES). Simple linear correlation coefficient was also used to determine relationship of responses of public and private school teachers to validate the constructed module according to its construct validity, content validity, and the face validity.

Instrumentation

The data gathering instruments used in this study were the pretest, posttest, the DECS form 138 and the Saint Mary's College of Catbalogan entrance test results of the first year high school students.

Pretest. The study utilized the 50-item teacher made test administered to both experimental and control groups, before instruction on Mathematics I (fractions) was done. A multiple-choice type of test was used, comprising the knowledge, comprehension and application type of cognitive abilities based on the content of the module.

Posttest. After the experimental and control groups were exposed to the respective teaching method, a posttest was given which contains the same test items as the pretest. This test was designed to determine the level of knowledge, comprehension and application or mathematical performance acquired by the students from Mathematics 1.

Questionnaire. Aside from the Flesch formula that was used to validate the readability level of the module, questionnaire was also constructed and used by the researcher for expert validation of the module. The validation of the questionnaire consisted of content validity, construct validity, and the face validity of the module. Two groups of teachers from public and private schools were identified as respondents to answer the questionnaire. They were from Samar State Polytechnic College, Samar National School, Samar College, St

Mary's College of Catbalogan and St. Michael high school of Gandara. Their responses were computed and compared for relationship using the simple linear correlation coefficient.

Module. The developed module contained the following features:

a) Overview. This is a general statement describing the subject or content of the modules; its relation to the previous lessons and its importance in the subject.

b) Direction for use. This contains information on the direction including the activities that the student will undertake while he/ she is using the module.

c) Objectives. This is the learning objective for each lesson in the module.

d) Input. This contains the desired learning objectives to be learned by the students. It covers the discussion of the theoretical lessons and procedures in case of skill lesson together with necessary illustrations, including activities and exercises designed to apply the new knowledge.

e) Exercises. This made use of the set of exercises on each lesson and the pretest/ posttest.

f) Answer to Exercises. This refers to the answers key of the Exercises.

Documentary analysis. Other instruments used in the experimentation were the DECS form 138, or the student report card. These forms were used to determine the Mathematics grades of the students for randomization in selecting the members of the experimental and control groups. These forms were secured from the registrar's office of St. Mary's College of Catbalogan, Catbalogan Samar, during the first semester school year 2000- 2001.

Aside from the DECS form 138 which was the basis of selecting samples of students, entrance test results of first year students was also considered for selection, to help validate the grades of students in mathematics. Data were secured at the guidance office of Saint Mary's College of Catbalogan, Catbalogan, Samar.

Validation of the Instrument

In the validation of the test instrument, 120-item test was first constructed with the table of specification as the bases, following the cognitive domain: knowledge, comprehension and application type. After the completion of the test, it was subjected to criticism and comments by some teachers who were knowledgeable and considered experts in mathematics for improvement and revision of the constructed test.

It aimed to establish the content validity of the test, after which the original pool of 120 item test was tried out among the second year high school students who had taken their Mathematics 1 in the previous year.

Some considerations were given emphasis during the try-out such as room, time, and the procedure in conducting the try-out to avoid bias on the results. After the try-out answer sheets were collected and corrected, followed by item analysis. The following steps were considered by the researcher as suggested by Ebel (1965: 546).

1. The answer sheets were arranged from the highest to the lowest score.
2. Two sub-groups of answer sheets were considered high scoring percentage of 25% of the total group who got the highest scores in the test and the low scoring group consisting also of 25% of the total group who received the lowest scores.
3. The number of correct responses of every item in the high scoring group was tabulated and the same was done to the low scoring group.
4. To compute for the difficulty index, the number of correct responses for both groups was added and express as a ratio to the number of cases on both groups. The quotient obtained was the index of difficulty, based on the formula:

$$P = \frac{U + L}{2N}$$

Where:

P = difficulty index

U = upper 25% of the test papers of students

L = lower 25% of the test papers of students

N = number of cases/ samples in each group

5. To obtain the Discrimination index of the item, the number of correct responses in the lower group was subtracted from the number of correct responses of the upper group and was expressed as a ratio to the number of cases in each. The quotient obtain is the discrimination index.

$$DI = \frac{U - L}{N}$$

Where:

DI = discrimination index

U = upper index

L = lower index

N = number of cases in each group

The accepted indices of discrimination range from 0.20 and above. This acceptance was based on the item selection of Ebel (1965:374), as follows:

Discrimination Index	Item Evaluation
0.40 and above	Very good item
0.30 to 0.39	Reasonably good but possibly subject to improvement
0.20 to .29	Marginal Item, usually needing improvement
0.19 and below	Poor items, to be rejected or improved by revision.

In the same manner Ebel's interpretation (1965:376) for the index of difficulty are as follows and was used

Index of Difficulty	Item Evaluation
86% - 100%	Very Easy Items
71% - 85%	Easy Items
40% - 70%	Moderately Difficult Items
15% – 39%	Difficult Items
1% - 14%	Very Difficult Items

The reliability of the test was computed using the Kuder-Richardson Formula 20 and interpreted based on the Interpretation given by Ebel(1965:376) as follows:

Interpretation of the coefficient of reliability

Reliability	Degree of Reliability
0.95 – 0.99	Very high, rarely found among teacher-made tests
0.90 to 0.94	Highly equaled by few tests
0.80 to 0.89	Fairly high, adequate for individual measurement
0.70 to 0.79	Rather low, adequate for group measurement but not very satisfactory for individual measurement
Below 0.70	Low, entirely inadequate for individual measurement, useful for group average and school surveys

The test administered was revised based on the item analysis of the test. The selection of items for its final form was based on the discrimination index of each item. Items with higher discrimination index were accepted, improve, and revised. The validated test contained only 50 items as a result of the item analysis.

The final form of the test was used as the pretest instrument to both experimental and control groups before each group were taught with the content of the module, using modular approach for the experimental group and lecture/ discussion for the control group.

To ensure the validity of the module, a questionnaire was made based on the content validity, construct validity and face validity of the module. Respondents were selected through purposive random sampling where two schools were selected from the public and private schools. Teachers from public schools were those from Samar State Polytechnic College and Samar National School while those from private schools were Samar College, St. Mary's College of Catbalogan, and St. Michaels School of Gandara, Samar. Results of the teacher's responses were computed and interpreted using the simple linear correlation coefficient.

Validation of Module

A table of specification was prepared based on the content of the module. One hundred twenty (120) multiple-choice type of test was constructed based on

the table of specification. The test items were shown to mathematics teachers for comments and suggestions for the improvement of the test.

Before the final form of the constructed test it was administered to second year high school students of St. Mary's College of Catbalogan, school year 2000 – 2001. These students had taken their Mathematics 1 on their previous years. The test factors such as teacher, room, (clean and orderly ventilated) time, (start at the same time and finish at the same time), and the conduct of the test, (no cheating), were taken into considerations to avoid bias in the test results.

After the test was administered, the answer sheets were corrected, scored and item analysis was performed to determine the discrimination index and the difficulty index of the test items. The one hundred twenty items were reduced to only fifty items test. The reliability level of the constructed test was determined by computing the coefficient of reliability using the Kuder-Richardson Formula 20. Each member of the experimental group was provided with a module. Clear copies of each lesson was provided for the student to read clearly the contents, while the control group was provided with a complete list of references, aside from the text books that they are using, for them to refer for their homework and assignment.

To ensure the validity of the module, a questionnaire was made based on the content validity, construct validity and the face validity of the module. Respondents were selected through purposive random sampling where two schools were selected from the public and three schools from the private. One

teacher respondents from Samar State Polytechnic College, two teacher respondents from Samar National School since they have a big group of first year math teachers, and also to equate with the number of private schools in Samar. One teacher respondents in every private school, such as St. Mary's College of Catbalogan, Samar College and St. Michaels in Gandara, Samar.

Results of the teachers' responses were computed and interpreted using the simple linear correlation coefficient using the following formula (Ybañez, 1998):

$$r_{xy} = \frac{N \sum XY - (EX)(EY)}{\sqrt{[N \sum X^2 - (X)^2][N \sum Y2 - (\sum Y)2]}}$$

where:

X = responses of the teachers from the public school

Y = responses of the teachers from the private school

N = number of items in every criteria

A pretest was given to both groups before they were exposed to the teaching methods. After teaching the contents of the module using modular approach for the experimental group and lecture/discussion for the control group, a posttest was given to both groups to evaluate the achievement of both groups on the learning contents given.

To determine the reading ease score (RES) and the human interest score (HIS) of the module, the Flesch formula was used. To measure the reading ease score (RES) of the module the following steps were undertaken:

1. Choosing the sample page. The samples were selected based on the total number of page of the developed module in mathematics 1 (fraction). Exercises, answer to exercises, and title page were not included. From the total number of pages, the researcher is going to select 25% of the total pages at random. If the sample falls on the pages on the page without reading material, the next page is to be considered.
2. Counting the number of words. One hundred words were taken from each page by counting the first paragraph up to 100th words, in samples were there are new paragraphs, the first word of the sentence was considered. Figure, Captions, heading of the lessons, number, and title were not included in the counting.
3. Counting number of sentences. The total number of the sentences in the 100th words in each sample was counted. If the 100th words fell more than one half of the words of the sentence it is counted as one. Otherwise, it was not included.
4. Counting the number of syllables. The syllables in the 100th words in each sample were counted. The syllables are counted the way the words are pronounced.

5. Finding the average word length, the average word length, the number of syllables in all the sample pages was divided by the total number of the sample pages.
6. Finding the average sentence length. The average sentence length is the number of sentence in all the samples were divided by the total number of pages.
7. Solving the reading ease score (RES). The formula shown below:

   RES = 206.835 – (1.105 x average sentence length + 0.84 x average word).

Sampling Procedure

The samples of the study consist of forty (40) first year high school students of St. Mary's College presently enrolled during school year (2000 – 2001), which were selected by randomization technique. The mathematics grades of the students in grade six and the entrance test results were taken into consideration as the basis for distributing the members of the experimental and control groups. To avoid bias in the experimental group these mathematics grades and entrance test results were matched or equated to assure equivalency.

After taking the forty samples, the researcher assigned the samples of the study to experimental and control groups by matched-group technique with random assignment. The first twenty samples (Section 1) were identified as the

experimental group and the second twenty samples (Section 2) as the control group.

Data Gathering Procedure

The data gathering procedure in this study consisted of two major phases, namely:

1. Development of the Module phase. The module contains the following six features, namely: overview, directions for use, objective, input, exercises and answers to exercises. This phase likewise involved the determination of the RES and HIS of the developed module using Flesch formula.

2. Experimentation phase. As discussed earlier, the researcher used the pretest-posttest control group design to determine the effectiveness of the module. This phase was undertaken as part of the validation of the module.

Statistical Treatment of Data

Statistical tools like the KR-20 formula, mean, standard deviation and the t-test for non-independent and dependent samples were used in analyzing results.

Moreover, the reliability of the test instrument was determined by using the Kuder-Richardson formula 20 given by Calmorin (1981:) as follows:

$$r_{11} = \left[\frac{N}{N-1}\right]\left[\frac{s^2-Npq}{s^2}\right]$$

Where:

r_{11} = reliability coefficient of the test

N = number of items in the test

p = the proportion of the group passing an item

q = 1 – P; the proportion of the group failing an item

S = standard proportion of the test scores.

The mean provided a concise description of the percentage of the performance of the group in the pretest and posttest of the same group. The standard deviation described average distance of the individual score from the mean in a given distribution.

To find out if there were significant differences between the pretest and the posttest mean score of the experimental and control groups, the t-test for dependent sample was used. The formula given by Walpole (1982.) was used:

$$t = \frac{\bar{d}}{s_d/\sqrt{N}}$$

Where:

$\bar{d}$ = mean of the differences between the pretest and posttest scores.

N = numbers of pairs

s_d = standard deviation of the differences as follows:

$$s_d = \sqrt{\frac{N\,\Sigma d^2-(\Sigma d)^2}{N\,(N-1)}}$$

To test the differences between the mean scores of the experimental and control groups per pretest and posttest, the t-test for independent samples was used with the following formula (Walpole, 1982:).

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(N_1-1)S_1^2+(N_2-1)S_2^2}{N_1+N_2-2}\left[\frac{1}{N_1}+\frac{1}{N_2}\right]}}$$

Where:

$\bar{X}_1$ = mean of the experimental group

$\bar{X}_2$ = mean of the control group

N_1 = number of samples in the experimental group

N_2 = number of samples in the control group

For determining the relationship between the responses of public school teachers and private school teachers on the validity of the developed module, the Pearson r coefficient of correlation was used as follows:

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

where:

r_{xy} = correlation coefficient;

x = responses of public school teachers;

y - responses of the private school teachers, and

N - number of pairs.

The Fisher's t-test was used to determine the significance of the coefficient of correlation between a set of paired variables, the Fisher's t-test (Walpole, 1982:389) formula was used as follows:

$$t = r\frac{\sqrt{N-2}}{\sqrt{1-r^2}}$$

where:

t - Fisher's t-value;

r - correlation; and

N - total number of cases.

To determine the reliability level of the module, Flesch formula was used. The formula is:

a) Reading Ease Score (RES) = 206.835 – (1.05 x Average sentence length + 0.846 x average word length).

Where:

$$\text{Average sentence length} = \frac{\text{Number of syllables in all samples}}{\text{Total number of sentences}}$$

$$\text{Average word length} = \frac{\text{Number of syllables in all samples}}{\text{Total number of sample pages}}$$

b) Human Interest Score (HIS) = (%personal word per 100 words x 3.635) + (% personal sentence x 0.314).

Where:

$$\text{\% personal words} = \frac{\text{Total number of personal word in all samples}}{\text{Total number of words in sample pages}}$$

$$\text{\% personal sentence} = \frac{\text{Total number of personal sentence}}{\text{Total sentences in all samples}}$$

In testing the hypotheses of the study, the level of significance, α was set at 0.05 level.

Chapter 4

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the data gathered, the analysis undertaken as well as the interpretation made. The discussion includes the following: 1) the profile of the students/subjects involved in the experiment, 2) evaluation of the module using Flesch formula, 3) teacher-respondents' evaluation of the module, and 4) tests of hypotheses.

Profile of the Subjects/Student-Respondents

This section presents the profile of the first year high school students of St. Mary's College of Catbalogan who served as subjects of the study, in terms of sex, age, Math grade in Grade VI, and Math performance in entrance test. The data in Table 1 are herein presented according to the grouping of the subjects, that is, experimental group (EG) and control group (CG).

Sex. As gleaned from Table 1, there were seven or 35 percent females, with 13 or 65 percent that comprised the experimental group (EG) and there were eight or 40 percent females with 12 or 60 percent males that comprised the control group. Thus, in terms of sex, the two groups had minimal disparity and are almost equated.

Table 1

Profile of the Subjects in Terms of Age, Sex, Math Grade and Entrance Test Result

SUBJECT	AGE		SEX		MATH GRADE		ENTRANCE RESULT	
NUMBER	EG	CG	EG	CG	EG	CG	EG	CG
1	12	12	M	F	87	80	79	76
2	13	13	M	F	78	85	75	81
3	13	12	M	F	84	86	75	84
4	13	13	F	F	83	85	79	80
5	13	12	F	M	79	80	76	75
6	12	13	F	M	80	81	77	85
7	13	13	F	M	82	83	81	77
8	12	13	M	M	78	76	79	77
9	12	13	M	M	77	84	81	82
10	13	12	M	M	82	85	80	78
11	13	12	M	F	82	81	75	76
12	13	13	M	F	78	82	76	79
13	12	12	M	M	82	80	76	75
14	13	14	M	M	77	80	77	75
15	13	13	M	M	79	78	75	75
16	13	12	M	M	84	79	76	75
17	14	13	M	M	85	79	77	75
18	12	12	F	F	82	82	77	78
19	13	13	F	F	85	86	76	77
20	13	12	F	M	86	79	78	75
Total	255	252	F = 7 (35%)	F = 8 (40%)	1631	1631	1545	1545
Mean	12.75 yrs	12.60 yrs	M =13 (65%)	M =12 (60%)	81.55	81.55	77.22	77.25
SD	0.53 yr	0.58 yr			2.96	2.89	1.92	2.81

Age. As regards their age, the oldest subject in the experimental group was 14 years old and the youngest was 12 years old. This group posted an average age of 12.75 years with a standard deviation of 0.53 year. Likewise, the oldest subject in the control group was control was 14 years and the youngest

was also 12 years old. Thus, the control group posted an average age of 12.60 years with a standard deviation of 0.58 year.

Math grade in Grade VI. Relative to the subjects' grades in Math in grade VI, the experimental group posted a highest grade of 87 and the lowest at 77, while the control group posted a highest grade at 86 and the lowest grade at 76. The average grades in Math in grade VI of the two groups were both pegged at 81.55 with standard deviations of 2.96 for the experimental group and 2.80 for the control group.

Math performance in entrance test. In terms of the entrance test results in Math, the highest rating for the experimental group was 81 and the lowest was posted at 75. On the other hand, the control group posted a highest rating of 85 and the lowest rating was 75. The average ratings in Math in the entrance test were 77.22 for the EG and 77.25 for the CG with standard deviations of 1.92 and 2.81, respectively. Relative to the subjects' grades in Math in grade VI, the experimental group posted a highest grade of 87 and the lowest at 77, while the control group posted a highest grade at 86 and the lowest grade at 76. The average grades in Math in grade VI of the two groups were both pegged at 81.55 with standard deviations of 2.96 for the experimental group and 2.80 for the control group.

Based from the profile of the subjects in the EG and CG, it is worthwhile to note at this point that the two groups of subject were matched in terms of their

age, sex, math grades in grade VI and entrance tests results, hence their entry behavior were controlled and were deemed equivalent.

Evaluation of the Module Using Flesch Formula

The evaluation of the developed module using Flesch formula included the test for appropriateness and how interesting the module as prepared.

As computed, the result of the Reading Ease Score (RES) and the Human Interests Score (HIS) obtained from the different pages chosen as samples.

Based on the RES value, the module was fairly easy and appropriate for the first year high school students. The computed HIS was interpreted to be interesting, that the prepared instructional material could really enhance the desire of the students to go through the module. Based on this finding, it can be stated that the developed module was appropriate and interesting to the first year high school students.

Teacher-Respondents' Evaluation of the Module

To collect data on the teachers' assessment of the module, the researcher made a questionnaire to determine the content validity, construct validity, and face validity of the developed module. A group of high school teachers from public and private schools in Catbalogan were made to evaluate the module using the questionnaire. Their responses are shown in Table 2.

Table 2

Validity of the Module Along Content, Construct and Face Validity As Perceived by the Teacher-Respondents from Public and Private Schools

TEACHER CODE NUMBER	*Areas of Validation*					
	CONTENT		CONSTRUCT		FACE	
	X	Y	X	Y	X	Y
1	13	14	12	14	13	14
2	13	14	14	12	13	12
3	13	14	14	14	12	12
4	12	13	13	14	13	14
5	13	13	12	14	13	14
Mean	12.80	13.60	13.00	13.60	12.80	13.20
SD	0.45	0.55	1.00	0.89	0.45	1.10

Legend: X –Public school Teachers Y –Private school Teachers

Content validity. As gleaned from Table 2, four out of five teachers from public school gave a rating of 13 for the content validity of the developed module while the remaining one teacher gave a rating of 12. Meanwhile, three out of the five private school teachers gave a rating of 14 and two gave a rating of 13 along the content validity of the module. Thus, the average rating of the public school teachers was posted at 12.80 with SD = 0.45, while that of the private school teachers was posted at 13.60 with SD = 0.55. This result shows that the ratings given by the two groups of teachers along content validity of the developed module were favorable.

Construct validity. Along construct validity, two out of five teachers from public school gave a rating of 14 for the construct validity of the developed module while one teacher gave a rating of 13 and two teachers gave a rating of

12. Meanwhile, four out of the five private school teachers gave a rating of 14 and the remaining one teacher gave a rating of 12 along the construct validity of the module. Thus, the average rating of the public school teachers was posted at 13.00 with SD = 1.00, while that of the private school teachers was posted at 13.60 with SD = 0.89. This result shows that the ratings given by the two groups of teachers along construct validity of the developed module were favorable.

Face validity. Along face validity, four out of five teachers from public school gave a rating of 13 for the face validity of the developed module while one teacher gave a rating of 12. Meanwhile, three out of the five private school teachers gave a rating of 14 and the remaining two teachers gave rating of 12 along the face validity of the module. Thus, the average rating of the public school teachers was posted at 12.80 with SD = 0.45, while that of the private school teachers was posted at 13.20 with SD = 1.10. This result shows that the ratings given by the two groups of teachers along face validity of the developed module were favorable.

Relationship Between the Responses of the Public and Private School Teachers on *the Validity of the Module*

This section presents the results of the correlational analysis between the perceptions of the two groups of respondents on the validity of the module along content, construct and face validity. The results are contained in Table 3.

Table 3

Relationship Between the Responses of the Public and Private School Teachers on the Validity of the Developed Module

Areas of Validation	r_{xy}	Fisher's t	Critical t at df = 3 and $\alpha = 0.05$	Evaluation
Content	0.61	1.342	3.182	NS/ Accept Ho
Construct	-0.56	1.168	3.182	NS/ Accept Ho
Face	0.61	1.342	3.182	NS/ Accept Ho

Content validity. As gleaned from Table 3, the computed r_{xy} between the responses of the public and private school teachers along content validity was posted at 0.61 with a corresponding Fisher's t-value of 1.342, which proved to be numerically lesser than the tabular/critical t value of 3.182 at 0.05 level of significance and degrees of freedom = 3. This led to the acceptance of the hypothesis that "There is no significant relationship between the responses of the mathematics teachers from public and private schools relative to content validity." This implies that the ratings given by the public school teachers are

not related to the ratings given by the private school teachers; that their ratings are independent of each other.

Construct validity. Along construct validity, the computed $r_{x,y}$ between the responses of the public and private school teachers was posted at -0.56 with a corresponding Fisher's t-value of 1.168, which proved to be numerically lesser than the tabular/critical t value of 3.182 at 0.05 level of significance and degrees of freedom = 3. This led to the acceptance of the hypothesis that "There is no significant relationship between the responses of the mathematics teachers from public and private schools relative to construct validity." This implies that the ratings given by the public school teachers are not related to the ratings given by the private school teachers; that their ratings are independent of each other.

Face validity. As gleaned from Table 3, the computed r_{xy} between the responses of the public and private school teachers along face validity was posted at 0.61 with a corresponding Fisher's t-value of 1.342, which proved to be numerically lesser than the tabular/critical t value of 3.182 at 0.05 level of significance and degrees of freedom = 3. This led to the acceptance of the hypothesis that "There is no significant relationship between the responses of the mathematics teachers from public and private schools relative to face validity." This implies that the ratings given by the public school teachers are not related to the ratings given by the private school teachers; that their ratings are independent of each other.

Comparison of the Means Scores of the Experimental and Control Groups Per Pretest and Posttest

This part discusses the pretest scores and posttest scores of the experimental and control groups and the results of the comparative analysis.

Pretest. Table 4 shows the scores of the EG and CG in the pretest. The highest score in the EG was posted at 2t and the lowest was 6. For the CG, the highest was posted at 28 and the lowest was 5. The pretest mean score of the experimental group was 15.85 and a standard deviation of 5.25. On the other hand, the control group mean score was 15.5 with a standard deviation of 5.11, with a mean difference of 0.35.

To test whether the observed difference is significant, t-test for independent samples was used. The computed t-value was 0.213, which proved lesser than the tabular t-value of 2.024 at 0.05 level of significance with degrees of freedom = 38. Therefore the hypothesis which states that there is no significant difference between the pretest mean scores of the experimental and control group was accepted. This implies that the two groups had the same entry behavior during the experimentation.

Table 4

Pretest Scores of the Experimental and Control Groups

STUDENT NUMBER	GROUP/SCORES			
	EXPERIMENTAL	*CONTROL*		
1	20	15		
2	15	16		
3	13	28		
4	22	13		
5	14	13		
6	15	12		
7	25	17		
8	15	18		
9	12	20		
10	12	18		
11	6	23		
12	17	10		
13	12	12		
14	18	14		
15	10	14		
16	14	5		
17	22	12		
18	11	16		
19	27	22		
20	17	12		
Total	317	310		
Mean	15.85	15.5		
SD	5.25	5.11		
Computed t-value	0.213			
Tabular t-value	2.024		α=.05	df=38
Evaluation/Decision	*Not Significant/Accept Ho*			

Posttest. Reflected in Table 5 are the posttest scores of the experimental and control groups. The highest score in the EG was posted at 45 and the lowest was 16. For the CG, the highest score was 29 and the lowest was 13. The data shows that the EG had a mean score of 24.3 with SD = 7.21 while the CG had a

mean score of 18.9 with SD = 4.28. It is evident that the EG had a higher mean than the CG with a numerical difference of 5.4.

Table 5

Posttest Scores of the Experimental and Control Groups

STUDENT NUMBER	*GROUP/SCORES*	
	EXPERIMENTAL	CONTROL
1	24	24
2	30	18
3	20	29
4	45	14
5	19	21
6	23	18
7	27	20
8	23	21
9	21	23
10	20	18
11	16	23
12	24	16
13	16	17
14	30	14
15	18	16
16	20	13
17	27	13
18	17	20
19	33	24
20	33	16
Total	*486*	*378*
Mean	24.3	18.9
SD	7.21	4.28
Computed t-value	2.88	
Tabular t-value	2.042	α=.05 df=38
Evaluation/Decision	*Reject Ho*	

To test as to the significance of the aforementioned difference, t-test for independent samples was applied. The computed t-value of 2.88 was greater than the tabular value of 2.024 with .05 level of significance and degrees of freedom = 38.

This led to the rejection of the hypothesis. This implies a significant difference between the mean scores of the posttest of the two groups. The result also indicated that the experimental group performed better than the control group in the posttest.

Therefore, the significant difference between the posttest results of the experimental and control groups substantiate the fact that modular approach in teaching mathematics is much more effective than the traditional lecture/discussion method.

The findings of the study further supported the studies conducted by Español, Gordove, Villanueva, Calapre, Uy, Dacula, and Alandino that modularized instruction is better or more effective than lecture/discussion method in attaining the objectives of the lesson.

Comparison of the Pretest and Posttest Means Scores of the Experimental and Control Groups

This part compares the pretest and posttest scores of the two groups of subjects to determine whether the subjects benefited from their exposure to the modular instruction (experimental group) and lecture-discussion (control group).

Experimental group. As indicated in Table 6, the highest score in the EG during the pretest was 27 and the lowest was 6; during the posttest, the highest score was 45 and the lowest was 16 indicating a general increase in the scores of

the EG. The mean score of the experimental group in the posttest was 24.3, which was higher than the mean score in the pretest (15.85) by 8.45.

Table 6

Pretest and Posttest Results of the Experimental Group

STUDENT NUMBER	*PRETEST*	*POSTTEST*	*DIFFERENCE* (d)
1	20	24	4
2	15	30	15
3	13	20	7
4	22	45	23
5	14	19	5
6	15	23	8
7	25	27	2
8	15	23	8
9	12	21	9
10	12	20	8
11	6	16	10
12	17	24	7
13	12	16	4
14	18	30	12
15	10	18	8
16	14	20	6
17	22	27	5
18	11	17	6
19	27	33	5
20	17	33	16
Total	*317*	*486*	*168*
Mean	15.85	24.3	4.923
Computed t-value:		7.723	
Tabular t-value:	2.093	α=.05	df = 19
Evaluation/Decision:		Significant/Reject Ho	

The computed t-value of 7.723 was higher than the tabular value of 2.093 at .05 level of significance and degrees of freedom = 19. Thus, the null hypothesis, which states that there is no significant difference between the pre-test and post-test mean scores of the experimental group, is rejected. This implies that the scores of the EG in the posttest is significantly higher than in the pretest, denoting that learning took place among the subjects in the EG with the use of the developed modules.

Control group. As indicated in Table 7, the highest score in the CG during the pretest was 28 and the lowest was 5; during the posttest, the highest score was 29 and the lowest was 13 indicating a slight increase in the scores of the CG. The mean score of the control group in the posttest was 18.90, which was higher than the mean score in the pretest (15.50) by 3.40.

The computed t-value of 5.43 was higher than the tabular value of 2.093 at .05 level of significance and degrees of freedom = 19. Thus, the null hypothesis, which states that there is no significant difference between the pre-test and post-test mean scores of the control group, is rejected. This implies that the scores of the CG in the posttest is significantly higher than in the pretest, denoting that learning took place among the subjects in the CG with the use of the lecture discussion method in teaching Mathematics I (fractions).

Table 7

Pretest and Posttest Results of the Control Group

STUDENT *NUMBER*	PRETEST	POSTTEST	DIFFERENCE *(d)*
1	15	24	9
2	16	18	2
3	28	29	1
4	13	14	1
5	13	21	8
6	12	18	6
7	17	20	3
8	18	21	3
9	20	23	3
10	18	18	0
11	23	23	0
12	10	16	6
13	12	17	5
14	14	14	0
15	14	16	2
16	5	13	8
17	12	13	1
18	16	20	4
19	22	24	2
20	12	16	4
Total	*378*	*68*	*168*
Mean	15.50	18.90	4.923
Computed t-value:		*5.43*	
Tabular t-value:	*2.093*	*α=.05*	*df = 19*
Evaluation/Decision:		Significant/Reject Ho	

Comparison of the and Posttest Mean Scores of the Experimental and Control Groups According to the Subjects' Profile

This section compares the posttest scores of the EG and CG according to their sex, age, Math grades in Grade VI and Math performance in the entrance test.

Sex Table 8 shows the results of the posttest of the experimental group grouped according to sex, that is, 13 males and seven females. The highest score obtained by the female group was 45 and the lowest was 17 while among the males, the highest was 30 and the lowest was 16. The mean scores were 28.14 for the females and 22.23 for the males, with a difference of 5.91. The computed t value of absolute t-value of -1.858 proved to be numerically lesser than the tabular t-value of 2.101 at $\alpha = .05$ level of significance and degrees of freedom = 18. This led to the acceptance of the hypothesis that "There is no significant

Table 8

Comparison of the Posttest Result of the Experimental Group by Sex

Student No.	Male	Student No.	Female
1	24	4	45
2	30	5	19
3	20	6	23
8	23	7	27
9	21	18	17
10	20	19	33
11	16	20	33
12	24		
13	16		
14	30		
15	18		
16	20		
17	27		
Total	289		197
Mean	22.23		28.14
Computed t-value:		-1.858	
Tabular t-value:	2.101	α=.05	df=18
Evaluation/Decision		Not Significant/Accept Ho	

difference between the posttest mean scores of the experimental group according to sex." This implies that the males and the females in the EG had more or less the same level of performance in the posttest.

For the control group, Table 9 shows that the highest score obtained by the male group was 23, while that of the female group was 29. The computed absolute t-value of 1.91 was numerically lesser than the tabular t-value of 2.101 at $\alpha = .05$ level and degrees of freedom = 18. This led to the acceptance of the hypothesis that "There is no significant difference between the posttest mean

Table 9

Comparison of the Posttest Result of the Control Group by Sex

Student No.	Posttest	Student No.	Posttest
5	21	1	25
6	18	2	18
7	20	3	29
8	21	4	14
9	23	11	23
10	18	12	16
13	17	18	20
14	14	19	24
15	16		
16	13		
17	13		
20	16		
Total	210		168
Mean	17.53		21.00
Computed t-value:		-1.91	
Tabulated t-value:	2.101	α=.05	*df*=18
Evaluation/Decision		Not Significant/Accept Ho	

scores of the control group according to sex." This implies that the males and the females in the CG had more or less the same level of performance in the posttest.

Age. Table 10 reveals the results of the posttest of experimental group grouped according to age. The respondents were divided into two groups –

Table 10

Comparison of the Posttest Result of the Experimental Group by Age

Student Number	12 years old	Student No.	13 –14 years old
1	24	2	30
6	23	3	20
8	23	4	45
9	21	5	19
13	16	7	27
18	17	10	20
		11	16
		12	24
		14	30
		15	18
		16	20
		17	27
		19	33
		20	33
Total	124		362
Mean	20. 67		25. 86
Computed t-value:		1.526	
Tabular t-value:	2.101	α=.05	df=18
Evaluation/Decision		Not Significant/Accept Ho	

12 years old with six respondents/subjects, and the other was composed of 14 respondents whose age ranged from 13 years old to 14 years old. The highest score obtained by 13 years old to 14 years old group was 45 (mean = 25.86), while that of 12 years old was 42 (mean = 20.67). The computed t-value of 1.526 proved to be numerically lesser than the tabular t-value of 2.101 at $\alpha = .05$ level and degrees of freedom = 18. This led to the acceptance of the hypothesis that "There is no significant difference between the posttest mean scores of the experimental group according to age." This implies that students in the EG had more or less the same level of performance in the posttest when grouped by age. This may be attributed to the fact that the respondents/subjects' age distribution is very compact/homogenous.

For the control group, Table 11 shows that the highest score obtained by the group of 12 years old was 29 with a mean score of 20.56. Meanwhile, the group of 13 years old to 14 years old posted the highest score of 24 with a mean score of 17.91.

The table shows the computed t-value of 1.345 proved to be lesser than the tabular value of 2.101 at .05 level of significance and 18 as degrees of freedom. This signifies that there is no significant difference between the posttest mean scores of the control group according to age. This implies that students in the CG had more or less the same level of performance in the posttest when grouped by

age. This may be attributed to the fact that the respondents/subjects' age distribution is very compact/homogenous.

Table 11

Comparison of the Posttest Result of the Control Group by Age

Student Number	*12 years old*	*Student No.*	*13 - 14 years old*
1	24	2	18
3	29	4	14
5	25	6	18
10	18	7	20
11	23	8	21
13	17	9	23
16	13	12	16
18	20	14	14
20	16	15	16
		17	13
		19	24
Total	185		197
Mean	20.56		17.91
Computed t-value:		1.345	
Tabular t-value:	2.101	α=.05	df=18
Evaluation/Decision		Not Significant/Accept Ho	

Math grades in Grade VI. Table 12 reveals the results of the posttest of experimental group grouped according to their grades in Math in Grade VI. The EG was divided into two groups, those whose average grade in Grade VI Math was less than 81.55 and those who got grades equal to 81.55 or higher.

The posttest mean score of the group of students whose average grades were below 81.55 was 23.50 and the mean score of the other group whose average grades were 81.55 or higher was 24.83. The mean difference was 1.33.

To test whether the numerical difference is significant, t-test for independent samples was applied.

Table 12

Comparison of the Posttest Result of the Experimental Group According to Math Grades in Grade VI

Student No.	With average grades in *Grade VI Math less* than 81.55	Student No.	With average grades in Grade VI Math *more than or equal* to 81.55
2	30	1	24
5	19	3	20
6	23	4	45
8	23	7	27
9	21	10	20
12	24	11	16
14	30	13	16
15	18	16	20
		17	27
		18	17
		19	33
		20	33
Total	188		298
Mean	23.50		24.83
Computed t-value:	-0.396		
Tabular t-value:	2.101	α=.05	df=18
Evaluation/Decision	*Not Significant/Accept Ho*		

The table shows that the computed absolute t-value is 0.-0.396 which proved to be lesser than the tabular value of 2.101 at 0.5 level of significance and 18 degree of freedom. This means that there is no significant difference between the posttest mean scores of the experimental group according to their Mathematics grades in Grade VI. Students whose average grades were below

81.55 had the same performance as those whose average grades in Grade Vi Math were above or equal to 81.55

For the control group (Table 13), the mean score of the group of students whose average grades were below 81.55 was 17.82 and the mean score of the other group whose average grades were 81.55 and above was 20.22. The mean difference was registered at 2.4.

Table 13

Comparison of the Posttest Result of the Control Group According to Math Grades in Grade VI

Student No.	With average grades in Grade VI Math *less than 81.55*	*Student No.*	With average grades in Grade VI Math *more than or equal to 81.55*
1	24	2	18
5	21	3	29
6	18	4	14
8	21	7	20
11	23	9	23
13	17	10	18
14	14	12	16
15	16	18	20
16	13	19	24
17	13		
20	16		
Total	196		182
Mean	17.82		20.22
Computed t-value:		-1.27	
Tabular t-value:	2.093	α=.05	*df*=18
Evaluation/Decision		Ho Accepted	

To test whether the numerical differences is significant, t-test for independent samples was applied. The table shows that the computed absolute t-value is 1.27. This value is lesser than the tabular value of 2.101 at .05 level of significance and 19 degrees of freedom. This signified that there is no significant difference between the posttest mean scores of the control group according to Mathematics grades in grade VI. This also implies that students whose average grades were below 81.55 had the same performance as those whose average grades were 81.55 and above.

Math performance in the entrance test. Table 14, gives the result of the posttest of the experimental group according to their Math ratings in the entrance test. The respondents were divided into two groups. One group composed of 13 respondents whose average grades were below 77.25 in their entrance test, while the other group was composed of seven respondents whose average grades were 77.25 or higher. The posttest mean score of the group whose average grades were below 77.25 was 22.54, while the other group posted a posttest mean score of 22.86. The two groups registered a mean difference of 0.32.

To test whether the numerical difference is significant, t-test for independent samples was applied. The computed absolute t-value of 0.057, is lesser than the tabular t-value of 2.101 at .05 level of significance and 18 degrees of freedom. This signified the acceptance of the hypothesis that there is no significant difference between the posttest mean scores of the experimental

group according to entrance test results. This further implies that both groups of the students in the EG had more or less the same performance level in the posttest.

Table 14

Comparison of the Posttest Result of the Experimental Group According to Math Performance in the Entrance Test

Student No.	With Math Rating *Below 77.25*	*Student No.*	With Math Rating Higher than or equal to *77.25*
2	30	1	24
3	20	4	45
5	19	7	27
6	23	8	23
9	16	9	21
11	24	10	20
12	16	20	33
13	30		
14	18		
15	20		
16	27		
17	17		
18	33		
Total	293		193
Mean	22.54		22.86
Computed t-value:		-0.057	
Tabular t-value:	2.093	α=.05	df=18
Evaluation/Decision		Not Significant/ Accept Ho	

For the control group (Table 15), the 13 respondents/subjects whose average Math ratings were below 77.25 obtained a posttest mean score of 18.46, while the other group composed of seven respondents/subjects whose average

Math ratings were 77.25 and above obtained a posttest mean score of 19.71. The two groups registered a mean difference of 1.25.

Table 15

Comparison of the Posttest Result of the Control Group According to Math Performance in the Entrance Test

Student No.	With Math Rating *Below 77.25*	Student No.	With Math Rating Higher than or equal to *77.25*
1	24	2	18
5	21	3	29
6	18	4	14
7	20	9	23
8	21	10	18
11	23	12	16
13	17	18	20
14	14		
15	16		
16	13		
17	13		
19	24		
20	16		
Total	240		138
Mean	18.46		19.71
Computed t-value:		-0.61	
Tabular t-value:	2.101	α=.05	*df*=18
Evaluation/Interpretation		Not Significant/ Accept Ho	

To test whether the numerical difference is significant, t-test for independent samples was applied. It can be gleaned from Table 15 that the

computed absolute t-value of 0.61 is lesser than the tabular t-value of 2.101 at .05 level of significance and 18 degrees of freedom. This signified that there is no significant difference between the posttest mean scores of the control group according to their entrance test results; those whose Math ratings in the entrance test were below 77.25 had more or less the same performance in the posttest with those whose Math ratings in the entrance test were equal to or higher than 77.25.

Chapter 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

This chapter includes the summary of findings, conclusions and recommendations based on the findings of the study.

Summary of Findings

The salient findings of the study are herein presented based on the specific questions and hypotheses of the study:

1. There were seven or 35 percent females, with 13 or 65 percent that comprised the experimental group (EG) and there were eight or 40 percent females with 12 or 60 percent males that comprised the control group. Thus, in terms of sex, the two groups had minimal disparity and are almost equated.

2. The experimental group (average age = 12.75 years) and control group (average age = 12.60 years) belonged to more or less the same age level.

3. The average grades in grade VI Mathematics of the experimental and control groups were 81.55 indicating that both groups had more or less the same entry behavior in terms of Math grade in grade VI.

4. The average Math ratings in the entrance test of the experimental and control groups were 77.25 indicating also that both groups had more or less the same entry behavior in terms of entrance test results.

5. Based on the Flesch formula, the Reading Ease Score (RES) and Human Interest Score (HIS) revealed that the developed module was appropriate for the first year high school students. The module is interesting based on the results of the test.

6. Based on the responses of the teacher-respondents from public and private high schools, the developed module was found to be valid in terms of content, construct and face validity.

7. The computed r_{xy} between the responses of the public and private school teachers along content, construct and face validity were 0.61 (Fisher's t-value of 1.342), -0.56 (Fisher's t-value of 1.168), and 0.61 (Fisher's t-value of 1.342). All the Fisher's t-values proved to be numerically lesser than the tabular/critical t value of 3.182 at 0.05 level of significance and degrees of freedom = 3. This led to the acceptance of the hypothesis that "There is no significant relationship between the responses of the mathematics teachers from public and private schools relative to content, construct and face validity." This implies that the ratings given by the public school teachers are not related to the ratings given by the private school teachers; that their ratings are independent of each other.

8. The pretest mean score of the experimental group was 15.85 with a standard deviation of 5.25. On the other hand, the control group mean score was 15.5 with a standard deviation of 5.11, with a mean difference of 0.35. For testing its significance, the computed t-value was 0.213, which proved lesser than the

tabular t-value of 2.024 at 0.05 level of significance with degrees of freedom = 38. Therefore the hypothesis which states that there is no significant difference between the pretest mean scores of the experimental and control group was accepted.

9. For the posttest, the EG had a mean score of 24.3 with SD = 7.21 while the CG had a mean score of 18.9 with SD = 4.28. It is evident that the EG had a higher mean than the CG with a numerical difference of 5.4. The computed t-value of 2.88 was greater than the tabular value of 2.024 with .05 level of significance and degrees of freedom = 38. This led to the rejection of the hypothesis. This implies a significant difference between the mean scores of the posttest of the two groups. The result also indicated that the experimental group performed better than the control group in the posttest.

10. The mean score of the experimental group in the posttest was 24.3, which was higher than the mean score in the pretest (15.85) by 8.45. The computed t-value of 7.723 was higher than the tabular value of 2.093 at .05 level of significance and degrees of freedom = 19. Thus, the null hypothesis, which states that there is no significant difference between the pre-test and post-test mean scores of the experimental group, is rejected.

11. The mean score of the control group in the posttest was 18.90, which was higher than the mean score in the pretest (15.50) by 3.40. The computed t-value of 5.45 was higher than the tabular value of 2.093 at .05 level of significance and degrees of freedom = 19. Thus, the null hypothesis, which states that there is

no significant difference between the pre-test and post-test mean scores of the control group, is rejected.

12. In comparing the posttest mean scores of the two groups of subjects according to sex, the following were the results: the computed absolute t-values were 1.86 for EG and 1.91 for CG. The computed t-values were lesser than the tabular value of 2.101 at 0.05 level of significance and df = 18.. Thus, the null hypothesis of no significant difference between the posttest mean scores of the experimental and control groups according to sex was accepted.

13. For the comparative analysis according to age, the computed absolute t-values were 1.526 for the experimental group and 1.345 for the control group. These values proved to be lesser than the tabular value of 2.101 at 0.05 level of significance and df = 18. Thus, the null hypothesis of no significant difference between the posttest mean scores of the experimental and control groups according to age was accepted.

14. According to Math grade in Grade VI, the computed absolute t-values were 0.396 for the experimental group and 1.270 for the control group. These values proved to be lesser than the tabular value of 2.101 at 0.05 level of significance and df = 18. Thus, the null hypothesis of no significant difference between the posttest mean scores of the experimental and control groups according to Math grade in Grade VI was accepted.

15. For the comparative analysis according to Math rating in the entrance test, the computed absolute t-values were 0.057 for the experimental group and

0.61 for the control group. These values proved to be lesser than the tabular value of 2.101 at 0.05 level of significance and df = 18. Thus, the null hypothesis of no significant difference between the posttest mean scores of the experimental and control groups according to Math rating in the entrance test was accepted.

Conclusions

Based on the findings of the study, the following conclusions were drawn:

1. The experimental and control groups had more or less the same level of entry behavior on the bases of their age, sex, Math grade in grade VI, Math rating in entrance examination and the pretest mean scores. This implies that the experiment was free from bias in terms of results arrived at.

2. There is significant improvement in the performance of the students in the experimental group as shown in their pretest and posttest results. This improvement was brought about by the modular approach of teaching fraction.

3. There is a significant improvement in the performance of the students in the control group as shown in the pretest and posttest results. This improvement in the performance of the students can be attributed to the strategies used by the researcher such as lecture/discussion, seatwork, board work, exercises and quizzes.

4. The modular approach of teaching is more effective than the traditional lecture/discussion method as far as the topic in fraction in mathematics 1 is concerned. It is a fact that the students can go through the module and learn its

contents at his own rate, check and repeat same topics of his work if needed, discover process and technique to learn the lesson until the feeling of self-satisfaction is attained.

5. The module is valid in terms of content validity, construct validity and face validity. It is also appropriate and interesting to the first year high school students.

6. The posttest performance of the experimental group and control group did not vary when the subjects were grouped according to sex, age, Math grades in grade VI and entrance results. This indicated that the developed module in Mathematics I (fraction) could be used among students regardless of their sex, age, previous Math performances.

Recommendations

Based on the conclusions of the study, the following recommendations were formulated:

1. The developed module in Mathematics 1 (fraction) should be used and evaluated in St. Mary's College of Catbalogan and in other schools to confirm its effectiveness.

2. Modules should be used to student to give them time to catch up with lessons not well learned during classroom instruction. However, this could be also go hand in hand with the lecture/ discussion method.

3. Teachers teaching Mathematics 1 are encouraged to develop and validate more modules on different topics for variation of teaching strategies.

4. School administrators should also encourage teachers in their schools to develop and validate modules not only in Mathematics but also in other fields and giving extra points in terms of performance as incentives for developing the instructional materials for the improvement of classroom instructions.

5. Modular instruction is strongly recommended since it helps the students to learn to be independent, responsible, self-reliant and hardworking individual.

6. School administrators/Principals should provide financial support for establishing and maintaining programs to develop instructional materials especially designed for instruction and remedial purposes.

7. In-house seminars should be periodically conducted particularly on module making so that teachers who are planning to use the modular instructions can make and prepare their own modules.

8. Other future researchers using the other control variables, contents, topic and experimental design to fully substantiate the validity and potential of the modular approach in teaching mathematics, should conduct similar studies.

Chapter 6

THE MODULE

The Module aims to show how Fractions are useful in any activities of man. Be it in the market, store, home, business, school, and other aspects of human endeavor.

This module will also help you understand better the meaning relevance and the applicability of the topic (Fraction) even with the absence of the teacher. This will also help the students develop learning independently by developing his/her own potentials and improve learning capability through self-discover and self-realization at his won rate. The lesson on this module helps the learner develop and the skills and processes needed in the application of the topic (Fraction) to its real life situations. The module is divided into eleven lessons, namely:

Module in Fractions

Lesson 1. Definition of Fraction and its types.

Lesson 2. Equal Fractions/ Reduction of Fraction to lowest term and raising fraction to higher terms.

Lesson 3. Ordering fractions/Fraction in increasing and decreasing fractions and conversion of fraction to mixed and mixed to improver fraction

Lesson 4. Addition and subtraction of similar fractions

Lesson 5. Addition and subtraction of dissimilar fractions

Lesson 6. Addition and subtraction of mixed fraction

Lesson 7. Application to worded problems. (Addition and Subtraction)

Lesson 8. Multiplication of fraction including mixed fractions

Lesson 9. Division of fraction including mixed fraction

Lesson 10. Application to worded problem (multiplication and Division)

Lesson 11. Complex

(Each lesson has the desired sequence of activities:

A. Objectives:

These are the specific objectives of the lesson.

B. Input

This contains the desired learning objective to be learned by the student.

C. Exercises

This presents a series of exercises based on content of the input.

D. Answer to exercises

This contains the correctness of the Exercises to guide the students.

How to use the Module

These are the guides on how to use the module. Follow the instruction carefully in order to gain maximum benefits from this module.

1. This Module is divided into eleven lessons. Each lesson is presented in a separate booklet.
2. The learning objective are found on the first page of each lesson, try to read them carefully.
3. You must work through each lesson in the sequence it is presented. After going through the INPUT, do the exercises. Look at the answers to the exercises page after you have completed the exercises.
4. You can work in groups, or by yourself independently.

5. Work on the next lesson only after you finished the previous lesson for you to achieve the objective.
6. When you successfully completed all the lessons on this module, answer Posttest. After you have taken the posttest, compare your answers with the answer key of the test. Be sure to achieve a minimum score of 76% or at your desired maximum rating before proceeding to work any additional module on this series. If you attain less than 75%, review this module and do the exercises again.

General Objectives of the Module

At the end of this module, you should be able to:

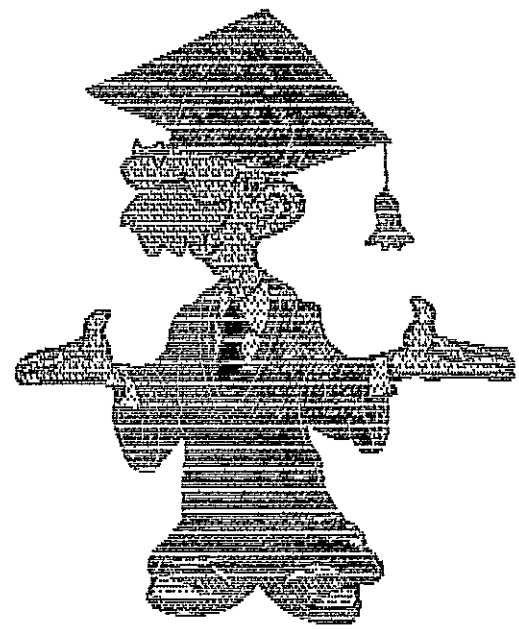
1. Define and differentiate the following terms.
    a) Fraction
    b) Proper fraction
    c) Improper fraction
    d) Mixed fraction
    e) Similar fraction
    f) Dissimilar fraction
    g) Equal fractions
2. Express fractions to lowest term and raise to higher terms.

3. Arrange fraction in increasing or decreasing order.
4. Convert? Fractions to mixed fraction and mixed to improper fractions.
5. Add and subtract similar and dissimilar fractions including mixed fractions
6. Multiply and divide fractions including mixed fractions.
7. Solve worded problems or application to problems on addition, subtraction, Multiplication, and division of fractions.
8. Simplify Complex fractions.

MODULE 1

LESSON 1

Definition of Fractions and It's Types



INTRODUCTION

In your Elementary years, mention was made of any amount of complex units or whole is expressed as? A whole number. Of a single unit is divided into several equal parts, each of the equal parts is a fractional or sub unit expressed by a number called a fraction.

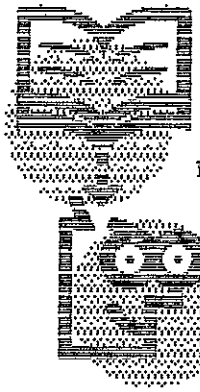
This lesson concentrates on the development of a part of a whole called fraction, its definition, types, its interpretation as one or more equal parts of a whole or of a set, a division, or a relation between two quantities, its application in all aspects of life such as in business, in the family, in school, or in all fields of human endeavor.

Objectives:

After reading and studying this lesson, you should be able to;

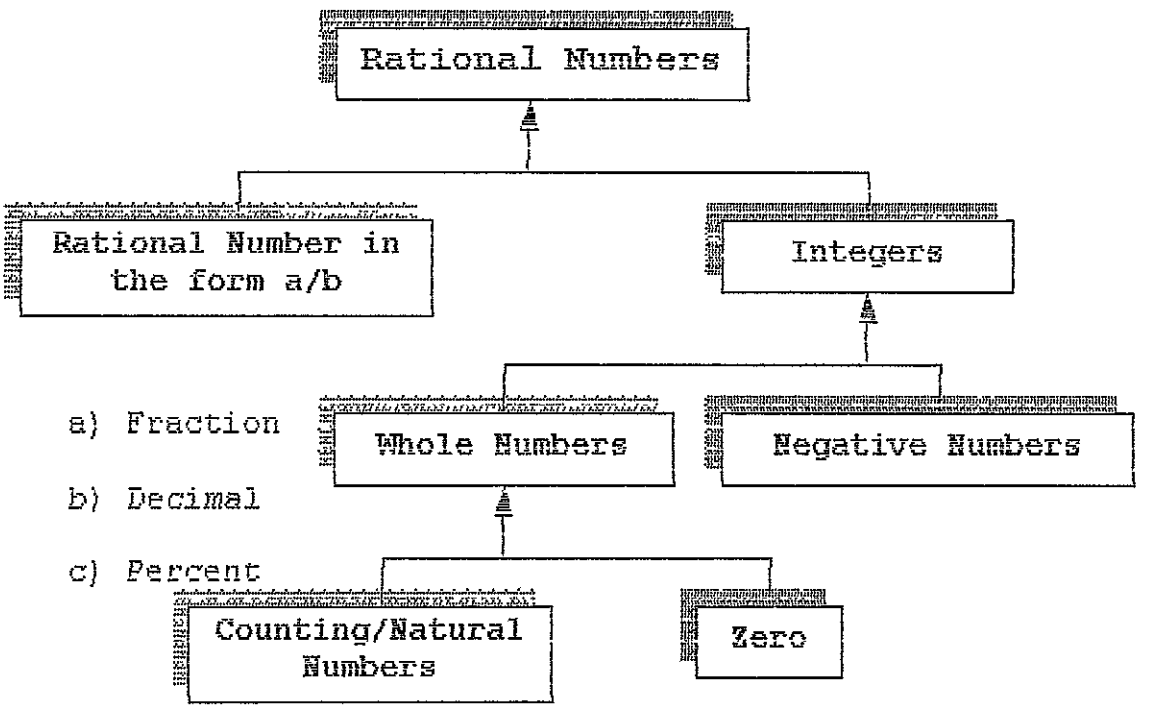
1) define a fraction
2) define and differentiate proper, improper and mixed fractions.
3) Identify similar and dissimilar fractions.
4) Manifest creativity in dealing with fractions.

Recall



The set of whole numbers is only a small part of a larger set of numbers. Try to look back the number system, in order that you can determine what type of numbers are you going to study in relation to what you have learned in your elementary years is it consonance to your previous knowledge of numbers?

Diagram below shows you the relationship of numbers from basic to higher order of rational numbers.

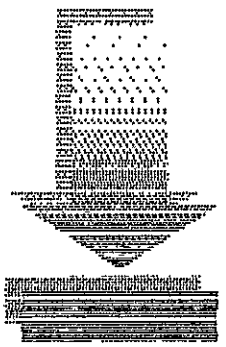


From the set of Counting or natural number plus zero gives us a whole number. There are existing numbers which are opposite of whole number we called negative numbers. As

you combine them, you get a set of integers. But numbers are yet incomplete because there are numbers which are not include in the set of integer, those numbers are the fractions, decimals, and percent, which are called rational numbers in the form of a/b, where b is not equal to zero.

The lessons that you are going to study and learn will deal on rational numbers in the form a/b, specifically fractions.

INPUT



Lesson 1 - Definition of fraction and its types.

1.1 Definition of fraction.

In the early times, human beings needed only counting numbers. But as the need to measure and to count became more complicated, they had to discover or invent a new kind of number. For example, out of 8 slices of "bibingka", you have eaten three, write the fractional part you have eaten as 3/8. this is read as "three-eights" or "three over eight". The number 3/8 represents a fraction where 2 is called as numerator and 89 as denominator. The 3 or the numerator (the number written above the line) indicates how many parts of the unit or total are taken, while 8 or the denominator (the number

written below the line) indicates the number of total equal parts into which the whole is divided.

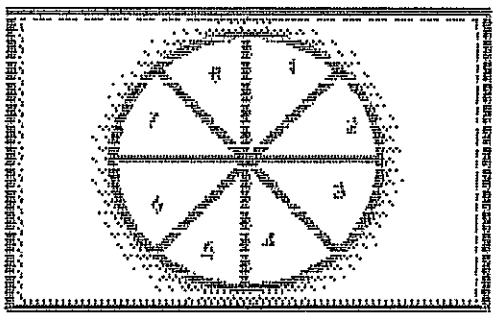


Figure 1. The shaded are of the bibingka indicates the number of units which was eaten, 3 out of eight or 3/6.

$$\frac{3}{8} = \frac{\text{Numerator}}{\text{Denominator}}$$

A fraction can be written in 2 ways

1) ratio - example 3:8

2) Division - example $\frac{3}{8}$.

But the most commonly used symbol for fraction is by division.

Therefore, here is the definition:

A **FRACTION** is a number used to represent a part of a whole.

EXAMPLES:

1.

1	2	3	4

$\frac{1}{4}$ (read as "one-fourth" or "one over four"

2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

$\frac{9}{20}$ (read as "nine-twentieths" or nine over twenty")

$\frac{7}{20}$ (read as "seven-tenths" or "Seven over ten).

From the given examples, the shaded areas 1,9, and 7 are numerators while 4, 20 and 10 are the denominators of the fractions.

1.1 Types of fractions

Fraction has also its types namely:

Proper Fractions, Improper fractions and mixed fractions or numbers. Consider the set of fractions below:

1) $\frac{3}{5}$, $\frac{8}{10}$, $\frac{15}{17}$, $\frac{21}{29}$, $\frac{101}{102}$

2) $\frac{10}{7}$, $\frac{21}{18}$, $\frac{24}{16}$, $\frac{35}{35}$, $\frac{901}{204}$

3) $4\frac{1}{6}$, $16\frac{7}{10}$, $12\frac{4}{7}$, $42\frac{2}{5}$, $32\frac{8}{13}$

From this set of examples the following definition s was derived.

1.A fraction with the numerator smaller than the denominator is called PROPER FRACTION.

2.A fraction with the numerator greater than the denominator is called IMPROPER FRACTION.

3.A fraction which is composed of counting number and a fraction is called MIXED FRACTION or MIXED NUMBER

Again, consider the example below:

1) $\frac{7}{3}$, $\frac{100}{3}$

2) $\frac{6}{12}$, $\frac{13}{12}$

3) $\frac{3}{8}$, $\frac{20}{8}$, $\frac{1}{8}$

4) $\frac{5}{10}$, $\frac{10}{10}$, $\frac{23}{10}$

5) $\frac{6}{10}$, $\frac{3}{9}$

6) $\frac{4}{5}$, $\frac{4}{4}$

7) $\frac{2}{3}$, $\frac{4}{6}$, $\frac{7}{8}$

8) $\frac{12}{13}$, $\frac{12}{100}$, $\frac{12}{1000}$

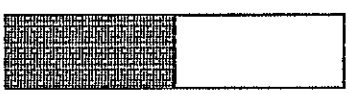
Based from the examples the following definitions was formulated.

1. SIMILAR FRACTIONS are fractions with equal denominators.

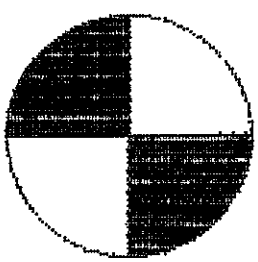
2. DISSIMILAR FRACTIONS are fractions with unequal denominators

Exercise 1

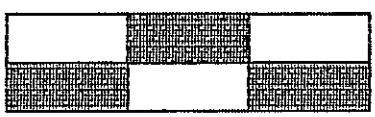
A. Name the fraction represented by the shaded part.

1. 

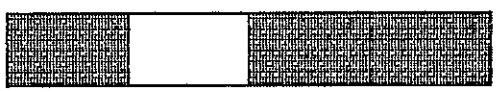
Ans: _____

2. 

Ans: _____

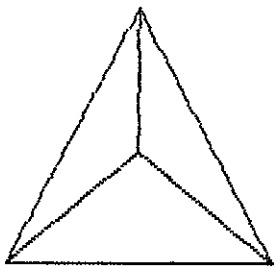
4. 

Ans: _____

5. 

Ans: _____

3.



Ans: _____

6.

Ans: _____

B. Write the fractions for each problem.

1. Sunny days and 4 rainy days

   _____ of the days were rainy.

   _____ of the days were not rainy.

2. Melissa invited 25 friends to a party. Six friends did not come to the party.

   _____ of the friends came.

   _____ of the friends did not come.

3. There were 49 girls in a class, 16 come from the province, 4 come form abroad, and the rest are old students.

   _____ come from province.

   _____ come from abroad.

   _____ are old students.

   _____ are new students.

C. Write each of the following expressions as a fraction.

1. Two - thirds
2. Three - eights
3. Five - sixths
4. Seven - ninths
5. Three - sevenths

D. Classify each of the following fractions as proper, improper or mixed.

1) $\frac{8}{19}$ 2) $\frac{72}{32}$ 3) $\frac{21}{49}$

4) $27\frac{2}{19}$ 5) $\frac{632}{87}$

E. Determine which of the following fractions are similar or dissimilar.

1) $\frac{2}{3}$, $\frac{7}{12}$, $\frac{13}{15}$ and $\frac{12}{8}$

2) $\frac{5}{6}$, $\frac{8}{6}$, $\frac{25}{6}$ and $\frac{15}{6}$

3) $\frac{4}{9}$, $\frac{13}{9}$, $\frac{9}{9}$ and $\frac{20}{9}$

4) $\frac{1}{8}$, $\frac{2}{6}$, $\frac{3}{8}$, $\frac{9}{10}$ and $\frac{2}{3}$

5) $\frac{2}{4}$, $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{5}{6}$

If you are through, ask for the answer key from your teacher and compare your work with answer key. You must see to it that your answers are the same as *those with the answers to the exercises.* If you have answered 75% of the exercises correctly, then you achieved the objectives. If you did not get 75% of the exercises correctly, then you must go back to Lesson 1 of Module 1 and do the exercises again.

CONGRATULATIONS!!!

You have just completed Lesson 1 of Module 1

Answer to Exercise 1

A.

1. 1/2
2. 1/4
3. 2/3
4. 3/6 or 1.2
5. 3/4
6. 3/6 or 1/2

B.

a) 4/13
b) 9/13

3. a) 16/49
   b) 4.49
   c) 29/49
   d) 29/49

C.

1. 2/3
2. 3/8
3. 5/6
4. 7/9
5. 3/7

D.

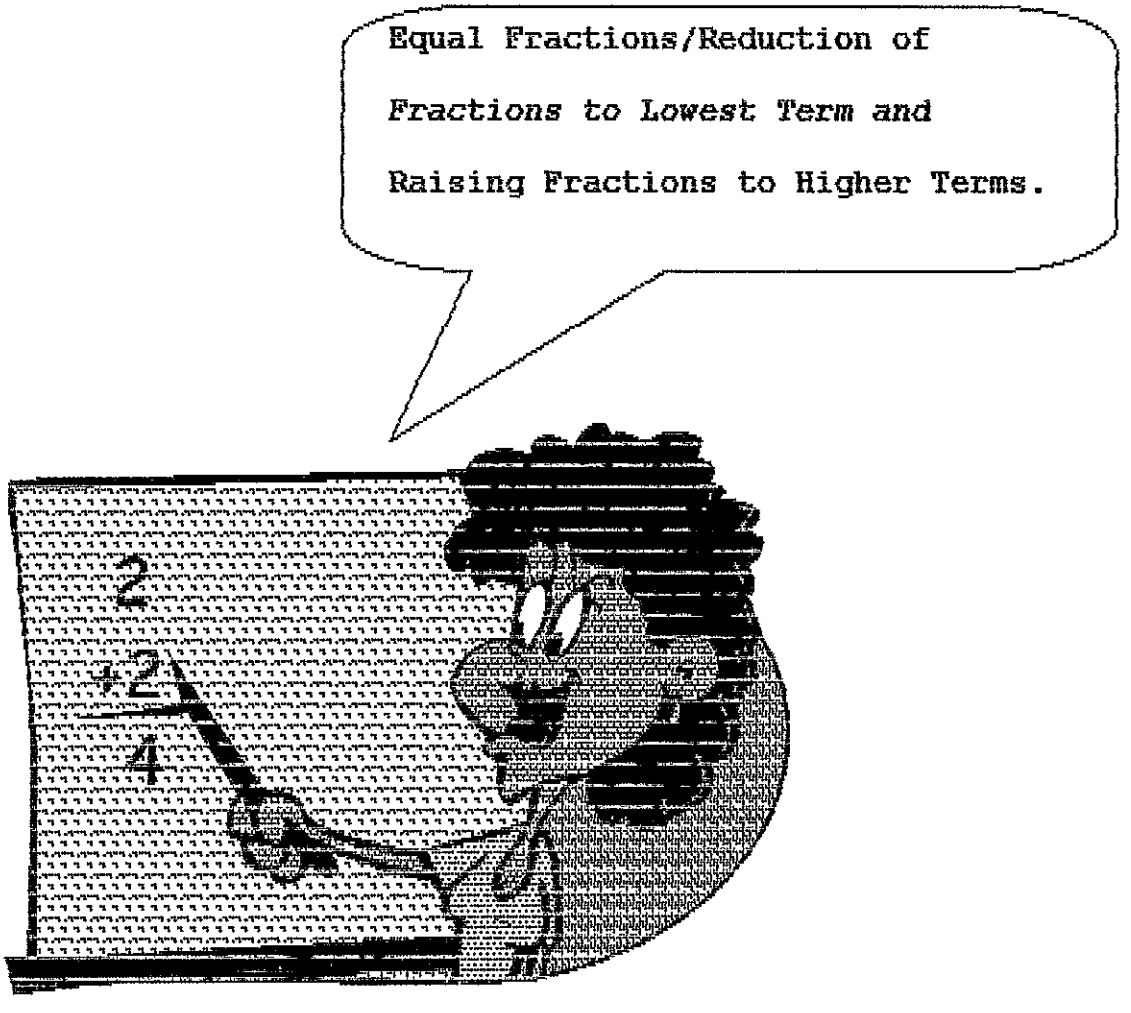
1. Proper fraction
2. Improper fraction
3. Proper fraction
4. Mixed fraction
5. Improper fraction

E.

1. Dissimilar
2. Similar
3. Similar
4. Dissimilar
5. Dissimilar

MODULE 1

Lesson 2



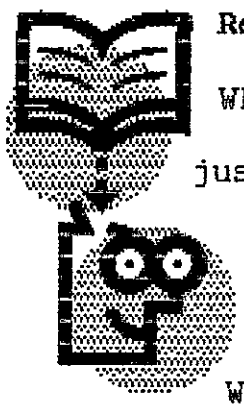
Lesson 2

Equal Fractions / Reduction of Fraction to Lowest Term and Raising Fractions to Higher Terms.

Objective:

After reading and studying this lesson you should be able to:

1. identify and define equal or equivalent fractions
2. simplify or reduce fraction to lowest term
3. convert fraction to higher fractions
4. work carefully orderly and accurately



Recall

What you have learned in the first lesson was just the beginning. The understanding of the definition, types and other terms will be your foundation to understand further the topic. What you need in the second lesson is to recall your understanding and the procedure of solving the greatest common factor of a fraction or GCF and the renaming fractions. Renaming, this is expressing a fraction in another fraction just by multiplying by one (1).

Example: Rename 3/4.

By multiplying the fraction by 1 or such as 2/2 or 3/3 or 4/4 etc. the fraction becomes like this:

3/4 x 1 = 3/4 x 2/2 = 6/8 or we can have

3/4 x 1 = 3/4 x 3/3 = 9/12

In the same way recall the procedure of finding GCF as what you have learned before, to summarize again the steps that follow.

1. Find the prime factorization of the numbers.
2. Write down the prime factorization of the first number in a single row.
3. Do the same for the next number in the following row, aligning its factor with those of the first number in such a way that equal factors are in one column.
4. Bring the common factor down to the third row. The product of these factors is the Greatest Common Factor or GCF.

Example 1. Find the GCF of 84 and 48.

$$84 = 2 \times 2 \times 3 \times 7$$

$$\underline{48 = 2 \times 2 \times 3 \times \quad 2 \times 2}$$

$$GCF = 2 \times 2 \times 3 \quad = 12$$

Example 2. Find the GCF of 78 and 104.

$$78 = 2 \times 3 \times 13$$

$$108 = 2 \times 13 \times 2 \times 2$$

$$GCF = 2 \times 13 = 26$$

Example 3. Find the GCF of 5, 9 and 25.

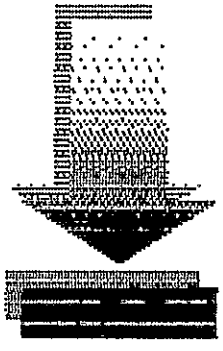
$$5 = 1 \times 5$$

$$9 = 1 \times 3 \times 3$$

$$25 = 1 \times 5 \times 5$$

$$GCF = 1 = 1$$

INPUT



Lesson 2 - Equal fraction/Reduction of fractions to Lowest Term and Raising Fractions to Higher Terms.

2.1 Equal fractions

How do you know if one fraction is greater than another? A very simple way of identifying this fraction is to rename the fraction. Consider the following fractions.

1. $3/5 = 3/5 \times 4/4 = 12/20$
2. $3/5 = 3/5 \times 6/6 = 18/30$
3. $3/5 = 3/5 \times 7/7 = 27/35$

In each example, by what number was 3/5 multiplied? Did the value of 3/5 change? Why? So, a fraction can be written in a different name when you multiply the fraction by 1, or a number multiplied by itself like 4/4, 6/6/, 7/7?

And so, the fraction above

3/5 = 12/20, 3/5 = 18/30, 3/5 = 27/35

are equal fractions. With these the definition was formulated.

> Fractions which have the same value but written in different names are called **EQUAL FRACTIONS.**

Example 1. Give at least three equivalent fractions of equal fractions in each of the following:

a) 1/4 c) 3/7 e) 3/3

b) 2/5 d) 5/7

Solution:

a) 1/4 = 1/4 x 2/2 = 2/8
1/4 = 1/4 x 3/3 = 3/12
1/4 = 1/4 x 5/5 = 5/20

b) 2/5 = 2/5 x 5/5 = 10/15
2/5 = 2/5 x 7/7 = 14/35
2/5 = 2/5 x 8/8 = 16/40

c) 3/7 = 3/7 x 8/8 = 24/56
3/7 = 3/7 x 11/11 = 33/77
3/7 = 3/7 x 9/9 = 77/63

d) 5/9 = 5/9 x 2/2 = 10/18
5/9 = 5/9 x 10/10 = 50/90
5/9 = 5/9 x 15/15 = 75/135

e) 3/3 = 3/3 x 5/5 = 15/15
3/3 = 3/3 x 2/2 = 6/6
3/3 = 3/3 x 4/4 = 12/12

2.2 Reduction of Fraction to lowest term

Since it is possible for a given fraction to find its equivalent by multiplying by 1, a fraction can also be reduced to lower terms or lowest terms as possible by a reverse process.

Examples:

1) $18 / 24 = \frac{18 \div 6}{24 \div 6} = 3 / 4$

2) $35 / 50 = \frac{35 \div 5}{50 \div 5} = 7 / 10$

3) $99 / 108 = \frac{99 \div 9}{108 \div 9} = 11 / 12$

What do 6,5 and 9 represent?

They are the GCF of the given fractions.

Therefore,

> In reducing fraction to lowest term you divide both the numerator and denominator by their GCF or greatest common factor.

Example 1. Reduce the lowest term each of the given fractions

a) 28/36 c) 95/315 e) 125/875

b) 49/98 d) 800/900

Solution:

a) GCF of 28 and 36 is 4

$$\frac{28}{36} = \frac{28 \div 4}{36 \div 4} = 7$$

b) GCF of 49 and 98 is 49

$$\frac{49}{98} = \frac{49 \div 49}{98 \div 49} = 1$$

c) GCF of 95 and 315 is 5

$$\frac{95}{315} = \frac{95 \div 5}{315 \div 5} = 19$$

d) GCF of 800 and 900 is 100

$$\frac{800}{900} = \frac{800 \div 100}{900 \div 100} = \frac{8}{9}$$

e) GCF of 125 and 875 is 125

$$\frac{125}{875} = \frac{125 \div 125}{875 \quad 125} = \frac{1}{7}$$

2.3 Raising Fraction to higher terms.

Actually, raising fraction to higher terms is just similar to the process of finding equal or equivalent fraction, therefore;

> A fraction can be raised to higher terms by multiplying both numerator and denominator by the same number.

Exercise 2

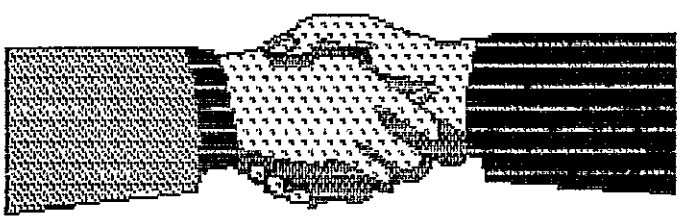
A. Give at least 3 fractions of higher terms for each of the following fractions.

1. 9/11
2. 12/13
3. 5/6
4. 4/11
5. 5/16
6. 7/16
7. 19/24

B. Reduce each of the following fractions to lowest terms.

1. 72/120
2. 18/49
3. 2000/3675
4. 270/60
5. 360/800

CONGRATULATIONS! You have just completed Lesson 2 of Module 1. Ask for the answer key from your teacher and compare your answer key from your teacher and compare your answer with the solution on the answer key. If you have answered 75% of the exercises correctly, then you have achieved the objectives of lesson. If you did not get 75% of the exercises correctly then you have to go back to Lesson 2 of Module 1 and do the exercises again.



Answers to Exercises 2

A.

1. a) 9/11 x 2/2 = 48/22
   b) 9/11 x 3/3 = 27/33
   c) 9/11 x 4/4 = 36/44
2. a) 12/13 x 2/2 = 24/26
   b) 12/13 x 3/3 = 36/39
   c) 12/13 x 4/4 = 48/52
3. a) 5/6/ x 2/2 =10/12
   b) 5/6 x 3/3 = 15/18
   c) 5/6 x 4/4 = 20/24
4. a) 4/11 x 2/2 = 8/22
   b) 4/11 x 3/3 = 12/33
   c) 4/11 x 4/4 = 16/44
5. a) 5/16 x 2/2 = 10/32
   b) 5/16 x 3/3 = 15/48
   c) 5/6 x 4/4 = 20/64
6. a) 7/16 x 2/2 = 15/32
   b) 7/15 x 3/3 = 21/48
   c) 7/16 x 4/4 = 28/64
7. a) 19/24 x 2/2 = 38/48
   b) 19/24 x 3/3 = 57/72
   c) 19/24 x 4/4 = 76/96

B.

1. 72/ = 72/120 - 24/24 = 35

GFC

72 = 2.2.2.3.3

120 = 2.2.2.3 .5

2.2.2.3 = 24

2) 18/49 = 18/49, because the GCF of 18 and 49 is 1.

3) 2000 = 2000 - 25 = 80

3675 3675 25 = 147

GFC

2000 = 2 . 2 . 2 . 2 . 5 . 5 . 5

3675 = 5 . 5 . 3 . 7 . 7

5 . 5 = 25

4. 270 = 270 - 30 = 9

600 600 30 20

GCF

270 = 3 . 3 . 3 . 2 . 5

600 = 3 . 2 . 5 . 5 . 2 . 2

3 . 2 . 5 = 30

5) 360 = 360 - 40 = 9

800 800 40 20

GCF

360 = 2 . 2 . 2 . 3 . 3 . 5

800 = 2 . 2 . 2 . 5. 5 . 2 . 2

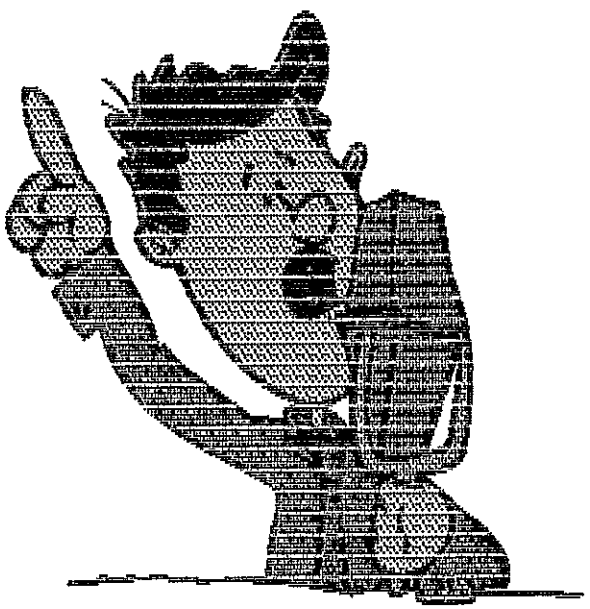
2 . 2 . 2 .5 = 40

MODULE 1

Lesson 3

Ordering Fractions

Fractions in Increasing or Decreasing order and Conversion of Improper Fraction to Mixed Number and Vice Versa.



Lesson 3

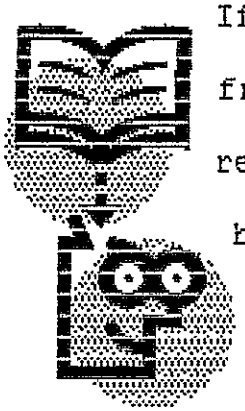
Order Fraction / Fraction in Increasing or Decreasing Order and Conversation of Improper Fraction to Mixed Number and Vice Versa.

Objective:

After reading and studying this lesson you should be able to:

1. Determine an increasing or decreasing fraction.
2. Evaluate a fraction which is greater than or less than the other fraction.
3. Arrange the fraction in increasing or decreasing order.
4. Convert improper fraction to mixed fraction and vice versa.
5. Observe orderliness and accuracy in one's work to save time and to yield better results.

Recall:



If you have mastered the process of converting fractions from lower terms to higher terms or by reducing to lowest terms through multiplication by one (1) and by GCF or greatest common factor in the case there of.

Lesson three of this module concentrates on ordering of fractions or arrangement of fractions from increasing to decreasing order and vice versa, at the same time, conversion of improper to mixed fractions or mixed fraction to improper fractions.

Try to recall you knowledge on the process or procedure of solving least common multiple or LCM of a fraction. The steps in findings LCM is similar to GCF only, that the difference lies in the fourth step. To get the LCM, bring all the factors down to the third row. The product of these entries in the third row is the LCM.

Example 1. Find the LCM of 84 and 48

$$84 = 2 \times 2 \times 3 \times 7$$

$$48 = 2 \times 2 \times 3 \times \quad 2 \times 2$$

$$\text{LCM} = 2 \times 2 \times 3 \times 7 \times 2 \times 2 = 336$$

Example 2. Find the LCM of 78 and 104.

78 = 2 x 3 x 13

104 = 2 x 13 x 2 x 2

LCM = 2 x 3 x 13 x 2 x 2 = 312

Example 3. Find the LCM of 5, 9 and 25

5 = 1 x 5

9 = 1 x 3 x 3

25 = 1 x 5 x 5

LCM = 1 x 5 x 3 x 3 x 5 = 225

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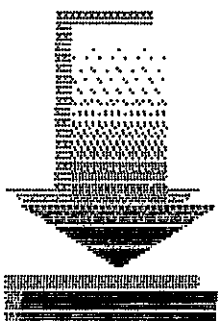
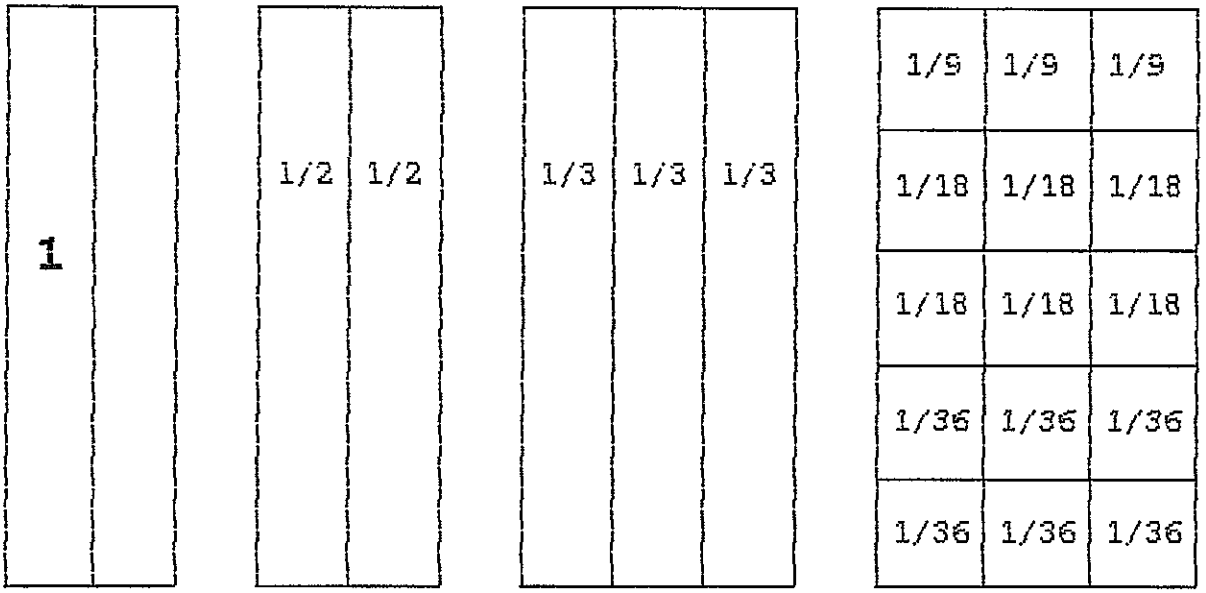


Lesson 3 - Ordering fraction / Fraction in increasing or decreasing order and conversion of improper fraction to mixed or mixed to improper.

3.1 Ordering fraction / Fractions in increasing or decreasing order.

Fractions can be arranged in an increasing or decreasing order. But before you can do this you have to know how to compare the fractions.

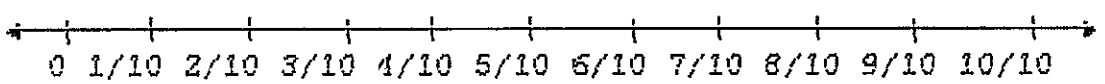
Examine the figure below:



It is easy to compare, if the fractions have the same numerations. From the example given above, the smaller the denominator the bigger its value of the fraction and the bigger the denominator the smaller its value of the fraction, if they have the same numerators.

So ½ > 1/3 > 1/9 > 1/18 > 1/36

Another Way of comparing fraction is through the number line. Study the segment illustrated below:



The line segment is 1 unit long. It is divided into 10 equal parts, hence one of the equal parts is 1/10. From 0.

Compare the length 2/10 with 4/10; 1/10 with 3/10, and 2/10 with 10/10.

When fractions have the same denominator, how can you tell which fraction is greater or lesser? In other words, the denominators of the given fractions are the same or equal or similar, we just compare the numerators. The bigger its numerator the bigger its value, the smaller the numerator, the smaller its value.

There are instances when in ordering fractions, its numerator and denominator are not equal. Consider the fractions below:

1. Which is greater 2/3 o 3/5.

The simplest way to determine which of the two is greater than the other is to express the two fractions into similar fractions by finding the least common denominator of the two fractions or the least common multiple (LCM) of the denominator.

The LCD of the denominator 3 and 5 is 15. Express each of the fractions with a denominator of 15.

$$2/3 = \frac{2 \times 5}{3 \times 5} = 10/15$$

$$3/5 = \frac{3 \times 3}{5 \times 3} = 9/15$$

Therefore, 10/15 > 9/15 o 2/3 > 3/5.

Therefore, the following key concepts in ordering *fractions must be remembered.*

1. In arranging or ordering similar fractions, examine the numerators of the fractions and arrange the *numbers in ascending* o *descending order as* indicated. **The greater the numerator, the greater the value of the fraction.**
2. *In arranging or ordering fractions with similar* numerators, arrange the denominators from smaller number to bigger, if its purpose is decreasing o descending and bigger to smaller if its purpose is *increasing* or ascending order. **The smaller the denominator the bigger its value, while the bigger the denominator the smaller its value.**
3. *In arranging or ordering fractions with dissimilar* numerators and denominators, express the two or more fractions into similar fractions by finding the least common multiple of the denominators (*LCM*) and arrange as indicated relating to similar fractions.

Illustrative example:

1. Arrange the fractions in an ascending order

   a) 1/6, 3/6, 2/6, 5/6

   b) 8/24, 10/24, 6/24, 23/24

   c) 3/16, 3/18, 3/10, 3/12

   d) 15/21, 15/19, 15/36, 15/40

   e) 8/5, 15/6, 8/2, 10/3

   f) 26/8, 30/9, 60/5, 84/7

Solution:

a. Since the denominators of the given sets of fractions are the same. Arrange the numerators in order.

   1/6, 2/6, 3/6, 5/6

b. Do

   6/24, 8/24, 10/24, 23/24

c. The numerators of the given set of fraction are equal. Arrange the denominators from bigger number to smaller number.

   3/18, 3/16, 3/12, 3/10

d. Do

   15/40, 15/36, 15/21, 15/19

e. Numerators and denominators are not equal, So, find fist the LCD of the denominators 5, 6, 2, 3 it is 30.

$$8/5 = \frac{8 \times 6}{5 \times 6} = \frac{48}{30}$$

$$15/6 = \frac{15 \times 5}{6 \times 5} = \frac{75}{30}$$

$$8/2 = \frac{8 \times 15}{2 \times 15} = \frac{120}{30}$$

$$10/3 = \frac{10 \times 10}{3 \times 10} = \frac{100}{30}$$

so, 48/30, 75/30, 100/30, 120/100 or 8/5, 15/6, 10/3, 8/2

f. Related to letter e, LCD of 8,9,5,7 is 2,520.

$$26/8 = \frac{26 \times 315}{8 \times 315} = \frac{8190}{2520}$$

$$30/9 = \frac{30 \times 280}{9 \times 280} = \frac{8400}{2520}$$

$$60/5 = \frac{60 \times 504}{5 \times 504} = \frac{30240}{2520}$$

$$84/7 = \frac{84 \times 360}{7 \times 360} = \frac{30240}{2520}$$

so, 8190/2520, 8400/2500, 30240/2520, 30240/2520 or 26/8, 30/9, 60/5, 84/7 o 26/8, 30/9, 84/7, 60/5.

3.2 Conversion of improper fraction to mixed number or mixed number to improper fraction.

If you have observed in the previous example especially letters e and f, all these fractions are improper fractions.

This fraction can be changed or converted to mixed fraction or mixed number and vice versa.

Study the example below.

1. Change each of the following improper fractions to mixed number.

   a. 8/5

   b. 15/6

   c. 8/2

   d. 10/3

Solution: a. 8/5 therefore, 8/5 = 1 + 3/5 = 1 3/5

$$5\overline{)\begin{array}{r}1\\8\\5\\\hline 3\end{array}}$$

b. 15/6 therefore 15/6 = 2 + 3/6 = 2 3/6 o 2 ½ (lowest term).

$$6\overline{)\begin{array}{r}2\\15\\12\\\hline 3\end{array}}$$

c. 8/2 therefore 8/2 = 4

$$2\overline{)\begin{array}{r}4\\8\\8\\\hline 0\end{array}}$$

d. 10/3 therefore, 10/3 = 3 + 1/3 = 3 1/3

$$3\overline{)\begin{array}{r}3\\10\\9\\\hline 1\end{array}}$$

2. Change each of the following mixed fraction to improper fraction.

a. 7 3/8 c. 3 11/12

b. 27 2/5 d. 19 / 12

Solution: a. 7 3/8

$$7\ 3/8 = \frac{(7 \times 8) + 3}{8} = \frac{56 + 3}{8} = 59/8$$

b. 27 2/5

$$27\ 2/5 = \frac{(27 \times 5) + 2}{5} = \frac{135 + 2}{5} = \frac{137}{5}$$

c. 3 11/12

$$3\ 11/12 = \frac{(3 \times 12) + 11}{12} = \frac{36 + 11}{12} = \frac{47}{12}$$

d. 19 1/2

$$19\ 1/2 = \frac{(19 \times 2) + 1}{2} = \frac{38 + 1}{2} = \frac{39}{2}$$

Therefore:

1. In changing improper fraction to a mixed number or whole number, divide the numerator by the denominator of the given fraction and write the remainder, if any, as a fractional part of the divisor.

2. *To change mixed number as improper fraction,* multiply the whole number by the denominator; add the numerator to the product then write the sum over the *denominator.*

Exercise 3

A. Arrange each of the following sets of fractions to increasing order.

1. 5/17, 5/18, 5/20, 5/15
2. 8/9, 17/6, 10/9, 3/14
3. 3/7, 5/7, 4/7, 6/7
4. 2/3, ¾, 4/5, 5/6, 6/7

B. Arrange each of the following sets of mixed fractions from the least to the greatest

1. 1 ¾, 1 5/6, 16/8

(Hint: Convert the mixed numbers to improper fractions).

2. 2 1/10, 2 1/15, 2 3/20, 2 4/25

3. 3/4, 5 1/3, 11/2, 2/5

C. Convert each of the following fraction as indicated

1. To mixed number

a. 7/4 d. 3245/3

b. 43/20 e. 1234/12

c. 220/45

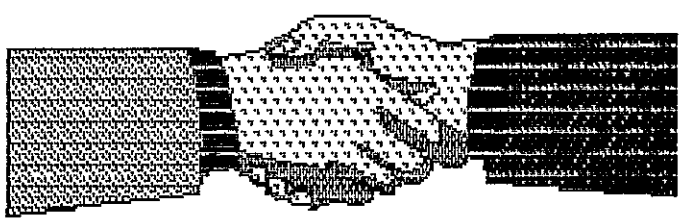
2. To improper fraction

a. 3 1/5 d. 10 2/67

b. 4 0/3 e. 12 13/21

e. 2 2/7

CONGRATULATIONS! You have just completed Lesson 3 of Module 1. Ask for the answer key from your teacher and compare your answer with the solution on the answer key. If you have answered 75% of the exercises correctly, then you have achieved the objectives of the lesson. If you did not get 75% of the exercises correctly then you have to go back to **Lesson 3** of **Module 1** and do the exercises again.



ANSWER TO EXERCISE 3.

A. 1. Since the numerator of the given fractions are the same, you just arranged the denominator from the highest to the lowest.

Ans. 5/20, 5/18, 5/17, 5/15

2. Changing all the fraction into similar fractions whose LCD of the denominator 9,6,9,14 equal to 126.

8/9 x 14/14 = 112/126

17/6 x 21/21 = 357/126

10/9 x 14/14 = 140/126

3/14 x 9/9 = 27/126

Ans. 27/126, 112/126, 140/126, 357/126

Or 3/14, 8/9, 10/9, 17/6

3. Since the denominator of the given fractions are similar, you just arranged the numerators from the smallest to the highest.

4. Changing to similar fraction, with LCD of 420.

2/3 x 140/140 = 280/420

¾ x 105/105 = 315/420

4/5 x 84/84 = 336/420

5/6 x 70/70 = 350/420

6/7 x 60/60 = 360/420

Ans. 280/420, 325/420, 336/420, 360/420

Or 2/3, ¾, 4/5, 5/6, 6/7

B. 1. Changing mixed fraction to improper: 7/4, 11/6, 16/8 and LCD of 24.

7/4 x 6/6 = 42/24

11/6 x 4/4 = 44/24

16/8 x 3/3 = 48/24

Ans: 42/24, 44/24, 48/24

Or 7/4, 11/6, 16/8

2. Changing mixed fraction to improper: 21/10, 31/15, 43/20, 54/25 and LCD of 300.

21/10 x 30/30 = 630/300

21/10 x 20/20 = 620/300

43/20 x 15/15 = 645/300

54/25 x 12/12 = 648/300

Ans. 620/300, 630/300, 645/300, 648/300

Or 31/15, 21/10, 43/20, 54/25

Or 2 1/15, 2 3/20, 2 4/25

3. Changing mixed fraction to improper ¾, 16/3, 11/2, 2/5 and LCD of 60

¾ x 15/15 = 45/60

16/3 x 20/20 = 320/60

11/2 x 30/30 = 330/60

2/5 x 12/12 = 24/60

Ans. 24/60, 45/60, 320/60, 330/60

Or 2/5, ¾, 5 1/3, 5 ½

B.1.

a. 1 ¾ b. 2 3/20 c. 4 8/9 d. 1081 2/3

d. 102 5/6

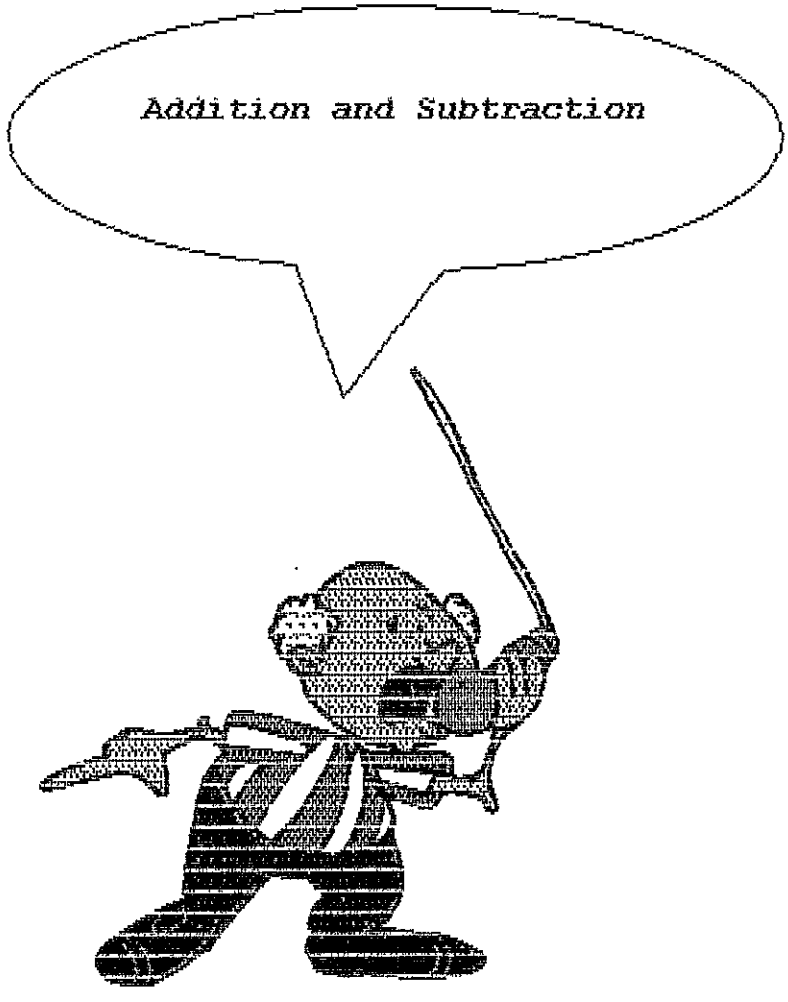
3.a. 16/5

b. 12/3 d. 672/67

c. 16/7 e. 265/21

MODULE 1

Lesson 4



Lesson 4

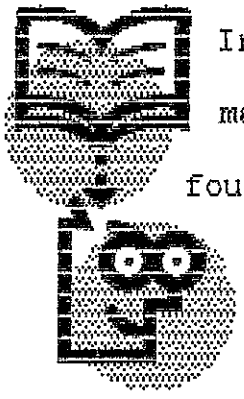
Addition and Subtraction of Similar Fractions.

Objectives:

After reading and studying this lesson you should be able to;

1. Perform Addition and subtraction of similar fractions;
   a. vertically
   b. horizontally
2. add and subtract mixed fractions with similar denominators.
3. reduce answer to lowest terms.
4. show patience in working with fractions to build a solid foundation in facing problems in daily life.

Recall:



In the previous lessons you have learned and mastered topics in fractions which are the foundations in understanding and doing the operations of fractions, specifically addition and subtraction of similar fractions.

To look some of the definitions: similar fractions are fractions whose denominators are the same such as 2/3, 1/3 or 5/3. Also, conversion of mixed to improper fraction or vice versa, such as 2 1/3 is also equal to 7/3, that is, 2 x 3 = 6 plus the numerator 1 all over the denominator. Here are more examples below.

Example 1. *Similar fractions*

a. 2/5, 1/5, 8/5, or 15/5

b. 1/9, 3/9, 7/9 or 16/9

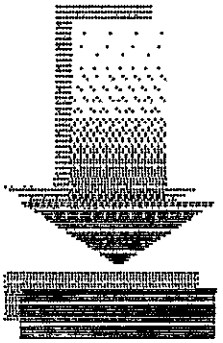
c. 1 2/5, 6 1/5, 33 4/5 and 6 3/5

Example 2. *Converted improper fractions to mixed fractions*

a. $5\ 2/3 = \frac{(5 \times 3) + 2}{3} = \frac{15 + 2}{3} = \frac{17}{3}$

b. $6\ \frac{1}{4} = \frac{(6 \times 4) + 1}{4} = \frac{245 + 1}{4} = \frac{25}{4}$

c. $11\ 4/7 = \frac{(11 \times 7) + 4}{7} = \frac{77 + 4}{7} = \frac{81}{7}$



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Lesson 4 - Addition and Subtraction of Similar Fractions.

4.1 Addition of similar fractions

Related to whole numbers, similar fractions can be added horizontally or vertically.

> To add similar fractions, add the numerators, then write or copy the denominator.

Examples:

1. $\frac{3}{5} + \frac{1}{5} = \frac{3 + 1}{5} = \frac{4}{5}$

2. $\frac{6}{11} + \frac{3}{11} = \frac{6 + 3}{11} = \frac{9}{11}$

3. $\frac{9}{16} + \frac{2}{16} + \frac{1}{16} = \frac{9 + 2 + 1}{16} = \frac{12}{16}$ or $\frac{3}{16}$

4. $\frac{3}{7} + \frac{4}{7} + \frac{1}{7} = \frac{3 + 4 + 1}{7} = \frac{8}{7}$ or $1\ \frac{1}{7}$

5. $\frac{9}{25} + \frac{8}{25} + \frac{10}{25} = \frac{9 + 8 + 10}{25} = \frac{27}{25}$ or $1\ \frac{2}{25}$

by vertical addition

1. $\begin{array}{r} \frac{2}{7} \\ \frac{3}{7} \\ +\ \frac{5}{7} \end{array}$

2. $\begin{array}{r} \frac{10}{19} \\ \frac{2}{19} \\ +\ \frac{12}{19} \end{array}$

3. $\begin{array}{r} \frac{6}{11} \\ \frac{3}{11} \\ +\ \frac{9}{11} \end{array}$

4. $\begin{array}{r} \frac{11}{15} \\ \frac{2}{15} \\ +\ \frac{13}{15} \end{array}$

5. $\begin{array}{r} \frac{16}{21} \\ \frac{3}{21} \\ +\ \frac{19}{21} \end{array}$

And if the fractions to be added are mixed, change mixed fractions to improper fraction by following the procedures of conversion of mixed numbers to improper fractions.

Examples.

1. $3\ \frac{1}{5} + 6\ \frac{3}{5} = \frac{16}{5} + \frac{33}{5} = \frac{49}{5}$ or $9\ \frac{4}{5}$

Alternative solution

$$3\ \frac{1}{5} + 6\ \frac{3}{5} = (3 + 6) + (\frac{1}{5} + \frac{3}{5})$$

$$= 9 + \frac{4}{5}$$

$$= 9\ \frac{4}{5}$$

2. $12\frac{1}{2} + 5\frac{1}{2} = \frac{25}{2} + \frac{11}{2} = \frac{36}{2}$ o 18

another solution

$$12\frac{1}{2} + 5\frac{1}{2} = (12+ 5) + (1/2 + ½)$$

$$= 17 + \frac{2}{2}$$

$$= 17 + 1$$

$$= 18$$

3. $1\frac{2}{9} + 10\frac{5}{9} = 11 + \frac{95}{9} = \frac{106}{9}$ or $11\frac{7}{9}$

another solution

$$1\frac{2}{9} + 10\frac{5}{9} = (1 + 10) + (2/9 + 5/9)$$

$$= 11 + (7/9)$$

$$= 11\frac{7}{9}$$

4.2 Subtraction of similar fractions

To subtract similar fractions, subtract the numerators and write or copy the denominator.

Examples:

1. $\frac{10}{17} - \frac{8}{17} = \frac{10 - 8}{17} = \frac{2}{17}$

2. $\frac{25}{12} - \frac{10}{12} = \frac{25 - 10}{12} = \frac{15}{12}$ or $1\frac{3}{12}$ or $1\frac{1}{4}$

3. $\frac{15}{19} - \frac{12}{19} = \frac{15 - 12}{19} = \frac{3}{19}$

4. $\frac{45}{21} - \frac{18}{21} = \frac{45 - 18}{21} = \frac{27}{21}$ or $1\ \frac{6}{21}$ or $1\ \frac{2}{7}$

5. $\frac{5}{7} - \frac{3}{7}\ \frac{5 - 3}{7} = \frac{2}{7}$

by vertical subtraction

1. $\begin{array}{r} \frac{35}{30} \\ -\ \frac{25}{30} \\ \hline \frac{10}{30} \end{array}$ or $\frac{1}{3}$

2. $\begin{array}{r} \frac{12}{15} \\ -\ \frac{9}{15} \\ \hline \frac{3}{15} \end{array}$ or $\frac{1}{5}$

3. $\begin{array}{r} \frac{8}{10} \\ -\ \frac{5}{10} \\ \hline \frac{3}{10} \end{array}$

4. $\begin{array}{r} \frac{50}{45} \\ -\ \frac{38}{45} \\ \hline \frac{12}{45} \end{array}$ or $\frac{4}{15}$

5. $\begin{array}{r} \frac{20}{21} \\ -\ \frac{18}{21} \\ \hline \frac{2}{21} \end{array}$

In the same manner subtraction of mixed number is also done related to addition

1. $10\ \frac{3}{5} - 5\ \frac{4}{5} = \frac{53}{5} - \frac{29}{5} = \frac{24}{5}$ or $4\ \frac{4}{5}$

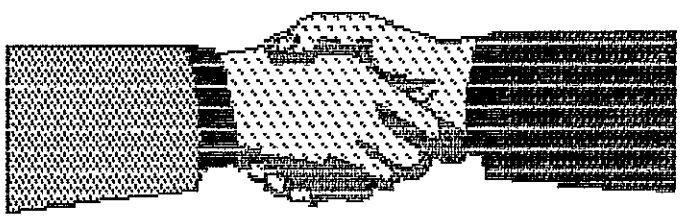
2. $15\ \frac{1}{8} - 10\ \frac{5}{8} = \frac{121}{8} - \frac{85}{8} = \frac{36}{8}$ or $4\ \frac{4}{8}$ or $4\ \frac{1}{2}$

3. $9\ \frac{2}{3} - 7\ \frac{1}{3} = \frac{29}{3} - \frac{22}{3} = \frac{7}{3}$ or $2\ \frac{1}{3}$

4. $\frac{13}{18} + \frac{13}{18} - \frac{3}{18} + \frac{4}{18}$

5. $\frac{21}{25} - \frac{15}{25} - \frac{3}{25} + \frac{2}{25}$

CONGRATULATIONS! You have just completed Lesson 4 of Module 1. Ask for the answer key from your teacher and compare your answers with the solutions on the answer key. If you answer 75% of the exercises correctly, then you have achieved the objectives of the lesson. *If you did not get 75% of the exercises* correctly then you have to go back to **Lesson 4 of Module 1** and do the exercises again.



Exercise 4

A. Add and write your answer if lowest term

1. $\frac{3}{7} + \frac{1}{7}$

2. $\frac{3}{4} + \frac{1}{4} + \frac{3}{4}$

3. $\frac{11}{15} + \frac{4}{15} + \frac{7}{15}$

4. (4/10 + 6/10) + (3/10 + 8/10)

5. $\begin{array}{r} 7/12 \\ 4/12 \\ + \\ \hline 5/12 \end{array}$ $\qquad$ $\begin{array}{r} 6/17 \\ 3/17 \\ + \\ \hline 8/17 \end{array}$

B. Subtract and write your answer to lowest term.

1. $\frac{9}{9} - \frac{5}{9}$

2. $\frac{11}{10} - \frac{9}{10}$

3. $\frac{5}{7} - \frac{5}{7}$

4. $\frac{25}{10} - \left(\frac{8}{10} - \frac{3}{10}\right)$

5. $\left(\frac{13}{6} - \frac{5}{6}\right) - \frac{2}{6}$

6. $\frac{30}{5} - \left[\frac{18}{5} - \frac{6}{5}\right]$

C. Perform the indicated operation and reduce you answer to lowest term.

1. $\frac{13}{16} - \frac{5}{16} + \frac{28}{16} - \frac{6}{16}$

Answer to Exercise 4

A.

1. 4/7
2. 1 ¾
3. 1 7/15
4. 2 1/10
5. 1 1/3
6. 1

B.

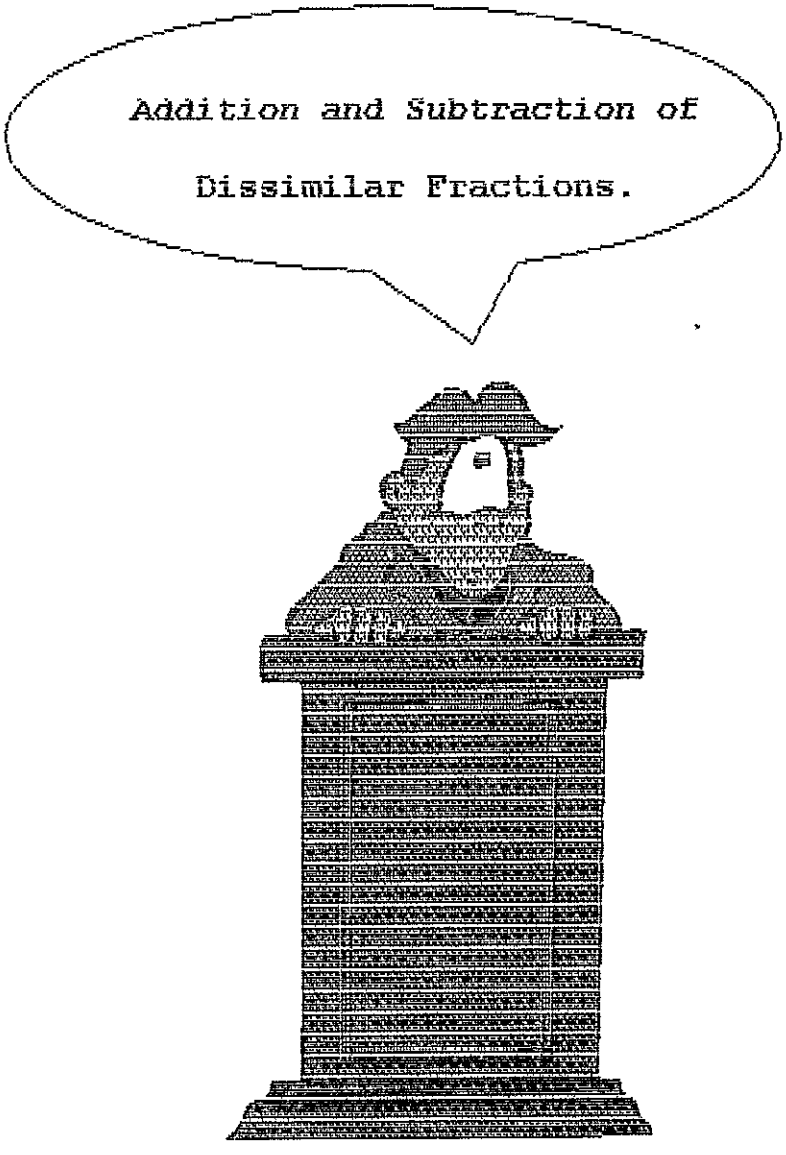
1. 4/9
2. 1/5
3. 10
4. 2
5. 1
6. 3 3/5

C.

1. 7/8
2. 1 ½
3. 1/5

MODULE 1

Lesson



Lesson 5

Addition and Subtraction of Dissimilar Fractions.

Objectives:

After reading and studying this lesson you should be able to;

1. Perform the addition and subtraction of dissimilar fractions.
2. Perform the addition and subtraction of dissimilar fractions by "cross-multiplication method."
3. simplify answers to lowest terms.
4. manifest in working with fractions to builds a solid foundation in facing problems in daily life.

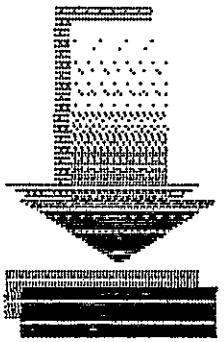
Recall:

Addition and subtraction of dissimilar fractions are not the same as Addition and Subtraction of similar fractions. Because of their denominators. What is needed here is your knowledge and understanding of solving LCM or Least Common Multiple of a number. LCM is similar to LCD or least Common Denominator. LCD is used in adding or subtracting dissimilar fractions, while LCM is used for whole numbers, but the process or procedure of solving is the same, only that in LCD you concentrate more on the denominator.

Study the comparison.

LCM?	Time consuming is preferable
1. 18 = 2 x 3 x 3	1. Find the LCD of 2/18 and 5/12.
12 = 2 x 3 x 2	Solution: Concentrating on the
LCM= 2 x 3 x 3 x 2 = 36	Denominator LCD = 36.
2. Find the LCM of 5 and 9	2. Find the LCD of 3/5 and 4/9
5 = 1 x 5	Solution: Concentrating again on
9 = 1 x 3 x 3	the denominator LCD = 5

LCM = 1 x 5 x 3 x 3 = 45



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Lesson 5

Addition and Subtraction of Dissimilar Fractions.

5.1 Addition of dissimilar fractions.

Addition of dissimilar or unlike fractions is not the same with similar fractions. Try to remember this:

1. Find the Least Common Denominator (LCD).
2. Change each fraction to an equivalent fraction or equal fraction using the LCD.
3. Add the numerator and write the result over the least *common denominator.*
4. If necessary, reduce the answer to lowest terms.

Examples:

1. ¾ + 5/3 = ?

   For this example, let us recall how to convert dissimilar fractions to similar fractions. The LCD of ¾ and 5/3 is the least common multiple of the denominators, which are 3 and 4. The LCD of 4 and 3 is 12, thus;

$3/4 > 12 \div 4 = 3$ $\qquad$ $3/4 \Rightarrow \frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$

$5/3 \Rightarrow 12 \div 3 = 4$ $\qquad$ $5/3 \Rightarrow \frac{5}{3} \times \frac{4}{4} = \frac{20}{12}$

Thus,

$¾ + 5/3 = 9/12 + 20/12 = \frac{9 + 20}{12} = \frac{29}{12}$ or $2\frac{5}{12}$

2. $½ + 3/5 = ?$

LCD of 2 and 5 is 10

$½ \Rightarrow 10 \div 2 = 5$ $\qquad$ $½ = \frac{1 \times 5}{2 \times 5} = \frac{5}{10}$

$3/5 \Rightarrow 10 \div 5 = 2$ $\qquad$ $3/5 = \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$

3. $7/12 + 3/8 = ?$

LCD = 24

$7/12 \Rightarrow 24 \div 12 = 2$ $\qquad$ $7/12 = \frac{7 \times 2}{12 \times 2} = \frac{14}{24}$

$3/8 \Rightarrow 24 \div 8 = 3$ $\qquad$ $3/8 = \frac{3 \times 3}{8 \times 3} = \frac{9}{24}$

thus,

$7/12 + 3/8 = 14/24 + 9/24$

$= \frac{14 + 9}{24}$

$= 23/24$

4. $4/5 + ¾ + ½ = ?$

LCD = 20

$4/5 \Rightarrow 20 \div 5 = 4$ $\qquad$ $4/5 = \frac{4 \times 4}{5 \times 4} = \frac{16}{20}$

$¾ \Rightarrow 20 \div 4 = 5$ $\qquad$ $3/4 = \frac{3 \times 5}{4 \times 5} = \frac{15}{20}$

$½ \Rightarrow 20 \div 2 = 10$ $\qquad$ $½ = \frac{1 \times 10}{2 \times 10} = \frac{10}{20}$

thus,

$4/5 + ¾ + ½ = 16/20 + 15/20 + 10/20$

$= \frac{16 + 15 + 10}{20}$

$= 41/20 \text{ o } 2\ \frac{1}{20}$

5. $[\ 5/6 + 1/2\ ] + [1/4 + 1/3] = ?$

LCD = 12

$5/6 \Rightarrow 12 \div 6 = 2$ $\qquad$ $5/6 = \frac{5 \times 2}{6 \times 2} = 10/12$

$½ \Rightarrow 12 \div 2 = 6$ $\qquad$ $½ = \frac{1 \times 6}{2 \times 6} = 6/12$

$¼ \Rightarrow 12 \div 4 = 3$ $\qquad$ $¼ = \frac{1 \times 3}{4 \times 3} = 3/12$

$1/3 \Rightarrow 12 \div 3 = 4$ $\qquad$ $1/3 = \frac{1 \times 4}{3 \times 4} = 4/12$

thus,

$[5/6 + ½] + [1/4 + 1/3] = [10/12 + 6/12] + [3/12 + 4/12]$

$= \frac{[10 + 6]}{12} + \frac{[3 + 4]}{12}$

$= 16/12 + 7/12$

$= 23/12 \text{ o } 1\ \frac{11}{12}$

Another method used in addition of dissimilar fraction is "cross multiplication" method. The common denominator used here is the product of the denominators.

Examples:

1. ½ + 1/6 = ?

cross multiply

$$\frac{1}{2}\times\frac{1}{6} = \frac{(1 \times 6) + (2 \times 1)}{2 \times 6}$$

$$= \frac{6 + 2}{12} = \frac{8}{12} \text{ or } \frac{2}{3} \text{ (lowest term)}$$

2. 7/8 + ¾ = ?

$$\frac{7}{8}\times\frac{3}{4} = \frac{(7 \times 4) + (8 \times 3)}{8 \times 4}$$

$$= \frac{28 + 24}{32} = 52/32 \text{ or } 1\ \frac{20}{32} \text{ or } 1\ \frac{5}{8}$$

3. ¾ + 2/5 = $\frac{(3 \times 5) + (4 \times 2)}{4 \times 5} = \frac{15 + 8}{20}$

$$= 23/20 \text{ or } 1\ \frac{3}{20}$$

4. 7/9 + 5/3 = $\frac{(7 \times 3) + (9 \times 5)}{9 \times 3}$

$$= \frac{21 + 45}{27} = \frac{66}{27} \text{ or } 2\ \frac{12}{27} \text{ or } 2\ \frac{4}{9}$$

5. 3/10 + 1/15 = $\frac{(3 \times 15) + (1 \times 10)}{10 \times 15}$

$$= \frac{45 + 10}{150} = \frac{55}{150} \text{ or } \frac{11}{30}$$

5.2 Subtraction of Dissimilar Fractions

The same with addition, subtraction of dissimilar fractions is done in the same procedure, that is, by just solving the LCD or LCM of the fraction then subtract, or by cross multiplication method, then subtract.

Examples:

1. $5/6 - 3/10 = ?$

   LCD = 30

   $5/6 \Rightarrow 30 \div 6 = 5$ $\qquad 5/6 = \frac{5 \times 5}{6 \times 5} = \frac{25}{30}$

   $3/10 \Rightarrow 30 \div 10 = 3$ $\qquad 3/10 = \frac{3 \times 3}{10 \times 3} = \frac{9}{30}$

   thus,

   $$5/6 - 3/10 = \frac{25}{30} - \frac{9}{30}$$

   $$= \frac{25 - 9}{30}$$

   $$= \frac{16}{30} \text{ or } \frac{8}{15}$$

2. $5/3 - 7/5 = ?$

   LCD = 15

   $5/3 \Rightarrow 15 \div 3 = 5$ $\qquad 5/3 = \frac{5 \times 5}{3 \times 5} = 25$

   $7/5 \Rightarrow 15 \div 5 = 3$ $\qquad 7/3 = \frac{7 \times 3}{5 \times 3} = \frac{21}{15}$

thus,

$$5/3 - 7/5 = \frac{25}{15} - \frac{21}{15}$$

$$= \frac{25 - 21}{15} = \frac{6}{15} \text{ or } \frac{2}{5}$$

By "cross multiplication" method.

3. ¾ - 3/10 =?

$$\frac{3}{4} \times \frac{3}{10} = \frac{(3 \times 10) - (4 \times 3)}{(4 \times 10)}$$

$$= \frac{30 - 12}{40}$$

$$= 18/40 \text{ or } 9/20$$

4. $13/12 - \frac{1}{2} = \frac{(13 \times 2) - (12 - 1)}{12 \times 2}$

$$= \frac{26 - 12}{24} = \frac{14}{24} \text{ or } \frac{7}{12}$$

5. $5/8 - 2/16 = \frac{(5 \times 16) - (8 \times 2)}{8\ 16} = \frac{80 - 16}{128} = \frac{64}{128} \text{ or } \frac{1}{2}$

Exercise 5

A. Add and reduce your answer to lowest term.

1. 17/2 + 16/15
2. 7/10 + 3/25
3. ¾ + 1/9 + 1/8
4. 7/10 + 69/100 + 103/1000
5. 6/49 + 3/56 + 5/14

B. Subtract and reduce your answer to lowest tem.

1. 7/12 - 16
2. 5/6 - 2/9
3. 9/10 - 7/30
4. 9/10 - ¾
5. 8/9 - 1/12

Add or subtract using cross multiplication method and reduce your answer to lowest term.

1. 1/3 + 1/6
2. 4/5 - 1/3
3. 5/6 - 1/9
4. 5/8 + ¾
5. 2/9 + ½

CONGRATULATIONS! *You have just completed* Lesson 5 of Module 1. Ask for the answer key from your teacher and compare your answer with the solution on the answer key. If you have answered 75% of the exercises correctly, then you have achieved the objectives of the lesson. If you did not get 75% of the *exercises correctly then you have to go back* to Lesson 5 to Module 1 and do the exercises again.

Answer the Exercise 5

A.

1. ½ + ¾ = 2+3/4 = 5/4 or 1 ¼

2. 7/10 + 3/25 = 5 (7) + 2 (3)/50 = 35 + 6 = 41/50

3. ¾ + 1/9 + 1/8 = 18 (3) + 8(1) + 9(1)/72 = 71/72

4. 7/10 + 69/100 + 103/1000

   100(7) + 10(69) + 103/1000 = 700 +690 + 103 /1000

5. 6/49 + 3/56 + 5/14 = 8(6) + 7(3) + 5(28)/392

   = 48 + 21 + 140/392

   = 209/392

B.

1. 17/12 - 16/15 = 5(7) - 4(16)/60 = 85-64/60
   = 21/60 or 7/10

2. 5/6 - 2/9 = 3(5) - 2(2)/18 = 15-4/18 = 11/18

3. 9/10 - 3/70 = 3(9)-7/30 = 27-7/30 = 20/20 or 2/3

4. 9/10 - 7/30 = 2(9)-5(3)/20 = 18/15/20 = 3/20

5. 8/9 - 1/12 = 4(8) - 3(1)/36 = 29/36 = 29/36

c.

1. 1/3 + 1/6 = 6+3/(3) (6) = 9/18 O ½

2. 4/5 - 1/3 = 4(3)-5(1)/(5) (3) = 12-5/15 = 7/15

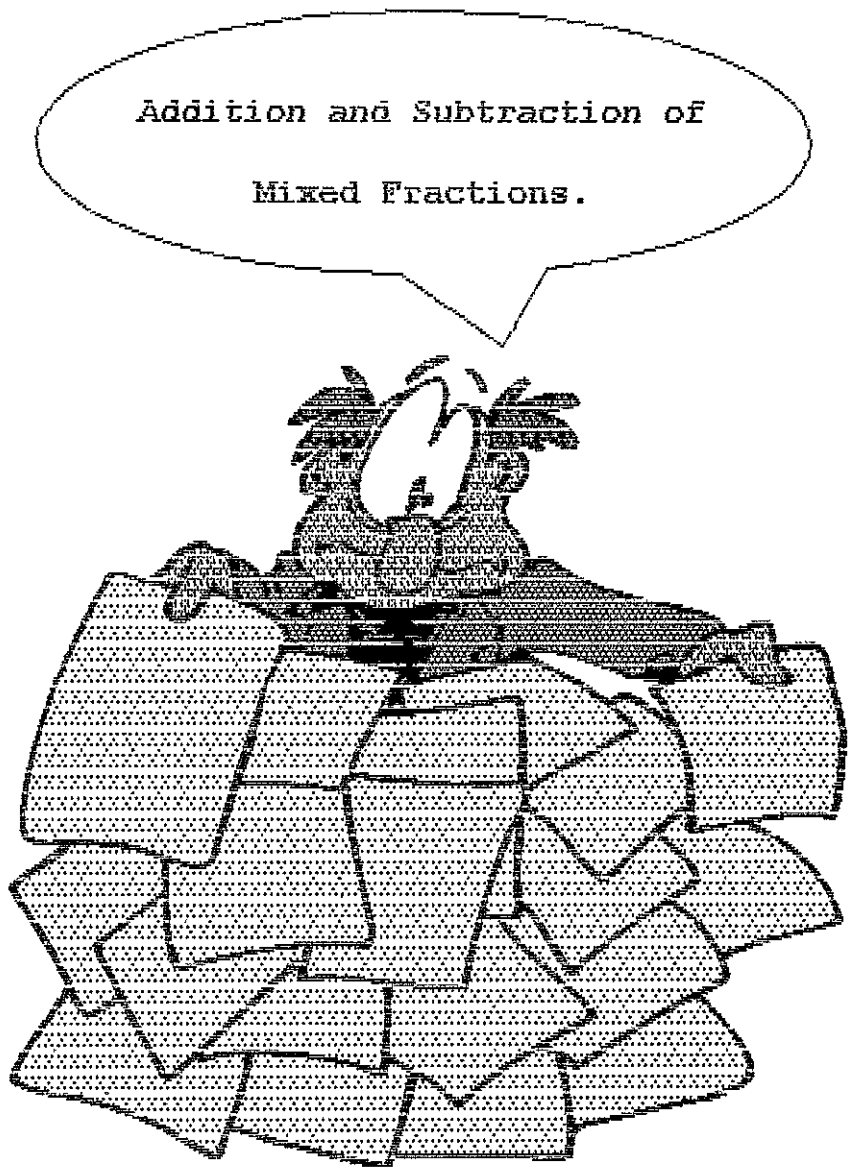
3. 5/6 - 1/9 = 5(9) -6(1)/(6) (9) = 45-6/54 = 39/54
   or 13/18

4. 5/8 + ¼ = 5(4) + 8(1)/(8)(4) = 20+8/32 = 28/32
   or 7/8

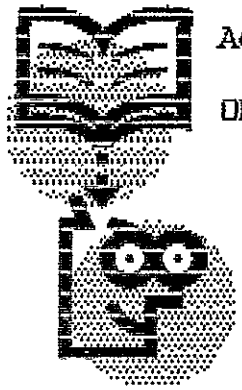
5. 2/9 + ½ = 2(2) + 9(1)/(9)(2) = 4+9/18 = 13/18

MODULE 1

Lesson 6



Lesson 6



Addition and Subtraction of Mixed Fraction

Objective:

After reading and studying this lesson you should be able to;

1. perform addition of mixed fraction.
2. perform subtraction of mixed fractions.
3. reduce answers to lowest terms.
4. sound mind and sound body leads to responsible personal and social decisions.

Recall:

After finishing lessons 4 and 5 of this module, which deals on addition and subtraction of similar and dissimilar fraction, this lesson will focused on mixed fractions - addition/subtraction, applying similar or dissimilar fractions. Previous knowledge is very important since they are interrelated in the process.

A recall is on conversion of mixed fraction to improper fraction, finding least common denominator or LCD and reducing fraction to lowest terms, by greatest common factor or GCF is needed.

Example 1. Conversion from mixed number to improper fraction of 5 2/3.

$$5\ 2/3 = \frac{(5 \times 3) + 2}{3} = \frac{15 + 2}{3} = \frac{17}{3}$$

Example 2. Finding LCD of 1 2/3 and 4 ½

$$1\ 2/3 = \frac{(1 \times 3) + 2}{3} = \frac{3 + 2}{3} = \frac{5}{3}$$

$$4\ ½ = \frac{(4 \times 2) + 1}{2} = \frac{8 + 1}{2} = \frac{9}{2}$$

LCD of 3 and 2 is 6.

Example 3. Reducing fraction to lowest term such as 36/20.

GCF of 36 and 20 is 4 by factorization.

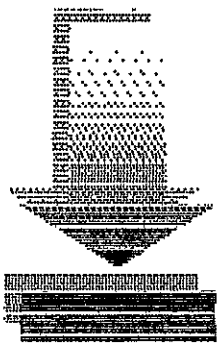
$36 = 2 \times 2 \times 3 \times 3$

$20 = 2 \times 2 \times 5$

GCF = $2 \times 2 = 4$

Therefore:

$$\frac{36}{20} \div \frac{4}{4} = \frac{9}{5} \text{ or } 1\ \frac{4}{5}$$



INPUT

Lesson 6

Addition and Subtraction of Mixed Fraction.

Similar to the previous operation of fractions, mixed fraction can be done in the same manner, what is important is, just change, convert mixed fraction to improper fraction, then, determine if the fractions are similar o dissimilar and add or subtract according to the process or procedure of similar or dissimilar fractions.

Consider the following examples:

1. 5 2/3 + 8 ¾ = ?

First change mixed number to improper fraction

$$5\ 2/3 = \frac{(5 \times 3) + 2}{3} = \frac{16 + 2}{3} = \frac{17}{3}$$

While $8\ \frac{3}{4} = \frac{(8 \times 4) + 3}{4}$

$$= \frac{32 + 3}{4} = \frac{35}{4}$$

thus,

$$5\ \frac{2}{3} + 8\ \frac{3}{4} = \frac{17}{3} + \frac{35}{4} = \frac{4(17) + 3(35)}{3 \times 4}$$

$$= \frac{4(17) + 3(35)}{12}$$

$$= \frac{68 + 105}{12}$$

$$= \frac{173}{12} \text{ or } 14\ \frac{5}{12}$$

Note: LCD of 3 and 4 is 12.

$12 \div 3 = 4 \times 17 = 68$

$12 \div 4 = 3 \times 35 = 105$

2. $10\ 1/8 + 3\ 3/8 = \frac{(10 \times 8) + 1}{8} + \frac{(3 \times 8) + 3}{8}$

$$= \frac{80 + 1}{8} + \frac{24 + 3}{8}$$

$$= \frac{81}{8} + \frac{27}{8}$$

$$= \frac{108}{8} \text{ or } 13\ \frac{4}{8} \text{ or } 13\ \frac{1}{2}$$

Note: 10 1/8 and 3 3/8 are similar fractions.

3. $2\ ½ + 5\ 1/3 - 3\ 2/3$

$$= \frac{(2 \times 20) + 1}{2}\ \frac{(5 \times 3) + 1}{3} - \frac{(3 \times 3) + 2}{3}$$

$$= \frac{4 + 1}{2} + \frac{15 + 1}{3} - \frac{9 + 2}{3}$$

$$= \frac{5}{2} + \frac{16}{3} - \frac{11}{3}$$

$$= \frac{3(5) + 2(16) - 2(11)}{2 \times 3}$$

$$= \frac{15 + 32 - 22}{6}$$

$$= \frac{47 - 22}{6}$$

$$= \frac{25}{6} \text{ or } 4\ \frac{1}{6}$$

Note: LCD of 2, 3 and 3 is 6.

4. 25 1/3 - 18 ½ $= \frac{(25 \times 3) + 1}{3} - \frac{(18 \times 2) + 1}{2}$

$$= \frac{75 + 1}{3} - \frac{36 + 1}{2}$$

$$= \frac{76}{3} - \frac{37}{2}$$

$$= \frac{2(76) - 3(37)}{3 \times 2}$$

$$= \frac{152 - 111}{6}$$

$$= \frac{41}{6} \text{ or } 6\ \frac{5}{6}$$

5. [11 2/5 + 8 ¾] - [6 1/3 + 2 2/7]

$$= \left[\frac{(11x5) + 2}{5} + \frac{(8x4) + 3}{4}\right] - \left[\frac{(6x3) + 1}{3} + \frac{(2x7) + 2}{7}\right]$$

$$= \left[\frac{55 + 2}{5} + \frac{32 + 3}{4}\right] - \left[\frac{18 + 1}{3} + \frac{14 + 2}{7}\right]$$

$$= \left[\frac{57}{5} + \frac{35}{4}\right] - \left[\frac{19}{3} + \frac{16}{7}\right]$$

$$= \left[\frac{4(57+ 5(35)}{20}\right] - \left[\frac{7(19) + 3(16)}{21}\right]$$

$$= \left[\frac{228 + 175}{20}\right] - \left[\frac{133 + 48}{21}\right]$$

$$= \frac{403}{20} - \frac{181}{21}$$

$$= \frac{21\ (403) - 20(181)}{420}$$

$$= \frac{8463 - 3620}{420}$$

$$= \frac{4843}{420} \text{ or } 11\ \frac{223}{420}$$

Note: LCD of 5 and 4 is 20, while LCD of 3 and 7 is 21 and LCD of 20 and 21 is 420.

Exercise 6

A. Perform the indicated operations of the following mixed fractions.

1. $30\ \frac{1}{3} - 20\ \frac{2}{5}$

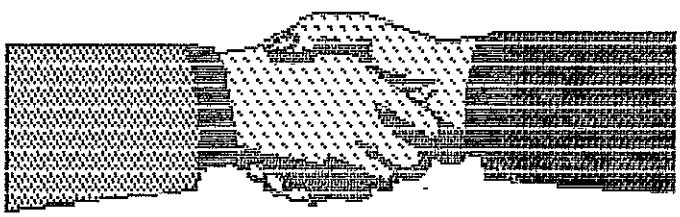
2. $17\ \frac{2}{5} + 10\ \frac{1}{3}$

3. $\left[6\ \frac{1}{8} + 4\ \frac{2}{3}\right] - 5\ \frac{2}{7}$

4. $35\ \frac{1}{5} - \left[9\ \frac{3}{8} + 2\ \frac{1}{4}\right]$

5. $\left[15\ \frac{1}{2} + 10\ \frac{1}{3}\right] - \left[6\ \frac{2}{5} + \frac{3}{4}\right]$

CONGRATULATION! You have just completed Lesson 6 of Module 1. Ask for the anser key fro myour teacher nd compare your answers with the solution on the answer key. If you have answered 75% of the exercises correctly, then you have acheved the objectives of the lesson. If you did not get 75% of the exercises correctly, then you hae to go back to Lesson 6 of Module 1 and the exercises again.



Answer to Exercise 6

A.

1. 30 1/3 - 20 2/5

$= (30 \times 3) + 1/3 - (20 \times 5) + 2/5$

$= \frac{455 - 306}{15}$

$= 149 / 15$

$= 9\ 14/15$

2. 17 2/5 + 10 1/3

$= (17 \times 5) + 2/5 + (10 \times 3) + 1/3$

$= 87/5 + 31/3$

$= \frac{261 + 155}{15}$

$= 416 / 15$

$= 27\ 11/15$

3. [6 1/8 + 4 2/3] - 5 2/7

$= [(6 \times 8) + 1 / 8 + (4 \times 3) + 2 / 3] - (5 \times 7) + / 7$

$= [49/8 + 14/3] - 37/7$

$= \frac{[147 + 112]}{24} - 37/7$

$= 259/24 - 37/7$

$= \frac{1813 - 888}{168}$

$= 925 / 168$

$= 5\ 85/168$

4. 35 1/5 - [9 3/8 + 2 ¼]

= (35x5)+ 1 / 5 - [(9x8) + (3) / 8 + (2x4)+1/4]

= 176/5 - [75/8 + 9/4

= 176/5 - [75+18 / 8]

= 176/5 - 93/8

$= \frac{1408 - 465}{40}$

= 943/40

= 23 23/40

5. [15 ½ + 10 1/3] - [6 2/5 + 3/4]

= [(15x2) + ½ + (10x3) + 1/3] - [(6x5)+2/5 + ¾

= [(31/2 + 31/3] - [32/5 + ¾]

$= \frac{[93 + 62]}{6} - \frac{[128 + 15]}{20}$

= [155/6] - [143/20]

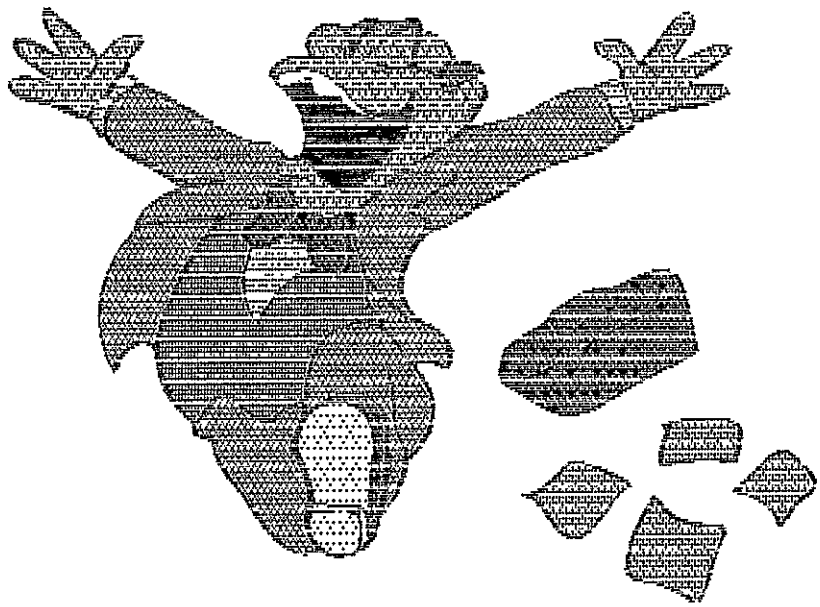
= 1121/60

= 18 41/60

MODULE 1

Lesson 7

Application of Fraction to Worded Problems (Addition and Subtraction).



Lesson 7

Application of Fractions to Worded Problems (Addition and Subtraction).

After reading and studying this lesson you should be able to:

1. understand, analyze and solve worded problems applying addition and subtraction of fractions.
2. reducing fraction to lowest terms.
3. Apply fraction skillfully in solving daily life problems.

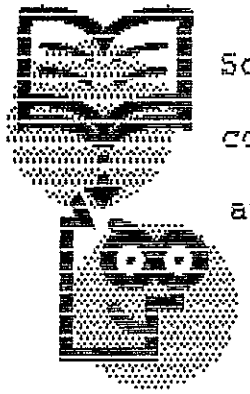
Lesson 7

Application of Fractions to Worded Problems (Addition and Subtraction).

After reading and studying this lesson you should be able to:

1. understand, analyze and solve worded problems applying addition and subtraction of fractions.
2. reducing fraction to lowest terms.
3. Apply fraction skillfully in solving daily life problems.

Recall



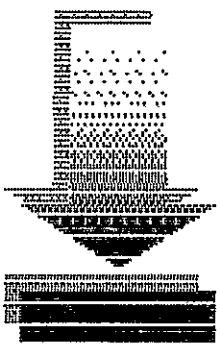
Solving worded problems is not an easy task to consider. It needs an expertise of understanding, analyze, diagram (if necessary) and skills of computation. Your knowledge of computation of previous lessons is much important in this area.

Steps (if any) are necessary to visualize the problems. Here are some of the suggested steps in problem solving.

1. Understanding the problem.
    A. What am I trying to find?
    B. What data are given?
    C. Have I ever solved similar problems?
2. Develop a plan.
    A. What strategies might I use to solve the problem?
3. Cary out the plan.
    A. How can I correctly carry out the strategies I selected?
4. Looked back and check if the solution works.
    A. What is the answer to the problem?
    B. Does the answer seem reasonable?

Here are some suggestions in understanding the problem.

1. Note the key words.
2. Get to know the problem setting.
3. Find out what is being asked for.
4. Restate the problem in your own words.
5. Draw an illustration for the problem.



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Lesson 7

Application to Word Problem

(Addition/Subtraction).

In reality, worded problems are further application of numbers in its real meaning. Everything you do, see and hear needs an analysis and at least a single and basic computation is necessary. Fractions are applied in day to day living or activities, only that, because of their complexity and difficulty almost all of our people ignore them and they resort to decimals. But one can not avoid fractions. For example in the market, if want to buy fish, fruits, vegetables and other things needed, it is sold per kilo. You want to buy pipe, per meter or centimeter, o if you want to budget you allowance in school or at home you resort to fractions, and there are still more and more related problems in our daily living that make use of fractions. Try some of them:

Example 1. A landowner owns two parcels of land of 13 1/5 and 18 2/3 hectares. He sells 12 1/3 hectares of the land. How many hectares of his land is left?

Solution: Since you are dealing with fractions and on the problem you do not know the total number of hectares of land after parcels of land and subtracting what was sold: so,

Solution;

$$13\ 1/5 + 18\ 2/3 = \frac{(13 \times 5) + 1}{5} + \frac{(18 \times 3) + 2}{3}$$

$$= \frac{65 + 1}{5} + \frac{54 + 2}{3}$$

$$= \frac{66}{5} + \frac{56}{3} \quad \text{LCD of 5 and 3 is 15}$$

$$= \frac{3(66) + 5(56)}{15}$$

$$= \frac{198 + 280}{15}$$

$$= \frac{478}{15} \text{ or } 31\ \frac{13}{15} \text{ hectares}$$

$$31\ \frac{13}{15} - 12\ \frac{1}{3} = \frac{478}{15} - \frac{37}{3}$$

$$= \frac{1(478) - 5(37)}{15}$$

$$= \frac{478 - 185}{15}$$

$$= \frac{293}{15}$$

$= 19\ \frac{8}{15}$ hectares - no. of hectares left after selling
12 2/3 hectares.

2. Ms. Consuelo Cruz bought 5 2/3 yards of materials for two uniforms. If her mother plans to use only 4 5/6 yards, how much extra material did Consuelo buy?

Solution:

$$5\ 2/3 - 4\ 5/6 = \frac{(5 \times 3) + 2}{3} - \frac{(4 \times 6) + 5}{6}$$

$$= \frac{17}{3} - \frac{29}{6} \qquad \text{LCD of 3 and 6 is 6}$$

$$= \frac{17(2) - 1(29)}{6}$$

$$= \frac{34 - 29}{6}$$

$= \frac{5}{6}$ yards, extra material

3. Mrs. Galvo has several remnants of lace that she wishes to tell at a reduced price. These are 3 ½ yards, 7 3/5 yards, 4 7/8 yards, 2 7/16 yards, 3 9/10 yards, and 5 ½ yards. Find the total quantity in yards of lace to be sold.

Solution;

3 ½ + 7 3/5 + 4 7/8 + 2 7/16 + 3 9/10 + 5 ½

$$= \frac{(3 \times 2)+1}{2} + \frac{(7 \times 5) + 3}{5} + \frac{(4 \times 80 + 7}{8} + \frac{(2 \times 16) + 7}{16}$$

$$+ \frac{(3 \times 10) + 9}{10} + \frac{(5 \times 2) + 1}{2}$$

$$= \frac{7}{2} + \frac{38}{5} + \frac{39}{8} + \frac{39}{16} + \frac{11}{2}$$

$$= \frac{40(7) + 16(38) + 10(39) + 8(39) + 40(11)}{80}$$

$$= \frac{280 + 680 + 390 + 195 + 312 + 440}{80}$$

$$= \frac{2225}{80} \text{ or } 27\ \frac{65}{80} \text{ or } 27\ \frac{13}{16} \text{ yards}$$

Exercise 7.

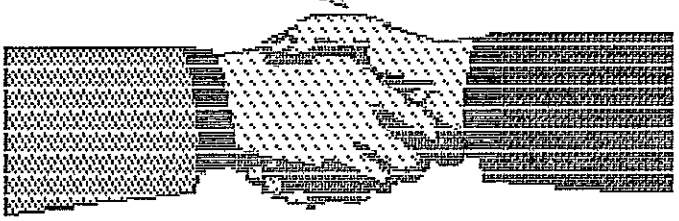
A. Solve the word problems carefully.

1. Mario cut 4 ¾ yards plastic cover from a bolt containing 35 1/8 yards. How many yards were left in the bolt?
2. Last May, a housewife made four purchases of dressed chicken, the four chicken weighing 2 ¾ kilos, 1 ¾ kilos, 3 ½ kilos and 3 3/8 kilos. What was the total weight of the four chickens?
3. An electrician needed the following lengths of electric wire: 12 2/5 feet, 16 11/15 feet, 41/3 feet, and 15 3/10 feet. How many feet of electric wire will he buy?
4. Four containers hold 4 1/3 gal., 8 ½ gal., 9 2/3 gal., and 7 ¾ gal. of acid, respectively. How many galloons of

acid do the five containers hold? If 16 ¾ gallons are sold, How many galloons are left?

5. In a shipment of 32 boxes of encyclopedia books 4 boxes had to be returned to the publisher because they were shipped in error. What fraction of the books was shipped in error

CONGRATULATIONS! You have just completed Lesson 7 of Module 1. Ask for the answer key from your teacher and compare your answers with the solutions on the answer key. If you *have answered 75% of the exercises correctly, the you have achieved the objectives of the* lesson. If you did not get 75% of the exercises correctly, then you have to go back to **Lesson 7 of Module 1** and do the exercises again.



Answer to Exercises 7

A.

1. Given:

35 1/8 yards - total number of yards of plastic cover

4 ¼ yards - number of yards that was taken.

Solution:

35 1/8 yards - 4 ¼ yards

= (35 x 8) + 1/8 - (4 x 4)+1/4

= 281/8 - 17/4

= 247/8

= 30 7/8 yards left in the bolt.

2. Given:

2 ¼ kilos

1 ¼ kilos number of kilos of chicken that was

3 ⅜ kilos purchased.

3 3/8 kilos.

Solution:

2 ¼ kilos + 1 ¼ kilos + 3 ⅜ kilos + 3 3/8 kilos

= (2 x 4) + ¼ + (1 x 4) + 1 / 4 (3 x 2) + 1 /

2 + (3 x 8) + 3 / 8

= 9/4 + 5/4 + 7/2 + 27/8

= 2(9) + 2(5) + 4(7) + 27 / 80 + 28 + 27 / 8

= 83/8

= 10 3/8 kilos - total weight of chicken

3. Given:

12 2/5 feet

16 11/15 feet length of electric wires

4 1/3 feet needed

15 3/10 feet

Solution:

12 2/5 feet + 16 11/15 + 4 1/3 feet + 15 3/10 feet

= (12x5) + 2 / 5 + (16x15)+11/15 41/3 + (15x10) + 3/10

= 62/5 + 251/15 + 41/3 + 153/10

= 62/5 + 251/15 + 41/3 + 153/10

= 372 + 502 + 410 + 459 / 30

= 1743 / 30

= 58 1/10 feet - total number needed by the electrician.

4. Given:

4 1/3 gal.

8 ½ gal. number of galloons

9 2/3 gal. Contained by four containers

6 ¾ gal.

7 ¾ gal.

18 ¼ gal. number of galloons sold

Solution:

4 1/3 gal + 8 ½ + 9 2/3 gal + 7 ¾ gal

= (4x3)+1/3 + (8x2)+1/3 + (7x4)+3 / 4

= 13/3 + 17/2 + 29/3 + 31/4

= 4(13) + 6(17) / 12 + 4(29) + 3(31) /12

= 52 + 102 + 116 + 91 / 12

= 361 / 12

= 30 ¼ galloons - total number contained by the four containers.

30 1/12 gal - 18 ¼ gal.

= 361/12 - 73/4

= 361 - 219/12

= 11 5/6 gal - number of galloons left.

5. Given:

32 boxes of encyclopedia books

4 boxes returned with error.

4/32 = 1/8 was the fractional part that was shipped with error.

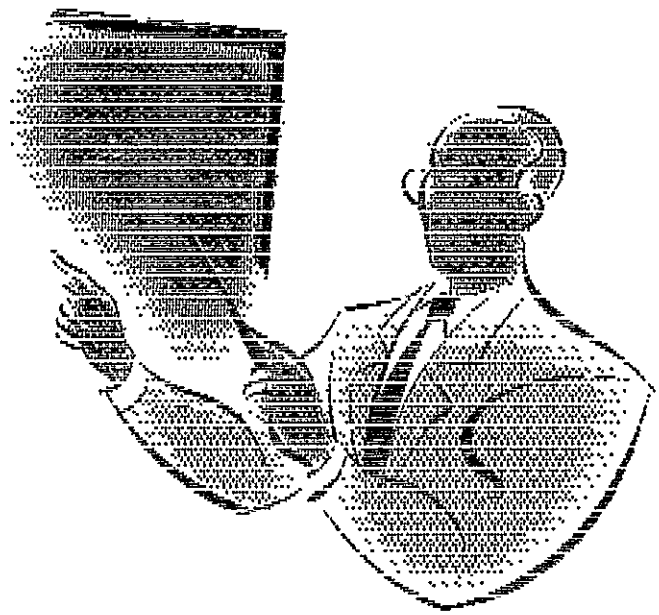
MODULE 1

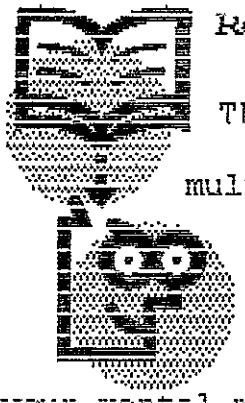
Lesson 8

Multiplication of

Fraction Including Mixed

Fractions.

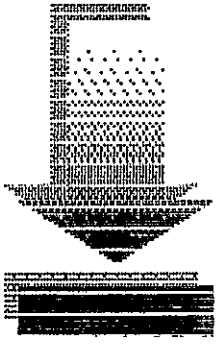




Recall:

The simplest operation of fractions is multiplication. Be it similar o dissimilar. You ability in multiplication of whole numbers is of much important. Your speed, accuracy and your mental multiplication capability are of great help.

Topics such as finding GCF, reducing to lowest term and conversion of mixed fraction to improper fractions and vice versa, which were given in lesson 2 are of real importance.



INPUT:

Lesson 6

Multiplication of Fractions Including Mixed Fractions

To multiply fractions, we simply multiply their numerators and multiply their denominators. The product of the numerators of the fractions becomes the numerator of the product. The product of the denominators of the fractions becomes the denominator of the product. Reduce you answer to lowest term.

Example 1. Multiply 3/7 and 2/5

Solution:

$$3/7 \times 2/5 = \frac{3 \times 2}{7 \times 5}$$

Example 2. Multiply 2/3 and 6/11

Solution:

$$2/3 \times 6/11 = \frac{2 \times 6}{3 \times 11}$$

$$= 12/33$$

Notice that 12/33 is not in lowest term, thus you divide the numerator and the denominator by their greatest common facto (GCF) which is 3, and you get:

$$\frac{12}{33} \div \frac{3}{3} = \frac{4}{11}$$

Repeat the above example and see if you can employ a method where you final answer will already be in lowest terms. This method is called <u>cancellation method.</u> Cancellation involves eliminating the common factors in the numerator and the denominator before multiplying. See the illustrative example.

Example 3. Multiply 2/3 and 6/11

Solution:

$$\frac{2}{3} \times \frac{6}{11} = \frac{2}{\cancel{3}^{1}} \times \frac{\cancel{6}^{2}}{11}$$

$$= \frac{2}{1} \times \frac{2}{11}$$

$$= \frac{2 \times 2}{1 \times 11} = \frac{4}{11}$$

Example 4. Multiply 2/3 and 9/10

Solution: if you employ cancellation before multiplying, we will have,

$$\frac{2}{3} \times \frac{9}{10} = \frac{\cancel{2}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{9}^{3}}{\cancel{10}^{5}}$$

$$= \frac{1}{1} \times \frac{3}{5}$$

$$= 3/5$$

Example 5. Multiply $\frac{20}{33}$ and $\frac{11}{24}$

Solution:

Observe that had you not used cancellation before multiplying, you product would have been $\frac{220}{792}$. Reducing such a fraction to lowest term it would be very difficult since the number itself is was too large. By cancellation it would be easily.

$$\frac{20}{33} \times \frac{11}{24} = \frac{\cancel{20}^{5}}{\cancel{33}_{3}} \times \frac{\cancel{11}^{1}}{\cancel{24}_{6}}$$

$$= \frac{5}{3} \times \frac{1}{6}$$

$$= \frac{5}{18}$$

Example 6. Find the product of the following fractions.

$$\frac{2}{12}, \frac{3}{13}, \frac{4}{14}, \frac{5}{15}, \text{ and } \frac{6}{16}$$

Solution; First, employ cancellation

$$\frac{\cancel{12}}{\cancel{12}} \times \frac{3}{13} \times \frac{\cancel{14}}{\cancel{14}} \times \frac{\cancel{15}}{\cancel{15}} \times \frac{\cancel{16}}{\cancel{16}}$$

Notice that you can still go on canceling. Thus,

$$\frac{1}{2^{6}} \times \frac{\cancel{3}}{13} \times \frac{\cancel{2}}{7} \times \frac{1}{1^{3}} \times \frac{\cancel{3}}{4^{6}}$$

If you want to multiply mixed faction try to remember these:

1. Change each mixed fraction to an improper fraction.

2. Multiply numerators.

3. Place the result over the product of the denominators.

4. Express the answer as a mixed number or as a proper fraction and reduce to lowest terms.

Example 7. Multiply $1\ \frac{1}{2}$ and $1\ \frac{7}{9}$

Solution:

$$1\ \tfrac{1}{2} \times 1\ 7/9 = \frac{(1\times 2)+1}{2} \times \frac{(1\times 9)+7}{9}$$

$$= \frac{2+1}{2} \times \frac{9+7}{9}$$

$$= \frac{\cancel{3}}{\cancel{2}} \times \frac{\cancel{16}^{8}}{\cancel{9}}$$

$$= \frac{1}{1} \times \frac{8}{3} = \frac{8}{3}$$

Example 8. Multiply 2 7/10 and 3 6/9

Solution:

$$2\frac{7}{10} \times 3\frac{6}{9} = \frac{(2 \times 10) + 7}{10} \times \frac{(3 \times 9) + 6}{9}$$

$$= \frac{20 + 7}{10} \times \frac{27 + 6}{}$$

$$= \frac{273}{10} \times \frac{33}{9}$$

$$= \frac{3}{10} \times \frac{33}{1}$$

$$= \frac{99}{10} \text{ or } 9\frac{9}{10}$$

Example 9. Multiply 7 ¼, 2 2/3 and 2 5/8

Solution:

$$7\tfrac{1}{4} \times 2\tfrac{2}{3} \times 2\tfrac{5}{8}$$

$$= \frac{(7 \times 4) + 1}{4} \times \frac{(2 \times 3) + 2}{3} \times \frac{(2 \times 8) + 5}{8}$$

$$= \frac{28 + 1}{4} \times \frac{6 + 2}{3} \times \frac{16 + 5}{8}$$

$$= \frac{29}{4} \times \frac{\cancel{8}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{21}^{7}}{\cancel{8}_{1}}$$

$$= \frac{29}{4} \times \frac{1}{1} \times \frac{7}{1}$$

$$= \frac{203}{4} \text{ or } 50\frac{3}{4}$$

Example 10. Multiply 2 7/8, 10 and 4/9

Solution:

$$2\ 7/8 \times 10 \times 4/9 = \frac{(2 \times 8) + 7}{8} \times \frac{10}{1} \times \frac{4}{9}$$

$$= \frac{16 + 7}{8} \times \frac{10}{1} \times \frac{4}{9}$$

$$= \frac{23}{8^{2}} \times \frac{10}{1} \times \frac{41}{9}$$

$$= \frac{23}{1^{2}} \times \frac{10^{5}}{1} \times \frac{1}{9}$$

$$= \frac{23}{1} \times \frac{5}{1} \times \frac{1}{9} = \frac{11^{5}}{9} \text{ or } 12\ \frac{7}{9}$$

Exercise 8

Find the product of each of the following sets of fractions. And reduce your answer to lowest term.

1. 3/5 x 6/7
2. 7/15 x 3/5
3. 20 x 6/7
4. 3 3/8 x 1/6
5. 2 1/6 x 5 ¾ x 3 ⅓
6. 9/10 x 6/5
7. 4 x ¾ x ⅓
8. 2 1/7 x 3 2/9 x 6 ¾ x 7/2
9. 7 ⅓ x 1 1/3 x 3 2/5
10. 6 ¾ x 2 2/3 x 3 1/6

CONGRATULATIONS! You have just completed Lesson 8 of Module 1. Ask for the answer key from your teacher and compare your answer with the solution on the answer key. If you have answered 75% of the exercises correctly, then you have achieved the objectives of the lesson. If you did not get 75% of the exercises correctly then you have to go back to Lesson 8 to Module 1 and do the exercises again.

Answer of Exercise 8

A.

1. 3/5 x 6/7 = 18/35

2. 7/15 x 3/5 = 21/75 o 7/25

3. 20 x 6/7 = 120/7 o 17 1/7

4. 3 3/8 x 1/6 = $\frac{3 \times 8 + 3}{8}$ x 1/6

= 27/8 x 1/6

= 27/48 o 9/16

5. 2 1/6 x 5 ¾ x 2 ½ = $\frac{(2x6) + 1}{6}$ $\frac{(5x4) + 3}{4}$ $\frac{(2x2) + 1}{2}$

= 13/6 x 23/4 x 5/2

= 1495/48 o 31 7/48

6. 9/10 x 6/5 x 3/7 = 9/10 x 6/5 x 3/7

= 162/350 or 81/175

7. 4 x ¾ x ½ – ¼ x ¾ x ½ = 3/2 or 1 1/2

8. 2 1/7 x 3 2/9 x 6 ¾ x 7/2

= $\frac{(2x7) + 1}{7}$ $\frac{(3x9) + 2}{9}$ $\frac{(6x4)}{4}$ + 3 7/2

= 15/7 x 29/9 x 27/4 x 7/2

= 1305/8 or 163 1/8

9. $7\frac{1}{2} \times 1\ 1/3 \times 3\ 2/5 = \frac{(7\times2)+1}{2} \frac{(1\times3)+1}{3} \frac{(3\times5)+2}{5}$

$= 15/2 \times 4/3 \times 17/5$

$= 34$

10. $6\frac{3}{4} \times 2\ 2/3 \times 3\ 1/6 = (6\times4)+3\ (2\times3)+2\ (3\times6)+1$

$= 27/4 \times 8/3 \times 19/6$

$= 57$

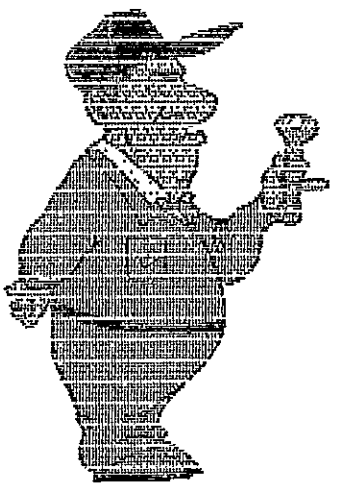
MODULE 1

Lesson 9

Division of Fractions

Including Mixed

Fractions.



Lesson 9

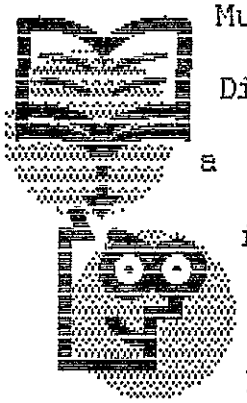
Division of Fractions Including Mixed Fractions.

Objectives:

After reading and studying the lesson you should be able to:

1. Find the quotient of a fraction.
2. divide mixed fractions.
3. reduce the answers to lowest terms.
4. Acquisition skills in division to enhance readiness in facing life situations.

Recall:



Multiplication is just a reverse process of Division, and in the same way, Division in also a reverse of Multiplication. In other words, finding the quotient of a fraction or diving fractions you need a thorough and implicit knowledge of multiplication. And the most important is understanding the reciprocal of a fraction.

Reciprocals of a number are numbers who product is 1. Numbers like ¾ and 4/3 are reciprocals of each other because its product is equal to one (1). Remember this:

1. Every fraction, except 0, has a unique reciprocal.
2. To find the reciprocal of a fraction, invert or reverse the position of the / numerator and the denominator. To find the reciprocal of a mixed number, just change it to an improper fraction before inverting it.

Examples: Finding reciprocals.

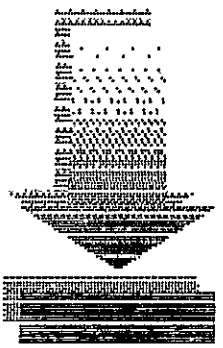
a. 2 and $\frac{1}{2}$ are reciprocals because $2 \times \frac{1}{2} = 1$

b. $\frac{5}{9}$ and $\frac{9}{5}$ are reciprocals because $\frac{5}{9} \times \frac{9}{5} = 1$.

c. $2\frac{1}{2}$ and $\frac{2}{5}$ are reciprocals because $2\frac{1}{2} \times \frac{2}{5} = 1$

d. 13 and $\frac{1}{13}$ are reciprocals because $13 \times \frac{1}{13} = 1$

e. $\frac{2}{25}$ and $\frac{25}{2}$ are reciprocals because $\frac{2}{25} \times \frac{25}{2} = 1$



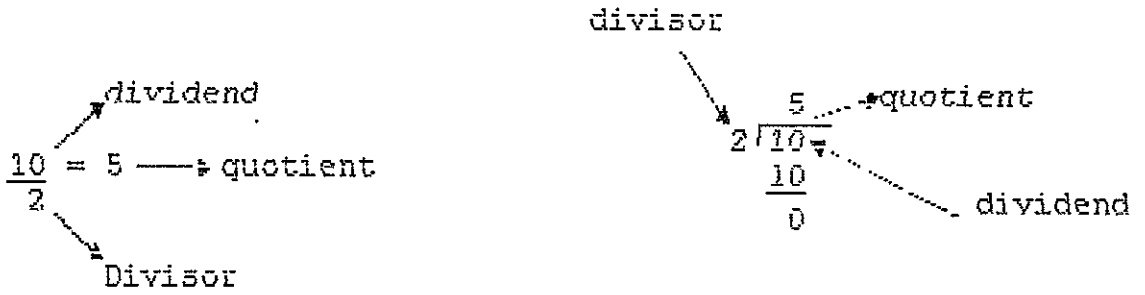
INPUT:

Lesson 9

Division of Fractions Including Mixed Numbers.

Actually, division of fraction is simplier than addition and subtraction, only that it requires your knowledge and mastery if multiplication of fraction and its reciprocals, which were introduced before this lesson.

In division of fractions, try to remember this: To divine a fraction by another fraction, multiply the dividend by the reciprocal of the divisor. Take note that in division they are terms as dividend, divisor and quotient. If 10/2 = 5 or 10/2 = 5, 10 is the dividend, 2 as divisor and 5 as the quotient, in short:



Or 10 ÷ 2 = 5 ⟶ quotient

| ⟶ Divisor

| ⟶ dividend

Illustrative examples:

1. Divide 3 by 21

Solution:

To divide, determine first the reciprocal of the divisor, $\frac{21}{8}$, is $\frac{8}{12}$. Change division sign to multiplication, then multiply.

$$\frac{3}{4} \div \frac{21}{8} = \frac{3}{4} \times \frac{8}{21}$$

$$= \frac{24}{24}$$

Notice again that your quotient is not on its lowest term and you have to reduce it by its GCF which is 12, reduced form is 2/7. But by cancellation method.

$$\frac{3}{4} \div \frac{21}{8} - \frac{3_{1}}{4_{1}} \times \frac{8_{2}}{21_{7}}$$

$$= \frac{1}{1} \times \frac{2}{7}$$

$$= \frac{2}{7}$$

2. Divide 35/12 by 45/26.

Solution: The reciprocal of 45/26 is 26/45.

$$\frac{35}{12} \div \frac{25}{26} = \frac{35^{7}}{18_{6}} \times \frac{26^{13}}{45_{7}}$$

$$= \frac{7}{6} \times \frac{13}{9}$$

$$= \frac{91}{54} \text{ OR } 1\ \frac{37}{54}$$

3. Divide ½ by 7/8 by 12

Solution:

The reciprocals of $\frac{7}{8}$ and 12 are $\frac{8}{7}$ and $\frac{1}{12}$ respectively.

$$\frac{1}{2} \div \frac{7}{8} \div 12 = \frac{1}{2_{1}} \times \frac{8^{1}}{7} \times \frac{1}{12_{3}}$$

$$= \frac{1}{1} \times \frac{1}{7} \times \frac{1}{3}$$

$$= \frac{1}{21}$$

4. Divide 1/6 by ¾ by 1/3 by 2/5

Solution: Reciprocals of $\frac{3}{4}$, $\frac{1}{3}$ and $\frac{2}{5}$ are $\frac{4}{3}$, $\frac{3}{1}$, and $\frac{5}{2}$

$$\frac{1}{6} \div \frac{3}{4} \div \frac{1}{3} \div \frac{2}{5} = \frac{1}{6_3} \times \frac{4^2}{3_1} \times \frac{3^1}{1} \times \frac{5}{2_1}$$

$$= \frac{1}{3} \times \frac{1}{1} \times \frac{1}{1} \times \frac{5}{1}$$

$$= \frac{5}{3} \text{ or } 1\ \frac{2}{3}$$

If you have observed some of your quotients in the examples are written in mixed number? How do you, divide mixed fraction or numbers. Actually, they are just similar, only that, you change mixed number to improper fraction and do the same process as division. Analyze the illustrative examples below.

1. Divide 2 7/12 by 5 7/20

Solution: Change mixed number to improper factors and get the reciprocal of the divisor, then multiply.

$$2\ 7/12 \div 5\ 7/20 = \frac{(2 \times 12) + 7}{12} \div \frac{(5 \times 20) + 7}{20}$$

$$= \frac{24 + 7}{12} \div \frac{100 + 7}{20}$$

$$= \frac{31}{12} \div \frac{107}{20}$$

$$= \frac{31}{12^6} \times \frac{20^{10}}{107}$$

$$= \frac{31}{6} \times \frac{10}{107} = \frac{310}{642} \text{ or } \frac{155}{321}$$

2. Divide 4/9 by 2 9/10

Solution:

$$\frac{4}{9} \div 2\ \frac{9}{10} = \frac{4}{9} \div \frac{(2 \times 10) + 9}{10}$$

$$= \frac{4}{9} \div \frac{20 + 9}{10}$$

$$= \frac{4}{9} \div \frac{29}{10}$$

$$= \frac{4}{9} \times \frac{10}{29}$$

$$= \frac{40}{261}$$

3. Divide 2 2/3 by 9.

Solution:

$$2\ \frac{2}{3} \div 9 = \frac{(2 \times 3) + 2}{3} \div 9$$

$$= \frac{6 + 2}{3} \div 9$$

$$= \frac{8}{3} \div 9$$

$$= \frac{8}{3} \times \frac{1}{9} = \frac{8}{27}$$

4. Divide 5 1/3 by 7 3/8 by 2 5/6

Solution:

$$5\ \frac{1}{3} \div 7\ \frac{3}{8} \div 2\ \frac{5}{6}$$

$$= \frac{(5 \times 3) + 1}{3} \div \frac{(7 \times 8) + 3}{8} \div \frac{(2 \times 6) + 5}{6}$$

$$= \frac{15 + 1}{3} \div \frac{56 + 3}{8} \div \frac{12 + 5}{6}$$

$$= \frac{16}{3} \div \frac{59}{8} \div \frac{17}{6}$$

$$= \frac{16}{3_1} \div \frac{8}{59} \times \frac{6^2}{17}$$

$$= \frac{16}{1} \times \frac{8}{59} \times \frac{2}{17} = \frac{256}{1003}$$

2 Divide 8 ¾ by 8 by 3/6

Solution:

$$8\frac{3}{4} \div 8 \div \frac{3}{6} = \frac{(8 \times 4) + 3}{4} \div 8 \div \frac{3}{6}$$

$$= \frac{32 + 3}{4} \div 8 \div \frac{3}{6}$$

$$= \frac{35}{4} \div 8 \div \frac{3}{6}$$

$$= \frac{35}{4_2} \times \frac{1}{8} \times \frac{1\cancel{6}^2}{\cancel{8}_1}$$

$$= \frac{35}{2} \times \frac{1}{8} \times \frac{1}{1}$$

$$= \frac{35}{16} \text{ or } 2\frac{3}{16}$$

Exercise 9

A. Find the quotient in each of the following fractions and write your answers in simplest or reduced form.

1. $\frac{9}{10} \div \frac{3}{2}$

2. $20 \div 3\frac{1}{4}$

3. $14\ \frac{1}{3} \div \frac{4}{5}$

4. $10\ \frac{1}{2} \div 4\ \frac{1}{6} \div 2\ \frac{1}{8}$

5. $(2\ 2/3 \div 1\ \frac{1}{3}) \div 1\ \frac{5}{11}$

CONGRATULATIONS! You have just completed *Lesson 8 of Module 1. Ask for the answer key* from your teacher and compare your answer with the solution on the answer key. If you have answered 75% of the exercises correctly, then you have achieved the objectives of the lesson. If you did not get 75% of the exercises correctly then you have to go back to *Lesson 8 to Module 1 and do the exercises* again.

ANSWER TO EXERCISE 9

A.

1. 9/10 - 3/2 = 9/10 x 2/3 = 18/30 or 3/5

2. 20 - 3 ¼ = 20 - (3x4) + 1 / 4

= 20 - 13/4

= 20 x 4/13

= 80/13 o 6 2/13

3. 14 1/3 - 4/5 = (14x3) + 1 / -- 4/5

= 43 / 3 - 4/5

= 43 / 3 x 5/4

= 215/12 or 17 11/12

4. 10 ½ -- 4 1/6 - 2 1/6

= (10x2) + 1 / 2 (4x6) + 1 / - (2x6) +1/6

= 21/2 - 25/6 - 13/6

= 21/2 x 6/25 x 6/13

= 378/325 or 1 53/325

5. (2 2/3 - 1 1/2) - 1 5/11

= ((2x3)+2 / 3 - (1x2)-)/2 - (1x11)+5/11)

= (8/3 - 3/2)--16/11

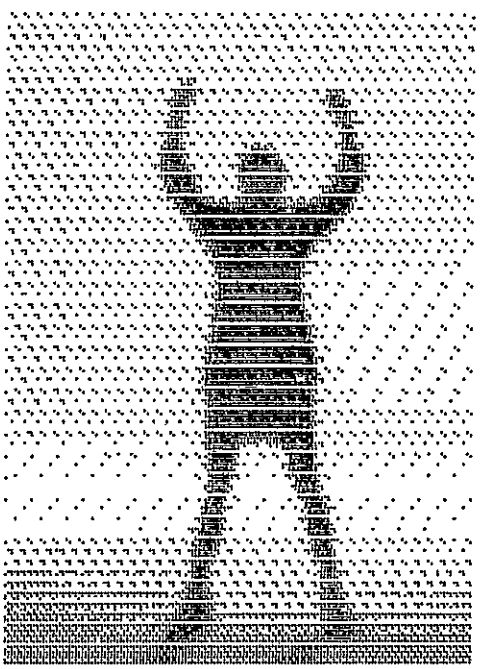
= (8/3 x 2/3) - 16/11

= 16/9 x 11/16 = 11/9 or 1 2/9

MODULE 1

Lesson 10

Application of Multiplication and Division to worded problems.



Lesson 10

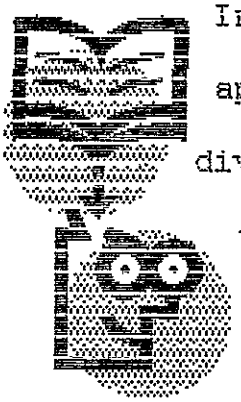
Application of Multiplication and Division to worded Problems.

Objectives:

After reading and studying the lesson you should be able to:

1. Solve worded problems containing multiplication and division.
2. Simplify or reduce answer to its lowest term.
3. Acquisition of skill in solving problems enhances readiness in facing life situations.

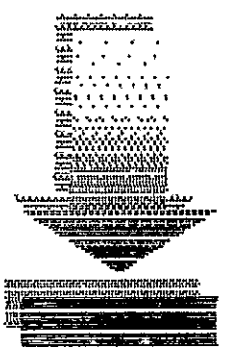
Recall:



In as much as addition and subtraction are applied to worded problems, multiplication and division are also applied to problems of our day to day activity. A simple recall or remainder on the steps of problem solving is needed as enumerated in lesson 7, to help us on how and what to do in solving problems.

Here are the steps.

1. Understand the problem.
2. Develop plan
3. Cay out the plan
4. Look back and check if the solution works.



INPUT:

Lesson 10. Application to worded problems (Multiplication and Division)

If addition and subtraction has it application in real life situation, Multiplication and Division is also indeed important in day to day activities of every individual be it in market

places, stores, malls, family and others. Try to consider some of its application below.

Example 1. Angle can ride her bicycle at the rate of 2 1/3 kilometer per hour. At this rate how far can she ride in 1 ½ hours?

Solution:

Since we were asked, how many kilometers could she ride in 1 ½ hours, we find its product by its rate of 2 1/3 hrs.

$$2\ 1/3 \times 1\ ½ = \frac{(2 \times 3) + 1}{3} \times \frac{(1 \times 2) + 1}{2}$$

$$= \frac{6 + 1}{3} \times \frac{2 + 1}{2}$$

$$= \frac{7}{3_1} \times \frac{3^1}{2} \quad \text{by cancellation method}$$

$$= \frac{7}{2} \text{ or } 3\ ½ \text{ km.}$$

Example 2. A bag contains black, green and white blocks. If 4/9 of the bag is green and 1/6 are white, how many of each color are there in the bag if the contains 36 blocks?

Solution:

Since we need the number of block in each of the colors, and a total of 36 blocks. Multiply each fraction parts by its total.

$$\text{For green} = \frac{4}{9} \times 36 = \frac{4 \times 36}{9} = \frac{144}{9} = 16$$

$$\text{For white} = \frac{1}{6} \times 36 = \frac{36}{6} = 6$$

for black color, we subtract the sum of green and white to the total number of blocks.

Thus,

$$36 - (16 + 6) = 36 - 22 = 14$$

Therefore, 14 pieces of black colors, 16 pieces are green and 6 are white

Example 3. Angelica receives P1,400 from her parents as monthly allowance. She spends 2/3 for board and lodging, 1/5 for her other needs and saves the rest. How much does she spend in each?

Solution: We have to determine the expenses for board and lodging, for other needs and her savings.

$$\text{Board and lodging} = \frac{2}{3} \times \text{P } 11{,}400 = \frac{2800}{3}$$

$$= \text{P } 933.00$$

$$\text{Other needs} = \frac{1}{5} \times \text{P1,400} = \text{P } \frac{1400}{5}$$

$$= \text{P } 280$$

$$\text{Savings} = \text{P } 1400 - (\text{P933.33} + \text{P } 280)$$

$$= ₱\ 1400 - p\ 1213.33$$

$$= ₱\ 186.67$$

Example 4. A 35 member boys choir needs a uniform. Their adviser bought 78 ¾ cloth. How many meters of cloth did each boy consume for a uniform.

Solution:

Since we need to know the number of meters of each member, out of 78 ¾ meters. We divide the total by 35 members.

$$78\ ¾ \div 35 = (78 \times 4) + 3 \div 35$$

$$= \frac{312 + 3}{4} \div 35$$

$$= \frac{315}{4} \div 35$$

$$= \frac{315}{4} \times \frac{1}{35}$$

$$= \frac{315}{140}$$

$$= 2\ \frac{35}{140}$$ or ¼ m. was consume by each of the member.

Example 5. A portion of Hacienda Sta. Ana consisting of 638,400 square meters was subdivided into small farms of 4840 ¼ square meters each. How many farms did that make?

Solution:

Since it is to be subdivided into small farms consisting an area of 4840 ¼ square meters. Just divide the total by 4840 ¼.

$$638{,}400 \div 4840\tfrac{1}{4} = 638{,}400 \div \frac{(4840 \times 4) + 1}{4}$$

$$= 638{,}400 \div \frac{19360 + 1}{4}$$

$$= 638{,}400 \div \frac{19361}{4}$$

$$= 638{,}400 \times \frac{4}{19361}$$

$$= \frac{2{,}553{,}600}{19361} \text{ or } 131\ \frac{17309}{19361}$$

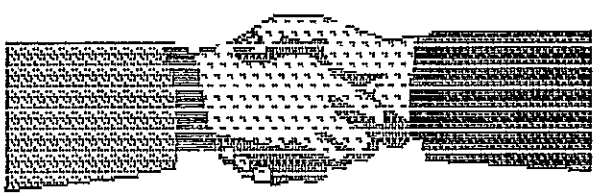
Exercise 10.

A. Read and Analyze each problems carefully and perform the operations needed.

1. During the week of November 9, Mr. Del Makabo worked 38 ¾ hours. If his hourly rate of pay was P15.70, What were his total earnings for the week?
2. Mr. Duque bought 30 dresses chicken weighing 48 2/5 kilos, what was the average weight of each chicken?
3. Tolator's Family budget for a month is P 5000.000 of this amount, 3/5 is allotted for food and 1/5 is for house rental. 2/3 of the remaining amount is spent for other necessities like laundry, maintenance and recreation. The rest like laundry, maintenance and

recreation. The rest is kept for savings. Find the amount of each item in the budget.

4. The passing grade in Mathematics test is 76. 1/3 of the class got 85 and above. ¼ of the class got 80-884 and 1/6 got 75-79. What part of the class get passing grades? What part failed the test?
5. Christopher wants to engrave his name on an I.D bracelet. There are 1 ¾ cm. Space on the bracelet. He can choose from three sizes of letter: 1/8 cm. wide, ¾ cm. wide, or ½ cm. Wide. Which size or sizes of lettering could he use for his name?



Answer of Exercises 10

A.

1. Given:

38 ¾ hours - total number of hours worked for a week

P 15.70 - rate in pesos per hour.

Solution

Total earnings = 38 ¾ hrs x P 15.70

= (38x4)+3 / 4 P 15.70

= 155 x P 15.70 / 4

= P 608.375

2. Given

30 - number of dressed chicken bought

48 2/5 kilos - total weight

Solution:

Ave. Weight - 48 2/5 kilos / 30

= (48x5) + 2 / 5 / 30

= 242/5 / 30

= 242/5 / 1/30

= 242/150

Ave. Weight - 1 46/75 kilos

3. Given:

P 5,000 - total budget for the month

3/5 - allotted for food

1/5 - house rental

2/3 - other necessities (laundry)

Maintenance, recreation)

Solution:

a. Amt. Spent for food = P 5,000 x 3/5

= 5,000 x 3 /5

= p 3,000

b. Amt. Spent for house rental = P 5,000 x 1/5

= P 1,000

c. Amt. Kept as savings = P 1,000 - P 666.67

= P 333.33

4. Given:

75 - Passing grade

1/3 - got grade 85 above

¼ got grade 80-84

1/6 got grade 75-79

Solution:

a. 1/3 + ¼ + 1/6 = 4+3+2/12 = 9/12 o ¾ got passing grade

b. Part of the class that failed

1 - ¾ = 4-3 /4 = 1/4

5. Given:

11 letters - taken from his name

1 ¾ cm - space of the bracelet

1/8 cm sizes of the letters to choose

¼ cm to be engrave

1.2 cm

Solution:

a. total space accommodate by 11 letters.

1/8 x 11 = 11/8 or 1 3/8 cm.

¼ x 11/4 or 2 ¾ cm.

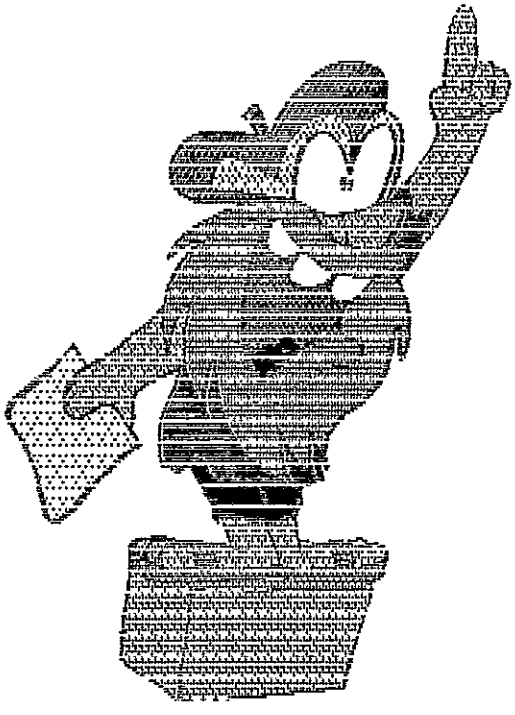
½ x 11 = 11/2 or 5 ½ cm.

Therefore Christopher will choose a letter whose size is 1/8 cm, that can occupy a space of 1 3/8 cm.

MODULE 1

Lesson 11

Complex Fraction



Lesson 11

Complex Fractions

Objectives:

After reading and studying the lesson you should be able to;

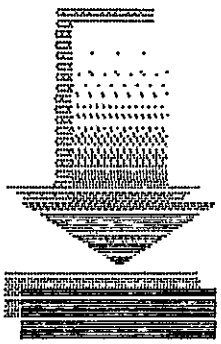
1. add and subtract complex fractions.
2. multiply and divide complex fractions.
3. simplify complex fractions.
4. show positive attitude toward the relationship of the operations of fractions.

Recall:

In as much as the operations of fractions are concerned, you are already familiar with addition and subtraction, multiplication, of similar and dissimilar fractions, including mixed fractions. The last lessons concentrates on the combination of two or more operations concerning fractions, called complex fractions, be it similar, dissimilar or mixed fraction.

You knowledge of the previous lessons on LCD, GCF, reciprocals and other is of great importance, it is assumed that you have already mastered them.

INPUT:



Lesson 11

Complex Fractions

Actually, complex fractions are just modification of fractions, where all of the four operations, addition, subtraction, multiplication and division, are combined in a single problem. What is important in complex fractions is your knowledge of the previous lessons on similar and dissimilar fractions and mixed numbers.

Consider the examples below and remember how they are solved or simplified.

1. Simplify $\dfrac{\frac{2}{3} + \frac{7}{12}}{\frac{7}{8} + \frac{1}{3}}$

Step 1. Simplify the fractions in the numerator by finding LCD first.

$$\frac{2}{3} + \frac{7}{12} = \frac{8 + 7}{12} = \frac{15}{12}$$

Step 2. Simplify the fractions in the denominator by finding LCD first.

$$\frac{7}{8} + \frac{1}{3} = \frac{21 + 8}{24} = \frac{29}{24}$$

Step 3. Divide the numerator by the denominator, by using the reciprocals.

$$\frac{\frac{15}{12}}{\frac{29}{24}} = \frac{15}{12} \div \frac{29}{24} = \frac{15}{12_1} \times \frac{24^2}{29} = \frac{30}{29} \text{ or } 1\ \frac{1}{29}$$

2. Simplify $\dfrac{\frac{7}{9} - \frac{1}{3}}{\frac{4}{5} \quad \frac{3}{8}}$

Solution:

Step 1. Simplify the fractions in the numerator by finding the LCD.

$$\frac{7}{9} - \frac{1}{3} = \frac{7 - 3}{9} = \frac{4}{9}$$

Step 2. Simplify the fractions in the denominator by finding the LCD.

$$\frac{4}{5} - \frac{3}{8} = \frac{32 - 15}{40} = \frac{17}{40}$$

Step 3. Divide the numerator by the denominator by using the reciprocals.

$$\frac{4}{9} \div \frac{17}{40} = \frac{4}{9} \times \frac{40}{17} = \frac{160}{153} \text{ or } \frac{17}{153}$$

3. Simplify $\dfrac{\frac{4}{9} \times \frac{3}{16}}{\frac{7}{12} \times \frac{3}{4}}$

4. Simplify $\dfrac{\frac{3}{5} \div 5}{\frac{5}{6} \div \frac{9}{16}}$

Solution:

Step 1. Simplify numerator

$$\frac{3}{5} \div \frac{5}{7} = \frac{3}{5} \times \frac{7}{5} = \frac{21}{25}$$

Step 2. Simplify denominator

$$\frac{5}{6} \div \frac{9}{16} = \frac{5}{6_{3}} \times \frac{16^{8}}{9} = \frac{40}{27}$$

Step 3. Divide the numerator by the denominator using reciprocals.

$$\frac{\frac{21}{25}}{\frac{40}{27}} = 21 \div 40 = 21 \times 27 = 567$$
$$25 \quad 27 \quad 25 \quad 40 \quad 1000$$

5. Simplify $\dfrac{3\ \frac{1}{4} + 6\ 1/7 \div \frac{1}{10}}{4\ \frac{3}{4} - 3/6}$

Solution:

Step 1. Simplify the numerator of the fraction by changing to improper fraction and find the LCD.

$$3\ \frac{1}{4} + 6\ \frac{1}{7} - \frac{(3 \times 4) + 1}{4} + \frac{(6 \times 7) + 1}{7} = \frac{13}{4} + \frac{43}{7}$$

$$- \frac{91 + 172}{28} - \frac{263}{28}$$

Step 2. Simplify the denominator of the fraction by changing to improper fraction and find LCD.

$$4\ \frac{3}{4} - \frac{3}{6} = \frac{(4 \times 4) + 3}{4} - \frac{3}{6} - \frac{19}{4} - \frac{3}{6}$$

$$= \frac{57 - 6}{12} - \frac{51}{12}$$

Step 3. Divide the numerator by the denominator using reciprocals.

$$\frac{\frac{263}{28}}{\frac{51}{12}} = \frac{263}{28} \div \frac{51}{12} = \frac{263}{28} \times \frac{12^{3}}{51} = \frac{789}{357}$$

Step 4. Divide the numerator again by the denominator using reciprocals.

$$\frac{789}{357} \div \frac{1}{10} = \frac{789}{357} \times \frac{10}{1} = \frac{7890}{357} \text{ or } 22\ \frac{36}{357}$$

$$\text{OR } 22\ \frac{12}{119}$$

Summary of example 5:

$$\frac{3\frac{1}{4} + 6\frac{1}{7}}{4\frac{3}{4} - \frac{3}{6}} \div \frac{1}{10} = \frac{\frac{(3 \times 4) + 1}{4} + \frac{(6 \times 7) + 1}{7}}{\frac{(4 \times 4) + 3}{4} - \frac{3}{6}} \div \frac{1}{10}$$

$$= \frac{\frac{13}{4} + \frac{43}{7}}{\frac{19}{4} - \frac{3}{6}} \div \frac{1}{10}$$

$$= \frac{\frac{91 + 172}{28}}{\frac{57 - 6}{12}} \div \frac{1}{10}$$

$$= \frac{\frac{263}{28}}{\frac{51}{12}} \div \frac{1}{10}$$

$$= \frac{263}{28} \div \frac{51}{12} \div \frac{1}{10}$$

$$= \frac{263}{287} \times \frac{\cancel{14}^{3}}{51} \div \frac{1}{10}$$

$$= \frac{789}{357} \div \frac{1}{10}$$

$$= \frac{789}{357} \times \frac{10}{1}$$

$$= \frac{7890}{357} \text{ or } 22\ \frac{36}{357} \text{ or } 22\ \frac{12}{119}$$

Generalization in simplifying complex fractions.

1. Simplify the fractions in the numerator by doing the indicated operations.
2. Simplifying the fraction in the denominator by doing the indicated operations.
3. divide the numerator by the denominator by applying the reciprocals.
4. Reduce the answer the lowest term.

Exercises 11.

A. Simplify the following complex fractions and reduce the answers to lowest term.

1. $\dfrac{\frac{5}{6} + \frac{1}{2}}{\frac{7}{8} + \frac{3}{4}}$

2. $\frac{9}{10} - \frac{3}{4}$

$\frac{5}{6} - \frac{7}{10}$

3. $8\frac{3}{4} \times 2\frac{1}{7}$

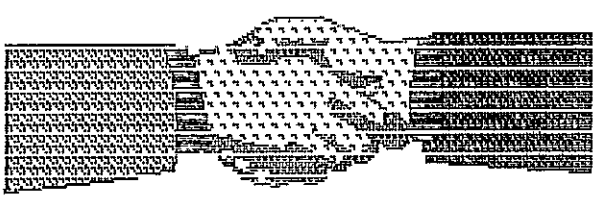
$3\frac{3}{7} \times 2\frac{5}{8}$

4. $\frac{3}{4} \div 6\frac{1}{2}$

$3\frac{2}{3} \div 2\frac{1}{3}$

5. $6\frac{1}{4} + \frac{\frac{1}{4} \div \frac{3}{4} \div \frac{7}{10}}{\frac{3}{5} \div \frac{4}{4}} \div 2\frac{1}{2}$

CONGRATULATIONS! You have just completed Lesson 11 of Module 1. Ask for the answer key from your teacher and compare your answer with the solution on the answer key. *If you have answered 75% of the exercises correctly, then you have achieved the objectives of the lesson.* If you did not get 75% of the exercises correctly then you have to go back to Lesson 11 to Module 1 and do the exercises again.



ANSWER TO EXERCISE 11

A.

1. 5/6 + 1/2 — 5+3 /6 — 8/6
   7/8 + ¾ — 7+ 6 /8 — 13/8 — 8/6 - 13/8
   — 8/6 X 8/13
   — 64/78 OR 32/39

2. $\frac{9/10 - ¾}{5/6 - 7/10}$ $\frac{36-30}{40}$ $\frac{}{6}$

2. $\frac{9/10 - ¾}{5/6 - 7/10} = \frac{18 - 15}{20} = \frac{3/20}{4/20}$ = 3/20 - 3/20 - 4/20

   25-21/30 = 3/20 X 30/4

   = 9/8 OR 1 1/8

3. 8 ¾ X 2 1/7 / 3 3/7 X 2 5/8 $= \frac{\frac{(8X4)+3}{4} \times \frac{(2X7)+1}{7}}{\frac{(3x7+3}{7} \times \frac{(2x6)+5}{8}}$

   $= \frac{35/4 \times 15/7}{24/7 \times 21/8}$

   $= \frac{525/28}{504/56}$ = 525/28 - 504/56

   = 525/28 x 56/504

   — 525/252 or 2 1/12

4. $\frac{3/4 - 6\ ½}{3\ 2/3 - 2\ ¼}$ - $\frac{¾ -- \frac{(6x2)+1}{2}}{\frac{(3x3)+2}{3}}$ - $\frac{¾ \quad 13/2}{11/3 \quad 5/2}$

   $= \frac{¾ \times 2/13}{11/3 \times 2/5}$

   = 6/52 / 22/15
   = 6/52 - 22/15
   - 6/52 x 15/11
   =45/572

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APPENDICES

APPENDIX A

Republic of the Philippines
SAMAR SATE POLYTECHNIC COLLEGE
Catbalogan, Samar

October 25, 1996

The Dean of Graduate Studies
Samar State Polytechnic College
Catbalogan, Samar

Madam.

In my desire to start writing my thesis proposal, I have the honor to submit for approval, one of the following research problems, preferably problems No. 1.

1. DEVELOPMENT AND VALIDATION OF MODULE ON MATHEMATICS I (FRACTIONS) FOR SECONDARY SCHOOLS

2. THE STATUS OF THE MATHEMATICS TEACHERS IN THE PROVINCE OF SAMAR

3. A COMPARATIVE STUDY OF THE ACHIEVEMENT OF MALE AND FEMALE STUDENT IN MATH I IN SACRED HEART COLLEGE

I hope for your early and favorable action on this request.

Very truly yours,

(SGD.) FERNANDO V. MACABARE, JR.
Researcher

APPROVED:

(SGD.) RIZALINA M. URBIZTONDO, Ed.D.
Dean, Graduate and Post-Graduate Studies

APPENDIX B

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

SCHOOL FOR ASSIGNMENT OF ADVISER

APPLICATION FOR ASSIGNMENT OF ADVISER

NAME MACABARE, JR. FERNANDO VELARDE
Surname *First Name* *Middle Name*

CANDIDATE FOR DEGREE Master of Arts

AREA OF SPECIALIZATION Mathematics

TITLE OF PROPOSED THESIS/DISSERTATION DEVELOPMENT AND VALIDATION OF MODULE IN MATHEMATICS 1 (Fraction) FOR SECONDARY SCHOOL

(SGD.) FERNANDO V. MACABARE
Applicant

EUSEBIO T. PACOLOR, Ph.D.
Name of Designated Adviser

Conforme.

(SGD.) EUSEBIO T. PACOLOR, Ph.D.
Adviser

APPROVED:

(SGD.) RIZALINA M. URBIZTONDO, Ed.D.
Dean

APPENDIX C

Republic of the Philippines
SAMAR STATE POLYTECHNIC COLLEGE
Catbalogan, Samar

COLLEGE OF GRADUATE STUDIES

CERTIFICATION

TO WHOM IT MAY CONCERN:

THIS IS TO CERTIFY that Mr. Fernando V. Macabare, Jr. has finished / complied with all the Academic Requirements of the course leading to the Degree Master of Arts in Teaching (MAT), major in Math last Summer 1996 including the comprehensive Examination last May 31, June 1 and 2, 1996 which he passed.

This certification is issued upon request of the interested party for whatever purpose it may serve.

Given this 15th day of January 1997 in Catbalogan, Samar.

(SGD.) RIZALINA M. URBIZTONDO, Ed.D.
Dean, Graduate and Post-Graduate Studies

NOT VALID
WITHOUT SEAL

O.R. : 4200316
Date Issued . January 16, 1997

APPENDIX D

SACRED HEART COLLEGE
Catbalogan, Samar

June 26, 2000

Sr. Herminia Gornes, RVM
HS/GS Principal
Sacred Heart College
Catbalogan, Samar

Sister:

PRAISE BE JESUS AND MARY!

I have the honor to request permission to conduct a tryout of my module in Mathematics 1, Fraction to selected First year high school students, in your school. The results of this tryout will be used as date for my master thesis entitled "DEVELOPMENT AND VALIDATION OF MODULE IN MATHEMATICS 1 (FRACTION) FOR SECONDARY SCHOOL".

Your favorable consideration on this request is highly appreciated.

Very truly yours,

(SGD.) FERNANDO V. MACABARE, JR.
Researcher

APPROVED:

(SGD.) SIS. HERMINIA GORNES, RVM
HS/GS Principal

APPENDIX E

Table of Specification for Test Construction
Math I – Fraction

CONTENTS / DOMAINS	K	C	A & MA	Total No. of Item
1. Fractions and its definition of terms.	7			7
2. Equal / Equivalent Fractions: Reducing Fractions and Raising Fractions to higher terms.		11		11
3. Ordering Fractions, Conversion of Fraction to mixed and improper and vice versa.		12		12
4. Addition and Subtraction of similar fractions		5		5
5. Addition and Subtraction of mixed fractions.		8		8
6. Addition and Subtraction of mixed fractions.			10	10
7. Application to Worded Problems (Addition/Subtraction)			14	14
8. Multiplication of Fraction including mixed fractions			14	14
9. Division of Fraction including mixed fractions			14	14
10. Division of fraction including mixed fractions.			14	14
11. Application to Worded Problems (Multiplication and Division)			15	15
12. Complex Fraction			10	10
TOTAL	7	36	77	120

APPENDIX F

ACHIEVEMENT TEST

Direction Read and analyze each item carefully before answering, blacken the letter of the correct answer on the answer sheet provided on each number.

1. A number used to represent a part of a whole.

   a. Counting numbers c. Fraction
   b. Integers d. Ratio

2. Which of the following numbers is the least common denominator (LCD) of 6 and 9.

   a. 18 c. 90
   b. 54 d. 108

3. A fraction whose denominator is greater than its numerator is said to be.

   a. Proper fraction c. mixed fraction
   b. Improper fraction d. equivalent fraction

4. Which of the following statements is true.

   a. Fractions are said to be similar if numerator and denominators are the same.
   b. Fractions are said to be similar if its denominators are the same.
   c. All of the above.

5. Which of the following is not included as a type of fractions.

   a. Equivalent fractionsc. Improper fractions
   b. Mixed fraction d. proper fractions

6. A type of fraction whose numerator is greater than its denominator.

7. Which of the following statement is true.

   a. Fractions are said to be dissimilar if its numerator and denominator are the same.
   b. Fractions are said to be dissimilar if its fractions are said to be dissimilar if its denominator are not the same.
   c. None of the above.

8. Which of the following sets of fractions are arranged in an increasing order.

   a. 1/2, 3/2, 7/2, 5/2, 4/32
   b. 1/4, 2/4, 3/4, 5/4, 6/4
   c. 3/5, 7/5, 1/5, 4/5, 6/5
   d. 4/12, 3/12, 2/12, 1/12, 5/12

9. Which of the given fraction below are equal.

   a. 3/4 – 6/9
   b. 7/2 = 49/12
   c. 5/8 = 60/96
   d. 2/5 = 10/12

10. A fraction which is consist of a number and a fraction is said to be.

    a. Proper fraction
    b. Improper fraction
    c. Mixed number
    d. Equal fractions

11. Change the given 5 2/5 to improper fraction.

    a. 7/5
    b. 25/5
    c. 27/5
    d. 12/5

12. The fractions 2/5 + 3/5 + has a sum of

    a. 11/45 b. 11/5 c. 11/10 d. 10/15

13. What fraction is the reciprocal of 11/2?

    a. 2 b.11 c.2/11 d. 10/15

14. If you add 5/12 to 5/8, what will you get?

    a. 24/24 b. 29/24 c.10/12 d.1/4

15. What is the difference of 1/12 and 1/15?

a. 2/15 b. 1/12 c. 4/9 d. 7/9

16. What will be the sum if you add 1/3 to 1/9?

a. 1/6 b. 1/12 c. 4/9 d. 7/9

17. In the 1997 and 1998 NBA Season Chicago Bulls won 17/20 of its 106 games. How many games did they lose?

a. 11 b. 13 c. 16 d. 18

18. If you add 4/5 to 8/15, what will be the result?

a. 12/20 b. 4/5 c. 1 1/5 d. 1 1/3

19. What will be the sum of 6 2/3 and 1 1/9?

a. 7 7/9 b. 7 1/3 c. 8 1/9 d. 7 5/9

20. When Don Juan Lorenzo de Mercado died, estate was divided. One-third went to his wife, 1/3 shared equally to his 4 daughters and 1/3 to his 5 sons. If one daughter received P600,000, how much was Don Juan's estate worth?

a. P3,000,000 c. P7,500.000
b. P6,000,000 d. P4,500,000

21. If you divide 9/10 by 1/2 what is its quotient?

a. 18/10 b. 9/5 c. 9/20 d. 5/9

22. The quotient of 6/7 8/9 is

a. 55/56 b. 27/28 c. 25/28 d. 56/54

23. What is the difference of 10 ½ - 4 ¼?

a. 6 1/4 b. 5 1/4 c. 6 1/2 d. 5 1/2

24. Gary can down a bottle of coke in 1/60 of an hour. It takes Edwin 1/20 of an hour to empty two bottles of coke. If Gary and Edwin drink together for 1/4 of an hour, how many bottles of coke will they finish?

a. 15 b. 20 c. 24 d. 25

25. Ms. Letty Flores bought 5 ¼ meters of cloth at P40 a meter. How much did she pay to the sales girl?

a. P140.00 b. P130.00 c. P120.00 d. P110.00

26. A salesman prepared 10 cuttings each of 1 3/4 meters long. Find the total length of material he used for the cuttings.

a. 27 1/2 meters
b. 27 1/4 meters
c. 28 meters
d. 28 1/2 meters

27. One recipe for a tray of brownies calls for 1 1/2 cups sugar, 1/4 cups butter, 1/3 tsp. Vanilla, 2/3 cup cocoa and 2 3/4 cups flour. How much of each ingredients would be used for 3 trays of cookies?

a. 5 1/2 b. 5 c. 16 d. 16 ½

28. Mr. Miguel Cruz a teacher, devotes 1/4 of an hour to his Filipino lesson, 1/3 hour to Social Studies, 3/4 hour to Science, 1 1/4 hours to Math, and 3/8 of an hour to English. How many hours in all does he use to prepare his lessons?

a. 2 23/24 hrs.
b. 70/24 hrs.
c. 2 24/23 hrs.
d. 3 1/23 hrs.

29. Alfredo does part time in a store. On Mondays he works 2 1/2 hours, on Wednesday 3 1/ hrs. and on Fridays 3 1/3 hours. How many hours does he work in a week?

a. 9 1/6 hrs. b. 9 hrs. c. 9 1/2 hrs. d. 9 1/2 hrs.

30. Francisco needs 4 strips of wood for his project, each 3 3/8 inches, 5 1/4 inches, 4 1/2 inches, and 6 6/5 inches. Find the total length of the wood?

a. 19 23/24 inches
b. 19 inches
c. 20 inches
d. 20 23/24 inches

31. A flagpole 10 meters high casts a shadow of 4 ¾ meters long. Find the difference.

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

32. In a class of 50 students, 18 are girls and 32 are boys. What fractional part of the class are boys?

a. 9/25 b. 16/25 c. 18/32 d. 50/32

33. An employee who earns P5,800 a month saves 1/12 of it. How much is saved in a month?

a. P516.67 b. P516.60 c. P517.00 d. P516.75

34. What fraction is between 1/4 and 1/2 ?

a. 7/20 b. 3/4 c. 3/8 d. 1/5

35. If 24/5 is converted to mixed fraction, what is the answer?

a. 2 4/5 b. 4 4/5 c. 6 d. 8

36. Benito is 5/6 of Ricardo's age. If Ricardo is 18, how old is Benito?

a. 13 yrs. b. 14 yrs. c. 15 yrs. d. 16 yrs.old

37. What is the Greatest Common Factor of 4 and 20?

a. 5 b. 10 c. 2 d. 4

38. Which of the given fractions are arranged from the least to greatest?

a. 32 5/6, 47 6/7, 79/6, 17/10
b. 47 6/7, 32 6/8, 79/6, 17/10
c. 17/10, 79/6, 32 5/8, 47 6/7
d. 47 6/7, 32 5/8, 17/16, 79/6

39. There are 16 different kinds of trees in the park. There are 7 fruit trees. What part are fruit in park?

a. 7/16 b. 16/7 c. 2 2/7 d. 4/7

40. What part of a peso is 25 centavos?

a. 25/50 b. 25/1 c. 1/4 d. 25/10

41. Simplify the fraction $\frac{2/3 + 7/12}{7/8 + 1/3}$

a. 1 1/29 b. 31/29 c. 1 2/29 d. 29/29

42. Simplify the fraction $\frac{7/9 - 1/6}{4/5 - 3/8}$

a. 2 101/459 c. 2 34/153
b. 100/459 d. 1 67/153

43. Mr. Reyes bought a stereo that cost P12,500. If he paid 1/3 of the cost in cash and the rest in 5 equal monthly installments, how much did he pay each month?

a. P1666.67 b. P1706.67 c. 1666.67 d. 1966.67

44. A certain polygon has 12 sides. Each side measures 7 3/8 cm. What is the perimeter of that polygon?

a. 19 3/8 b. 20 3/8 c. 66 1/2 d. 88 1/2

45. A driveway was built to accommodate 4 cars. The length of the driveway is 12 1/2 m. the width is 3/4 . How much lot area will be accommodated by the driveway?

a. 109 3/8 b. 110 c. 110 3/8 d. 121 7/8

46. What is the product when the sum of 5 2/3 and 3 is multiplied by 9?

a. 68 1/2 b. 70 1/4 c. 78 d. 80 1/2

47. Divide the sum of 2 2/4 and 5 by 22?

a. 15 1/2 b. 3 3/4 c. 15 3/4 d. 16

48. Find the quotient when the product of 4 1/2 and 2 is divided by sum of 4 1/2 and 2.

a. 2 5/13 b. 1 2/13 c. 18/13 d. 14/13

49. Find the quotient of 6 divided by 3 1/2

a. 1 5/7 b. 1 2/13 c. 13/7 d. 11/7

50. Arrange 3/4, 2/4, 11/12 and 5/6 from lowest to highest.

a. 2/4, 5/6, 3/4, 11/12 c. 2/4, 3/4, 11/12, 5/6
b. 11/12, 3/4, 5/6, 2/4 d. 2/4, 3/4,5/6, 11/12

51. Find the value of n in N + 4 2/3 = 7.

a. 2 3/2 b. 7/4 c. 2 1/3 d. 7/6

52. A man died leaving P2,000,000.00 behind him. In his will, he stated that 1/2 of his wealth must go to charitable institution. The remaining half of his spare money will be divided equally among his 8 faithful friends. What fractional part of the inheritance will each of his friends receive?

a. 1/8 b. 1/16 c. 1/2 d. 1/4

53. From problem #53. How much will each friend receive?

a. P125,000 b. 62,500 c. 150,000 d. 120,00

54. For the Stock Exchange field trip, 15 of 33 club members wee able to go. What fraction of the members did not make the trip?

a. 15/33 b. 6/11 c. 5/6 d. 11/6

55. To install an air-conditioner an electrician needs one piece of wire 3 1/2 m. long, and another 8 5/8 m. long. How many meters of wire does he need in all?

a. 8 17/8 m. b. 12 1/8 m. c. 12 meters d. 11 6/8 m.

56. What is the reciprocal of 5/2?

a. 5 b. 2 c. 2/5 d. 5/2

57. A certain school is sponsoring a benefit show for the disabled. The PTA has agreed to shoulder 1/3 of the expenses. If the school student's council will shoulder 2/5 of the expenses and the remaining shall be shouldered by the school, what part of the expenses will the school shoulder?

a. 11/15 b. 4/15 c. 5/15 d. 3/8

58. Suppose the total expenses for the show, from 57, is P30,000.00 how much will be shouldered by PTA?

a. P10,000 b. P15,000 c. P12,000 d. 8,000

59. From #57, how much will be shouldered by the student council?

a. P8,000 b. P12,000 c. P10,000 d. P15,000

60. From 57, how much will be shouldered by the school?

a. P10,000 b. P12,000 c. P8,000 d. P15,000

61. If three brothers are to divide a piece of land in such a way that the eldest gets 7/11 of the land and the youngest gets 1/6 of the land, what part of the land goes to the other brother?

a. 13/66 b. 53/66 c. 6/17 d. 42/66

62. From #61, if there are 132 hectares of land all in all, how many hectares will each brother get?

a. Eldest = 22, 2nd = 84, youngest = 26
b. Eldest = 26, 2nd = 84, youngest = 22
c. Eldest = 84, 2nd = 26, youngest = 22
d. Eldest = 84, 2nd = 22, youngest = 26

63. Arrange the following in descending order 7/4, 2 3/8, 1 12/3, 1 7/2.

a. 7/8, 1 7/2, 2 3/8, 1 12/3
b. 7/8, 1 12/3, 1 7/2, 2 3/8
c. 7/8, 1 7/2, 1 12/3, 2 3/8
d. 7/8, 2 3/8, 1 7/2, 1 12/3

64. What is the reciprocal of 1/2 + 1/3?

a. 5/6 b. 2/5 c. 6/5 d/ 5/2

65. Mr. Mercado receives P8,400 per month which he budgets as follows: 1/3 for board and lodging; 1/12 for clothing; 1/10 for life insurance, 1/5 for church and charity; 1/20 for recreation and 1/30 for personal needs, and he saves the remaining amount. How much does he save?

a. P2,800 b. P1,690 c. P15,80 d. P1,680

66. From 65, how much does he spend for board and lodging?

a. P2,800 b. P700 c. P1,680 d. P1,260

67. From 65, how much spent for clothing?

a. P1,680 b. P1,260 c. P2,800 d. P700

68. From 65, how much does he spend for life insurance and recreation?

a. P700 b. P1,120 c. P1,260 d. 1,620

69. From 65, how much does he spend for church and charity and personal needs?

a. P1,120 b. P1,960 c. P1,620 d. P1,260

70. What is the Least Common Multiple of 12, 15 and 20.

a. 20 b. 15 c.30 d. 60

71. Which of the following numbers below is the Greatest Common Factor (GCF) of 30, 90 and 102.

a. 15 b. 5 c. 6 d. 2

72. George bought a pair of jogging pants marked P189.00. He was given a discount which was 1/3 of the marked price. How much did George Save?

a. P126.00 b. P63.00 c. P162.00 d. P56.00

73. Given the fractions 3/5 = N/20, what is the value of N to make it equivalent fractions?

a. 2 b. 4 c. 6 d. 12

74. Find the product of 1 5/6 and 1/5.

a. 11/30 b. 7/30 c. 112/30 d. 30/11

75. Arrange the fractions in ascending order 1/8, 7/3, 4/9 and 1/6.

a. 7/3, 1/6, 1/8, 4/9
b. 4/9, 1/8, 1/6, 7/3
c. 1/8, 1/6, 4/9, 7/3
d. 1/8, 4/9, 1/61, 7/3

76. Find the value of b in order that the two fractions will be equal b/14 = 72/126.

a. 6 b. 8 c. 10 d. 12

77. If 600 x 120/360 x 3/100, what is the product?

a. 3 b. 2 c. 4 d. 6

78. A man planted 2/3 of a hectare with tomatoes, 5/6 of a hectare with garlic and 1/9 of a hectare with tomatoes. How many hectares did the man cultivate?

a. 1 11/18 b. 8/18 c. 28/18 d. 1 10/18

79. Which of the given fractions below are properly arranged in ascending order?

a. 1/6, 5/16, 1/2, 3/4
b. 1/2, 1/6, 1/16, 3/4
c. 1/2, 3/4,1/6, 5/16
d. 1/2, 1/6, 3/4,5/16

80. A fruit vendor sold Mrs. Reyes 3 3/4 dozens bananas, Mrs. Cruz 3 5/6 dozens and Mrs. Santos 5 5/12 dozens. What part of the whole was sold to Mrs. Cruz by the vendor?

a. 156/12 b. 45/6 c. 23/6 d. 23/78

81. From #80, how many pieces of bananas did the vendor sell them all?

a. 130 b. 156 c. 145 d. 150

82. Last summer there was an over supply of tomatoes in the market. A housewife bought 4 1/2 kilos for P8.00. What was the price of the tomatoes per kilo? expenses?

a. P1.78 b. P3.60 c. P1.50 d. P1.65

83. A student spent 1/3 of her allowance for food, 1/4 for rental and 2/6 for school supplies and the rest for miscellaneous expenses. If she has a monthly allowance of P900.00, how much was left for her miscellaneous expenses?

84. From #83, how much was spent for her food allowance?

a. P300 b. P325 c. P225 d. P675

85. From #83, what part of monthly allowance was the miscellaneous expenses?

a. 1/3 b. 1/4 c. 1/6 d. 1/5

86. From #83, how much was spent for the rental?

a. P300 b. P425 c. P225 d. P150

87. From #83, how much was spent for supplies?

a. P425 b. P300 c. P225 d. P150

88. From #83, what part of the allowance was spent for rental, food and supplies?

a. 1/2 b. 3/4 c. 2/3 d. 3/13

89. Mrs. Villanueva ordered the following from the market 2 ¾ kls. Of fish at P35 per kilo, 3 ½ kls. Of pork at 80 per kilo, 5 1/3 kls. Of beef at P120 per kilo and 4 1/2 kls. Of chicken at P65 per kilo. How many kilos in all were ordered by Mrs. Villanueva?

a. 30 3/11 kilos c. 16 kilos
b. 43/11 kilos d. 16 1/12 kilos

90. From #89, how much was Mrs. Villanueva's order cost?

a. P1,308.75 c. P1,703.85
b. P1,803.75 d. P1,807.75

91. A plumber needs 3 3/4 meters of pipe in one of his jobs and 6 2/3 meters of pipe in another. What is the total length of pipe needed?

a. 10 5/12 b. 11 5/12 c. 9 5/12 d. 12 5/12

92. From #91, if he cut the two pieces from 15 ½ meter length, how many meters of pipe were left?

a. 5 3/4 b. 5 1/4 c. 5 1/12 d. 5 1/2

93. What is the lowest term of 1020/1380.

a. 17/23 b. 51/69 c. 102/138 d. 5 1/2

94. To 97. Represent following with a fraction. Give your answers in lowest term.

95. From Figure 1. What part of the collection of dots are inside the triangle?

a. 4/24 b. 6/24 c. 3/24 d. 1/8

96. What part of the collection of dots is outside the triangle?

a. 6/24 b. 1/8 c. 3/4 d. 1/12

97. What part of the collection of dots in the intersection of the triangle and the rectangle?

a. 1/8 b. 7/24 c. 3/4 d. 1/12

98. Calculate 4 1/4 – 2 4/5 + 1 1/3

a. 2 47/60 b. 2 60/47 c. 2 23/60 d. 2 23/30

99. Subtract 3 from the quotient of 9 1/5 2 1/3.

a. 3 33/35 b. 135/35 c. 105/135 d. 33/35

100. A bridge being built to span 3/4 km.; 1/8 km. Has been completed so far. What part of the bridge has not ye been completed?

a. 1/4 b. 1/8 c. 3/4 d. 1/3

101. What fractional part of 82 is 44?

a. 22/41 b. 44/82 c. 82/44 d. 41/22

102. When 1/5 is subtracted from a fraction, the result is 9/10. What is the fraction?

a. 8/10 b. 10/10 c. 11/10 d. 8/5

103. Subtract the sum of 5/7 + 7/8 from 15/8, then multiply by 2/3. What is the product?

a. 4/21 b. 15/8 c. 89/56 d. 16/56

104. Each section of a fence is 6 1/2 meters long. How long is this fence if it has 8 section?

a. 14 1/2 meters c. 52 meters
b. 13 ½ meters d. 104 meters

105. Simon mailed four letters that weighted a total of 3 grams. One letter weighted 1/2 of a gram, another weighted 3/4 of a gram, and a third 7/8 of a gram. How much did the fourth letter weigh?

a. 7/8 b. 1/4 c. 2/3 d. 5/8

106. Christopher wants to engrave his name on an I.D. bracelet. There are 1 ¾ cm. Of space on the bracelet. He can choose from three sizes of letters: 1/8 cm. Wide, or 1/2 cm. Wide. Which size or sizes of lettering could he use for his name?

a. 1/4 b. 1/2 c. 1/8 d. none of the above

107. Mr. Tan gave P1 million to the volleyball team that won the Olympic gold medal. If there were 20 players in the team they divided the price money equally, what part of P1 million did each get?

a. 1/1,000.00 b. 1/20 c. 1/50,000 d. 1/100,00

108. From #107, how much money was received by each player?
a. P45,000 b. P60,000 c. P75,000 d. P50,000

109. Josie made buko salad by combining 1/4 cup of shredded buko, 1/4 cup of fruit cocktail, 1/4 cup of diced pineapple, 1/4 cup diced apple, and 1/4 cup of cream. How many cups of fruits did she use?

a. 3/4 cups b. 1 cup c. 4/4 cups d. 5/4 cups

110. Tony saved ¼ of his weekly allowance to buy his mom's gift. If his weekly allowance is P150.00 how much did he save?

a. P112.50 b. P37.50 c. P187.50 d. P121.50

111. From #110. How much did Tony spend?

a. P37.50 b. P112.50 c. P187.50 d. P121.50

112. Roger will cover the folders of his brother Raymund. If each folder consumes 1/8 m. of plastic, how many folders will be covered by 1 1/4 cm. of plastic?
a. 8 b. 10 c. 12 d. 13

113. Mary Ann earned P1,200 this week. She deposited 3/4 of the amount in the bank and spent the rest. How much did she spend?

a. P900 b. P600 c. P300 d. P150

114. What is the next fraction in a sequence 1/8, 3/8, 5/8 and _____?

a. 6/8 b. 1/3 c. 1/4 d. 40/8

115. Mr. Sy owns 1/3 of the stock of the company of which he is president. His wife owns 1/3 of the stock. What fractional part of the stock will his son need to purchase in order for the family to own 3/4 of the stock?

a. 2/3 b. 1/3 c. 1/4 d. 1/12

116. A taxi charges P10.00 for the first 1/5 km. and P2.50 for each additional 1/5 km. or part thee of. For P95.00, what is the longest family distance you can travel on this taxi?

a. 7 km. b. 7 1/5 km. c. 6 4/5 km. d. 6 3/5 km.

117. Calculate $\frac{6\ 2/3 - 2\ 1/4}{5 - 2\ 1/3}$

a. 52/32 b. 55/32 c. 1 20/32 d. 1 21/32

118. Subtract 45 by the sum of 9 1/3 and 12 1/2.

a. 22 5/6 b. 22 7/12 c. 23 5/12 d. 23 7/12

119. Simplify 2/3 + 1/5 x 2 1/2 – 5 + 4 2/3.

a. 2 1/5 b. 7½ c. 5/6 d. 1 2/3

120. What is the product when the sum of 3 and 5 2/3 is multiplied by 9?

a. 26 b. 72 c. 74 d. 76

ENDS HERE

THANK YOU VERY MUCH !!!

Prepared by:

MR. FERNANDO V. MACABARE, JR.

APPENDIX G

Answers for 120-Item Pretest

1. c
2. a
3. a
4. c
5. a
6. b
7. c
8. b
9. c
10. c
11. c
12. b
13. c
14. a
15. d
16. c
17. c
18. d
19. a
20. b
21. b
22. b
23. a
24. d
25. b
26. a
27. d
28. a
29. c
30. a
31. d
32. b
33. a
34. c
35. b
36. c
37. d
38. c
39. a
40. c
41. a
42. d
43. a
44. d
45. d
46. c
47. b
48. c
49. a
50. d
51. c
52. b
53. a
54. b
55. b
56. c
57. b
58. a
59. b
60. c
61. a
62. c
63. d
64. c
65. d
66. a
67. d
68. c
69. b
70. d
71. d
72. b
73. d
74. a
75. c
76. b
77. d
78. a
79. a
80. d
81. b
82. a
83. d
84. a
85. b
86. d
87. d
88. b
89. d
90. a
91. a
92. d
93. a
94. b
95. c
96. c
97. a
98. a
99. d
100. b
101. a
102. c
103. a
104. c
105. a
106. c
107. b
108. d
109. d
110. b
111. b
112. b
113. c
114. b
115. d
116. c
117. d
118. a
119. c
120. d

APPENDIX H

Table of Specification for Test Construction In the Final Form of the Test Pretest/Posttest

CONTENTS / DOMAINS	K	C	A & HA	*Total No. of Item*
1. Fractions and its definition of terms.	4			4
2. Equal / Equivalent Fractions: Reducing Fractions and Raising Fractions to higher terms		5		5
3. Ordering Fractions, Conversion of Fraction to mixed and improper and vice versa.		5		5
4. *Addition and Subtraction of similar fractions.*		5		5
5. *Addition and Subtraction of dissimilar fractions.*		3		3
6. Addition and Subtraction of mixed fractions.			4	4
7. Application to Worded Problems (Addition/Subtraction)			5	5
8. Multiplication of Fraction including mixed fractions			4	4
9. Division of Fraction including mixed fractions.			4	4
10. *Application to Worded Problems (Multiplication and Division)*			6	6
11. Complex Fraction			5	5
TOTAL	4	18	28	50

APPENDIX I

ACHIEVEMENT TEST

Name :
Year/Sec. .

Direction. Read and analyze each item carefully before answering. Select the letter of the correct answer on each number.

1. A number used to represent a part of a whole.

a. counting numbers c. fraction
b. integers d. ratio

2. Which of the following numbers is the least common denominator (LCD) of 6 and 9.

a. 18 c. 90
b. 54 d. 108

3. What fraction whose denominator is greater than its numerator?

a. proper fraction c. mixed fraction
b. improper fraction d. equivalent fraction

4. Which of the following statements is true.

a. Fractions are said to be similar if its numerator and denominators are the same.
b. Fractions are said to be similar if its numerator are the same.
c. Fractions are said to be similar if its denominators are the same.
d. All of the above.

5. Which of the following is not included as a type of fraction.

a. Equivalent fraction c. improper fractions
b. mixed fraction d. proper fractions

6. A type of fraction whose numerator is greater than its denominator.

a. proper fraction c. mixed fraction
b. improper fraction d. equal fraction

7. Which of the following statement is true.

a. Fractions are said to be similar if its numerator and denominator are the same.
b. Fractions are said to be dissimilar if its numerators are not the same.
c. Fractions are said to be dissimilar if its denominators are not the same.
d. None of the above.

8. Which of the following sets of fractions are arranged in an increasing order.

a. 1/2, 3/2, 7/2, 5/2, 4/2
b. 1/4, 2/4, 3/4, 5/4, 6/4
c. 3/5, 7/5, 1/5, 4/5, 5/12
d. 4/12, 3/12, 2/1 1/12, 5

9. A fraction which is consist of a number and a fraction is said to be.

a. Proper fraction
b. Improper fraction
c. mixed number
d. equal fractions

10. Change the given fraction 5 2/5 to improper fraction

a. 7/5
b. 25/5
c. 27/5
d. 12/5

11. The fractions 2/5 + 5/5 + 6/5 has a sum of

a. 11/45 b. 11/5 c. 11/10 d. 10/15

12. What fraction is the reciprocal of 11/2?

a. 2 b. 11 c. 2/11 d. 2/13

13. If you add 5/12 to 5/8, what will you get?

a. 25/24 b. 29/24 c. 10/12 d. 1/4

14. What is the difference of 1/2 and 1/15?

a. 2/15 b. 13/30 c. 8 1/9 c. 1/60

15. Find the sum of 6 2/3 and 1 1/9.

a. 7 7/9 b. 7 1/3 c. 8 1/9 d. 7 5/9

16. When Don Juan Lorenzo de Mercado died, estate was divided. One-third went to his wife, 1/3 shared equally to his 4 daughters and 1/3 to his 5 sons. If one daughter received P500,000, how much was Don Juan's state worth?

a. P3,000,00 c. P7,500,000
b. P6,000,00 d. P4,500,000

17. What is the difference of 10 1/2 – 4 1/4?

a. 6 1/4 b. 5 1/4 c. 6 1/2 d. 5½

18. Ms. Letty Flores bought 3 1/4 meters of cloth at P40 a meter. How much did she pay to the salesgirl?

a. P140.00 b. P150.00 c. P120.00 d. P110.00

19. A salesmen prepared 10 cuttings each of 2 3/4 meters long. Find the total length of material he used for the cuttings.

a. 27 1/2 meters c. 28 meters
b. 27 1/4 meters d. 28 1/2 meters

20. One recipe for a tray of brownies calls for 1 1/2 cups sugar, 1/4 cups butter, 1/3 tsp. Vanilla, 2/3 cup cocoa and 2 3/4 cups flour. How much of each ingredients would be used for 3 trays of cookies?

a. 5 1/2 b. 5 c. 16 d. 16 1/2

21. Mr. Miguel Cruz a teacher, devotes 1/4 of an hour to his Filipino lesson, 1/3 hour to Social Studies, ¾ hour to Science, 1 1/4 hours to Math, and 3/8 of an hour to English. How many hours in all does he use to prepare his lessons?

a. 2 23/24 hrs. c. 2 24/23 hrs.
b. 70/24 hrs. d. 3 1/23 hrs.

22. Alfredo does part time work in a store. On Mondays he works 2 1/2 hours, on Wednesdays 3 1/4 hrs. and on Fridays 3 1/3 hours. How many hours does he work in a week?

a. 9 1/6 hrs. b. 9 hrs. c. 9 1/12 hrs. d. 9 1/2 hrs.

23. Francisco needs 4 strips of wood for his project, each 3 3/8 inches, 5 1/4 inches, 4 1/2 inches, and 6 5/6 inches. Find the total length of the wood.

a. 19 23/24 inches
b. 19 inches
c. 20 inches
d. 20 23/24 inches

24. A flagpole 10 meters high casts a shadow of 4 3/4 meters long. Find the difference?

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

25. If 24/5 is converted to mixed fraction, what is the answer?

a. 2 4/5 b. 4 4/5 c. 6 d. 8

26. What is the Greatest Common Factor of 4 and 20?

a. 5 b. 10 c. 2 d. 4

27. There are 18 different kinds of trees in the park. Seven are fruit trees. What part are fruit trees in park?

a. 7/18 b. 18/7 c. 2 2/7 d. 4/7

28. What part of a peso is 25 centavos?

a. 25/50 b. 25/1 c. 1/4 d. 25/10

29. Simplify the fraction $\frac{7/9 - 1/6}{4/5 - 3/8}$

a. 1 101/459 b. 100/459 c. 1 67/153 d. 2 20/249

30. Mr. Reyes bought a stereo that cost P12,500. If he paid 1/3 of the cost in cash and the rest in 5 equal monthly installments, how much did he pay each month?

a. P1666.67 b. 1706.67 c. P1866.67 d. P1966.67

31. A certain polygon has 12 sides. Each side measures 7 3/8 cm. What is the perimeter of that polygon?

a. 19 3/8 b. 20 3/8 c. 66 1/2 d. 88 ½

32. To install an air-conditioner an electrician needs one piece of wire 3 1/2 m. long, and another 8 5/8 m. long. How many meters of wire does he need in all?

a. 8 17/8 m. b. 12 1/8 m. c. 12 meters d. 11 6/8 m.

33. What is the reciprocal of 5/2?

a. 5 b. 2 c. 2/5 d. 5/2

34. A certain school is sponsoring a benefit show for the disabled. The PTA has agreed to shoulder 1/3 of the expenses. If the school student council will shoulder 2/5 of the expenses and the remaining shall be shouldered by the school, what part of the expenses will the school shoulder?

a. 11/15 b. 4/15 c. 5/15 d. 3/8

35. What is the Least Common Multiple of 12, 15 and 20.

a. 20 b. 15 c. 30 d. 60

36. George bought a pair of jogging pants marked P189.00. He was given a discount which was 1/3 of the market price. How much did George save?

a. P126.00 b. P63.00 c. P162.00 d. P36.00

37. Given the fractions 3/5 = N/20, what is the value of N to make it equivalent fractions?

a. 2 b. 4 c. 6 c. 12

38. Which of the given fractions are arranged in ascending order?

a. 7/8, 1/6, 1/8, 4/9 c. 1/8, 1/6, 4/9, 7/8
b. 4/9, 1/8, 1/6, 7/3 d. 1/8, 4/9, 1/61, 7/3

39. Find the value of b in order that the two fraction will be equal b/14 = 72/126.

a. 6 b. 8 c. 10 d. 12

40. Find the product of 600 [120/360] [5/100].

a. 3 b. 2 c. 4 d. 6

41. Which of the given fractions below are property arranged in ascending order?

a. 1/6, 5/16, 1/2, 3/4c. 1/2, 5/4, 1/6, 5/16
b. 1/2, 1/6, 5/16, 3/4 d. 1/2, 1/6, 3/4,5/16

42. A student spent 1/3 of her allowance for food, 1/4 for rental and 1/6 for school supplies and the rest for miscellaneous expenses. If she has a monthly allowance of P900, how much was left for her miscellaneous expenses?

a. P300 b. P325 c. P675 d. P225

43. Form #42, how much was spent for her food allowance?

a. P300 b. P325 c. P225 d. P675

44. Mrs. Villaneuva ordered the following from the market, 2 3/4 kilos of fish at P35 per kilo, 3 1/2 kilos of pork at P80 per kilo, 5 1/3 kilos of beef at P120 per kilo and 4 1/2 kilos of chicken at P65 per kilo. How many kilos in all were ordered by Mrs. Villanueva?

a. 30 3/11 kilos c. 16 kilos
b. 43/11 kilos d. 16 1/2 kilos

45. Find the sum of 4 1/4 – 2 4/5 + 1 1/3.

a. 2 47/60 b. 2 60/47 c. 2 23/60 d. 2 22/30

46. When 1/5 is subtracted from a fraction, the result is 9/10. What is the fraction?

a. 8/10 b. 10/10 c. 11/10 d. 8/5

47. Mr. Tan gave P1 million to the volleyball team that won the Olympic gold medal. If there were 20 players in the team they divided the price money equally, what part of P1 million did each get?

a. 1/1,000,00 b. 1/20 c. 1/50,000 d. 1/100,000

48. Josie made buko salad by combining 1/4 cup of shredded buko, 1/4 cup of fruit cocktail, 1/4 cup of diced apple, and 1/4 cup of cream. How many cups of fruits did she use?

a. 3/4 cups b. 1 cup c. 4/4 cups d. 5/4 cups

49. Tony saved 1/4 of his weekly allowance to buy his mom's girt. If his weekly allowance is P150.00 how much did he save?

a. P112.50 b. P37.50 c. P187.50 d. P121.50

50. Subtract 45 by the sum of 9 2/3 and 12 ½

a. 11 5/12 b. 22 7/12 c. 23 5/12 d. 23 7/12

APPENDEX J

ANSWERS KEY (FINAL FORM)

1. c	11. b	21. a	31. a	41. d
2. a	12. c	22. c	32. d	42. b
3. a	13. a	23. a	33. a	43. c
4. c	14. b	24. d	34. d	44. b
5. a	15. a	25. b	35. a	45. d
6. b	16. b	26. d	36. c	46. b
7. c	17. a	27. a	37. c	47. d
8. b	18. b	28. c	38. b	48. c
9. c	19. a	29. c	39. b	49. b
10. c	20. d	30. a	40. a	50. d

APPENDIX K

QUESTIONNAIRE FOR THE VALIDATION OF MODULE

Name (Optional) .

School :

Direction. Please rate the materials per criteria on the basis of your agreement or disagreement using the following scale:

Validation Criteria	SA	A	U	D	SD
A. Content Validity					
1. The key concepts are presented in a logical and structured manner to students for easy understanding.					
2 Provides a variety of exercises for reinforncement and mastery of concepts and skills.					
3. Provides for development, learning, and mastery of the different key operations.					
4. Includes materials that are suitable, interesting current and up-to-date.					
5. Includes materials for extension of learner interest and independent study.					
B Construct Validity					
1. The constructed materials are really intended as a teaching material for first year high school.					
2. Has vocabulary and appropriateness of language that are within the comprehension of the target learners.					

3. Contains illustrative examples that are appropriate and instructional.					
4. Gives instructions that can easily be followed and understand.					
5 Present new and unfair materials in a consistent logical manner.					
C. Face Validity					
1. The materials look like teaching materials and not anything else.					
2 Lesson are arranged from simple to complex.					
3. Page layout is acceptable.					
4. Format used is convenient and understandable.					
5. Printing is clear and readable.					

APPENDIX L

Computation of RES of Module

Pages	No. of words	No. of Sentence	No. of Syllables
2	100	5	130
5	100	7	141
10	100	5	127
18	100	9	164
54	100	5	139
66	100	11	156
79	100	7	109
27	100	6	129
44	100	5	96
39	100	5	193
31	100	8	143
98	100	9	124
84	100	9	156
87	100	6	156
95	100	8	158
91	100	7	112
70	100	10	131
75	100	10	167
	1800	*128*	*2531*

Reading Ease Score (RES)

RES = 206.835 – (1.05 x Ave. Sent. Length) + (0.846 x Ave. Word length)

Where.

$$\text{Average Sentence Length} = \frac{\text{No. of words in all samples}}{\text{Total No. of Sentence}}$$

$$\text{Average World Length} = \frac{\text{No. of Syllables in all Samples}}{\text{Total No. of Samples pages}}$$

$$\text{Average Sentence Length} = \frac{1800}{128} = 14.06$$

$$\text{Average Word Length} = \frac{2531}{18} = 140.61$$

RES = 206.835 – (1.05 x 14.06) + (0.646 x 140.61)
= 206.835 – (14.763 + 118.96)

= 206.835 – 133.723

= 73.112 Fairly Easy

Computation of HIS of Module

Pages	Personal Words	Personal Sentence
2	5	2
5	3	3
10	4	3
18	2	4
54	3	5
66	3	6
79	2	6
27	4	7
44	2	4
59	3	5
31	3	5
98	2	4
84	3	6
87	1	3
95	1	3
91	2	2
70	2	2
75	3	5
	49	75

HIS = (% Personal Words per 100 words x 3.635) +
(% Personal Sentence x 0.314)

Where,

$$\%\ \text{Personal Words} = \frac{\text{Total no. of personal words in all samples}}{\text{Total no. of words in sample pages}}$$

$$\frac{\text{Total no. of personal sentence}}{}$$

% Personal sentence = Total sentence in all samples

Personal words = 48

Personal sentence – 75

$$\% \text{ Personal words} = \frac{48 \times 100}{1800} = 2.67$$

$$\% \text{ Personal Sentence} = \frac{75 \times 100}{128} = 58.59$$

HIS = (2.67 x 3.635) + (58.59 x 0.314)

= 9.705 + 18.397

HIS = 28.102 o 28.10 Interesting

APPENDIX M

Interpretation of Reading Ease Score and Human Interest Score of the Flesch Formula

Reading Ease Score

RES	*Descriptive Style*	*Corrected Grade Level*
90 – 100	*Very Easy*	*5th grade*
80 – 90	*Easy*	*6th grade*
70 - 80	Fairly Easy	1st – 2nd yr. (H.S.)
60 – 70	Standard	3rd – 4th yr. (H.S.)
50 60	Fairly Difficult	1st – 2nd yr. (Coll.)
30 – 50	Difficult	3rd – 4th yr. (Coll.)
0 - 30	Very Difficult	College Graduate

Human Interest Score

HIS	*Descriptive of Style*
60 – 100	Dramatic
40 – 60	Highly Interesting
20 – 40	Interesting
10 – 20	Mildly Interesting
0 - 10	Dull

CURRICULUM VITAE

CURRICULUM VITAE

NAME	:	FERNANDO V. MACABARE
ADDRESS	.	Purok 1, Brgy. San Pablo
DATE OF BIRTH	:	June 9, 1963
PLACE OF BIRTH	:	Calbayog City
POSITION	.	Secondary School Teacher
STATION	.	Sacred Heart College Catbalogan, Samar Bulletin
CIVIL STATUS	.	Married

EDUCATIONAL BACKGROUND

Elementary	.	Calbayog Pilot Central School Calbayog City
Secondary	.	Christ the King College Calbayog City
College	.	Christ the King College Calbayog City
Graduate Studies	.	Samar State Polytechnic College, Catbalogan, Samar
Curriculum Pursued	.	Master of Arts in Teaching
Major	.	Mathematics

SEMINARS ATTENDED

Philippine Council of Mathematics Teacher Education (MATHTED, Inc) Mathted Biennial Conference 2001. "Curricular Issues and New Technologies" held at Racso's Woodland Resort, Iloilo, Oct. 19-20, 2001

Philippine Council of Mathematics Teacher Educators (MATHHTED). Addressing Curricular Issues in Mathematics: Implication in Teacher Training, held at Dela Salle University, Manila, On May 29-30, 1997.

The Department of Psychology, College of Liberal Arts, De La Salle University. Research methods and Techniques Seminar Workshop held on April 24025, 1-,1977 at De La Salle University, Manila, Philippines.

Statlink Research Training and Development and the University of San Jose-Recoletos Instructional Media Center. Seminar Workshop in Statistics "Non Parametric Statistics in Research" held April 20-21, 2001 Cebu City.

The Philippines Association of Collegiate Schools of Business, "Calculus for Business" held at San Jose Recoletos University on Feb. 20-23, 1991.

St. Paul's College of Ilo-ilo. "Organizational Growth and Development in the Philippine Context an Analysis held on Feb 21, 1987.

Office of the Ombudsman (Visayas) Region 8 wide Junior Graft watch Unit Orientation Seminar. THEME: "The Empowered Youth Instrument of Peace and Promotor of Good Governance", COA Training Center, Palo, Leyte, Nov. 15, 2001.

Regional Seminar on Total Quality Education held on Sept. 29, 2001 at the St. Scholastica's College of Health Science, Tacloban City.

Commission on Higher Education Regional Office VIII. Regional Seminar-Workshop on Accreditation held at CHEDRO VIII on Jun 7-8, 2000.

CHEDRO VIII and CHED-ZONAL Research Center, Reg. 8, Visayas State College of Agriculture and Development: Potential finding for R and D in Region 8. held at SMED Center, on July 20, 2000, Tacloban City.

CHED-ZONAL RESEARCH CENTER for Region 8 and VISCA, Baybay, Leyte. CHED-ZRC 8 R&D Review and Planning Workshop on Nov. 27-29, 2000, Visayas State College of Agriculture, Baybay, Leyte.

Catholic Educational Association of the Philippines (CEAP) : CEAP Regional Assembly held at St. Therese Arts Center, St. Therese Child Development Center on August 20, 1999.

Philippine Association for Teacher Education Region 8 Chapter 2003 General Assembly on Teacher Education. "Teacher Education Issues and the Teacher of the New Century" held at Ritz Tower, Tacloban City on February 5, 2003.

Leyte Normal University Region 8 "Networking Conference on Teacher Education" held on Sept. 24-25, 1998 at LNU house function room, Tacloban City.

Commission on Higher Education and the Leyte Normal University Region 8. "Networking Conference on Teacher Education" held at LNU house on August 20-21,1997, Tacloban City.

CHED Region 8, Leyte Normal University and PAFTE 8. "Research Seminar Workshop", held at LNU Library Mini Theater on March 7-8, 1977 at Tacloban City

Philippine Association for Teacher Education Regional Office 8, "Responding to the Continued Quest for Quality in Teacher Education" held on February 19, 2003 at LNUE, Tacloban City.

Eastern Visayas Association of fund for Assistance to Private Education. Teaching Mathematics in Secondary Schools" under the SEDP Program on April 17-27, 1990.

Department of Education Culture and Sports Regional Office 8. "The SEDP Mass Training of Teacher in Mathematics Second Batch (Private) at Samar National School on May 18-June 1,1992.

PROFESSIONAL ORGANIZATIONS

Philippine Council of Mathematics Teacher Educators (MATHTED) (NATIONAL LEVEL).

Philippine Association for Teacher Education (PAFTE Region 8)

POSITIONS HELD

1989-1995- High School Teacher and Part time College Instructor Sacred Heart College, Catbalogan, Samar.

1996-1997 – Liberal Arts Department and Education Department Program head and College Instructor St. Mary's College Catbalogan

1998- Present – Liberal Arts Department and Education Department Program Head and College Instructor Sacred Heart College Catbalogan Samar(Formerly Sacred heart College), Catbalogan, Samar

LIST OF TABLES

Table | Page

LIST OF FIGURE