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March 2016

Mathematical Proficiency and Achievement of Grade Six Pupils

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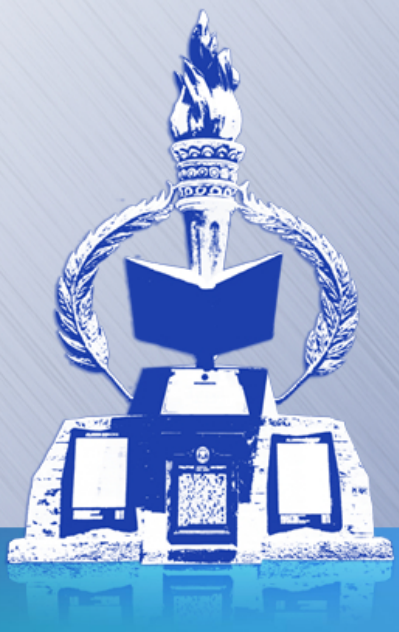

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Montes, L.P. & Belecina, R.R. (2016)
Mathematical Proficiency and Achievement of Grade Six Pupils
(Seminar Paper, Philippine Normal University)
Retrieved from pnu-onlinecommons.org/omp/index.php/pnu-oc/catalog/book/486

MATHEMATICAL PROFICIENCY AND ACHIEVEMENT OF GRADE SIX PUPILS

A Seminar Paper
Submitted to the Faculty of the
College of Graduate Studies and Teacher Education Research
Philippine Normal University
Taft Avenue, Manila

In Partial Fulfillment
of the Requirements for the Degree
MASTER OF ARTS IN TEACHING MATHEMATICS

LEONARD P. MONTES

March 2016

APPROVAL SHEET

This seminar paper entitled **MATHEMATICAL PROFICIENCY AND ACHIEVEMENT OF GRADE SIX PUPILS,** prepared and submitted by **LEONARD P. MONTES** in partial fulfillment of the requirements for the degree **Master of Arts in Teaching Mathematics** is hereby recommended for approval and acceptance.

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ACKNOWLEDGMENT

The completion of this study would not be possible without the support of all those who shared their precious time and ideas while this study was being conducted. Therefore I would like to thank and remember all the people who gave their full effort and expertise during the conduct of my study.

First and foremost to our **Almighty God**, for giving me the strength to go in spite of so many challenges in the course of undertaking this study.

I would like to express my sincere gratitude to my adviser **Dr. Rene R. Belecina** for sharing his valuable ideas and continuous support to this research. His guidance and suggestions helped me in the conduct of my study.

My sincere thanks also to **Dr. Elisa S. Baccay** for her encouragement and insightful comments for the improvement of my study.

I am grateful to **Dr. Juanita N. Morato** for her moral support and allowing me to conduct my study in Balibago Elementary School.

I thank **Dr. Ma. Rose D. Centeno** for encouraging and inspiring me to continue my study.

I would like to thank also **Mr. Nestor V. Hadi** for his assistance and insightful suggestions in my study.

I thank also my co-teachers, Dr. Lilian D. Perez, Mrs, Arce V. Ongteco, Mrs. Ma. Tita M. Lacena, Mrs. Rosemarie C. Nopueto, Ms. Lewelyn B. Canlas, Ms. Rachel Anne J. Zarraga, Mrs. Merlyn P. Almeda and Mr. Armando G. Ramirez and friends for their moral support and encouragement to finish my study.

I want to express my heartfelt gratitude to my parents, **Mr. Albino A. Montes** and **Mrs. Estrella P. Montes**, for inspiring and understanding me and for their never ending love and support at all times as I pursued this study.

Finally, I want to thank also those people who were not mentioned but have greatly contributed to the accomplishment of this study.

L. P. M.

DEDICATION

This work is lovingly dedicated to the researcher's parents,

Mr. Albino A. Montes and Mrs. Estrella P. Montes,

to his nephew, Philip Yuan M. Ramirez,

and above all to God Almighty.

ABSTRACT

Name	:	Leonard Pineda Montes
Title	:	Mathematical Proficiency and Achievement of Grade Six Pupils
Key Concepts	:	Mathematical Proficiency, Conceptual Understanding, Procedural Fluency, Strategic Competence, Adaptive Reasoning, Productive Disposition, Achievement in Mathematics
Degree	:	Master of Arts in Teaching
Specialization	:	Mathematics
Adviser	:	Rene R. Belecina, Ph. D.

This study was conducted to describe the mathematical proficiency of grade six pupils of Balibago Elementary School in terms of five strands, namely, conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition and its relationship to their achievement in Mathematics.

The participants of this study were 286 grade six pupils. The descriptive correlational method was used in this study. A mathematical proficiency test consisting of 210 items, 42 items per strand, was used as instrument to determine the proficiency level of the pupils based on the five strands.

The findings reveal that in terms of mathematical proficiency, the pupils have *low proficiency* level in all the five strands. In terms of mathematics achievement, majority of them are *approaching proficiency*. However, there is a significant relationship between each of the five strands of mathematical proficiency and mathematics achievement. Moreover, regression analysis revealed that conceptual understanding and procedural fluency are significant predictors of achievement in Mathematics. The higher or lower the conceptual understanding and procedural fluency, the higher or lower the pupils' achievement in Mathematics.

From the result of the study it is inferred that different learning techniques and abilities must be given a closer look in the learning process to enhance pupils' mathematical proficiency and mathematics achievement. Teachers should use teaching strategies and varied learning activities that will motivate pupils to learn. They should find ways to actively engage students in mathematical tasks to upgrade their proficiency level. Further studies may also be conducted to pinpoint factors that affect the mathematical proficiency and achievement of pupils in basic education.

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Chapter I

THE PROBLEM AND ITS BACKGROUND

Introduction

Mathematics is a mental processes which consists of carrying out, one after the other, mental constructions that are inductive and logical. Mathematical content itself should be rigorous and complete, not altered in some way to push an agenda (Ernest, 1998).

Since the 17th century, mathematics has been an integral part to the physical sciences and technology. In more recent times, it has assumed a similar role in the quantitative aspects of the life sciences. In fact, in many cultures and societies – under the stimulus of the needs of practical pursuits, such as commerce and agriculture - mathematics has evolved far beyond counting.

The increasing contributions of Mathematics to the advancement of the modern world as well as its traditional standing as an element of humanistic and scientific education are the reasons why Mathematics holds a dominating place in the curriculum. Its importance as a key subject is of common knowledge that it cannot be over-emphasized. In fact, Ruberu (1983) identified it as one of the two school subjects, language being the other, which has a universally recognized place in the common core of the curriculum for all

pupils. This is because of the unique role it plays in the total development of the individual. This subject uses a universal language, the only one shared by everyone regardless of culture, religion or gender. The main function of Mathematics is to assure the learners to solve daily-life situations and to enable them to appreciate and understand the discoveries of a rich stimulating technological word.

However, Mathematics is perceived as a difficult subject and is hated by most learners. It is the subject that makes them anxious. Teenagers find mathematics as the most difficult subject (Saad, 2005). They seldom see its significance in their everyday life. Although, Carlos (2012) stated that a person doesn't need to be a math genius to appreciate math, many students still hate math. This was also revealed in a Gallup youth survey conducted in 2004. Thus, Saad (2005) said that it is not surprising to find the subject having the lowest performance level. Unfortunately, people have the tendency to blame educators for the poor performance of students in mathematics (Stites, 1993).

Mathematics education is not necessarily provided in an agreeable way, but it must be accessible to all the pupils and this must be taught during basic education (UNESCO, 2012). However, both national and international assessment shows that many pupils' mathematics knowledge and competencies fall short of the expected level.

Many Filipino scientists, engineers, and mathematicians have made their names abroad. The Philippines is also proud for having top winners in different international competitions. However, it is sad to note that in general, Filipino students' performance in international and national assessment studies is below par compared with neighboring countries (Tan, 2012). The ten year basic education curriculum, the shortage of qualified math teachers, teacher-centered classroom activities and the difficulty of the pupils to understand the English language in teaching mathematics are among the reasons of having this kind of situation in our country.

A global survey ranks the Philippines 115th out of 142 countries in perceived quality of Math and Science education. This was based on the World Economic Forum's (WEF) Global Competitiveness Report for 2011-2012 which placed Singapore, Taiwan, Hong Kong and South Korea at the top of the list.

The results of the Trends in Mathematics and Science Study (TIMSS) administered in 2003 revealed that the Philippines was the 41st among the 45 countries ranked on the basis of the students' mathematics achievement. Again, five (5) Asian countries were on top. It was noted that the performance of Filipino students in the TIMSS 2003 were similar to those in the TIMSS 1999. While the international average score was 58.25%, the Philippines got 47.25% slightly higher than Botswana, Saudi Arabia, Ghana and South Africa,

the latter ranked last. Simply put, the Philippines is found on the lower tail end of the norm.

For the past 12 years, Mathematics proficiency in the Philippines has fast deteriorated. This alarming condition is noted in results of nationwide tests. A National Achievement Test (NAT), showed that less than 27 percent of the grade school pupils have mastered Mathematics. The NAT results in the mathematics area showed that grade six pupils performed below the 75% mastery level set by the Department of Education (DepEd). In 2012, most of the grade six pupils got a mean percentage score (MPS) between 35% and 65%. This means that pupils have not truly mastered the necessary skills. Because of this, the DepEd considered teaching mathematics as a major challenge to Philippine education.

In view of the poor assessment results among Filipino learners in mathematics, there is a need to improve mathematics teaching. The instructional process should move toward the proper development of the mathematics skills of students so that they become competitive and useful citizens of the country and of the world. A more radical suggestion was made by Diaz (2007) when he said that there is a pressing need to reform mathematics education in the Philippines. He suggested that mathematics concepts and skills should be studied from kindergarten to high school. On top

of this, the higher order thinking skills should be emphasized (Leongson, 2003).

The utilitarian perspective is also observed in the views of some concerned individuals. Mathematics education should not only receive serious consideration for the sake of global competition but also as a major factor in national development (Ogena, et. al, 2010). Thus, it should be accessible to all pupils enrolled in school. Henceforth, all learners should acquire mastery of math concepts and skills that will eventually make them productive in the society they choose to belong. In this rapidly changing world, those who can understand and perform mathematics will have an opportunity in choosing the right path for their future.

According to Kennedy and Tipps (2000), in order for the learners to be successful in mathematics, they should acquire understanding of concepts, proficiency with skills, and a positive attitude in mathematics. Therefore, teaching mathematics should focus on the balancing and sequencing of conceptual knowledge with procedural knowledge. In addition, the goal of mathematics instruction is to help the students learn and master the concepts and use this knowledge in solving problems and developing their reasoning abilities.

Today, assessment of success in Mathematics is focused on mathematical proficiency in five areas, namely, conceptual understanding,

procedural fluency, strategic competence, adaptive reasoning, and productive disposition. The DepEd pegs its target mastery at 75%. This may have evolved from the Bloom and Block recommendation in the 1970's placing 75% at the high level proficiency. In the K to 12 curriculum, students' performance are described based on their proficiency levels whether they beginning, developing, approaching proficiency, proficient or advanced level.

The mathematical proficiency of the pupils' nowadays is becoming poor. Worse of all, many fail on this area. Only students in the higher sections or those who can afford to pay tutors become proficient. On the other side, there is a large number of pupils that are left behind in terms of gaining knowledge, computing, solving, strategizing, problem solving and decision making.

In the Division of City of Santa Rosa, no schools in the elementary level, both public and private, reached the target mastery level, 74.41% being the highest and 26.79% being the lowest. The case was also the same for the secondary level. No secondary schools reached the mastery level. The result shows that math learners in the secondary level have poor foundations. It is believed that for secondary level students to succeed in mathematics, they need a good foundation that will enable them to do the learning tasks appropriate for their age and level.

In Balibago Elementary School alone, this 75% target of mastery level in Mathematics was not also achieved, based on the 2014 NAT result. The MPS got by the school in Mathematics was 67.41%. For the past five years, this target mastery level was found to be difficult to reach even if the administrators in the division engaged the pupils in activities and innovations that are designed to uplift the mathematical proficiency of the pupils like MTAP and Mathscore. By the time the pupils finish grade six, they were expected to have understanding of the basic mathematical concepts and be proficient in the mathematical processes. This should enable them to cope with the spiral curriculum in high school mathematics that include more topics requiring higher order thinking skills, ability to conceptualize, and ability to apply this subject to real-life situations. However, it has been observed that this was very difficult to achieve.

The different problems encountered in teaching mathematics, the low performance of the Filipino students in assessments, and the observation of other mathematics teachers regarding the poor performance of students in their classrooms prompted the conduct of this study. There seemed to be a need to take a close scrutiny of the mathematical proficiency of students and correlate it to math achievement. Information on the pupils' mathematics proficiency in relation to math achievement provide inputs to the improvement of both learning and teaching.

Conceptual Framework

Mathematics has always been regarded as an essential tool in the study of various fields. It is exemplified by methods that attempt to give precise expressions to logical thought. Engineering, the natural sciences and the social sciences are already becoming more analytically oriented and more mathematical in flavor. Breslich (1966) speaks on the importance of mathematics in general education. He said that Mathematics is important in general education because the average citizen of today needs considerable mathematical knowledge in the activities and experiences of everyday life and because mathematics supplies a means of understanding important aspects of the world.

In 2001, the National Research Council (NRC) released its consensus report entitled *Adding It Up,* to give a more rounded portrayal of the mathematics children need to learn, how they learn it, and how it might be taught to them more effectively. The NRC adopted a definition of mathematical proficiency that presented a comprehensive view of what they thought constituted successful mathematics learning (NRC, 2001).

More recently, Kilpatrick, Swafford, and Findell, (2001) described the mathematics to be learned, their reading of the research in cognitive psychology and mathematics education, their experience as learners and teachers of mathematics, and their judgment as to the mathematical

knowledge, understanding and skill people need today. They have led us to adopt a composite, comprehensive view of successful mathematics learning. Recognizing that no term captures completely all aspects of expertise, competence, knowledge, and facility in mathematics, they have chosen *mathematical proficiency* to capture what we think it means for anyone to learn mathematics successfully.

The NRC and Kilpatrick state that mathematical proficiency, has five strands, namely, conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition.

The most important observation they make about these five strands is that they are interwoven and interdependent in the development of mathematical proficiency. To understand what mathematical proficiency entails, one must first consider the strands individually and then consider the interdependent nature of the strands as shown in Figure 1. They argue that helping children acquire mathematical proficiency calls for an instructional program that addresses all its strands. All students should become increasingly proficient in mathematics as they start from kindergarten to Grade Eight. They should also cope with mathematical challenges of daily life situations.

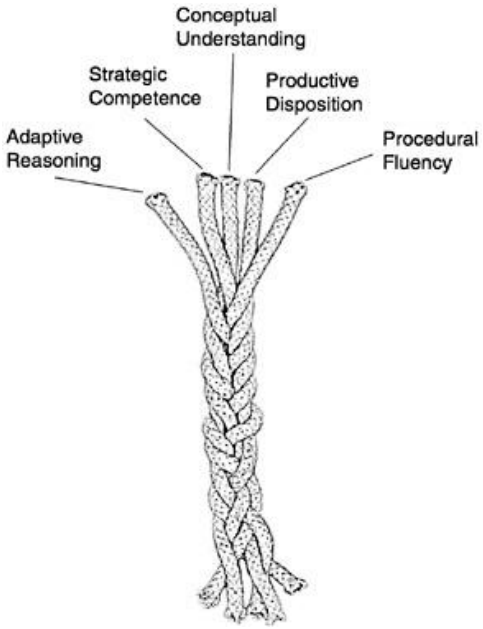


Figure 1. The Strands of Mathematical Proficiency.
Source: NRC (2001)

This observation has implications on how students acquire mathematical proficiency, how teachers develop that proficiency in their students, and how teachers are educated to achieve that goal.

Kilpatrick, Swafford and Findell (2001) presents the interdependence of the five components of learner's mathematical proficiency in problem solving. It starts with a clear grasp and understanding of the concept/problem, efficient strategies in solving the problems, meaningful procedures and justified reasoning. This results in a challenging, engaging and investigative problem solving. All these are purposively to refine mathematical proficiency.

The NRC starts the discussion of mathematical proficiency with conceptual understanding. This strand refers to the comprehension of mathematical concepts, operations, and procedures. People with conceptual understanding have their mathematical knowledge organized in such a way that they can easily use it in appropriate contexts. Moreover, their knowledge is not in separate, disconnected pieces, but rather their knowledge builds from their old conceptions to newer ones.

Hiebert and Levfre (1986) stated that conceptual understanding can be thought of as a connected web of knowledge, a network in which the linking relationships are as prominent as the discrete pieces of information. Relationships pervade the individual faces and provisions so that all pieces of information are linked to some network.

According to the National Research Council (2001), a significant indicator of conceptual knowledge is being able to represent mathematical situations in different ways and knowing how different representations can be useful for different purposes.

The next strand is procedural fluency. It is the knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently, (NRC, 2001). The procedural knowledge referred to is any and all methods one might use to

solve a mathematical problem, including written procedures, mental procedures, computer or calculator use, and modeling with manipulative.

Procedural fluency is not an opposition to conceptual understanding. On the contrary, the two strands work together to help build mathematical proficiency. Having procedural knowledge can lead to new conceptual understandings.

MacGregor (2013) mentioned that students who do not possess an adequate level of procedural fluency will devote much of their attention resources to the task of basic computation at the expense of developing a deep understanding of more complex mathematical ideas. Pupils who lack procedural fluency will find it difficult in dealing with problem solving.

Strategic competence is the ability to formulate mathematical problems, represent them, and solve them (NRC, 2001). Having strategic competence enables one to formulate a problem mathematically and then use his or her knowledge to solve it. Strategic competence is invoked in deciding which strategies might be useful in solving the problem and in finding connections to previous mathematical experiences in which similar problems were solved. This strand is similar to what has been called problem solving and problem formulation in the literature of mathematics education and cognitive science, and mathematical problem solving, in particular, has been studied extensively. (Kilpatrick et.al., 2001, p. 124).

Townsend, Lannin, and Barker (2009) found that students who were given opportunities to generalize algebraic tasks used recursive and proportional reasoning and were explicit in their choice and use of strategies. These students differed from students taught to focus on key words and to use those words to determine the operations needed (Mayer & Hegarty, 1996) instead of trying to make sense of and formulate a mathematical problem relevant in the given situation.

Another strand is adaptive reasoning, the capacity to think logically about the relationship among concepts and situations (NRC, 2001). Ability in adaptive reasoning enables one to consider alternative approaches, to follow the mathematical logic of proposed proof, to note logical inconsistencies or contradictions, and to justify any conclusions. This strand is the bond that cling everything in mathematics (Kilpatrick et.al., 2001,). The justifications need not be formal proofs, but rather, those that would provide sufficient reasons. People with adaptive reasoning know when their solutions are correct, not because of the particular procedures they use but because they could follow the steps they use to solve in a logical manner and justify their solutions. In problem solving, adaptive reasoning is always present and it interacts with the other strands of mathematical proficiency. Through strategic competence, pupils will visualize and represent the problem but adaptive reasoning must identify whether the strategy to be use is valid and appropriate. The ability to

justify one's work and give a correct solution and conclusion to a problem are indicators of adaptive reasoning.

The last strand is productive disposition. This is the tendency to see sense in mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning mathematics pays off, and to see oneself as an effective learner and doer of mathematics (NRC, 2001). Students who have productive disposition see mathematics not as a set of arbitrary rules that one must memorize but as a system of connected conceptions that, with diligent effort, can be understood. This strand is very different from the other strands. It encompasses issues such as a person's affect, beliefs and identity, whereas the other four strands focus mainly on cognitive processes. However, productive disposition is needed to build the other four strands (NRC, 2001). Moreover, the strengthening of the other four strands helps to build one's productive disposition.

Resnick's (1987) states that the term disposition should not be taken to imply a biologically inherited trait, but that a disposition, is more akin to a habit of thought, one that can be learned and, therefore, taught. Productive dispositions in mathematics can be developed in all learners and teachers play active roles in the construction.

Mathematics achievement has shown that the students from each major level of education in Asia seemed to outperform their counterparts.

Many studies have examined students' thinking about school and their attitude toward Mathematics. Mathematics performance involves a complex interaction of factors on school outcomes. Although the relationship between mathematics performance and student factors have been studied widely, it is important to investigate the factors that contribute students' mathematics performance.

Mathematical proficiency and achievement go in hand together. In her study, Servando (2014) said that there is a significant relationship between conceptual understanding, procedural fluency, strategic competence and mathematics performance. She concluded that pupils have a favorable disposition towards mathematics. A pupil cannot perform well in a math subject if he is not mathematically proficient. In problem solving, this means that underlying concepts are fully grasped, operations to be employed are clear, representations are well illustrated, procedures are reasonable and logical and the utilitarian value of math is realized.

This study is anchored on the hypothesis that mathematical proficiency is related to achievement of pupils in mathematics. This study also determined whether the strands influence mathematical achievement.

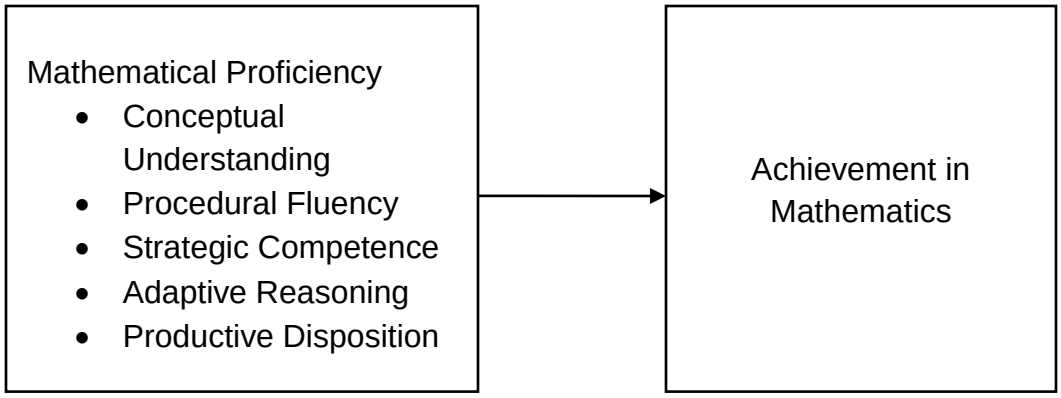


Figure 2. Conceptual Paradigm Illustrating the Relationship between Mathematical Proficiency and Achievement

Figure 2 presents the conceptual paradigm of the study. There are five strands of mathematical proficiency, namely, conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. The arrow indicates that the five strands are related to mathematics achievement. Strands significantly correlated to achievement were subjected to regression analysis to identify which strand predicts achievement.

The concern of this study was to determine if, indeed, proficiency is related to math achievement. Should a positive significant relationship exist, the next concern would be to identify the predictor variables. This knowledge may help mathematics teachers in fine tuning their instructional practices so

that they will produce students with the necessary skills and competencies to meet the challenges of a complex world.

Statement of the Problem

The purpose of this study was to describe the level of mathematical proficiency and achievement of grade six pupils and determine if a significant relationship exists between them.

Specifically, it sought to answer the following questions:

1. What is the level of pupils' mathematical proficiency in terms of:
    1.1 Conceptual Understanding;
    1.2 Procedural Fluency;
    1.3 Strategic Competence;
    1.4 Adaptive Reasoning;
    1.5 Productive Disposition.
2. What is the level of pupils' achievement in Mathematics?
3. Is there a significant relationship between the strands of mathematical proficiency and achievement?
4. Which among the strands of mathematical proficiency influence mathematics achievement?

Hypothesis of the Study

The study will test the following hypotheses;

1. There is no significant relationship between the strands of mathematical proficiency toward Mathematics achievement.
2. The mathematical proficiency does not influence the achievement in mathematics.

Significance of the Study

The result of this investigation will be useful to the following educators as they explore correlates of achievement in mathematics.

To the Curriculum Planners. The results of this study can guide curriculum planners in designing the curriculum for instruction. The results may enhance their awareness of the factors that influence math achievement of pupils. Greater awareness of variables that enhance mathematics education provide guidance in planning and developing new policies and instructional strategies that can help in enhancing quality mathematics education.

To The Mathematics Teachers. Since the teachers have the direct contact with students, findings of this study will intensify their creativity and inventiveness to identify the factors that affect their effectiveness as math teachers. It can provide information on the actual achievement level of the

pupils in mathematics. With this, teachers could adjust their way of teaching and plan more effective instructional materials that can help in enhancing the proficiency level of the pupils.

To The Schools. The results of this study may be used to come up with programs and learning activities that will enhance the mathematical proficiency and achievement of the pupils. This study also will provide the institution to prepare the pupils as they enter in the higher level of schooling.

To The Students. Improvements in the curriculum based on the results of this study will benefit the pupils in the long run. Instructional practices that intertwine the five strands will trickle down to the students making them active, involved and proficient in the subject.

To The Future Researcher. The findings of this study will serve as their baseline data when they attempt to conduct similar study about mathematical proficiency.

Scope and Delimitation of the Study

The study was confined to the mathematical proficiency and achievement in Mathematics of grade six pupils of Balibago Elementary School, Division of City of Santa Rosa, and School Year 2015-2016. The mathematical proficiency includes five strands, namely, conceptual

understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition (NRC, 2001). These variables were measured using the mathematical proficiency test (see Appendix F) developed by Dimaculangan (2015).

The achievement in Mathematics were based on the pupils' average grade on the first and second grading period as shown in their report card.

This investigation was limited to the analysis of the responses of the learners in the mathematical proficiency test in relation to their achievement in mathematics. Furthermore, only grade six pupils of the said school are the participants of this study.

Definition of Terms

To avoid ambiguity, the following terms are defined both conceptually and operationally as used in this study:

Achievement. This term refers to the average of the learners received in the learning areas of the curriculum at the end of the year. In this study, it pertains to the grades in Mathematics obtained by grade six pupils during the first and second grading period.

Mathematical Proficiency. This refers to the complete aspects of expertise, competence, knowledge, and facility necessary for anyone to learn

mathematics successfully (Kilpatrick, et.al, 2001). It consists of five strands, namely, conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. In this study, it refers to proficiency level in mathematics of the pupils based on the test given.

Conceptual Understanding. This term refers to the integrated and functional grasp of mathematical ideas, which enables the learners to learn new ideas by connecting those ideas to what they already know (Kilpatrick, et.al, 2001). In this study, it is one of the five strands that are interwoven and interdependent in the development of proficiency in mathematics.

Procedural Fluency. This term refers to knowledge of procedures, knowledge of when and how to use them appropriately and skill in performing them flexibly, accurately and efficiently (Kilpatrick, et.al, 2001). In this study, it is one of the five strands that are interwoven and interdependent in the development of proficiency in mathematics.

Strategic Competence. This term refers to the ability to formulate, represent and solve mathematical problems (Kilpatrick, et.al, 2001). In this study, it is one of the five strands that are interwoven and interdependent in the development of proficiency in mathematics.

Adaptive Reasoning. This term refers to the capacity to think logically about the relationships among concepts and situations (Kilpatrick, et.al, 2001). In this study, it is one of the five strands that are interwoven and interdependent in the development of proficiency in mathematics.

Productive Disposition. This refers to the inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy (Kilpatrick, et.al, 2001). In this study, it is one of the five strands that are interwoven and interdependent in the development of proficiency in mathematics.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter deals with a collection of related literature and studies which are found relevant in the conduct of the present study. The information gained from these reading materials had greatly contributed in the conceptualization of the structural framework of the study.

On Mathematical Proficiency

Mathematics is one of humanity's greatest inventions. By upgrading the capabilities of the human mind, mathematics has facilitated the development of science, technology, engineering, business and government. Mathematics is also an intellectual success of great sophistication and beauty that epitomizes the power of deductive reasoning. People must know the basic of mathematics for them to fully participate in society. Citizens who cannot reason mathematically are cut off from whole realms of human endeavor. Innumeracy deprives them not only of opportunity but also of competence in everyday tasks.

Kilpatrick, et.al (2001) used the term mathematical proficiency to capture what it means to learn mathematics successfully. This means that learners who understand basic concepts, fluent in performing basic

operations, exercise a selection of strategic knowledge, reason clearly and flexibly, and maintain a positive outlook toward mathematics are mathematically proficient. The five interwoven strands of mathematical proficiency are conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition. Kilpatrick et.al (2001) used these strands in an integrated manner, so each reinforces the others. Askew (2013) supports this idea that reinforces the integration of the strands by indicating that fluency in calculation and reasoning about number system are mutually entwined. He also added that if all the strands are involved in teaching and learning it will assist in developing multiplicative reasoning in learners.

A summary of work by a panel of experts that represented the range of philosophies about mathematics education showed that mathematics proficiency is necessary for anyone to understand mathematics successfully. They further discussed that the five strands or components provide a framework for discussing the knowledge, skills, abilities, and beliefs. These components feature conceptual understanding, procedural knowledge and problem solving, and include additional specifications for reasoning, connection, and communication.

There are a lot of ways mathematics proficiency has been taught. But more focus had been done on concepts and skills. Strategies, reasoning and disposition as well as understanding procedure must be incorporated.

In a report written, the University of Georgia, College of Education leads an effort to revitalize the teaching of mathematics from kindergarten through college. This effort is to rebuild the infrastructure of teaching mathematics. This will prepare the teachers to focus on mathematical proficiency.

In the past years, studies were conducted to identify the mathematical proficiency of the pupils. They were able to find out the strengths and weaknesses of the learners in terms of skills in mathematics.

In a study, the researcher Lagundino (2005) revealed that the Grade VI pupils of Bangued West District as a whole obtained an “average” rating in the National Achievement Test (NAT) results and a “good” level of mathematics proficiency in terms of average grade. These are indicative of meeting the minimum average which is suggestive of a wide room or need for improvement in their proficiency in Mathematics. With this result, teachers should find appropriate motivation and strategies to train and teach the pupils the concepts and skills of their math subjects. The teachers need to emphasize the learning competencies which have not been mastered by the pupils.

Bigornia (2000) found out the factors affecting the mathematical proficiency level of grade six pupils such as teacher competence, pupils background and communication skills wherein these factors have highly significant relationship with pupils mathematics achievement. The 47.80% proficiency level of the grade six pupils based on the results of the achievement test administered was too far below the 75% mastery level. From the findings, it is recommended that the school administrators perform their supervisory functions in order to ensure that the teachers are performing their job in the classroom well.

Furthermore, Dimaculangan (2015) found out that grade six pupils are highly mathematically curious and motivated and have average level of mathematical proficiency. Moreover, Servando (2014) revealed that there is a significant relationship between conceptual understanding, procedural fluency, strategic competence and mathematics performance. She also notes that strategic competence predicts mathematics performance.

These studies showed that mathematical proficiency is very important on the part of the learners. In order for them to become proficient, they must acquire and learned how to apply the five strands of mathematical proficiency in their daily lives.

Conceptual Understanding

People with conceptual understanding have their mathematical knowledge organized in such a way that they can easily use it in appropriate contexts. Moreover, their knowledge is not in separate, disconnected pieces, but rather their knowledge builds from their old conceptions to newer ones. Malumes, Jr. (2005) stated that understanding of concepts in Mathematics is the key to its successful study and understanding.

This statement was supported by Marshall (2006) in his study. He concluded that mathematics is one subject that demands pupils to fully grasp conceptual understanding. Without the ability to interconnect concepts, the process of learning Mathematics would become disjoined and illogical.

Cramer (2001) finds it essential that students learn in a conceptual manner. She believes that learners must continuously be involved in concrete models and be able to express how they work, why they work, and how they compare to other problems.

In an article written by Wiggins (2014) he stressed the significance of conceptual understanding as a key component of mathematical proficiency. He further mentioned that many teachers do not understand conceptual understanding. Students possess understanding if they master all the definitions and rules in mathematics. The standards themselves arguably offer

too little for confused educators. The evidences merely states that “understanding” means being able to justify procedures used or state why a process works.

Willingham (2010) discusses the poor results for basic content and procedural knowledge. However, he also notes that many students’ lack of conceptual understanding. He further explained that conceptual knowledge pertains to an understanding of meaning in the sense that multiplying two negative numbers gives a positive result is not the same as understanding why it is true.

To fully develop these skills among students, Cotton (2008) found out that challenging her students to convey mathematics, both orally and in writing, deepened her students’ disposition in mathematics. Levels of understanding intensify when a variety of methods were presented and discussed where learners could “grab onto” the ideas that best suited them.

As Ally (2011) found, regardless of the continued rhetoric about the need for students to develop conceptual understanding, opportunities for this to happen do not occur continually in regular classrooms. However, frameworks for effective teaching to support children’s conceptual understanding also emphasize the need for tasks, which are mathematically challenging and significant (Fraivillig, 2001).

Procedural Fluency

Procedural fluency is a critical component of mathematical proficiency. It refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently (Kilpatrick, et.al., 2001). Procedural fluency is more than knowing facts or procedures, but it is more than understanding and being able to use one process for a given task. It constructs on the foundation of conceptual understanding, strategic reasoning, and problem solving (NCTM, 2000, 2014).

Rohrer (2009) mentioned that effective teaching practices provide experiences that help students link procedures with the underlying concepts and provide students with opportunities to exercise or practice strategies and to prove their processes. Practice should be concise, interesting, purposeful, and categorized.

Further, Booth et.al, (2013) said that analyzing students' procedures often reveals ideas and misunderstanding that help teachers in planning next steps in instruction. In the same way, worked examples can serve as a high-end instructional tool, permitting teachers to understand how students analyze why procedures work or don't work and consider what procedure might be most appropriate in a given situation.

Bautista (2013) construed that the students' procedural fluency is measured by their mathematical skills, both algebraically and trigonometrically. This means that their mathematical abilities predict their success in evaluating problems in Physics.

Concomitantly, the written-mathematical explanation, which involves the verbal mode of problem solving in science, is also controlled by their English ability as shown by their performances on the select constructed response tasks. It can be said that students' achievement is dependent on their capability to comprehend and translate problems into a functional working schema and diagrams where they can make solution and strategies in problem solving.

These results support the findings and conclusions of Kilpatirck et.al. (2001), Pugale (2004, 2005), Suh and Moyer-Packenham (2007), Ginsburg (2012) and Graven and Stott (2012) when they concluded that the increase on the levels of cognitive demand, mathematical complexity and levels of abstraction complements procedural fluency and written-mathematical explanations of students in problem solving tasks is based on their ability to use cognitive knowledge and skills in contextualizing a problem into a functional knowledge and presentation.

Strategic Competence

Strategic Competence refers to the ability to formulate mathematical problems, represent them, and solve them (Kilpatrick,et.al, 2001).

The work of Jordan, Hanich & Kaplan (2003), Landeri, Began & Butterworth, (2004), (as cited by Kilpatrick,et.al., 2001), shown that students with general math difficulty, with and without reading problems, undergo comparable deficits on number combinations. Other research suggested that specific math difficulty, usually defined as performance on computational task, is associated with difficulties in procedural knowledge.

Numerous factors affect one's use of strategic competence. In trying to develop strategic competence in a group of fifth-grade students, Townsend, Lannin, and Barker (2009) found that students who were given opportunities to generalize algebraic tasks used recursive and proportional reasoning and were explicit in their choice and use of strategies.

MacGregor cited that when students use their strategic competence they apply their mathematical knowledge in order to select the most appropriate procedures when faced with a mathematical problem. Students that do not possess adequate strategic competence often do not know how to approach a mathematical problem; they have trouble interpreting the nature of the problem and do not know what strategy or strategies are appropriate to

solve the problem. Solving mathematical problems proficiently requires a combination of the proper use of conceptual understanding, procedural fluency, and strategic competence.

Adaptive Reasoning

Many conceptions of mathematical reasoning have been confined to formal proof and other forms of deductive reasoning. The idea of adaptive reasoning is very broad, including not only informal explanation and justification but also intuitive and inductive reasoning based on pattern, analogy, and metaphor.

According to the Australian Curriculum, students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they proved that something is true or false and when they compare and contrast related ideas and explain their choices (Mathematics (F-10) Australian Curriculum Assessment and Reporting Authority, 2013).

In addition, Newton (2010) stated that students with adaptive reasoning can think logically about math and they can explain and justify what they are doing. The key to getting students to engage in mathematical discussions is to create a talk friendly environment. He also adds that it is important that students feel that what they have to say will be considered worthy and

important. They need to know that they will not be mocked, ridiculed or belittled.

Cunningham (1999) noted that “not all talk sustains learning. For classroom talk to promote learning it must be accountable to the learning community, to accurate and appropriate knowledge, and to rigorous thinking.” The key idea here is the talk that promotes learning, that expands thinking, and that contributes to the intellectual community.

Productive Disposition

This strand is related not directly to mathematical knowledge but instead to the attitudes and beliefs people have toward mathematics as well as how closely they identify with being a learner and doer of mathematics.

Siegfried,et.al.(2012) described people with productive disposition as being confident in their mathematical knowledge and abilities and as able to continue to increase their knowledge and abilities by steady effort and the gaining of new mathematical experiences.

It is interesting to note that the only one of the five strands’ of mathematical proficiency missing from the new Australian Curriculum is productive disposition. Perhaps this is not surprising given Kilpatrick’s (2011) comment that in the Mathematics Learning Study, which led to his report, some experts opposed having productive disposition as one of the five

strands, while other teachers believed that it was critical for students to have a productive disposition towards mathematics if the other proficiency strands were to be met.

Moreover, McGregor (2013) revealed that productive disposition together with conceptual understanding, procedural fluency, and strategic competence positively affect the performance of the students in mathematics.

As Siegfried (2012) noted, although productive disposition in isolation is a little-researched construct, connection of productive disposition to the other four strands of mathematical proficiency is completely unresearched. He further stressed that the five strands must be developed simultaneously to ensure proficiency in mathematics. Productive disposition in mathematics can be developed in all learners, and teachers can play active roles in the construction.

Achievement in Mathematics

Many studies discussed the achievement of pupils when it comes to mathematics subject. They reveal the proficiency and deficiency level of the pupils. Some of the result are positive but they are mostly negative and these were affected by different variables.

Guskov (2009) found out that the skills of pupils are getting worse and worse. Many children in secondary schools have low achievement in mathematics. His experience showed that problem started in primary school where the root is bad practical skills in counting and simple mental computations. He said that all students who have problems with addition and subtraction within the limits of 20, multiplication and division within the limits of 100 do not master many basic topics of school math successfully. He also said that basic concepts in mathematics in the primary level should be given more emphasis so that pupils could master the lessons considered being least mastered skills.

Dulfo (2006) focused on problem solving difficulties among pupils. The study described grade four pupils as greatly handicapped in problem solving. Factors that affect the abilities of pupils in problem solving are comprehension skills and procedural skills in performing fundamental processes.

To enhance higher order thinking skills in elementary mathematics, Dela Cueva (2004) developed and validated drill charts. The use of drill charts showed positive effects in improving the academic performance of pupils in elementay mathematics IV.

Dacara (2002) recommends in her study that to improve performance of pupils in Mathematics, constant drill or practice should be done to bring mastery of the skills.

In addition, Puchner (2008) analyzed an action research study. His focus was on the effectiveness in enhancing student achievement in mathematics. Puchner's results, were positive in that the research technique was effective in enhancing student achievement in mathematics.

Erickan et.al (2005) reported the results of an exploratory study examining factors that might be associated with achievement in Mathematics and participation in Mathematics courses in Canada, Norway, and the United States of America (USA). These factors, which were not directly related to schooling accounted for large degrees of variability, 24% to 39%, in Mathematics achievement scores. Confidence in Mathematics was the strongest predictor of achievement for students from Canada and Norway.

However, Kramarski & Gutman (2005) cited that mathematics achievement could not be completely or largely predicted by only few variables since there were so many variables such as teacher and student characteristics affecting student achievement.

Furthermore, Valencia (2000) found out in her study that most of the students were in the above average category in terms of mathematics achievement level; furthermore data showed that students had varied mathematics achievement levels.

Synthesis

The reviewed related literature and studies were all found significant to the current study in as much as they are related either in content or methodology.

Mathematical proficiency, as defined by the National Research Council (NRC, 2001) consists of five interwoven and interdependent strands: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. The authors noted that proficiency is not an all or nothing prospect; pupils build proficiency over time through understanding and connecting mathematical concepts. Furthermore, learners cannot be called as mathematically proficient if they lack or are deficient in one or more of the strands. Efforts should be exerted to improve pupils' proficiency towards Mathematics since majority of the study reveals that most of the learners are below the proficiency level. They should be trained to understand the concepts and apply it in real-life situation.

Differences were noted on the studies reviewed and the current study on the latter is primarily focused on the relationship of mathematical proficiency and achievement of pupils' in Mathematics.

CHAPTER III

METHODOLOGY

This chapter presents the research design, the participants of the study, the research instruments, the data gathering procedure, and the data analysis procedure.

Research Design

The descriptive correlational method of research was employed in this study. This method is used if scores are known on a variable and see if they correspond systematically to scores in another variable (Mason and Bramble, 1997).

Descriptive method, otherwise known as “normative survey” is a fact-finding study with adequate and accurate interpretation. It is to collect demographic data about people’s behavior, practices, intentions, beliefs, attitudes, opinions, judgment, interests, perception and the like and then such data are analyzed, organized and interpreted (Calderon, 1993).

In order to determine the relationship between the mathematical proficiency and achievement of grade six pupils, the correlation method using Pearson r was used. This method of correlation was used because the variables are both interval variables. If corresponding observation scores is

made of two sets tend to have a similar position in their series, the correlation is positive. It is negative, on the other hand, if the corresponding values tend to be divergent in position in the perspective series (Zulueta, 2003).

These two approaches were used to investigate or describe the mathematical proficiency and achievement of grade six pupils in Balibago Elementary School, School Year 2015-2016.

Participants of the Study

The participants of this study were the 286 grade six pupils of Balibago Elementary Schools, School Year 2015-2016. Since the researcher wants to find out the proficiency level of the whole population of the specific school, all the pupils were included in this study as the respondents. So, no sampling method strategy was used in this study. The following tables show the distribution of respondents according to gender and age.

Table 1
Frequency Distribution of Respondents According to Gender

Respondents	Frequency	Percent
Male	136	48
Female	150	52
Overall	**286**	**100**

Female respondents represented 52 percent of the total number of respondents. The male respondents constituted 48 percent of the total population. There were more female students as this is usually the enrolment statistics in terms of gender.

Table 2 represents frequency distribution of respondents according to age.

Table 2
Frequency Distribution of Respondents According to Age

Age of Respondents	Frequency	Percent
10	15	5
11	140	49
12	105	37
13	18	6
14	8	3
Total	**286**	**100**

The table shows that the respondents' age ranges from 10 to 14 years old. Almost half of the respondents are 11 years old having 140 respondents or 49 percent of the total population. This age is the usual age of grade six pupils.

Research Instrument

The main instrument used in this study is the Mathematical Proficiency Test (MPT) which was developed by Dimaculangan (2015). The test is

composed of 210 items which covers the five strands of mathematical proficiency, namely, conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition. Each strand has 42 items based on the topics/lessons for grade six.

Table 3
Table of Specifications of the Mathematical Proficiency Test

TOPICS	STRANDS OF MATHEMATICAL PROFICIENCY				
	Conceptual Understanding	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Productive Disposition
Whole Numbers	1-3	43-45	85-87	127-129	169-171
Four Operations	4-6	46-48	88-90	130-132	172-174
Factors and Multiples	7-9	49-51	91-93	133-135	175-177
Angles	10-12	52-54	94-96	136-138	178-180
Fractions	13-15	55-57	97-99	139-141	181-183
Ratio and Proportion	16-18	58-60	100-102	142-144	184-186
Decimals	19-21	61-63	103-105	145-147	187-189
Percentage	22-24	64-66	106-108	148-150	190-192
Average	25-27	67-69	109-111	151-153	193-195
Temperature	28-30	70-72	112-114	154-156	196-198
Volume	31-33	73-75	115-117	157-159	199-201
Triangles	34-36	76-78	118-120	160-162	202-204
4-sided Figures	37-39	79-81	121-123	163-165	205-207
Polygons	40-42	82-84	124-126	166-168	208-210
TOTAL (210)	**42**	**42**	**42**	**42**	**42**

The MPT was use to determine the level of mathematical proficiency of pupils. The test items were chosen carefully to avoid bias among participants who have different social organizations. The content of the MPT were validated by five experts in the field, including two dissertation advisers. The test has a very remarkable consistency (r=0.81) based on the reliability test made by the researcher. This instrument will help in revealing the proficiency or deficiency level of the pupils.

The average grade of the first grading and second grading were used also to substantiate information on the mathematical achievement of the pupils.

Data Gathering Procedure

The data in this study were gathered following the stages discussed below.

Phase I. Preparation Stage

At this stage, readings on research related literature were done on the mathematical proficiency. Readings were also done to find out how correlational studies were undertaken on the achievement of pupils. The necessary instruments used in this study were also prepared.

Phase II. Administration Stage

The permission of the schools division superintendent and school principal were obtained for the administration of the research instruments to the target respondents. To ensure that students take the test seriously, they were oriented on the purpose of the study before the administration of the instruments. They were assured that the data gathered will be treated confidentially and that the findings of the study will not affect their status as students in the class. The questionnaires were administered to the respondents personally. The directions were explained and they were requested not to leave any item unanswered.

The test papers were then collected and checked. The data collected were coded, organized, collated, and tabulated in preparation for the statistical treatment, analysis and interpretation.

Data Analysis Procedure

In order to analyze and interpret the data, the following statistics were used: frequency, percentage, weighted mean, Pearson-Product Moment Correlation and multiple regression analysis.

Frequency was used to determine the number of responses in a particular item.

Percentage was utilized to determine the magnitude of the frequency count, specifically the respondents' mathematical proficiency.

Weighted Mean was used in determining the different weights of the score in the mathematical proficiency test.

The respondents' level of proficiency was determined accordingly based on a five-point level categorization. The following guide was used in assigning their levels in all the strands.

Scores		Level of Proficiency
35 – 42	-	Very High
27 – 34	-	High
19 – 26	-	Average
9 – 18	-	Low
1 – 8	-	Very Low

The descriptive ratings of the numerical ratings of the pupils' proficiency levels were based on the following:

90 and above	Advanced
85 – 89	Proficient
80 – 84	Approaching Proficient
75 – 79	Developing
74 and below	Beginning

Pearson Product – Moment Correlation Coefficient (r) was employed in finding the index of relationship between the mathematical proficiency and achievement of the respondents.

Multiple Regression Analysis was used to identify which among the mathematical proficiency variables influence the achievement of the pupils in math.

Chapter IV

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents, analyzes and interprets the data which were gathered in the study. The discussions are based on the order of the presentation of the specific research questions in the statement of the problem.

Problem 1. What is the level of pupils' mathematical proficiency in terms of:

1.1 conceptual understanding;

1.2 procedural fluency;

1.3 strategic competence;

1.4 adaptive reasoning and

1.5 productive disposition?

The mathematical proficiency of the respondents were obtained through the use of Dimaculangan's mathematical proficiency test (Appendix F). It consists of five strands, namely, conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition that are not independent but instead, represent different aspects of a complex whole, thus leading to the notion of intertwined strands (Kilpatrick, et.al,2001).

Table 4 shows the mean scores of the respondents on the five strands of mathematical proficiency that consists of 42 items per strand.

Table 4
Level of Pupils' Mathematical Proficiency

Mathematical Proficiency	Mean	Standard Deviation	Interpretation
Conceptual Understanding	16.51	4.93	Low
Procedural Fluency	13.35	3.95	Low
Strategic Competence	12.50	3.53	Low
Adaptive Reasoning	12.09	4.73	Low
Productive Disposition	11.48	6.26	Low
Overall	**13.19**	**4.68**	**Low**

It can be seen from Table 4 that the highest mean is on *conceptual understanding* and the lowest mean is on *productive disposition*. The mean achievements are low. The overall result shows that the pupils have *low mathematical proficiency*. This means that grade six pupils do not perform well in mathematics. Furthermore, they did not reach the mastery level required by Department of Education (DepEd). Teachers and students should double their efforts to reach a high level of proficiency. In order to learn knowledge and

skills, retain pupils as necessary until they are able to apply them to solve problems. Students must also learn with understanding (Wu, 2008).

With 42 as the highest possible score, the score on conceptual understanding is below 50%. It is short of the DepEd standard of 75%. It seems that more should be done to make pupils truly understand math concepts. They should truly know what they want to know with depth (Cotton, 2008).

A poor second performance is on procedural competency. At the Grade Six level, pupils should already possess basic operations processes. Much has to be done by teachers to make their students learn. The lowest mean reflects how students regard mathematics as if it has no value at all.

Based on the item analysis, Item No. 9 has the highest percentage (73%) of correct response in all the strands. The pupils seem to be familiar with divisibility by 9. Although a majority of the pupils master the divisibility concept, the remaining 27% of grade six pupils not knowing the concept is a matter of serious concern.

Item No. 9: Which statement is true?

A. 144 is divisible by 9.

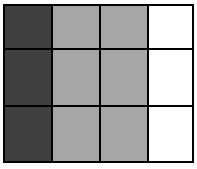
B. 739 is divisible by 6.

C. $3^3 \times 2^3 \times 4$ is 865.

D. $2^4 \times 3^2 \times 6$ is 890.

On the other hand, most of the pupils (80%) find Item No. 15 in conceptual understanding difficult to answer. Fraction concepts appear to be vague even with visual representations. One approach could have been the step-by-step method. In Item No. 15, the first step is to recognize the division vertically (or horizontally). There are 4. Second step is to determine how many shaded parts there are. There are 3. The concept of 3 out of 4 (or $\frac{3}{4}$). The pupils could not comprehend that there are 3 shaded parts out of four equal parts and that 1 out of 3 equal parts is represented by the dark shaded part. It seems that the logical connections are still loose among grade six pupils where fraction concepts are concerned. This finding is consistent with Espiritu's (2012) study that pupils have no conceptual understanding in unit of fractions, even though visual displays were used instead of numerical values.

Item No. 15: Which is true about the figure?



A. $\frac{1}{3}$ of $\frac{3}{4}$

B. $\frac{1}{4}$ of $\frac{3}{4}$

C. $\frac{3}{4}$ of $\frac{1}{4}$

D. $\frac{3}{4}$ of $\frac{1}{3}$

It is interesting to note that among the items on procedural fluency, Item No. 51 has the highest number of correct response (65.38%). The pupils were able to use appropriately their knowledge on divisibility. This is consistent with the performance in Item No. 9 which is also about divisibility.

Item No. 51: 45 336 is divisible by the following set of numbers EXCEPT _____.

A. 2,3,4,6,8,12
B. 2,3,4,5,6,8
C. 2,3,4,5,6,7,8,12
D. 2,3,4,6,8,9,12

In strategic competence, the pupils found it difficult to answer Item No. 102. Almost 80% of the pupils (78.67%) got the wrong answer on the topic ratio and proportion. In this item, where problem solving involves multiple stages, the performance is low. However, half of the pupils (51.75%) got the correct answer on Item No. 106 which is the highest among the items in this strand. In this problem which involves single step, pupils found it easy to follow and solve the problem.

Item No. 102: There are 4 lions in a zoo. They are fed 12 kg of meat a day, 2 more lions are added to the zoo. How much meat would have to be prepared now to feed all the lions for a day?

A. 12 kg B. 14kg C. 16kg D. 18kg

Item No. 106: A school has 1 500 pupils on a certain day, 30 of the pupils were absent. What is the percentage of the pupils who were present on that day?

A. 96%
C. 98%
B. 97%
D. 99%

Table 4 shows that the level of pupils' mathematical proficiency in adaptive reasoning and productive disposition is *low*. Since the pupils were not able to reach the mastery level in the first three strands, then they also find it hard to answer the items on adaptive reasoning and productive disposition. In adaptive reasoning, Item No. 131 has the highest correct answer (51.05%). This means that only half of the pupils were able to master this topic. Grade six pupils should have already master this lesson on fundamental operation. While in productive disposition, Item No. 185 reveals that the pupils have low proficiency in mathematics. This item got 38.81% correct answer. In this item, pupils were not able to use correctly their personal belief and opinion in performing it in mathematical problems. Attitude is important in developing productive disposition. These findings show us that having low proficiency on the other strand will result to low mathematical proficiency.

The item below is under adaptive reasoning.

Item No. 131: To determine the sum of values of the digit 3 in 6 813 425 and 387 627, one should know how to _____.

A. identify place values
C. add numbers greater than 1 000
B. approximate numbers
D. all of the above

Here is Item No. 185 under productive disposition.

Item No. 185: Chicken curry is the viand for dinner of Castro family. It is also Charmaines's favorite. She knows that it is just enough for the 8 members of her family. What must she do if she is done eating her part and still she would like to eat some more?

A. Get some more even if she knows that his eldest brother is not yet eating.
B. Ask her mother to cook some more so that she can have more to eat.
C. She will take her part and enjoy eating it so that all of the members could eat chicken curry.
D. Ask her father if instead of eating chicken curry he will eat fried chicken just to give in to her craving of the viand.

Based on the results, it can be gleaned that the higher the conceptual understanding, the higher will also be the procedural fluency, strategic

competence, adaptive reasoning, and productive disposition. Pupils' are more likely to become mathematically proficient when they start learning the basic concept of mathematics before going to a more complex process. Mathematical proficiency is not a one-dimensional trait, and it cannot be achieved by just focusing on just one or two of these strands.

Problem 2. What is the level of pupils' achievement in Mathematics?

Table 5 presents the achievement level of the pupils in Mathematics. The achievements in Mathematics were obtained from their grades in the first and second grading period.

Table 5
Level of Pupils' Achievement in Mathematics

Level	Frequency	Percent
Advanced	2	0.7
Proficient	12	4.2
Approaching Proficient	154	53.85
Developing	118	41.25
Beginning	0	0
Overall	**286**	**100.00**

The table shows that majority of the pupils have *approaching proficient* level of achievement in Mathematics. This means that much has to be done to improve the competencies of grade six pupils in mathematics. The result also reflects that the pupils' performance is homogeneous. The students' academic achievement plays an important role in producing the best quality graduates who will become great leader and manpower of the country (Ali, et. al., 2009).

Problem 3. Is there a significant relationship between the strands of mathematical proficiency and achievement in Mathematics?

Table 6 presents the relationship between the strands of mathematical proficiency and achievement in Mathematics.

The correlation matrix shows that the five strands are highly positively correlated. Further, the five strands are highly correlated to mathematics achievement. This means skills on the five strands should be emphasized in instruction focusing on conceptual understanding should be emphasized in instruction. According to Ignacio (2005), one of the reasons for the failure of the students in Mathematics, is lack of students' conceptual understanding of the subject. If the students learn rules or definition by rote they become weak in problem solving because they lack spatial visualizations.

Table 6
Correlation Between Mathematical Proficiency and Achievement in Mathematics

		Conceptual Understanding	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Productive Disposition	Achievement
Conceptual Understand-ing	Pearson (r) (p-value)	1	.424** (.000)	.288** (.000)	.220** (.000)	.293** (.000)	.596** (.000)
Procedural Fluency	Pearson (r) (p-value)		1	.356** (.000)	.191** (.000)	.280** (.000)	.434** (.000)
Strategic Competence	Pearson (r) (p-value)			1	.241** (.000)	.224** (.000)	.269** (.000)
Adaptive Reasoning	Pearson (r) (p-value)				1	.546** (.000)	.184** (.002)
Productive Disposition	Pearson (r) (p-value)					1	.205** (.000)
Achievement	Pearson (r) (p-value)						1

** Correlation is significant at the 0.01 level (2-tailed)

Furthermore, the computed values show that there is a significant relationship between procedural fluency and mathematical achievement. The result implies that achievement in mathematics is associated with procedural fluency. This simply shows that as the procedural proficiency increases, the

academic achievement will also increases within the rate of 43 percent. This strand of mathematical proficiency is necessary for the students to get a high achievement. Nathan (2002) says that many students, despite a good understanding of mathematical concepts, lack skills in computing. These students used to struggle especially in primary school, where basic computations are stressed. They were not able to apply the step by step process in solving mathematical problems.

Moreover, the paired variables between strategic competence and achievement in Mathematics found to have a significant relationship. This means that these two variables are related to each other. Though there is a small percentage of their relationship but still when the strategic increases the achievement will also increases. This proves that one cannot get a high achievement if the pupils do not have the ability to formulate, represent and solve mathematical problems. Townsend, Lannin, and Barker (2009) found that students who were given opportunities to generalize algebraic tasks use recursive and proportional reasoning and were explicit in their choice and use of strategies. Pupils should learn not only the concepts and the skills of computing but also they must learn how they solve problems using different strategies.

In addition, the correlation coefficient of the paired variables between adaptive reasoning and achievement in Mathematics is 0.184 which is

significant at 0.01 level.. Yet, there is a positive relationship exists between the adaptive reasoning and achievement in mathematics. Further, this implies that as the independent variable increases, the achievement also increases. Newton (2010) stated that students with adaptive reasoning can think logically about mathematics and they can explain and justify what they are doing. When the pupils were able to master these skills, they will achieve higher.

Likewise, it was found out that there is a significant relationship between productive disposition and achievement. This means that productive disposition partly explains math achievement. The better the disposition the greater the math achievement. This strand of mathematical proficiency is necessary in developing the higher order thinking skills especially when applying this matter in real-life situations. Siegfried, et.al. (2010) described people with productive disposition as being confident in their mathematical knowledge and abilities and are able to continue to increase their knowledge and abilities by steady effort and the gaining of new mathematical experiences. However, Blechle (2007) believes that positive attitude and productive disposition must be developed together with the other strands simultaneously so that students will see mathematics as useful and worthwhile. Moreover, Servando (2014) concluded that the pupils showed favorable disposition towards mathematics.

Problem 4. Which among the strands of mathematical proficiency influence mathematics achievement?

Because there is a significant correlation between the five strands of mathematical proficiency and achievement in mathematics, a regression analysis was done to find out which among these strand best influence the math achievement. The following table shows the regression analysis for predicting achievement in Mathematics.

Table 7
Regression Analysis for Predicting Achievement in Mathematics

Predictors	Beta	t value	p value	Interpretation
Conceptual Understanding	0.494	9.357	0.000	Significant
Procedural Fluency	0.208	3.865	0.000	Significant
Strategic Competence	0.050	0.987	0.329	Not Significant
Adaptive Reasoning	0.040	0.718	0.473	Not Significant
Productive Disposition	-0.031	-0.537	0.571	Not Significant

$R=0.632_a$ $R^2= 0.399$

As shown in Table 7, the variables or strands that best explain much on the achievement in Mathematics of the respondents are the conceptual

understanding and procedural fluency with the Beta value of 0.494 and 0.208, respectively. These findings are similar to Tongco (2012) that conceptual understanding and procedural skills are significant predictors of academic performance. The remaining three strands do not seem to correlate with math achievement. However, all the five strands can jointly explain 38.8% of the variables in math achievement. The F value of 37.175 also implies significance. The higher the conceptual understanding and procedural fluency, the higher also will be the strategic competence, adaptive reasoning, and productive disposition. Pupils with better conceptual understanding and procedural skills are more likely to have a better academic performance (Tongco, 2012).

Chapter V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter includes the summary of findings based on the data gathered from the study. The conclusions and recommendations were based on the findings.

Summary

This study aimed to describe the mathematical proficiency, namely, conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition of grade six pupils. This study was conducted to determine the relationship between mathematical proficiency and achievement in mathematics. Regression analysis was made to find out which among the strands of mathematical proficiency influence mathematics achievement.

This study used the descriptive correlational method in analyzing the data. The respondents of the study were composed of 286 grade six pupils, 136 were male and 150 were female, from Balibago Elementary School. A mathematical proficiency test consisted of 210-item test, 42 items per strand, was used to measure the pupils proficiency level. The achievement in mathematics of pupils was based on their average grade in the first and second grading period.

Findings

Based on the analysis of data, the following findings were obtained.

1. In terms of level of mathematical proficiency, on the five strands are *low*. The best achievements are items on conceptual understanding. The lowest is on productive disposition.
2. In terms of level of achievement of the pupils, the results showed that their performance in Mathematics was *approaching proficiency*. Pupils' achievement in mathematics is homogenous.
3. There is a significant relationship between achievement in mathematics and each of the five strands of mathematical proficiency.
4. All the five strands of mathematical proficiency jointly influence math achievement. However, the best predictors of mathematical proficiency are conceptual understanding and procedural fluency.

Conclusions

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

1. Pupils have low mathematical proficiency. They need to improve their competencies on the five strands. Mathematics teaching must be designed to integrate the five strands skillfully so that the pupils level up in their math achievement.

2. The pupils have low Mathematics achievement level. In order to raise this level, mathematics proficiency should develop in them.
3. Pupils with higher mathematical proficiency level, performed better than those who are low proficient in the subject. Generally, pupils who are proficient in mathematics will have a better achievement in class.
4. The conceptual understanding and procedural fluency can influence the achievement in mathematics of the pupils. The higher or lower the conceptual understanding and procedural fluency, the higher or lower the pupils' achievement in Mathematics. Also, if the pupils were able develop these two skills, the strategic competence, adaptive reasoning and productive disposition can also be develop.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. In order to substantiate a better mathematical proficiency and achievement in mathematics, different learning techniques and abilities must be given more emphasis on the learning process.
2. Teachers should used new teaching strategies and varied learning activities that will enhance the mathematical proficiency and achievement level in Mathematics of the pupils.

3. Conduct further research on the relationship between mathematical proficiency and other variables that affects the achievement of pupils in Mathematics.

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APPENDIX A

Letter of Request to the Superintendent to Conduct the Study

September 19, 2015

CATHERINE P. TALAVERA, Ph.D.
OIC-Office of the Schools Division Superintendent
City of Santa Rosa, Laguna

Madam:

Greetings of Peace and Joy!

The undersigned is a faculty member of Balibago Elementary School, Balibago, City of Santa Rosa, Laguna and is currently undertaking a research study entitled **"Mathematical Proficiency and Achievement of Grade Six Pupils",** a partial fulfillment of the requirement for the degree of Master of Arts in Teaching Mathematics in Philippine Normal University, Manila Campus.

In this regard, may I ask permission from your good office to allow me to administer a test using the mathematical proficiency test. Attached herewith are the copy of the test questionnaires and table of specifications.

Your positive response regarding this matter is highly appreciated. Rest assured that I will share you the result of this study for whatever purpose it may serve you.

Thank you very much and more power.

Respectfully yours,

LEONARD P. MONTES
Researcher

Noted:

RENE R. BELECINA, Ph. D.
Adviser

Approved:

CATHERINE P. TALAVERA, Ph. D.
OIC-Office of the Schools Division Superintendent

APPENDIX B

Letter of Request to the Principal to Conduct the Study

September 19, 2015

JUANITA N. MORATO, Ed.D.
Principal III
Balibago Elementary School

Madam:

Greetings of Peace and Joy!

The undersigned is a faculty member of Balibago Elementary School, Balibago, City of Santa Rosa, Laguna and is currently undertaking a research study entitled **"Mathematical Proficiency and Achievement of Grade Six Pupils",** a partial fulfillment of the requirement for the degree of Master of Arts in Teaching Mathematics in Philippine Normal University, Manila Campus.

In this regard, may I ask permission from your good office to allow me to administer a test using the mathematical proficiency test. Attached herewith are the copy of the test questionnaires and table of specifications.

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Thank you very much and more power.

Respectfully yours,

LEONARD P. MONTES
Researcher

Noted:

RENE R. BELECINA, Ph. D.
Adviser

Approved:

JUANITA N. MORATO, Ed. D.
Principal III

APPENDIX C

Descriptives

[DataSet1]C:\Users\Admin\Desktop\MathematicalProficiencyandAchievement\Leonard.sav

Descriptive Statistics

	N	Mean	Std. Deviation
Achievement	**286**	**80.01**	**2.6000**
Valid N (listwise)	**286**		

Descriptives

[DataSet1]C:\Users\Admin\Desktop\MathematicalProficiencyandAchievement\Leonard.sav

Descriptive Statistics

	N	Mean	Std. Deviation
Conceptual Understanding	286	16.51	4.934
Procedural Fluency	286	13.35	3.953
Strategic Competence	286	12.50	3.532
Adaptive Reasoning	286	12.09	4.734
Productive Disposition	286	11.48	6.261
Valid N (listwise)	286		

APPENDIX D

Correlations

[DataSet1]C:\Users\Admin\Desktop\MathematicalProficiencyandAchievement\Leonard.sav

Correlations

		Conceptual Understanding	Procedural Fluency	Strategic Competence	Adaptive Reasoning	Productive Disposition	Achievement
Conceptual Understand-ing	Pearson (r)	1	.424**	.288**	.220**	.293**	.596**
	Sig.(2-tailed)		.000	.000	.000	.000	.000
	N	286	286	286	286	286	286
Procedural Fluency	Pearson (r)	.424**	1	.356**	.191**	.280**	.434**
	Sig.(2-tailed)	.000		.000	.000	.000	.000
	N	286	286	286	286	286	286
Strategic Competence	Pearson (r)	.288**	.356**	1	.241**	.224**	.269**
	Sig.(2-tailed)	.000	.000		.000	.000	.000
	N	286	286	286	286	286	286
Adaptive Reasoning	Pearson (r)	.220**	.191**	.241**	1	.546**	.184**
	Sig.(2-tailed)	.000	.000	.000		.000	.002
	N	286	286	286	286	286	286
Productive Disposition	Pearson (r)	.293**	.280**	.224**	.546**	1	.205**
	Sig.(2-tailed)	.000	.000	.000	.000		.000
	N	286	286	286	286	286	286
Achievement	Pearson (r)	.596**	.434**	.269**	.184**	.205**	1
	Sig.(2-tailed)	.000	.000	.000	.000	.000	
	N	286	286	286	286	286	286

**.Correlation is significant at the 0.01 level (2-tailed)

APPENDIX E

Regression

[DataSet1]C:\Users\Admin\Desktop\MathematicalProficiencyandAchievement\Leonard.sav

Variables Entered/Removed[b]

Mode	Variables Entered	Variables Removed	Method
1	Productive Disposition, Strategic Competence, Conceptual Understanding, Procedural Fluency, Adaptive Reasoning		Enter

a. All requested variables entered.
b. Dependent Variable: Achievement

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.632[a]	.399	.388	2.033

a. Predictors: (Constant), Productive Disposition, Strategic Competence, Conceptual Understanding, Procedural Fluency, Adaptive reasoning

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	768.472	5	153.694	37.175	.000[a]
	Residual	1157.623	280	4.134		
Total		1926.095	285			

a. Predictors: (Constant), Productive Disposition, Strategic Competence, Conceptual Understanding, Procedural Fluency, Adaptive reasoning
b. Dependent Variable: Achievement

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	73.310	.584		125.575	.000
	Conceptual Understanding	.260	.028	.494	9.357	.000
	Procedural Fluency	.137	.035	.208	3.865	.000
	Strategic Competence	.037	.038	.050	.978	.329
	Adaptive Reasoning	.022	.031	.040	.718	.473
	Productive Disposition	-.013	.024	-.031	-.537	.591

a. Dependent Variable: Achievement

APPENDIX F
Questionnaire for Grade Six Pupils

Mathematical Proficiency Test (MPT)

Your answers to all items in the test will help the researcher achieve his purpose in this study. Please answer all items and return the test questionnaires together with the answer sheet to the researcher. REST ASSURED THAT YOUR RESPONSES WILL BE KEPT IN CONFIDENCE AND WILL BE USED FOR RESEARCH PURPOSES ONLY. Thank you very much.

Directions: Read each item carefully. Shade the letter of your answer in the answer sheet.

1. 7 568 467 is _____ more than 7 168 467.
   A. 4 x 100 C. 4 x 10 000
   B. 4 x 1 000 D. 4 x 100 000
2. 9 millions + 7 hundreds + 20 tens + 3 ones = _____
   A. 9 700 023 C. 9 070 203
   B. 9 070 230 D. 9 000 723
3. Which is the least number?
   A. 8 235 175 C. 8 254 021
   B. 8 245 170 D. 8 255 000
4. 64 000 ÷ 8 000 is the same as _____.
   A. 640 000 ÷ 8 ÷ 1 000 C. 640 000 ÷ 8 ÷ 100 000
   B. 640 000 ÷ 80 ÷ 1 000 D. 640 000 ÷ 80 ÷ 10 000
5. Which is the closest estimate of 39 x 62?
   A. 1 800 C. 2 400
   B. 2 100 D. 3 000
6. The ones digit in the result of 250 x 4 + 420 is _____.
   A. 0 C. 4
   B. 2 D. 8
7. The product of the prime factors of 72 in index notation is _____.
   A. 4 x 2 x 5 C. 2^2 x 10
   B. 2 x 2 x 2 x 5 D. 2^3 x 5

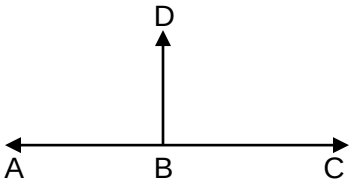
8. Which is NOT divisible by 4?

   A. 448 B. 518 C. 1 512 D. 2 304

9. Which statement is true?

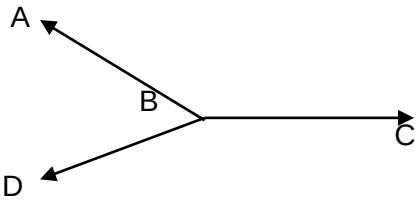
   A. 144 is divisible by 9.
   B. 739 is divisible by 6.
   C. $3^3 \times 2^3 \times 4$ is 865.
   D. $2^4 \times 3^2 \times 6$ is 890.

10. $\angle$ ABC and $\angle$ DBC are angles on _____.



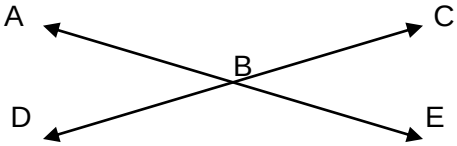
   A. diagonal line
   B. parallel lines
   C. perpendicular lines
   D. straight line

11. The common point in the given angles below is _____.



   A. A B. B C. C D. D

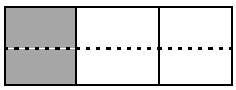
12. Which are vertically opposite angles?



   A. $\angle$ ABC and $\angle$ ABD
   B. $\angle$ ABC and $\angle$ CBE
   C. $\angle$ ABD and $\angle$CBE
   D. $\angle$ DBE and $\angle$ABD

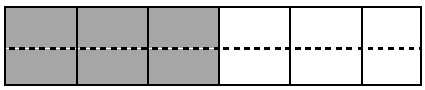
13. Which illustrates $\frac{1}{3} \div 2$?

   A.

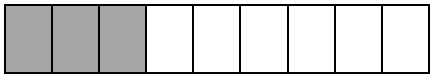


   B.

   C.

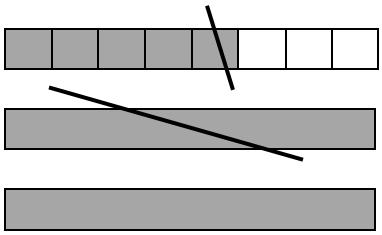


   D.



14. $2\frac{5}{8}$ - $1\frac{1}{8}$ is the same as _____.

A.



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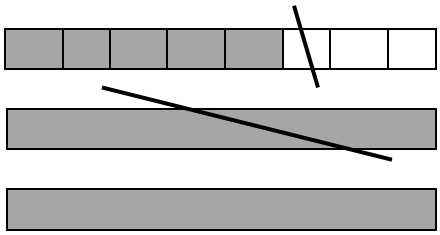
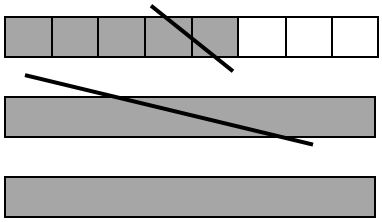
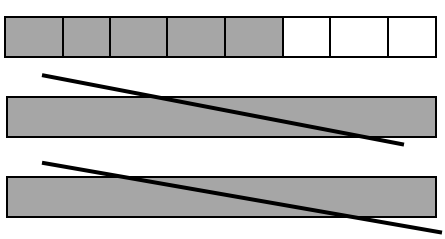


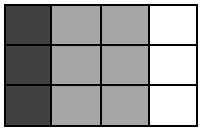
. B.



D.



15. Which is true about the figure?



A. $\frac{1}{3}$ of $\frac{3}{4}$

B. $\frac{1}{4}$ of $\frac{3}{4}$

C. $\frac{3}{4}$ of $\frac{1}{4}$

D. $\frac{3}{4}$ of $\frac{1}{3}$

16. What is “6 lemons to 12 pears” in symbols?

A. 6 ⟶ 12

B. 12 > 6

C. 6 : 12

D. 12/6

17. Which shows direct proportion?

A. $\frac{2}{3} = \frac{8}{12}$

B. $\frac{3}{5} = \frac{6}{5}$

C. $\frac{4}{5} = \frac{4}{15}$

D. $\frac{5}{6} = \frac{5}{6}$

18. Which is NOT true about the phrase “8 bags to 16 notebooks”?

A. There can be four notebooks in each bag.
B. There are eight more notebooks than bags.
C. There are half as many as bags as notebooks.
D. The number of notebooks is twice the number of bags.

19. How many places are you going to move the decimal point when you multiply 0.0005 by 1 000?

A. 2

B. 3

C. 4

D. 5

20. When you multiply a 5.45 by $\frac{1}{10}$, we just have to move the decimal point of 5.45 ____ place to the left.

    A. one B. two C. three D. four

21. A sando bag of rice has a mass of approximately _____.

    A. 32 kg B. 3.2 kg C. 0.32 kg D. 0.032 kg

22. 25% of 88 is the same as _____.

    A. $\frac{1}{14}$ of 88 C. $\frac{3}{4}$ of 88

    B. $\frac{1}{2}$ of 88 D. $\frac{3}{2}$ of 88

For numbers 23 – 24, refer to the situation presented below.

There are 1 800 pupils in an elementary school. Among them, 28% are girls. How many girls are there in this school?

23. What is the base?

    A. 28% C. number of boys

    B. 1 800 pupils D. number of girls

24. What is the percentage?

    A. 28% C. number of boys

    B. 1 800 pupils D. number of girls

25. Which stacks of books will have an average of 4 after rearrangement?

    A. 4 books, 3 books, 7 books, 2 books
    B. 3 books, 2 books, 5 books, 4 books
    C. 2 books, 3 books, 4 books, 6 books
    D. 4 books, 2 books, 7 books, 5 books

26. Which is possible average age of Grade 6 Filipino pupil?

    A. 10 B. 11 C. 12 D. 13

27. What number will divide the sum of 1 200, 1 000, 1 600 and 1 400 to get an average of 1 220?

    A. 4 B. 5 C. 6 D. 7

28. If you want to measure temperature, then you want to measure _____.

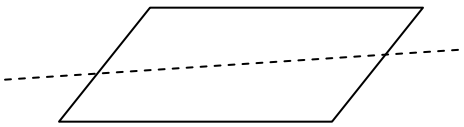
    A. breadth or depth C. length or width

    B. hotness or coldness D. softness or hardness

29. Which object is NOT hot?

    A. coffee B. magma C. soda D. sun

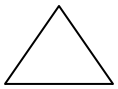
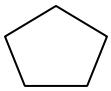
30. The normal body temperature of human is _____.
    A. 30° C
    B. 33° C
    C. 37° C
    D. 43° C
31. Which is a cube?
    A. flat screen tv
    B. iPad
    C. pair of dice
    D. rectangular box
32. The object that occupies more space than the others is _____.
    A. iMac
    B. iPad Air
    C. iPad mini
    D. iPhone 6
33. Which is a unit of volume?
    A. cubic meter
    B. decimeter
    C. meter
    D. square meter
34. The sum of the angles in a triangle is _____.
    A. 180°
    B. 200°
    C. 280°
    D. 360°
35. An acute triangle has three angles that are _____.
    A. acute
    B. obtuse
    C. scalene
    D. straight
36. A triangle with two sides equal has _____ equal angles.
    A. two
    B. three
    C. four
    D. no
37. Which does NOT belong to the group?
    A. parallelogram
    B. rhombus
    C. trapezoid
    D. triangle
38. Rhombus is similar to a _____.
    A. circle
    B. rectangle
    C. square
    D. triangle
39. When we cut a parallelogram into two pieces and match the angles, we can say that the opposite angles are _____.



    A. acute
    B. equal
    C. right
    D. unequal

40. How many sides does a pentagon have?
    A. 5
    B. 6
    C. 7
    D. 8

41. Which is a regular polygon?

A.  B.  C.  D. 

42. How many triangles can be formed in a hexagon?

A. 3 B. 4 C. 5 D. 6

43. What is the missing number in the mathematical sentence given below?

8 000 000 + _____ + 30 000 + 4 000 + 200 + 90 + 1 = 8 734 291

A. 550 000 C. 650 000

B. 600 000 D. 700 000

44. Which should come first if 54 650 258, 53 925 579, 54 649 950 and 53 924 579 will be arranged from least to greatest?

A. 54 650 258 C. 54 649 950

B. 53 925 579 D. 53 924 579

45. Approximate 35 681 000 to the nearest millions.

A. 40 000 000 C. 35 700 000

B. 36 000 000 D. 35 680 000

46. What is the sum of the values of the digit 8 in 6 813 425 and 387 627?

A. 360 000 C. 880 000

B. 720 000 D. 1 600 000

47. Find the value of 17 x (63 ÷ 9) + 23.

A. 121.56 B. 142 C. 280 D. 510

48. What is the next number in the sequence 1 024, 512, 256, _____.

A. 158 B. 128 C. 98 D. 68

49. Express 252 as a product of prime factors using the index notation.

A. 2^2 x 3 x 5 C. 2^2 x 3 x 7

B. 2^2 x 3^2 x 5 D. 2^2 x 3^2 x 7

50. Which number is divisible by 2, 4, 5 and 8?

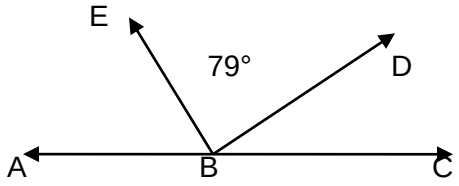
A. 316 B. 1 705 C. 2 840 D. 3 100

51. 45 336 is divisible by the following set of numbers EXCEPT _____.

A. 2, 3, 4, 5, 6, 8, 12 C. 2, 3, 4, 5, 6, 7, 8, 12

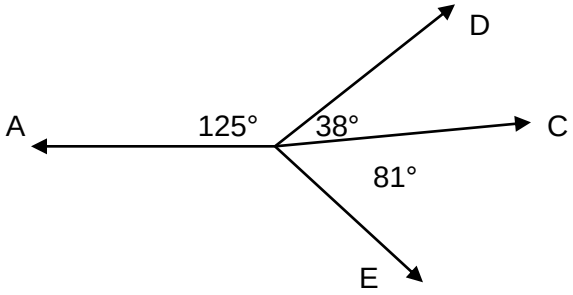
B. 2, 3, 4, 5, 6, 8 D. 2, 3, 4, 6, 8, 9, 12

52. Find the value of $\angle$ DBC.



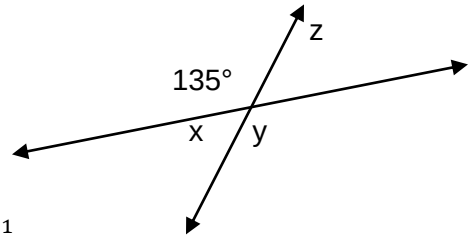
A. 39°
C. 62°
B. 42°
D. 69°

53. Find the value of $\angle$ ABE



A. 114°
C. 116°
B. 115°
D. 117°

54. Find the value of $\angle$ x.



55. Subtract: $3\frac{5}{6} - 1\frac{1}{6}$.

A. $\frac{2}{3}$
C. $2\frac{2}{3}$
B. $\frac{4}{3}$
D. $2\frac{4}{3}$

56. What is $\frac{5}{12} + \frac{7}{6}$?

A. $\frac{12}{18}$
C. $\frac{13}{12}$
B. $\frac{19}{18}$
D. $\frac{19}{12}$

57. Estimate $5\frac{7}{8} \div 3$.

A. 2
B. 2.5
C. 3
D. 3.5

58. What is the missing number in 4:3 = ___ : 12?

A. 8 C. 16

B. 12 D. 20

59. Simplify 44:40.

A. 1:4 C. 10:11

B. 4:1 D. 11:10

60. What is the value for the missing number in the box?

$\frac{12}{16} = \frac{\quad}{20}$

A. 5 C. 15

B. 10 D. 20

61. 5.907 X _____ = 59.07

A. 10 C. 1 000

B. 100 D. 10 000

62. 0.002 X 500 = _____

A. 0.01 B. 0.1 C. 1 D. 10

63. 10.4 ÷ 200 = _____

A. 0.52 C. 0.0052

B. 0.052 D. 0.00052

64. What is 3:100 in percent?

A. 3% B. 6% C. 30% D. 60%

65. Express $\frac{35}{500}$ as a percentage.

A. 7% B. 30% C. 35% D. 100%

66. The 25% of 440 is _____.

A. 100 B. 110 C. 220 D. 400

67. What is the average of 15, 20, 32, and 45?

A. 15 B. 28 C. 37 D.43

68. Approximately, the average of 126.2 cm, 121.4 cm, 32.7 cm and 128.2 cm is _____.

A. 100 cm C. 102 cm

B. 101 cm D. 103 cm

69. Divide the sum of $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{3}{8}$ by 3.

A. $\frac{11}{20}$ C. $\frac{12}{32}$

B. $\frac{11}{30}$ D. $\frac{13}{64}$

70. Convert 37°C to °F.

A. 95.3°F C. 98.6°F

B. 96.7°F D. 99.1°F

71. 100°F is approximately equal to _____.

A. 37°C B. 38°C C. 39°C D. 40°C

72. What is 32°F in °C?

A. 0 B. 10 C. 20 D. 30

73. Express 5 400 000 mm^3 in cm^3.

A. 540 000 C. 5 400

B. 54 000 D. 540

74. If V= l x w x h, then w = _____

A. V x l x h C. $\frac{V}{l\text{h}}$

B. V x h x l D. $\frac{l\text{h}}{V}$

75. 0.7 m^3 is equal to _____.

A. 700 cm^3 C. 70 000 cm^3

B. 7 000 cm^3 D. 700 000 cm^3

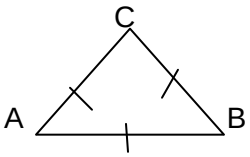
76. Two angles of a triangle are 138° and 32°. What is the value of the other angle?

A. 10° B. 15° C. 20° D. 25°

77. Find the value of $\angle$ C given that $\angle$ A of a right triangle is 45°.

A. 30° B. 45° C. 60° D. 90°

78. What is the value of $\angle$A?



A. 30° C. 60°

B. 45° D. 90°

79. Given the parallelogram below, find the value of C if B = 50°.

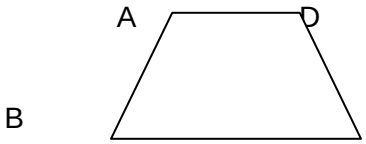
A. 50° C. 100°

B. 80° D. 180°

80. An angle in a rhombus measures 70°. What is the measure of its opposite angle?

A. 50° B. 70° C. 90° D. 110°

81. If ∠ A = 75°, then ∠ B = _____.



A. 75° C. 105°

B. 95° D. 115°

82. The angles of a quadrilateral measure 110°, 78° and 62°. What is the measure of its last angle?

A. 100° B. 110° C. 220° D. 400°

83. What is the sum of the interior angles of a decagon?

A. 5 x 180° C. 7 x 180°

B. 6 x 180° D. 8 x 180°

84. How many triangles can be formed from a 25-gon?

A. 21 B. 22 C. 23 D. 24

85. According to the Population Census of 2012, the population of the Philippines was 103 775 002. How big is the population f the Philippines?

A. One hundred and three million, seven hundred and seventy-five thousand and two

B. One hundred and three million, seven hundred and seventy-five thousand and two hundred

C. One hundred and three million, seven hundred fifty-five thousand and two

D. One hundred and two million, seven hundred and seventy-five thousand and two

86. The populations of some countries in 2011 are shown below. Based on the information, which country has the greatest population?

Country	Population
Germany	81 831 000
Turkey	74 724 269
Vietnam	87 840 000
Italy	60 776 531

A. Germany
B. Italy
C. Turkey
D. Vietnam

87. Based on the information above, which country has a population of about 80 million?

A. Germany
B. Italy
C. Turkey
D. Vietnam

88. Mr. Bautista bought four new tires and a new battery for his car at a total cost of ₱ 18 210. If the cost of the battery was ₱ 2 850, what was the piece of each tire?

A. ₱ 3 000
₱ 3 530
C. ₱ 3 840
D. ₱ 4 000

89. James and Paulo have 125 stickers. James and Ansel have 305 stickers. If Ansel has three times as many stickers as Paulo, how many stickers does James have?

A. 30
B. 35
C. 40
D. 45

90. School A has 609 girls and 724 boys. School B has 51 more boys than school A. If the total number of pupils in school A and school B is 2 470, how many girls does school B have?

A. 360
B. 362
C. 364
D. 366

91. Rizza made 10 postcards to sell. She wants to pack the postcards into envelopes with the same number of postcards in each envelope with no remaining postcards. Can you help Rizza decide how many postcards she can put into each envelope, 4, 5, 6 or 9?

A. 4
B. 5
C. 6
D. 9

92. A flower shop sold 37 161 tulip bulbs packaged in same bags. How many tulip bulbs could there be in each bag?

A. 4
B. 5
C. 9
D. 10

93. Three bells ring at intervals of 8 minutes, 15 minutes and 24 minutes respectively. If they ring together at 3 pm, at what time will they next ring together?

A. 5 pm
C. 9 pm
B. 7 pm
D. 11 pm

94. Three angles are on a straight line. If $\angle 1 = 75°$ and $\angle 2 = 82°$, then $\angle 3 =$ _____.

A. 23°
C. 43°
B. 33°
D. 53°

95. If $\angle ABD = 85°$, $\angle DBC = 135°$ and $\angle CBF = 30°$, then $\angle ABF =$ _____.

A. 100°
C. 120°
B. 110°
D. 130°

96. What is the value of $\angle EBC$, the opposite of $\angle ABE$, if $\angle ABE = 30°$?

A. 130°
C. 150°
B. 140°
D. 160°

97. After James spent $\frac{1}{13}$ of his savings on a school bag, he had ₱ 7 800 left. Find James's savings at first.

A. ₱ 8 000
C. ₱ 8 300
B. ₱ 8 150
D. ₱ 8 450

98. There are 40 girls in a class, $\frac{3}{8}$ of them have long hair. How many girls have short hair?

A. 10
C. 20
B. 15
D. 25

99. $2\frac{1}{4}$ liters of milk was poured equally into 9 cups. Jane drank 2 cups. How much milk did Jane drink?

A. $\frac{1}{8}$ L
C. $\frac{1}{2}$ L
B. $\frac{1}{4}$ L
D. $\frac{3}{4}$ L

100. The ratio of the number of boys to the number of girls in a class is 3 : 4. There are 16 girls in the class. Find the total number of pupils in the class.

A. 20
C. 28
B. 24
D. 32

101. The ratio of 2 – bedroom, 3 – bedroom and 4 – bedroom flats in an apartment block is 5 : 4 : 2. The number of 4 – bedroom flats is 24. Find the number of 2 – bedroom flats in the block.

A. 50
C. 70
B. 60
D. 80

102. There are 4 lions in a zoo. They are fed 12 kg of meat a day, 2 more lions are added to the zoo. How much meat would have to be prepared now to feed all the lions for a day?

A. 12 kg
B. 14 kg
C. 16 kg
D. 18 kg

103. A nurse poured 1.5 L of cough mixture equally into 6 bottles. How many mL of cough mixture were there in each bottle?

A. 210
B. 230
C. 250
D. 270

104. A bread costs ₱ 9.50. Michael bought a dozen of this bread. How much did he pay for them?

A. ₱ 114
B. ₱ 114.75
C. ₱ 115.25
D. ₱ 115.50

105. An elderly couple exercises by walking on a pebble pathway in the playground. The length of the pebble pathway is 15.6 meters. Find the total distance the husband walks if he walks 14 times along the length of the pathway.

A. 218.1 m
B. 218.2 m
C. 218.3 m
D. 218.4 m

106. A school has 1 500 pupils. On a certain day, 30 of the pupils were absent. What is the percentage of the pupil who were present on that day?

A. 96%
B. 97%
C. 98%
D. 99%

107. During a sale, a discount of 20% was given for all items in a shoe shop. Mrs. Roces bought a pair of shoes. The original price of the pair of shoes was ₱ 750. How much did she pay?

A. ₱ 550
B. ₱ 600
C. ₱ 650
D. ₱ 700

108. Maricel plans to open a bank account with a deposit of ₱ 25 000. The bank pays an annual interest of 2.5%. What will be the amount of money in Maricel's account after one year?

A. ₱ 25 000
B. ₱ 25 500
C. ₱ 25 625
D. ₱ 25 800

109. The average height of 2 boys is 131.6 cm. The average height of 4 girls is 128.3 cm. What is the average height of all the children?

A. 127.4 cm
B. 128.4 cm
C. 129.4 cm
D. 130.4 cm

110. Miggy bought a dozen of pencils at ₱ 19.50 each. He bought another half a dozen at ₱ 24.00 each. How much did he pay for each pencil on the average?

A. ₱ 21.00
B. ₱ 22.00
C. ₱ 23.00
D. ₱ 24.00

111. Ellaine accidentally spilled ink on the result slip of her two tests in Mathematics. Her first score is 60, while her second test score cannot be seen. However, her teacher told her that her average score of the two tests is 70. What is Ellaine's second test score?

A. 70
B. 75
C. 80
D. 85

112. The temperature yesterday afternoon was 26°C. It rained today and the temperature was 18°C. By how many °C has the temperature dropped today?

A. 4°C
B. 8°C
C. 12°C
D. 16°C

113. Janine is heating water in a pot. The temperature when the water was not heated was 21.5°C. Five minutes later, the temperature of the water rose by 50.7°C. What is the temperature of water in the pot five minutes after it was heated?

A. 62.2°C
B. 72.2°C
C. 75.2°C
D. 82.2°C

114. It was 26°C in the Philippines yesterday. It was 7°C cooler in America. What was the temperature in America?

A. 12°C
B. 15°C
C. 17°C
D. 19°C

115. Daniel wants to cut a block of cheese into smaller cubes measuring 2 cm by 2 cm by 2 cm. How many such cubes of cheese can he cut from the large block with volume equal to 192 cm^3?

A. 20
B. 22
C. 24
D. 26

116. Kathryn makes chocolate balls for her birthday party. She has 10 chocolate bars each measuring 240 cm^3. She melts all of them and pours the chocolate into some molds to make chocolate balls. Each chocolate ball has a volume of 8 cm^3. How many chocolate balls has she made?

A. 200
B. 300
C. 400
D. 500

117. A rectangular tin which has a length of 12 cm, width of 9 cm and height of 4 cm holds 120 g of tea. If 1 kg of the same tea is packed into a box which has a 12 – cm square base, what should be the height of the box?

A. 25 cm
B. 26 cm
C. 27 cm
D. 28 cm

118. The stand of an ironing board forms an isosceles triangle with the floor. If one of the base angles is 60°, then what is the measure of the angle opposite the floor?
A. 30° C. 60°
B. 45° D. 90°

119. A signage that reads "Give Way" has a shape of an equilateral triangle. If two of its angles has a sum of 120°, then what is the measure of the other angle?
A. 30° C. 60°
B. 45° D. 90°

120. A right triangle has two equal angles. What is the measure of one of its angles?
A. 30° C. 60°
B. 45° D. 90°

121. The plant box in the Garden of Eden has a face similar to a trapezoid. One of its angles measures 108°. What is the measurement of its pair angle?
A. 70° C. 80°
B. 72° D. 82°

122. One of the angles of a rhombus is 70°. What is the value of the angle opposite 70°?
A. 70° C. 110°
B. 90° D. 150°

123. One of the sides of a parallelogram has a length of 25 cm. What is the length of its opposite side?
A. 15 cm C. 25 cm
B. 20 cm D. 30 cm

124. Determine the sum of the interior angles of a floor that has a shape of a pentagon.
A. 510° C. 530°
B. 520° D. 540°

125. Enrique would like to use triangular tiles in covering a table with ten sides. How many tiles could easily cover the entire table?
A. 6 C. 10
B. 8 D. 12

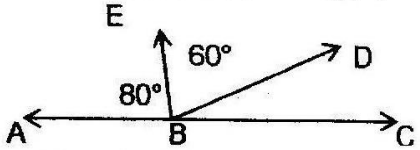
126. Determine the sum of the interior angles of a medallion that has a shape of an octagon.
A. 1020° C. 1060°
B. 1040° D. 1080°

127. How can you determine the missing number in 7 000 000 + _____ + 20 000 + 4 000 + 200 + 90 + 5 = 7 624 295?
   A. adding the sum to the addends
   B. subtracting the addends from the sum
   C. dividing the sum by the number of addends
   D. identifying the place value of each digit in the sum
128. Why is 54 650 258 greater than 54 649 950?
   A. The hundreds digit is greater.
   B. The thousands digit is greater.
   C. The ten thousands digit is greater.
   D. The hundred thousands digit is greater.
129. 35 681 000 is approximately 40 million because _____.
   A. there are 8 digits
   B. the millions digit is 5
   C. it has a ten millions digit
   D. the hundred thousands digit is 6
130. We can get 159 from 17 x (72 ÷ 9) + 23 if we will start by _____.
   A. dividing 63 by 9
   B. adding 17 and 23
   C. multiplying 17 and 23
   D. solving it from right to left
131. To determine the sum of values of the digit 3 in 6 813 425 and 387 627, one should know how to _____.
   A. identify place values
   B. approximate numbers
   C. add numbers greater than 1 000
   D. all of the above
132. The next number in the sequence 512, 256, 128, 64 is 32 because the sequence has _____.
   A. common divisor
   B. common sum of 2
   C. common ratio of 2
   D. common difference of 2
133. Which explains that $2^4 \times 6 = 96$ is correct?
   A. $2^4 \times 6 = 4 \times 1$
   B. $2^4 \times 6 = 8 \times 6$
   C. $2^4 \times 6 = 16 \times 6$
   D. $2^4 \times 6 = 32 \times 6$
134. Why is 288 divisible by 6?
   A. It is an even number.
   B. It is divisible by 2 and 3.
   C. The last two digits is divisible by 2.
   D. The product of the digits is divisible by 2 and 4.

135. A number is divisible by 10 when _____.

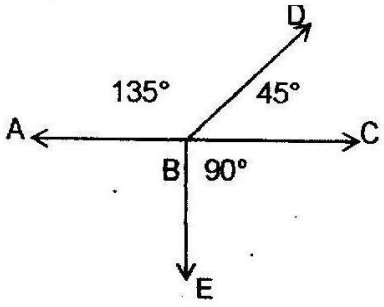
A. it ends in zero
B. it is divisible by 2
C. it is divisible by 5
D. it is an even number

136. ∠DBC = 40° because _____.



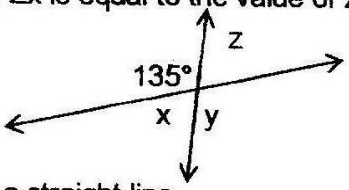
A. 40° is a multiple of 10°
B. 360° divided by 9 is 40°
C. twice the difference of 80° and 60° is 40°
D. the sum of the angles in a straight line is 180°

137. Based on the given angles, ∠ABE = 90° because _____.



A. 360° – 270° = 90°
B. 180° – 90° = 90°
C. 135° – 45° = 90°
D. 180° ÷ 2 = 90°

138. The value of ∠x is equal to the value of ∠z because they are _____.



A. angles in a straight line
B. angles in one point
C. opposite angles
D. vertical angles

139. How will you solve $5\frac{3}{7} - 2\frac{1}{7}$?

A. Keep the same denominator and subtract the numerators. Subtract also the whole numbers.
B. Subtract the whole numbers first. Then, solve the similar fractions by subtracting the numerators then keep the common denominator.
C. Change the two fractions to improper fractions. Subtract the numerators and keep the common denominator. Change the resulting fraction to mix numbers.
D. All of the above.

140. In solving $\frac{5}{12} + \frac{7}{6}$, how can we make the addends similar fractions?
   A. Cross multiply the two fractions.
   B. Multiply the numerator and denominator of the second fraction by 2.
   C. The product of 12 and 6 is the common denominator then keep the numerators.
   D. The sum of the denominators will be the common denominator then keep the numerators.

141. The estimate quotient of $7\frac{6}{7} \div 4$ is 2 because _____.
   A. the divisor is 4
   B. the whole number is 7
   C. $7\frac{6}{7}$ is approximately equal to 8
   D. the fraction is almost equal to 1

142. Which could help in determining the missing number in 2 : 5 = _____ : 25?
   A. Dividing 25 and 5
   B. Dividing 25 and 2
   C. Multiplying 25 and 2
   D. Multiplying 2 and 5 in 2 : 5

143. How can you simplify 35 : 450?
   A. Divide 35 by 450.
   B Divide 450 by 35.
   C. Divide 35 and 450 by a common factor.
   D. Determine the common multiples of 35 and 450.

144. Why are some proportion called direct proportions?
   A. Because when one term in the ratio increases, the other related term in the ratio decreases.
   B. Because when one term in the ratio decreases, the other related term in the ratio increases.
   C. Because when one term in the ratio increases, the other related term in the ratio remains the same.
   D. Because when one term in the ratio increases, the other related term in the ratio also increases.

145. When will 5.907 become equal to 59.07?
   A. When it is multiplied by 1.
   B. When it is multiplied by 0.01.
   C. When it is multiplied by 10.
   D. When it is multiplied by 100.

146. 0.002 x 500 = 1 because _____.
   A. 500 x 2 is 1000 and moving the decimal point of 1000 3 places to the right is 1
   B. 5 x 0.002 is 0.01 and moving the decimal point of 0.01 3 places to the right is 1
   C. 500 x 2 is 1000 and moving the decimal point of 1000 3 places to the left is 1
   D. 5 x 0.002 is 0.01 and moving the decimal point of 0.01 3 places to the left is 1

147. Why is 0.5 ÷ 100 equal to 0.005?
   A. Because when a number is divided by 100, we may think of it as moving the decimal point 2 places to the left.
   B. Because when a number is divided by 100, we may think of it as moving the decimal point 2 places to the right.
   C. Because when a number is divided by 100, we may think of it as moving the decimal point 3 places to the right.
   D. Because when a number is divided by 100, we may think of it as moving the decimal point 3 places to the left.

148. How can you express $\frac{3}{10}$ as a percentage?
   A. Divide 3 by 10.
   B. Multiply the numerator by 100.
   C. Multiply the denominator by 100.
   D. Multiply the numerator and denominator by 10.

149. Why is 25% the same as 1 : 4?
   A. Because 2 is $\frac{1}{2}$ of 4.
   B. Because $\frac{25}{100}$ is equal to 4.
   C. Because 25 : 100 = 1 : 4
   D. Because 25 : 100 = 1 : 2

150. Why is 35% = 7 : 10 a false mathematical statement?
   A. Because $\frac{35}{100}$ is equal to 7 : 10.
   B. Because $\frac{35}{100}$ is equal to 7 : 20.
   C. Because 35 : 10 is equal to 7 : 10.
   D. Because 35 : 100 is equal to 7 : 50.

151. Why is 5 the average of the five numbers 8, 2, 4, 6 and 5?
   A. Because there are five numbers.
   B. Because the sum of the five numbers is divisible by 5.
   C. Because the sum of the five numbers divided by 5 is 5.
   D. Because if the numbers will be arranged in ascending order, 5 is the middle number.

152. Why is the average electricity consumption of the country greater than the average electricity consumption of your household?
   A. Our household has no electric gadgets.
   B. Our family has lesser members.
   C. Our family knows how to save electricity.
   D. Our household uses solar panel that generates electricity.

153. The average of ₱ 49.50, ₱ 45.00, ₱ 39.75, ₱ 40.65 and ₱ 48.00 is ₱ 44.58 because _____.

A. ₱222.9 ÷ 5 = ₱ 44.58
B. ₱222.9 x 5 = ₱ 44.58
C. ₱222.9 – 5 = ₱ 44.58
D. ₱222.9 + 5 = ₱ 44.58

154. In the formula $°C = \frac{5}{9} x (°F - 32)$, $\frac{5}{9}$ means _____.

A. ratio of increase in the Celsius scale to Fahrenheit scale
B. ratio of increase in the Fahrenheit scale to Celsius scale
C. ratio of decrease in the Celsius scale to Fahrenheit scale
D. ratio of decrease in the Fahrenheit scale to Celsius scale

155. Why is the reading of temperature in Celsius lesser than the reading in Fahrenheit?

A. Because Fahrenheit has longer scales.
B. Because the mercury in Fahrenheit scale rises faster.
C. Because Celsius was developed earlier than Fahrenheit.
D. Because Fahrenheit starts with 32° while Celsius starts with 0°.

156. In the formula $°F = (\frac{9}{5} x °C) + 32$, 32 means _____.

A. Fahrenheit has longer scales
B. the mercury in Fahrenheit scale rises faster
C. Celsius was developed earlier than Fahrenheit
D. Fahrenheit starts with 32° while Celsius starts with 0°.

157. Why is a cube with 4cm long, 4 cm wide and 4 cm high has a volume of 64 cm^3?

A. The cube has 3 layers and each layer has 9 unit cubes.
B. The cube has 4 layers and each layer has 16 unit cubes.
C. The cube has 5 layers and each layer has 25 unit cubes.
D. The cube has 6 layers and each layer has 36 unit cubes.

158. A solid has dimensions of 3 cm x 3 cm x 1 cm. The volume of the solid is 9 cm^3 because _____.

A. a layer has 3 unit cubes and there are 3 layers
B. a layer has 4 unit cubes and there are 4 layers
C. a layer has 5 unit cubes and there are 5 layers
D. a layer has 6 unit cubes and there are 6 layers

159. Why is 3 cm^3 = 3000 mm^3?
   A. mm is one unit to the right of cm and volume has three dimensions so move the decimal point of 3 three times to the right
   B. since 1 cm^3 = 100 mm^3, so 3 cm^3 equals 3000 mm^3
   C. mm is one unit to the left of cm and volume has three dimensions so move the decimal point of 3 three times to the left
   D. since 1 cm^3 = 10 000 mm^3, so 3 cm^3 equals 3000 mm^3

160. Two angles of a triangle are 118° and 32°. How can you get the value of the third angle?
   A. By subtracting the sum of 118° and 32° from 360°
   B. By subtracting the sum of 118° and 32° from 180°
   C. By adding the difference of 118° and 32° from 360°
   D. By adding the difference of 118° and 32° from 180°

161. The value of ∠C given that ∠A of a right triangle is 45° because _____.
   A. 90° – 45° = 45°
   B. 105° – 60° = 45°
   C. 180° – 90° – 45° = 45°
   D. 360° – 180° – 45° = 45°

162. In an equilateral triangle, why are the angles equal?
   A. It is scalene.
   B. It is equiangular.
   C. The sides are equal.
   D. They all measure 60°.

163. Rhombus is a trapezoid. This is an incorrect statement because _____.
   A. Trapezoid has four equal sides.
   B. Trapezoid has 2 pairs of parallel sides.
   C. Rhombus has 2 pairs of parallel sides.
   D. Rhombus has one pair of parallel sides.

164. The statement "Rhombus is a parallelogram." is true because _____.
   A. rhombus has four sides
   B. rhombus has four equal sides
   C. rhombus has two parallel opposite sides
   D. all of the above

165. The sum of the angles of a trapezoid is 360° because _____.
   A. each angle between the 2 parallel sides measures 100°
   B. each angle between the 2 parallel sides measures 180°
   C. each pair of angles between its 2 parallel sides adds up to 100°
   D. each pair of angles between its 2 parallel sides adds up to 180°

166. Decagon is the name given to a polygon with ten sides because _____.
   A. deka means ten and gonia means side
   B. deka means ten and gonia means angle
   C. deka means seven and gonia means side
   D. deka means seven and gonia means angle

167. Square is a regular polygon because _____.
   A. all its angles are equal
   B. the sides are not of equal length
   C. two of its sides and angles are equal
   D. all its sides and all its angles are equal

168. How is the number of triangles in a polygon related to the number of its sides?
   A. the number of triangles is 2 less than the number of sides
   B. the number of triangles is 3 less than the number of sides
   C. the number of triangles is 4 less than the number of sides
   D. the number of triangles is 5 less than the number of sides

169. The Grade VI pupils of St. John Learning Center conducted a fund – drive by collecting empty bottles of mineral water. The organizers decided to have it in a form of a contest. The table below shows the number of collected bottles for 8 months.

Section	Number of Bottles
VI – St. Mapanuri	100 615 105
VI – St. Mapagmatyag	101 365 002
VI – Magilas	99 979 189

If you are one of the organizers, how will you choose the winner?
   A. The section with the least number of bottles collected
   B. The section with the highest number of bottles collected
   C. The section where the president of the organization is included
   D. The section who submitted the bottles clean and ready for selling

170. Roger's family ate in a fine dining restaurant. The amount of the food ate was ₱ 5 875. If his father gave ₱ 6 000 to the waiter and did not get the change, how did he do that?
   A. His father gave a tip to the waiter by looking at the quality of his service.
   B. His father gave a tip to the waiter by giving all the money inside his wallet.
   C. His father gave a tip to the waiter by rounding off the money to the nearest thousand.
   D. His father gave a tip to the waiter by rounding off the money to the nearest hundred.

171. Joshua, a Grade VI pupil, has a savings account in Banco De Oro amounting to ₱ 175 586 which was opened by his parents. How do numbers help Joshua in managing his account?
   A. ₱ 175 586 is a good amount for collecting many friends.
   B. Joshua can use the numbers in his bank book to bully his poor classmates.
   C. The numbers in his account represent the money that he can use in buying luxury cars.
   D. Numbers give Joshua a representation of his account so that he can monitor its growth and safety.

172. Gino inquired about the price of a new pair of pedals and wheels for his mountain bike in a store. He found out that a new pair of pedals costs ₱ 2 991.50 and a pair of wheels costs ₱ 6 299.50. He has only ₱ 5 500 savings. What was found out by Gino?
   A. Buying new parts of a bicycle is quite expensive.
   B. He needs to ask his father to buy them for him as a gift.
   C. He must call a friend to help him get a discount from the owner of the store.
   D. His should save ₱ 3 791 more in order to buy the new accessories for his bike.

173. Rochelle needs to sell 3 booklets of ticket for Daniel Padilla's concert in Batangas Coliseum. Each booklet has 100 tickets. If each ticket costs ₱ 499, how can she determine the total amount of the tickets?
   A. She will google the answer.
   B. She will ask her brother who is a mechanical engineer.
   C. She will just count the money when tickets are sold out already.
   D. She will use the formula number of booklets x number of tickets in each booklet x ₱ 499.

174. Jayson is traveling 1.5 km from home to his elementary school. If his parents decided to transfer to other town, a place that is 3 500 m away from their house, what will be its effect to Jayson?
   A. He should eat his breakfast well.
   B. His parents should buy him a car.
   C. He will be accompanied by his mother.
   D. He needs to wake up earlier because he will have a longer trip.

175. The mass of the Sun is 1 989 000 000 000 000 000 000 000 000 000 kg. Using scientific notation it becomes 1.989×10^{30} kg. Why should you choose to write the mass of the Sun using scientific notation?
   A. It will make me look more intelligent.
   B. When I use it others will adore me.
   C. It is more convenient to use especially if it will be written.
   D. It might be one of the items in the National Achievement Test.

176. Benok's pimples are being doubled as days go by. It grows from 1 (2^0), 2 (2^1), 4 (2^2), until it becomes 8 (2^3). What is the importance of knowing that the number of his pimples is growing exponentially?
   A. He will be aware that pimple is a common problem among teenagers.
   B. He will be understood by his parents if he will consult Dra. Belo.
   C. He will be careful in choosing the food that he will eat and the amount of time he will spend sleeping.
   D. He will stop from going to school because his classmates will tease him.

177. VI – Diamond won in a contest sponsored by the Supreme Student Government. They received a box with 1 575 pieces of ball pen as a prize. If there are 45 pupils in the class, how should they deal with their prize?
   A. They will play a game and the team that will win will receive the box of ball pen.
   B. The teacher will post the list of top performing pupils in the class and they will be rewarded with ball pens.
   C. The number of ball pens will be divided by the number of pupils in the class so each pupil will receive 35 ball pens.
   D. They will ask their class president to prepare names of the pupils in VI – diamond and draw 10 names who will receive the ball pens.

178. A table is parallel with the floor with an angle of 180° so that _____.
   A. the table cloth will fit the table
   B. it is more pleasing to the eyes
   C. the food will not be spilled when served
   D. visitors will not give negative comments about the table.

179. Maricar can't understand why vertically opposite angles are equal. What should she do?
   A. Stop from studying the lesson and move to the next.
   B. Hire a tutor who will answer her homework about vertical angles.
   C. Inform her parents about her difficulty and ask them to transfer her in other school.
   D. Keep on studying the examples and answering some exercises through the help of a classmate who is good in Math.

180. Richard prefers a tripod than a monopod in taking pictures because _____.
   A. it is more expensive
   B. he can take good pictures
   C. it is given as a gift to him
   D. it has three legs that make it more stable

181. Liza is preparing for her Third Quarterly Test. How should she manage her time in studying her lessons if she has only 12 hours to study Filipino, Mathematics, MSEP and English?
   A. She should divide 12 hours giving each subject $\frac{1}{4}$ of her available time.
   B. Study first her favorite subject then the remaining time will be used in studying other subjects.
   C. Give more time in studying MSEP because it is an easy subject.
   D. She will visit first her Facebook account so that she will be relaxed before studying her lessons.

182. Mother Lily's Bulalo is the best in the province. She is using cups with $\frac{1}{8}, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ and others in measuring the ingredients for Bulalo. How is her knowledge of fractions helped her?
   A. She can cook Calderetang Kambing with ease.
   B. She established a good recipe in cooking Bulalo.
   C. She is selling measuring cups as source of income.
   D. She contributes to the income of her community because of her high sales.

183. Jerwin's mother is managing well the take home salary of his father. She allocates $\frac{3}{8}$ of the salary for his education, $\frac{1}{2}$ is for the needs at home like food and utilities, and $\frac{1}{8}$ will be saved. Why is it important to use fraction in deciding how to spend money?
   A. So that the mother will not need to work.
   B. So that the father has time to go out with his friends every night.
   C. So that a bigger part will be given to the more important need of the family.
   D. So that all the money brought home by the father will be consumed in one month.

184. An elementary school has 315 Grade VI pupils. The pupils are divided into 7 sections having 45 pupils in each section. In VI – Sampaguita, there are only 38 available chairs. What mathematical idea should be considered by the adviser of VI – Sampaguita?
   A. The ratio of pupils to chairs should be 1 : 1.
   B. The Grade VI pupils should be divided into 6 sections so that there will be no shortage of chairs.
   C. The number of chairs should be greater than the number of pupils in a classroom.
   D. The school should subtract some pupils by transfering them to other elementary schools because of not enough number of chairs.

185. Chicken curry is the viand for dinner of Castro family. It is also Charmaine's favorite. She knows that it is just enough for the 8 members of her family. What must she do if she is done eating her part and still she would like to eat some more?
   A. Get some more even if she knows that his eldest brother is not yet eating.
   B. Ask her mother to cook some more so that she can have more to eat.
   C. She will take her part and enjoy eating it so that all of the members could eat chicken curry.
   D. Ask her father if instead of eating chicken curry he will eat fried chicken just to give in to her craving of the viand.

186. John is always copying his assignments and seatworks about Ratio and Proportion from Jacob. No wonder, he failed to pass the quiz last time. In what could Jacob help John pass the other quizzes in Mathematics?
   A. Allow John to continuously copy his assignments and seatworks
   B. Go to the Principal's office to report the dishonesty that John is doing
   C. Ask John to copy assignments and seatworks from his other classmates.
   D. Teach John how to get the answers of the assignments and seatwork patiently

187. Jerome and his brother Jerry went on shopping. He noticed that the change they got from Department Store are 5, 10 and 25 centavos. What should they do with the coins?
   A. Tell the sales lady to keep the change.
   B. Keep them because 10 pieces of ₱ 0.10 is ₱ 1.00.
   C. Throw them away because they have no more value.
   D. Place them in a jar and display it in the receiving room.

188. How could a Grade VI pupil learn how to divide decimals?
   A. Study the examples given in the book.
   B. Participate actively in the tasks given by the Mathematics teacher.
   C. Try answering the exercises given in the book and use a calculator to check if the answer is correct.
   D. All of the above.

189. Franchesca measured the length and width of the table that she will be covering using a table cloth. She used tape measure in determining its dimensions. She found out that its length is 49.6 in and the width is 38.5 in. Why did she use a tape measure in measuring the table?
   A. There is no ruler or meter stick at home.
   B. It is better than using hand span or arm span.
   C. It is easier to use because it can be rolled or folded.
   D. The store of cloth uses the same standard of measurement.

190. Roland scored 37 out of 60 in a quarterly test in Mathematics. Why does the teacher compute the percentage of his score?
   A. To give him extra homework and test.
   B. To determine if he passed or not the quarterly test.
   C. To record his score in the record book of the teacher.
   D. To compare his score from the score of his classmates.

191. How should one choose the bank where he or she will open a savings account?
   A. The bank that offers 1.8% interest.
   B. The bank that offers 2.08% interest.
   C. The bank that offers 2.3% interest.
   D. The bank that offers 2.5% interest.

192. T – shirt A has a 40% discount. T – shirt B has 20% discount. In the given situation, how can you use the knowledge you gained in school about percentage?
   A. I can identify which T – shirt is more expensive.
   B. I can compute how much money will be saved if i will buy A or B.
   C. I can give a lecture to the shoppers how to compute discounts.
   D. I can help the sales lady to determine how much change she will give to me.

193. The average size of white T – shirt of Grade VI pupils in an elementary school is 10. If the Municipal Councilor will donate white T – shirts in the school, how will the average size of T – shirt help him?
   A. The T – shirts that he will buy are size 10.
   B. The T – shirts that he will buy are below size 10.
   C. The T – shirts that he will buy are above size 10.
   D. The T – shirts that he will buy are combinations of sizes 6 – 14.

194. Richard's grades from first to fourth grading in English are 77, 75, 74 and 76 respectively. Which mathematical concept will help him determine if he passed or not the subject?
   A. Average
   B. Percentage
   C. Quotient
   D. Ratio

195. On the average, the electrical usage of Atienza family is 64 kwh. What does it mean?
   A. The family should start saving electrical energy.
   B. The family should pay their electrical bill on time.
   C. The family should report the result to the Department of Energy.
   D. The electric meter reading next month could be little lower or higher than 64 kwh.

196. Gemma used the digital thermometer to determine the temperature of his brother Josua. She found out that her brother's temperature is 38.5°C. What does it mean?
   A. The digital thermometer is not working well.
   B. Gemma ad Joshua could go out for a picnic.
   C. His brother should stay in an air conditioned room.
   D. She should inform her mother that her brother has fever.

197. Bernard's family wil migrate in Canada. The temperature there is 11°C lower than the Philippines. What types of clothes should he prepare?
   A. Sando and shorts
   B. T – shirt and pants
   C. Sweater and jackets
   D. Coat and long sleeves polo

198. The family of Kenneth will put up a business in Baguio City which has an average temperature of 16°C. What kind of business should they put up in Baguio?
   A. Furniture shop
   B. Swim wear boutique
   C. Flowering plants
   D. Ice cream parlor

199. Romeo bought a new pair of shoes. The box of the shoes has dimensions of 11 in x 6 in x 5 in. Which is true about the shoes of Romeo?
   A. Romeo has a black leather shoes.
   B. Romeo's feet is 10 – 11 inches long.
   C. Romeo has doesn't like his running shoes.
   D. Romeo will return the shoes to the store because it doesn't fit him.

200. Leah learned that when she buy an item with bigger volume she can save more money. How could she determine an item that has a bigger volume?
   A. Items with bigger container have bigger volume.
   B. An item with the smaller container has a bigger volume.
   C. Items that are in sachets are cheaper than those in boxes or tubes.
   D. An item that has an attached free item can help her save more money.

201. Krishna finds it very difficult to solve word problems involving volume. What advice can you give her to make things easier for her?
   A. Ask a friend to solve the problems for her.
   B. Memorize the formula in finding the volume.
   C. Copy the given in the problem then stop solving the problem.
   D. Read the word problem with understanding and solve it patiently.

202. The stand of an ironing board is triangular in shape. It is triangular so that _____.
   A. it is stable
   B. it is easy to fold
   C. it can save space
   D. it will roll around the house

203. A carpenter is using an instrument called triangle in order to make sure that corners are forming 90°. This means that _____.
   A. houses can be triangular in shape
   B. pupils should become carpenters
   C. triangles can be used to build houses
   D. carpenters studied triangle in Grade VI

204. The teacher gave a quiz about equilateral triangles. Edward got zero in the test. What must he do?
   A. Retake the quiz.
   B. Never mind the result.
   C. Give the teacher a gift.
   D. Spend more time studying triangles.

205. Tiles with shapes like trapezoid, rhombus and parallelogram can be used to design a floor. The interior designer used parallelograms instead of circles. Why is this so?
   A. Parallelograms are easier to connect.
   B. More designs can be formed using parallelograms.
   C. It is more convenient to cut tiles that are parallelogram in shape.
   D. All of the above.
206. Lance learned that the angles between the parallel sides of a trapezoid could form a straight line. Because of this, Lance decided to cut some papers to form trapezoids to cover bulletin board. What was shown by Lance?
   A. Trapezoids are purely mathematical concepts.
   B. Only Mathematics teachers can understand trapezoids.
   C. Trapezoids are discussed in school to study four – sided figures.
   D. The properties of trapezoids can be used in some of real – life tasks.
207. The teacher gave an assessment test about trapezoids to the Grade VI pupils. Kevin scared his classmate to lend him the answers. The teacher caught him copying the answers of his classmate. What must he do?
   A. Deny that he is copying the answer of his classmate.
   B. Tell to the teacher that his classmate is the one copying his answers.
   C. Ask forgiveness and promise that he will donate new chairs to the school.
   D. Accept his fault and tell the teacher that he didn't understand the lesson.
208. Ayala Triangle in Makati was formed due to the intersections of three roads namely Makati Avenue, Ayala Avenue and Paseo De Roxas. What can you say about the structures in Ayala Triangle?
   A. It causes heavy traffic.
   B. The triangle was formed accidentally.
   C. It is a mark that Makati is a progressive city.
   D. It was carefully planned by the city engineer.
209. Susan can't understand how to get the number of triangles in different polygons. What must she do?
   A. Never mind how to determine it.
   B. Hire a tutor who will do his homework.
   C. Blame the teacher because she can't understand the lesson.
   D. Exert extra effort in studying her lessons and ask help from his brother.

210. Aryanna's younger brother Ryan Kael has difficulties in studying the sum of the interior angles of a polygon. How can she help her younger brother?
   A. Answer his assignments and projects.
   B. Talk to his teacher and share the difficulties.
   C. Scold her brother and report the brother's difficulties to their father.
   D. Explain to him how to do it and tell him that he just need some practice to master it.

APPENDIX G
Key to Correction
Mathematical Proficiency Test (MPT)

1. D	43. D	85. A	127. D	169. B
2. D	44. D	86. D	128. C	170. A
3. A	45. B	87. A	129. B	171. D
4. B	46. C	88. C	130. A	172. D
5. C	47. B	89. B	131. A	173. D
6. A	48. B	90. B	132. A	174. D
7. D	49. D	91. B	133. C	175. C
8. B	50. C	92. C	134. B	176. C
9. A	51. B	93. A	135. A	177. C
10. C	52. A	94. A	136. D	178. C
11. B	53. C	95. B	137. B	179. D
12. C	54. B	96. C	138. C	180. D
13. A	55. C	97. D	139. D	181. A
14. A	56. D	98. D	140. B	182. B
15. D	57. A	99. C	141. C	183. C
16. C	58. C	100. C	142. C	184. A
17. A	59. D	101. B	143. C	185. C
18. A	60. C	102. D	144. D	186. D
19. B	61. A	103. D	145. C	187. B
20. A	62. C	104. A	146. C	188. D
21. A	63. B	105. D	147. A	189. D
22. A	64. A	106. C	148. D	190. B
23. B	65. A	107. A	149. C	191. D
24. D	66. B	108. C	150. B	192. B
25. A	67. B	109. C	151. C	193. D
26. C	68. C	110. A	152. B	194. A
27. B	69. A	111. C	153. A	195. D
28. B	70. C	112. B	154. D	196. D
29. C	71. B	113. B	155. D	197. D
30. C	72. A	114. D	156. D	198. C
31. C	73. C	115. C	157. B	199. B
32. A	74. C	116. A	158. A	200. A
33. A	75. D	117. A	159. A	201. D
34. A	76. A	118. C	160. B	202. A
35. A	77. B	119. C	161. C	203. C
36. A	78. C	120. D	162. C	204. D
37. D	79. A	121. B	163. C	205. D
38. C	80. B	122. A	164. D	206. D
39. B	81. C	123. C	165. D	207. D
40. A	82. B	124. D	166. A	208. D
41. A	83. D	125. C	167. D	209. D
42. D	84. C	126. D	168. A	210. D

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B. Eduational Background

Master of Arts in Teaching Mathematics	Philippine Normal University Taft Avenue, Manila 2009-present
Bachelor of Elementary Education (BEED) Area of Concetration: Mathematics	Philippine Normal University Lopez, Quezon 2003-2007 Cum Laude
Secondary School	Lopez National Comprehensive High School 1999-2003
Elementary School	Don Mateo Lopez Elem. School 1993-1999 First Honorable Mention

Eligibility: Licensure Examination for Teachers

Teaching Experience:

June 2007-July 2008	Elementary/Secondary Math Teacher Our Lady of Assumption College Mamatid, Cabuyao City, Laguna
July 2008 – Present	Elementary Grade Teacher III Balibago Elementary School Balibago, City of Santa Rosa

Seminars/Workshop Attended:

December 2015	2015 National Dance Conference Angeles City, Pampanga
November 2015	Curriculum Writer - Finalization and Localized/ Indigenized Mathematics Curriculum under K to 12 City of Santa Rosa, Laguna
October 2014	Seminar Workshop in MAPEH/MSEP City of Santa Rosa, Laguna
May 2014	8th National Educators Convention Baguio City, Philippines
April 2013	Dance Xchange: The International Dance Workshop and Festival Puerto Princesa City, Palawan
November 2012	Regional Training on Campus Journalism Sto. Tomas, Batangas
May 2011	Three-Day Training on Instructional Technology in Mathematics and Heuristics Applications in Problem Solving