UNIVERSITY OF EDUCATION, WINNEBA

PUPIL S' PERFORMANCE ON THE PRIMARY SCHOOL MATHEMATICS NATIONAL MINIMUM STANDARDS IN THE EFUTU MUNICIPALITY

LYDIA IMPRAIM

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A MASTERS' THESIS IN THE DEPARTMENT OF BASIC EDUCATION OF THE FACULTY OF EDUCATIONAL STUDIES, SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, UNIVERSITY OF EDUCATION, WINNEBA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR AWARD OF THE MASTER OF PHILOSOPHY DEGREE IN BASIC EDUCATION

JUNE, 2014

DECLARATION

STUDENTS' DECLARATION

I declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

NAME: LYDIA IMPRAIM

SIGNATURE: ……………………………………

DATE: ……………………………………………

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: D. K. MEREKU (PROFESSOR)

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DATE: …………………………………………………………

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DEDICATION

This dissertation is dedicated to the almighty God for strengthening and guiding me throughout the preparation of this work. The work is also dedicated to my parents Mr. & Mrs. Impraim, my siblings Freda, Anastasia and Jerry and my nieces and nephew Arabella, Isabella and Charles.

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ABSTRACT

The study sought to investigate primary school pupils' performance on the national minimum standard assessment test. A survey design was used to solicit pupils' responses on the national minimum standard assessment test. The population of the study comprised all primary six pupils in the Efutu municipality in the central region of Ghana. A stratified sampling technique was used to select 300 pupils (159 boys, 141girls) who responded to test items on the national minimum objectives enshrined in the primary school mathematics syllabus. The findings revealed that pupils' general performance on the national minimum standards assessment test was good. However, the study revealed that seven (43%) out of the sixteen standards were found to be difficult by pupils. The findings also revealed that boys performed better than girls, private schools performed better than public schools and urban schools performed better than rural schools. The results were further analyzed using independent samples t-test and chi-square relational test with the level of significance fixed at 0.05. The findings of the independent samples t-test revealed that the gender of pupils have no influence on their achievement of the National Minimum Standards assessment test. However, there were significant differences in the performance of pupils with respect to the type of school and school location. The findings on the chi-square relational test on the proportion of pupils reaching the national education assessment benchmarks with respect to the type of school revealed that there was a significant difference between the mean scores attained by private and public schools ($\chi^2 = 13.332$, df = 2, $p > 0.01$). It was also revealed that more than half (52%) of pupils from the urban schools have reached proficiency as compared to rural schools (29%), with a significant difference ($\chi^2 = 21.609$, df = 2, $p > 0.00$).

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The pursuit of mathematics is vital and imperative for any society or nation, in order to maintain its independence, ensure increased prosperity and keep its place among the civilized nations of the world in this era of technology. Mathematics is a vital tool for understanding and applying science and technology; the discipline plays a vital role to the much needed technological and national development, which has become imperative in the developing nations of the world (Bassey, Joshua and Asim, 2008). It is also a means of sharpening the mind, building the reasoning abilities, and developing the personality of the individual to become a more scientifically and technologically minded person in the society (Asiedu-Addo and Yidana, 2000).

The significance of mathematics in producing versatile and resourceful graduates that are needed for economic development cannot be over-emphasized. This is why Jaiyeoba and Atanda, (2011) affirmed that mathematics is a fundamental science that is necessary for understanding most other fields in education. They stressed that, it is glaring that no other subject forms such a strong force among the various branches of science. It is also seen as the queen of the sciences because most of the science subjects are dependent on mathematics, without it, one cannot study other science subjects satisfactorily. For example in studying science subjects such as Physics, Chemistry, Economics and Engineering, one needs to have a firm foundation in mathematics. In his submission, Odusoro (2002) writes that the knowledge of science remains superficial without mathematics. It therefore means the position of mathematics in the basic school curriculum in Ghana is important for scientific development. The rich and more advanced countries of the world have attained their affluence through the advances they made in mathematics, which links science and technology. This implies mathematics education is a very important input in the scientific and technological development of any society. It is now obvious that mathematics as a subject is a tool for science and technology (Bassey, Joshua and Asim, 2008).

The importance of mathematics in most fields of human endeavor cannot be underestimated. Its usefulness in science, mathematical and technological activities as well as commerce, economics, education and even humanities is almost at par with the importance of education as a whole (Tella, 2008). The competencies gained in the study of mathematics are widely used in all spheres of human life. Mathematics plays a key role in shaping how individuals deal with the various spheres of private, social, and civil life (Anthony and Walshaw, 2009). Mathematics is a very important subject because the day to day activities of human beings largely depends on it. For example, in the business industry (buying and selling of goods and services), mathematics is extensively used. Business men and women always make use of money in their day to day transactions. To understand how money is used, one needs to have some basic mathematical foundations such as addition, subtraction and division. Also in the construction industry (construction of houses, roads, and schools) mathematics is used. Contractors usually demarcate the area to be used by measuring. The number of building materials to be used is also estimated and budgeted; all these processes involve mathematics. This justifies the compulsion of the study of the subject by all students who go through basic and secondary education in most countries. Mathematics is therefore a core subject at these levels of education in Ghana. Mathematics is one of the key subjects in both the primary and secondary school education system in Ghana.

Right from childhood, in nursery classes, mathematics is one of the basic skills expressed. This is because mathematics in the early years predicts children's mathematical achievement for later years and moreover, for the child to operate effectively in the society (Sarama and Clements, 2009; Adetunde, 2009). The curriculum emphasizes mathematical knowledge and skills that should help the pupils to develop basic numeracy competency to be able to function effectively in the society- in areas like Number and numerals, Number operations (addition, subtraction, multiplication and division), Measurement, shape and space and Collecting and handling data. These mathematical content domains offer pupils the opportunity to study mathematical skills that are important to apply in the society.

Due to the importance attached to the study of mathematics, the Ministry of Education has put in place various assessment tools to address the cognitive needs of students. This is to provide the opportunity for students to develop the concepts and skills needed to become flexible problem solvers (CRDD, 2012). These assessment tools include the National education assessment (NEA), School education assessment (SEA), Basic education certificate examination (BECE) and Trends in international mathematics and science study (TIMSS).

The national education assessment is a national assessment that is conducted every two years for primary three and six pupils across the country. The NEA provides an overall summary report for the country in the area of mathematics and English. It provides the ministry of education and the Ghana education service with reliable and useful information for evaluating the quality of primary school education in Ghana (MOE, 2011). The school education assessment is a national assessment designed for school level diagnostic use. It assesses pupils in primary two and six in English and mathematics. The SEA is meant to assist teachers and other stakeholders in the school, to improve the content delivery in the classroom (Ampiah, 2008). Basic education certificate examination is an examination taken at the end of basic education cycle, which determines whether or not a pupil will be able to progress to the second cycle education. Trend in international mathematics and science study is a worldwide assessment which takes place every four years. It provides data about trends in mathematics and science achievement over time. Pupils between the ages of 8 and 15 are used for the international assessment. The results are used to inform education policy, to improve teaching and learning of mathematics for teachers and students around the world.

Over the years, pupils' performance in the above mentioned assessment schemes have not been encouraging. It is sad to note that in the contemporary times; many students struggle with Mathematics and perform abysmally low in their final examinations in most jurisdictions (Mensah, Okyere and Kuranchie, 2013). The National Education Assessment (NEA) results released from (2005-2011), indicates that pupils reaching minimum competency (35%) and proficiency (55%) in mathematics at the basic schools was very disappointing (Ampiah, 2008; Mereku, 2012). In 2005, only 47.2% of the primary 6 pupils reached the minimum competency level while 9.8% of the pupils' attained proficiency. In 2007, the percentage of pupils' reaching the minimum competency dropped to 46.2% and there was a slight increase in the number of pupils who attained proficiency which was 10.8%. Ministry of Education, (2009) however writes that, there were increases in both the minimum competency (61.9%) and the proficiency (13.8%). Finally in 2011, pupils' achieving the minimum competency and proficiency for primary six was 56.9% and 16.1% respectively. The results show that about 90% of primary 6 pupils did not reach proficiency in mathematics in 2005 and 2007 (Ampiah, 2010). However, the results for 2009 and 2011 shows a slight increase in the proficiency level that is, about 16% of the pupils were able to reach the proficiency level (Mereku, 2012).

Ghana participated in the Trends in International Mathematics and Science Study (TIMSS) in 2003 and 2007. Ghana was last on the league table of participating countries just ahead of South Africa. The international average score for mathematics was 467, and Ghana scored 276. In 2007, Ghana registered improvement in scores in mathematics and science. Ghana's score, (309), was one of the lowest, and it was statistically significantly lower than the TIMSS scale average of 500. This poor performance placed Ghana at the 47th position on the overall mathematics achievement results table when the 48 participating countries were ranked by their mean performances. Ghana's score was lower than those obtained by all the participating African countries. Factors such as gender, type of school and school location is also believed to hinder pupils' performance in mathematics assessment. The NEA result released in 2011 shows that pupils' performance in urban schools was much higher than in rural schools. Urban Primary 6 pupils' were more than three times likely to achieve proficiency math scores than their rural counterparts (21% versus 6%). Private schools outperformed public schools. The private school pupils attained a proficiency math score of 39% as against 11% for public schools. The difference in performance with respect to gender was not significant. The boys achieved a proficiency score of 12.8% against 9.7% for girls (Ministry of Education 2012).

From the above discussion it can be seen that students' performances in mathematics over the years have not been encouraging. Researchers have delved into pupils' low performance in mathematics and have identified a number of factors. Mereku, (2012) conducted a research into the low literacy and numeracy levels currently observed in the nation's basic schools. Literacy and numeracy are fundamental skills for operating in the modern world and giving the best start for a child includes ensuring that they have grounding in these important skills. Mereku (2012) asserts that the causes of low literacy and numeracy levels observed in Ghana can be attributed to the gap between demand and supply of basic school teachers. This indicated that the supply is not good enough to meet the current demands of continually increasing population of children of school going age. He also points out that the issue of low literacy and numeracy level go beyond the teacher supply gap to include the nature and organization of the curriculum at the basic school level and the low assessment literacy of teachers. From the causes of low literacy and numeracy level identified by Mereku (2012), he cited lack of national minimum standards for basic education as one of the factors affecting student's poor performance in literacy and numeracy. National Minimum Standards (NMS) refer to the basic level of knowledge and understanding needed to function at a particular year level (National Assessment Program – Literacy and Numeracy, 2010). The NMS are more suited to foundation areas such as reading, writing and numeracy where deficiencies will have significant effects on students' future learning and functioning in society.

In order to improve the quality of teaching and learning at the basic school level, the national minimum standards have been introduced into the mathematics curriculum to guide teachers in their mathematics instruction and assess their students' performance.

Children come from various backgrounds and have different learning styles and abilities. It must be recognized that each child is an individual whose learning development and rate of progress is different from others. Different children will be ready for particular mathematical content and experiences at different times. It is therefore not expected that all children of the same age will be achieving at the same level at the same time, or that an individual child will necessarily be achieving at the same level in all content areas of the mathematics curriculum hence the introduction of the national minimum standards.

1.2 Statement of the problem

In recent times, there has been series of discussions on the fallen standards of mathematics education in Ghana. In Ghana, students' performance in mathematics at the basic, junior and senior high school has not been encouraging of late. Candidates are reported to exhibit poor understanding of mathematical concepts and are unable to form the appropriate mathematical models which could be tackled with the requisite skills (Mensah, Okyere and Kuranchie, 2013).The National Education Assessment (NEA) results released from 2005 to 2011, indicates that pupils reaching minimum competency (35%) and proficiency (55%) in mathematics at the basic schools is only about 15%; implying that most pupils are not reaching the target (Ampiah, 2010; Mereku, 2012). Anamuah – Mensah, Mereku and Asabre-Ameyaw, (2004) report that Ghanaian students who participated in the 2003 Trends in International Mathematics and Science Study (TIMSS) performed poorly, placing Ghana at the 45th position on the overall mathematics achievement result. According to the TIMSS 2007 report Ghana's JHS students' score were lower than those obtained by all participating African countries; although there was an improvement in the performance from that of 2003. Ghana's overall score of 309 was statistically significantly lower than the TIMSS average scale score of 500 (Anamuah-Mensah, Mereku and Ampiah, 2008). In the 2011 Basic Education Certificate Examinations, the Efutu municipality recorded an average percentage score of 54.4 in mathematics; however this score reduced to 38.8% in 2012 indicating a decrease in performance (Education Management Information System, EMIS 2012).

These poor performances have been attributed to the lack of national minimum standards (NMS) embedded in the mathematics curriculum (Mereku, 2012). This problem has brought about poor performances in national and international assessment (NEA, BECE and TIMSS respectively). The performance of most basic school pupils in the above mentioned mathematical assessments is not encouraging; in effect, most pupils are not able to climb the academic ladder after this level. This is because mathematics forms an integral part in selecting students for higher level of learning.

The introduction of the national minimum standards in the mathematics curriculum is to provide a platform for addressing pupils' inability to achieve mathematical skills expected of them at different levels. This is to prevent pupils from moving to other levels of their schooling with difficulties in understanding a particular mathematical skill. The NMS also cater for pupils who are extremely intelligent as it provides them with concept that challenge them. The NMS is designed to give pupils basic level of knowledge and understanding needed to function at a particular year level. Minimum standards vary from country to country due to differences in goals and objectives but within the Ghanaian society, it is expected that, all children must achieve the NMS set up in the curriculum. It is expected that every Ghanaian child who reaches primary six should be able to exhibit certain level of knowledge and skills on selected topics from the mathematics syllabus;

when the child is able to exhibit a level of knowledge and understanding needed to learn further task, then it means the child has been able to achieve the minimum standard. On the other hand, when the child is not able to perform to the standard set, then remedial teaching is put in place to assist the child overcome that challenge in order to be able to learn new task.

To date, however, there has been only limited research to investigate pupils' performance on the national minimum standards. Maliki, Ngban and Ibu**, (**2009) agree that we live in a world where science and technology have become an integral part of the world culture, therefore for any nation to be relevant; it must not overlook the importance of mathematics in her educational system. Accordingly, the observed poor performance in mathematics has been a matter of serious concern to all well-meaning educators. Students' poor performance in mathematics over the years has been attributed to the fact that the subject is difficult. It was therefore essential to conduct an empirical study to investigate pupils' performance on the national minimum standards which to a large extent may reduce pupils' poor performance in mathematics; this is because the NMS focuses on specific skills that every pupil is expected to achieve at a particular level. In situations where the minimum objectives are not achieved by the pupils, the teacher is expected to conduct remedial lessons to address the difficulties encountered by the pupils. Earlier researchers have indicated that there are differences in the performance of pupils in mathematics with respect to gender, type of school and school location. These differences in the performance of pupils if not addressed can have serious problems in future. This is because only few pupils would be able to further their studies after basic school and this would reduce the number of experts needed in the various field of wok. The researcher therefore sought to establish whether there was any significant difference between pupils' performance on the NMS in relation to gender (boys or girls), school location (urban or rural) and school type (private or public). The study also sought to establish the proportion of pupils reaching the National Education Assessment (NEA) benchmarks.

1.3 Purpose of the study

The purpose of the study was to investigate pupils' performance on the national minimum standards for primary school mathematics. To achieve the purpose, the following objectives were formulated to guide the study

- To investigate the performance of pupils on the mathematics minimum standards (NMS) required by the mathematics syllabus for primary schools.
- To determine whether or not pupils are achieving the mathematics national minimum standards including differences with respect to gender, type of school (private or public) and location (rural or urban).
- To find the proportion of primary school pupils reaching the National Education Assessment benchmarks.

1.4 Research questions

1. How do primary school pupils in the Efutu municipality perform on the National Minimum Standard Test?
2. How do factors such as (gender, type of school and location) influence pupils' achievement of the NMS for mathematics?
3. What proportion of primary school pupils are reaching the various levels of NEA benchmarks?

To answer research question (2) and (3), the researcher formulated the following hypothesis;

There is no significant difference between the performance of pupils on the national minimum standard assessment test and gender, type of school and school location.

There is no significant difference between the proportion of pupils reaching the various levels of the NEA benchmarks category with regard to gender, type of school and school location.

1.5 Significance of the study

The study provided insights into pupils' performance on the NMS assessment test in primary school mathematics that could be sustainable and transferable to other levels of education (junior high and senior high schools). The study provided empirical evidence on the pupils' performance on the content and cognitive domains of the mathematics syllabus. This could provide guidance for policy makers and stakeholders in education to structure and improve classroom practices in mathematics instruction to maximize effective teaching and learning.

Also, the Ghana education service can adopt the outcome of this study to monitor the quality of teaching and learning of mathematics in the classroom. Finally, the findings of the study will serve as a guide to others who have interest in researching further into the NMS for teaching mathematics.

1.6 Limitations of the research

Out of the districts in the central region of Ghana, the research was conducted in only the Efutu municipality. Ten (10) primary schools were selected to participate in this study. Therefore the generalization of the findings was limited. However, this limitation was compensated by the fact that all the primary six pupils across the country use the same teaching syllabus for mathematics instruction; hence pupils selected from Efutu municipality provided the study with a sample of pupils who had similar characteristics of Ghanaian public and private school pupils across the country.

There were limited developed standardized test items for assessing pupils' performance on the national minimum standards in Ghana. However because similar assessments such as the national education assessment and the school education assessment have been conducted in Ghana, the researcher drew from their examples to develop the test items to suit the Ghanaian situation.

1.7 Delimitation

The study should have covered the central region or the entire country but due to time constraint, it was delimited to only primary schools pupils in the Efutu Municipality of the central region. Furthermore, the study was delimited to only the public and private primary schools in Efutu municipality and the outcome might be different if any other district should have been included.

1.8 Organization of the thesis

This thesis was organized into five chapters. Chapter 1, constituted the background, statement of the problem, purpose and research questions. Relevant literature review was presented in Chapter 2. The literature review was based on the subheadings related to the study. The research design and methodology were described in Chapter 3. Results and discussion of data were presented in Chapter 4. The summary of findings, discussions, recommendations and suggestions were discussed in Chapter 5.

1.9 Definition of terms

SEA: School education assessment

NEA: National education assessment

TIMSS: Trends in international mathematics and science study

BECE: Basic education certificate examination

The NEA benchmarks

Minimum competency: Students who scored 35% or better are defined as having reached minimum competency. Thirty-five percent originally was set as the minimum competency as it would indicate that students had achieved a score higher than what they could have achieved if they had guessed all the questions.

Proficiency: Students scoring 55% or better are defined as having reached proficiency. This is the definition of minimum competency and proficiency that has been applied in all previous NEA applications.

NMS: National minimum standards refers to the specific skills that every pupil is expected to achieve at a particular level. The NMS are more suited to foundation areas such as reading, writing and numeracy where deficiencies will have significant effects on students' future learning and functioning in society.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter is to review and discuss the factors from the literature that are related to students' performances in mathematics and test item development. Themes under which literature was reviewed are**:**

- The concept of assessment
- Assessment practices in Ghanaian basic schools
    - ➢ School education assessment
    - ➢ National education assessment
    - ➢ Trends in international mathematics and science study
    - ➢ Basic education certificate examination
- Pupils performance on national assessment
- The mathematics national minimum standards
- Gender differences and mathematics achievement of students
- School location and Mathematical achievement of students
- School type and mathematical achievement of students
- Test item development

2.1 The concept of assessment

The Introduction to the Primary School syllabi (That is official curriculum) identifies assessment as an integral part of teaching and learning, and emphasizes the importance of assessing the process of learning as well as the product (CRDD, 2012). The official curriculum (syllabus) includes general guidelines on assessment for each subject and suggests a range of assessment tools that can be used for specific purposes. More detailed guidance is intended to enable schools and teachers continue to develop good practice in assessment. The syllabus emphasizes formative classroom-based assessment and its use in providing feedback to inform the next stages in children's learning. The wider purposes of assessment are also formally acknowledged and emphasized. The methods and tools of assessment recommended in the curriculum range on a continuous seamless series from less structured, informal methods such as teacher observation to more formal structured methods such as the use of tests (CRDD, 2012).

The term assessment is derived from the Latin word "assidere" which means 'to sit beside' National Council for Curriculum and Assessment (NCCA, 2004). In many respects that simple phrase tells us a lot about the essence of assessment in the context of primary school classroom. Its tone is non-threatening and affirming, it suggests a partnership based on mutual trust and understanding. What it reminds us is that there should be a positive rather than a negative association between assessment and the process of teaching and learning in schools. Clarke (2012) defines assessment as the process of gathering and evaluating information on what students know, understand, and can do in order to make an informed decision about next step in the educational process. Avoke (2008) having a similar view also writes that educational assessment is a systematic process of gathering information about educational needs of exceptional children and adolescents. Assessment is often an interdisciplinary effort that focuses on areas of learning and other factors affecting school achievement. Examples of assessment tools are observation, case study, Interview, questionnaire, checklist, rating and task analysis. An increasing number of international, regional, and national assessments reported low and unequal learning outcomes, reflecting the extent to which poor assessment is undermining the achievement of Education for All (Avoke, 2008).

Postlethwaite and Kellaghan (2008) outline a number of benefits derived from assessment. They write that the information obtained in assessment can supplement information on inputs to an education system (for example, information about educational resources or teacher qualifications) and on educational processes. Together, these types of information provide policy makers and education managers with evidence about their education system's achievements and successes, constraints it may be operating under, the problems (weaknesses and failures) it may be experiencing, all of which should provide a basis for proposals for remedial action (Ministry of Education, 2011). Since it is difficult for an education system to plan for improvement without such information, assessments can be considered as an essential component of the professional administration of any education system. Assessments also provide important information to other stakeholders – teachers, parents, and the general public (Morton, 2010). Although it has been known for governments to suppress the results of national assessments because of anticipated embarrassment, the long-term advantages of an open information system (including increased public support for education and a stimulus for reform) are likely to outweigh any short-term disadvantages.

Postlethwaite and Kellaghan, (2008) opine that a national assessment can have wide-ranging implications for: (a) social and economic policy regarding the overall quality and performance of the education system, including its role in achieving social and economic objectives (for example: equality of opportunity, gender parity, and improving the performance of students from disadvantaged backgrounds); (b) the organization and management of an education system (for example: the provision of public and private education); and (c) learning conditions (for example: instructional time, resources, teacher education). Clarke, (2012) sharing a similar view writes that national assessment provides information which is used to assess the quality and performance of an educational system. Zutaah, (2012) asserts that assessment in the broadest sense is concerned with children's progress and achievement. More specifically, classroom assessment may be defined as the process of gathering, recording, interpreting, using and communicating information about a child's progress and achievement during the development of knowledge, concepts, skills and attitudes. Assessment, therefore, involves much more than testing. It is an ongoing process that encompasses many formal and informal activities designed to monitor and improve teaching and learning in all areas of the curriculum.

In conclusion assessment can be viewed as the process of gathering information for the purposes of making decisions about educational policy, about curriculum and educational programs, or about individual pupil's learning. At the basic school level, there are different assessment practices aimed at improving performance and teaching.

2.2 Assessment practices in the Ghanaian basic schools

Many countries have gone down the track of compulsory testing of their students at a selection of year levels. High-stakes national assessment such as Basic education certificate examination (BECE) takes place only in the final year of the nine year basic education. For the first nine years of students' education, Ghana has a range of assessment initiatives aimed at gaining the assessment information needed at student, classroom, school, and system-wide levels. These give quality information to all the stakeholders in the education system, from students, parents, and teachers to policy makers and politicians.

Each assessment initiative has its own distinctive niche within these wide assessment needs. This has the benefit of giving teachers a meaningful choice of assessment tools that they can use within their classrooms and schools. This helps them match the distinctive nature of their own local communities, as well as the learning needs of the students within the school. The major assessment initiatives identified by Ampiah, (2010) are school education assessment (SEA), national education assessment (NEA) basic education certificate examination (BECE) and trends in international mathematics and science study (TIMSS).

2.2.1 School education assessment (SEA)

Ampiah (2010) writes that the SEA is an assessment intended for school-level diagnostic use. The assessment measures how well students can complete core objectives in mathematics. Results of the SEA at the school level are not intended for comparison across schools and regions rather, the assessment results highlight the areas in mathematics, which need to be addressed. Parents in each community can also be provided with information through School Performance Appraisal Meetings (SPAM) on how their school performed on each of the assessments. The results of the SEA are meant to help teachers and school leaders improve the focus and content delivery in the classroom (Ampiah, 2010). The results are therefore not intended to serve as an overall measure of student achievement (Ministry of Education Youth and Sports, 2008).

2.2.2 National education assessment

The National Education Assessment (NEA) tests pupil proficiency in English and in mathematics in the third and sixth grades of primary school (Ampiah, 2010). The NEA provides an overall summary report card for the country in mathematics and English-thus giving the ministry of education and Ghana Education Service (GES) reliable and useful information for evaluating the quality of primary school education in Ghana (Ministry of Education, 2011). According to the MOE (2011), the NEA is based on the assessment framework described in the national teaching syllabi for primary school English and mathematics. The conceptual framework for the NEA is based on a three-strand model of the curriculum:

- The intended curriculum (syllabus/textbook requirements)
- The implemented curriculum (what is actually taught)
- The attained curriculum (what the students learn).

The implemented curriculum may be different from the intended due to factors that may be learner-related, teacher-related, or environmental (MOE, 2011). The attained curriculum represents the extent to which the implemented curriculum has succeeded in achieving the curriculum goals. Based on this perspective of the educational process, the NEA aims at assessing the critical knowledge that pupils are expected to acquire and skills they should be able to demonstrate by the end of primary education, and not the entire curriculum. The alignment procedures described above ensure that the tests cover what can be judged as adequate (or not), in terms of minimum competency or mastery required by all learners to be successful.

The NEA mathematics assessment is organized around two dimensions: (1) a content dimension specifying the domains or subject matter to be assessed within each subject and (2) a cognitive dimension specifying the domains or thinking processes to be assessed (MOE, 2011). In the national teaching syllabi for primary school, the latter is also referred to as the profile dimensions (CRDD, 2012). The teaching syllabi describe the content domains in terms of the specific topic areas to be covered and the objectives within each topic. Each cognitive domain (or profile dimension) is described according to the sets of processing behaviors expected of students as they engage with the subject content (Ampiah, 2008). CRDD (2012) Posit that the mathematics curriculum framework used at the two levels (Primary 3 and 6) for the NEA has four content domains. In mathematics, the content domains are:

- Basic Operations
- Numbers and Numerals
- Measurement; shape and space
- Collecting and Handling Data.

According to (MOE, 2012; Ampiah, 2008), the National Education Assessment (NEA) results released from (2005-2011) were based on two parameters 'minimum competency' and 'proficiency' set to assess pupils attainment. A student is said to attained minimum competency if he/she answers at least 35% of the NEA test items correctly while he/she who is able to answer 55% is said to have attained proficiency.

2.2.3 Trends in international mathematics and science study (TIMSS)

Ghana is also involved in international studies of student achievement, such as TIMSS, so that the performances of its students, schools and system can be seen in a wider international perspective. Anamuah-Mensah, Mereku and Asabere-Ameyaw, (2004) write that TIMSS is a series of studies conducted by the International Association for the Evaluation of Educational Achievement (IEA) to examine student achievement in science and mathematics, two key curriculum areas that are fundamental to the development of technologically literate societies (Anamuah-Mensah and Mereku 2005). Ampiah (2010) opines that the Trends in International Mathematics and Science Study (TIMSS) is a worldwide assessment that takes place every four years and provides data about trends in mathematics and science achievement over time. Trends in International Mathematics and Science Studies (TIMSS) are a series of studies undertaken once every four years by the International Association for the Evaluation of Educational Achievement (IEA) to examine student achievement in science and mathematics. TIMSS seeks to continue monitoring trends in science and mathematics at the eighth grade (JSS2) and at the fourth grade (Primary 4); (Anamuah- Mensah, Mereku and Asabere-Ameyaw, 2004). It assesses the knowledge and skills of students aged 9-10 and 13-14 in over 60 countries, and enables researchers to collect extensive background information about the quantity, quality, and content of teaching, which can be used to make comparisons among participating countries (Anamuah- Mensah, Mereku and Asabere-Ameyaw, 2004). Findings from the survey are used to inform education policy and to improve teaching and learning of mathematics and science for students around the world (Ampiah, 2010). Mullis, Martin, Foy and Arora (2012) write that TIMSS is organized around two dimensions: a content dimension specifying the subject matter or content domains to be assessed in mathematics, and a cognitive dimension specifying the thinking processes that students are likely to use as they engage with the content. Each item in the mathematics assessment is associated with one content domain and one cognitive domain, providing for both content-based and cognitive-oriented perspectives on student achievement in mathematics.

2.2.4 The Basic Education Certificate Examination (BECE)

Ampiah (2010) writes that the Basic Education Certificate Examination (BECE) is the examination taken at the end of the basic education cycle, which determines whether or not a pupil is able to progress on to second cycle education. The BECE examination is structured so as to ensure that approximately 60% of students each year obtain aggregate 6-30, and so little variation is to be expected. The results of the BECE gives more of a relative ranking of students since each subject test score in reported in stanines, a statistical measure derived by dividing the normal bell curve into nine intervals for purposes of standardized reporting. Since the top mark in a subject is reported as having a score of one, the best aggregate score a student can have from taking six subject tests is a six. Anamuah-Mensah and Mereku (2005) having a similar view write that all students in basic education in Ghana write one public examination, Basic Education Certificate Examination (BECE), which is school leaving examination written at end of Year 9 (or JSS3). In this examination, students write papers in at least eight subjects including mathematics.

2.3 Pupils' performance on national assessment

In Ghana, pupils' performance on national assessment such as NEA, SEA, BECE and TIMSS, over the years have not been encouraging (MOE, 2012, Ampiah, 2008). According to the Ministry of Education (2012), the performance of pupils on the NEA benchmarks was below expectation as 56.9% of the pupils' attained minimum competency and 16.1% attained proficiency indicating that most of the pupils are not proficient. Ampiah (2010) affirmed that about 90% of primary 6 pupils performed below proficiency in the 2005 and 2007 NEA test organized. Ampiah, (2008) writes that primary 2 pupils performance on the 2006 SEA test organized was good in addition and subtraction.

However, the results showed that more instructional time on multiplication, fractions and ordinal numbers was needed (MoESS, 2008). The results of the test suggest that Primary 4 pupils require remediation and additional support in fractions, writing numbers in words, and concepts of basic geometry. These results cut across schools, districts and regions in the country (Ampiah, 2008). Results from TIMSS 2011 shows Ghana had an average score of 331 which was lower than the international average score of 500 (Mullis, Martins, Foy & Arora, 2011).

2.4 National Minimum standards

According to the National Assessment Program–Literacy and Numeracy (NAPLAN, 2010), National Minimum Standards (NMS) refer to the basic level of knowledge and understanding needed to function at a particular year level. The NMS are more suited to foundation areas such as reading, writing and numeracy where deficiencies will have significant effects on students' future learning and functioning in society. Also, according to the Australian curriculum assessment and reporting authority ACARA (2011), the National Minimum Standards describe some of the skills and understandings students can generally demonstrate at their particular year of schooling, in a specific subject area or domain. The standards are intended to be a snapshot of typical achievement and do not describe the full range of what students are taught or what they may achieve. CRDD (2012) also reported that the National Minimum Standards refers to the things each pupil would be able to do by the end of primary school. Some targets may be more complicated than they seem and so the syllabus has been designed for the teacher to revisit some of these objectives more than once in the year and possibly again at different levels.

The National Minimum Standards at primary 3, 6 and JHS 3 represent increasingly challenging skills and understandings as students move through the years of schooling from primary 3 to JHS 3 (CRDD, 2012). According to ACARA (2011), students who do not achieve the NMS at any year level may need intervention and support to help them achieve the literacy and numeracy skills they require to progress satisfactorily through their schooling. Pupils with higher ability who are reaching the national minimum standard might require additional assistance to enable them realize their potentials. Pupils with low ability who perform below the national minimum standard have not achieved the learning outcomes expected for their year level. They are at risk of being unable to progress satisfactorily at school without targeted intervention (ACARA, 2011).

According to the California state board of education (1997), a high-quality mathematics program is essential for all students and provides every student with the opportunity to choose among the full range of future career paths. To compete successfully in the worldwide economy, today's students must have a high degree of comprehension in mathematics (California state board of education, 1997). For too long, schools have suffered from the notion that success in mathematics is the province of a talented few. Instead, a new expectation is needed: all students will attain Ghana's mathematics academic content standards, and many will be inspired to achieve far beyond the minimum standards. These content standards establish what every student in Ghana can and needs to learn in mathematics (CRDD, 2012). Mathematics is critical for all students, not only those who will have careers that demand advanced mathematical preparation but all citizens who will be living in the twenty-first century. These standards are based on the premise that all students are capable of learning rigorous mathematics and learning it well, and all are capable of learning far more than is currently expected. Proficiency in mathematics is not an innate characteristic; it is achieved through persistence, effort, and practice on the part of students and rigorous and effective instruction on the part of teachers. The standards focus on essential content for all students and prepare students for the study of advanced mathematics, science and technical careers, and postsecondary study in all content areas (California state board of education, 1997).

The standards identify what all students in Ghanaian schools should know and be able to do at each grade level (CRDD, 2012). Topics may be introduced and taught at one or two grade levels before mastery is expected. The tests are by nature strongly formative as they attempt to assess all the objectives of specific minimum objectives and levels (content and cognitive domains) of the mathematics curriculum (CRDD, 2012). In order to achieve the general aims of the mathematics curriculum, teachers must provide opportunities for children to realize the specific minimum objectives which are the National Minimum Standards (NMS) for Primary three, six and JHS 3 (CRDD, 2012).

2.5 Gender differences and mathematics achievement of students

Gender differences in mathematics performance have been a great controversial issue in the educational domain. Research documents show great discrepancies among girls' and boys' performances in school mathematics (Sprigler and Alsup, 2003). Long research history in this area shows that boys' advantage in mathematics achievement is a universal phenomenon (Janson, 1996, Mullis, Martin, Beaton, Gonzalez, Gregory, Garden, and Murphy, 2000). Orhun (2003) conducted a research and identified that, right from first grade there were strong and consistent gender differences in the strategies used to solve problems. On the contrary, girls showed superiority in computation in elementary school and middle school. There was no gender differences in problem solving in elementary or middle school; differences favoring boys emerged in high school and in college (Orhun, 2003). While early research (Fennema and Sherman, 1977) indicated that males outperformed females in math achievement at the junior high and high school levels; there were also significant differences in attitudes toward math between the two groups. Girls tended to use more concrete strategies and boys tended to use more abstract strategies. Beller and Galli (2000) investigated the gender effect on problem solving and reported that boys' performances were better than girls. Studies show that girls achieve at a lower level as evidenced by performance gaps in mathematics and literacy in Ghana (Asante, 2010; Dunne & Leach, 2005; Shabaya and Konadu-Agyemang, 2004). Gallagher and Kaufman (2006) assert that the math achievement and interest of boys are better than the girls. However they explained that they don't know the main cause of these differences. O'Connor-Petruso, Schiering, Hayes and Serrano (2004) have shown that gender differences in math achievement become apparent at the secondary level when female students begin to exhibit less confidence in their math ability and perform lower than males on problem solving and higher level mathematics tasks.

In spite of research evidences for male's superiority in math achievement, some research findings do not support the difference between boys and girls in math achievement. As an example, Sprigler and Alsup (2003) refer to researcher indications that show no gender difference on the mathematical reasoning ability at elementary level. Ding, Song and Richardson (2007) conducted a longitudinal study about gender differences in mathematics. The finding of the study showed that there was no significant difference between the mathematical achievement of boys and girls. An international study conducted by IEA, on average scores across all countries, there was essentially no difference in achievement between boys and girls at either the eighth or fourth grade (Mullis, Martin, Gonzalez, and Chrostowski, 2004).

2.6 School location and Mathematical achievement of students

Location of a school a student attends may be closely related to the opportunities and support they have for learning. In order to be able to say, for example, that textbooks are related to higher achievement scores, we have to also take into account “control variables” such as location or region (Etsey, Smith, Gyamera, Koka, Boer, Havi and Heyneman 2009). A school cannot usually change its location, yet location conceivably may have consequences for how well students learn at the school. The investigation of a rural gap in academic achievement has been recently explored in studies conducted in the USA (Roscigno and Crowley, 2001; Reeves and Bylund, 2005), in Australia (Webster and Fisher, 2000; Young, 1998), and in cross-national comparisons (Williams, 2004). The findings indicated that the location of a school to a large extent has effect on the mathematics achievement of students. Etsey et al (2009), write that the urban/rural gap is a persistent problem for education systems around the world. While previous strategies in Ghana have targeted this disparity, and some resource disadvantages appear to have been addressed, the gap in achievement is still strong and significant. Etsey (2009) conducted a research and concluded that both Primary 3 and Primary 6 pupils from the schools in the urban districts performed significantly better than the pupils from the schools in the rural districts on Mathematics.

2.7 School type (private or public) and mathematical achievement of students

Ampiah (2008) conducted a research on pupils' performance on the NEA test with respect to the type of school. The finding revealed that the performance of private school pupils was significantly higher than public school pupils. The mean score of primary 3 pupils in the private schools was 60.3% for mathematics. The same trend was seen in Primary 6 (59.2%). In the private schools, the mean scores percent for mathematics in primary 3 and primary 6 were higher than that of public schools. A higher percentage of pupils in private schools also reached the 35% and 55% criteria for English language and mathematics compared to pupils in public schools. Etsey, Amedahe and Edjah (2005) in a study of 60 schools from peri-urban (29 schools) and rural (31 schools) areas in Ghana found that academic performance was better in private schools than public schools because of more effective supervision of work. According to the MOE (2012) Private schools outperformed their counterparts in the public schools when the NEA test was conducted in 2011. Meremikwu and Enukoha (2010) also conducted research on the use of instructional aides and its effects on the performance of pupils in mathematics; they posit that pupils from the private schools performed better than their counterparts from the public schools.

2.8 Developing a test

The primary objective of the test development process is to ensure that the test items accurately and reliably measure the knowledge and skills identified in the learning expectations, as opposed to irrelevant, ancillary skills. (Saeed and Noor, 2011). Hence, there are specific practices that should be built into the test development process to maximize test item alignment with the learning expectations and test reliability (Kuan, 2011).

According to MOE (2011), Anderson and Morgan, (2009) and Suen and McClellan (2003) the test development process involves the specification of the test domain, writing the test items, editing the drafted test items, piloting the test item, scoring and analyzing the items. Sound design and construction of items follow the principles of discrimination, score variance, reliability, and validity (Suen and McClellan 2003). A good item construction process is one that enhances the discrimination power, score variance, reliability and evidence of validity for the intended interpretation and use of scores from the overall test. Suen and McClellan (2003) opine that discrimination power has to do with the test not being too difficult or too easy for the intended examinees. Score variance deals with the span of scores among examinees. That is how the scores vary from each other. This principle is related to discrimination. Large score variance provides the potential for sound discrimination power. Reliability refers to the precision of test scores. That is the consistency of the test scores (MOE 2011). Validity refers to the degree to which evidence supports the interpretations of test scores. (National Council on Measurement in Education, 1999).

2.8.1 Specification of the test domain

According to the MOE (2011), before test items are constructed, the assessor scrutinizes the mathematics syllabi to tease out the core objectives for the group who are to take the test and use these as the basis for developing the tests. The objectives selected have syllabus reference numbers which should be recorded against each item to ensure that the selected curriculum objectives have all been catered for in the test. Suen and McClellan (2003) having a similar view write that the very first step in the development of a test and prior to the construction of any items is the specification of the test domain. The construction of a test is a sampling process. That is, since a test must contain items from all aspect of a particular subject, item writers must sample various items that represent the various aspects of the subject (Anderson and Morgan, 2008; Florida Comprehensive Assessment Test FCAT, 2005). According to a handbook by FCAT (2005), the specifications include the specific standards benchmarks for the particular State or country, the types of items used, guidelines for the relative balance of topics, item formats and complexity levels, plus general guidelines to minimize non-content influences, such as confusing wording or poor graphics.

2.8.2 Writing the test items

After the test specifications have been dealt with, the writers can go ahead with the construction of test items taking into consideration the specifications drawn. At this stage, writers construct some initial items out of which a panel of experts in the various fields review the questions and make a preliminary selection of questions that are relevant (FCAT, 2005). Throughout the item writing and editing process, several key concepts should be considered and continually checked. One such concept is face validity**.** In any ability-measurement situation, test designers must ensure that items are constructed appropriately to target the ability of interest (Anderson and Morgan, 2008; MOE, 2011). One facet of validity is the extent to which the content of a test is representative of the curriculum or construct that is being measured. The test development manager is responsible for coordinating with a nominated reference group of subject specialists, such as curriculum specialists, to ensure that the items represent an adequate sampling of a curriculum or construct (Anderson and Morgan, 2008). Another key concept is maintaining the appropriate number of items to assess a given skill. The full range of student ability needs to be assessed, without fatiguing participants. The final concept deals with multiple forms and consistency**.** It is critical that the level of detail in the instructions, the example items to illustrate instructions, and the question formats do not change from one test form to another. Inconsistencies in forms could advantage or disadvantage students and result in misrepresentation of their skill level.

Suen and McClellan (2003) posit that during the item development stage, writers may opt for multiple choice items. A typical multiple-choice item comprises of the stem, which gives the problem scenario in one or more sentences, and the options (alternatives, responses, or choices), which are the possible solutions to the problem presented within the stem. The options include the correct answer, called the key or key option, and various plausible incorrect answers called distracters. The distracters act to divert those examinees who are unsure of the correct answer. On the other hand, the distracters should not attract the attention of examinees who are knowledgeable of the correct answer. Torres, Lopes, Babo and Azevedo (2010), having a similar view writes that a multiple-choice test Item consists of two parts: a problem (stem)-that may be in the form of a question/problem or an incomplete statement, at the beginning of each item. A list of options (alternatives) – that contains one correct option (the answer) and a number of incorrect options (distracters). The purpose of the distracters is to appear as tempting solutions to the problem, plausible competitors of the answer for the students that didn’t achieved the objective being measured by the test Item. According to Haladyna (1999) a good distracter should be selected by low achievers and ignored by high achievers.

2.8.3 Editing the drafted test items

Even when the last word in the initial construction of test items is written, the test development process is not over yet. The writers should put away the constructed items for a few days and then go back to them. Invariably there will be something that could have been done better. Thus, the next step after constructing the items is to edit them (Anderson and Morgan, 2008; Suen and McClellan 2003). It is an accepted norm in testing to give a newly constructed test to a colleague or to a subject-matter expert in the same field, for editing. This step is done to improve the quality of the test further. According to Suen and McClellan (2003) the test items are edited to ensure that the following are not present:

- grammatical and typographical errors
- unclear expressions or statements
- unclear or inaccurate illustrations
- wrong use of words
- ambiguity
- Gender stereotyping in relation to domestic chores, games, etc.
- gender insensitivity
- Lack of ethnic balance in the use of names, places, etc.

All edits should be tracked and verified by at least one external reviewer to provide quality assurance on the typographical edits, ensure the maintenance of the original item intent, and check response options for the presence of a correct answer (MOE, 2011).

2.8.4 Piloting the test item

A pilot study involves small scale testing of procedures planned for the main study, and consequent revision of the procedures recommended for many qualitative and quantitative research studies (Gall, Borg and Gall, 1996). One goal of pilot testing is to determine how well the test instrument is assessing the students we are interested in learning about (FCAT, 2005). Therefore it is critical to collect data that are as complete as possible from a wide range of students with a sampling of many different skill levels**.** If the pilot data collection samples only from a single, select group (such as low skill students), there will be uncertainty about how well the test instrument will be able to assess high-ability students (and even those at the middle range of ability) during the full data collection. In order for the pilot data analysis to correctly evaluate the test instrument, the sample must resemble the full population of interest as much as possible (MOE, 2011). Ideally for a pilot study, the test team should collect at least 150 cases per grade, of data that are complete (i.e., minimal missing data) and variable (the majority of completed answer sheets should not have responses that are at the extremes of all correct, or all incorrect, but with good variation somewhere in the middle). Again, this variability is needed to ensure that the final test will be properly calibrated (not too difficult and not too easy). Kuan (2011) writes that after the pilot test administration, individual student responses are entered onto an electronic spreadsheet so that psychometric analysis can be performed to inform the test developers if the test items successfully captured student learning as expected. For test items that do not perform acceptably, test developers may choose to bring back the writers to review the pilot test data and make edits to the items so that these items can be used on test forms for future test administrations of the national assessments. For example, if a test question has two correct answers or an ambiguous correct answer, it will be evident from the data analysis reports since high achieving students will perform poorly on this item. Under these circumstances, the test developers will explain to the writers what was problematic about the item so that the teachers can revise the item accordingly. The newly revised items will then be sent out for pilot testing before it is included on an operational test form. Reviewing poor performing piloted items is a step that is typically skipped in the event that sufficient items pilot tested well for an operational test form.

2.8.5 Scoring and analyzing the items

According to the MOE (2011), once the pilot test data have been pre-scanned, scanned, and cleaned, and any outliers or other anomalies resolved, it is time to examine the item responses more closely. Some methods look at relationships among items. For example, internal consistency reliability assessments use the Cronbach's alpha statistic, which is calculated from the correlations between items in a test. This analysis provides information on how well the items on a test relate to one another (Izard, 2005). The term validity refers to usefulness for a specified purpose and can only be interpreted in relation to that purpose. In contrast, reliability refers to the consistency of measurement regardless of what is measured. Clearly, if a test is valid for a purpose it must also be reliable (MOE, 2011). But a test can be reliable (consistent) without meeting its intended purpose. Test reliability is influenced by the similarity of the test items, the length of the test, and the group on which the test is tried. When we add scores on different parts of a test to give a score on the whole test, we assume that the test as a whole is measuring on a single dimension or construct, and the analysis seeks to identify items which contradict this assumption. An item that shows low correlations with the remaining set may need to be reviewed further for content, or possibly with a different analytic method.

According to the MOE (2011), other analytic methods look at item-level response data to assess test characteristics. Rasch measurement is one such method, and is used to construct additive and objective instrumentation, or to create a 'ruler' that can be used to measure student skill level. Brombacher (2010) having a similar view writes that the Rasch analysis produces a person/item plot that provides insight into both the distribution of the participants and the items across the difficulty continuum. The Rasch analysis highlights any ceiling effects and/or floor effects. It also highlights particular items that are potentially measuring the same thing, and therefore is redundant, or that are not performing well. Based on the interpretation of the analysis the items on the assessment are refined and finalized. Bond and Fox, (2001) also write that output from the Rasch model analysis also flags items that are producing unexpected responses and may need further review. For example, if the Rasch analytic model estimates that an item is easy, but several high-skill students are not able to respond correctly to that item, it should be examined for content. Perhaps there is a typographical error in the item causing the question to be misleading, or perhaps the correct response is not present in the response options. This item would likely require revision before full data collection (MOE, 2011).

2.9 Summary

The review looked extensively at both classroom and national assessment at the basic school level. The chapter has also examined pupils' achievement at the basic school level and looked at some of the factors which influence pupils' performance on mathematics. It also reviewed test development practices which were useful for designing the test items used for the study. The areas reviewed have given a framework on test construction which is vital in developing national assessments useful for classroom practices.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter presents the methodology employed for the study. It considered the research design, the population, sample and sampling techniques, instrument used in gathering the data, and description of the instrument, validity and reliability. It also covered the pilot study, administration of instruments and procedure for data analysis.

3.1 Research design

To address the different research questions, survey was used for the study. The design employs quantitative method because test was used. The study described the performance of primary six pupils on the national minimum standard test. Survey is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables.

Survey studies are conducted to collect detailed description of existing phenomena with the intention of employing data to justify current conditions and practices or to make more intelligent plans for improving them. That is to say, survey studies are conducted to analyze, interpret, and report the status of an institution, group, or area in order to guide practice in the immediate future (Fraenkel and Wallen, 2000). A survey is a systematic method of collecting data from a population of interest. It tends to be quantitative in nature and aims to collect information from a sample of the population such that the results are representative of the population within a certain degree of error. Survey is used in a variety of ways, but survey commonly refers to the collection of standardized information from a specific population, or some sample usually but not necessarily by means of questionnaires or interviews (Fraenkel and Wallen, 2000). Creswell (2012) argues that despite the many applications of surveys today, there are still only two basic types of research surveys: cross sectional and longitudinal. The purpose of a survey is to collect quantitative information, usually through the use of a structured and standardized test.

3.2 Population and setting

The target population for the study included all primary School pupils in the Efutu municipality. The researcher chose the target population from the Efutu municipality, because she is a native, has been teaching in the municipality for four years and is familiar with the learning habits and pupils' capabilities in the municipality. There are 59 primary schools in the municipality (EMIS, 2012). This comprised 24 public schools and 35 private schools. The total enrolment for primary schools in the municipality is 13,562 (public = 9,786, private = 3,776, EMIS data, 2012). Out of this number, 1888 (public = 1475, private = 413) pupils were in primary six (EMIS, 2012) as at 2012.

3.3 Sample and sampling technique

The sample was selected from the Efutu municipality in the central region of Ghana. The stratified sampling technique was used to select 300 primary six pupils from the Efutu municipality in the central region. According to Osuala (2001), stratified random sampling involves the division of the population into separate strata on a characteristic assumed to be closely associated with the variables under study. A separate probability sample is then selected from within each stratum (subgroups). Stratified sampling technique was used in this study because the basic schools in the Efutu municipality are made up of public and private schools. Therefore to be able to get equal representatives of pupils from both private and public schools, stratified sampling technique was employed. The researcher divided Efutu municipality into two stratums (private and public schools). A simple random sampling technique was employed to select five (5) schools from the public stratum and five (5) schools from the private stratum. A total of 300 pupils from primary six were selected from the ten schools in the municipality. This was made up of 159 boys' and141 girls. The pupils selected from the sampled schools were all in primary six. At this level, most of them might have acquired the minimum standard enshrined in the primary school mathematics syllabus. The distribution of the sampling procedure is presented in Table 3.1.

Table 3.1: Stratified Sampling of Participants

Strata	Number of schools	Number of pupils
Public schools	5	178
Private schools	5	122
Total	**10**	**300**

The frequency distribution of the sample procedure shows that the number of pupils selected from the public schools were more than those selected from private schools. The reason is that, in the municipality, the public schools have higher enrolment than those in the private schools.

3.4 Instrumentation

The instrument used to gather data on the study was test. The items were constructed to test pupils' performance on the national minimum objectives. Each of the minimum objectives on which the items were constructed corresponded to the content and cognitive domains in the mathematics syllabus for primary schools (CRDD 2012). The test development was guided by the frameworks suggested by Anderson and Morgan, (2008); Florida Comprehensive Assessment Test (FCAT, 2005), Suen and McClellan (2003) for test construction. Using an item specification grid, several questions were set to cover all the content domains stated under the standards as well as cognitive domains (see Appendix A). Table 3.2 presents some of the key words which were used to identify the items that were classified under the content and cognitive domains.

Table 3. 2: Mathematics content and cognitive domain

Content domains	Cognitive domain
Basic Operations: basic number facts (the four basic operations on whole numbers; fractions and decimals); ratio, proportion, and percent; mappings	*Knowledge and Understanding* (KU): remember, recall, identify, define, describe, list, name, match; state principles, facts, and concepts
Numbers and Numerals: whole numbers; fractions, decimals, and percentages	*Application of knowledge* (AK): explain, summarize, translate, rewrite, paraphrase, give examples, generalize, estimate or predict consequences based upon a trend
Measurement; Shapes and Space: lines and angles; 2- and 3-dimensional shapes; congruence, geometric measurements—length, area, volume; spatial measurement; capacity; mass and time; number plane	
Collecting and Handling Data: data collection and organization in tables, data representation in charts, reading data presented in tables, probability	

Source (MOE, 2011)

The table shows the various topics classified under the content domain and the terms used to classify the test items under the cognitive domain. The content domain is made up of four areas that is, number and numerals, number operations, measurement, shape and space and collecting and handling data. The cognitive domains have two areas that is knowledge and understanding and application of knowledge.

3.5 Validity and reliability of the instrument

Validity is an important aspect of research and according to Cohen, Manion, and Morrison (2003), it is based on the view that a particular instrument measures what it claim to measure. They also commented that, with the increasing adoption of qualitative studies, however, the focus of measuring validity is no longer in terms of figures since qualitative data emphasize trustworthiness, truthiness, honesty and scope of the data. To ensure validity of the test items, experts, supervisors, mathematics teachers and colleagues were consulted for suggestions, before it was administered as suggested by (Anderson and Morgan, 2008).

Reliability, according to Cohen et al. (2003); Suen and McClellan (2003), means that scores from an instrument are stable and consistent. Scores should nearly be the same when researcher administer the instrument a multiple times and at different times. Therefore to ensure reliability of the test items, the researcher used the same test items for all participants, the same duration was given to all the participants and the test items were administered to pupils who were in primary six as suggested by (Anderson and Morgan, 2008; MOE, 2011). Reliability was established when the test items was piloted, before administering it to the pupils who participated in the research. A reliability test conducted using the Cronbach alpha established that the Cronbach alpha was greater than 0.8

indicating that the test was highly reliable. This result confirms MOE (2011) assertion that Cronbach's alpha (to be 'reliable,' must be between 0.7 and 0.9).

A pilot study involves small scale testing of procedures planned for the main study and consequent revision of the procedures recommended for many qualitative and quantitative studies, two or three participants are sufficient (Gall, Borg and Gall, 1996). Piloting is able to help in establishing reliability and practicability of the test because it serves among other things, to check clarity of the questions, give feedback on validity of the test items and also to make sure that the data required will answer the research questions.

The pilot study was conducted among primary five pupils of two schools from the municipality who were not used for the main study. This class was selected because the national minimum objectives runs through primary one to six, therefore most of the pupils were familiar with the topics from which questions were selected and also, that class had similar characteristics just as those in class six, most of the topics studied in primary five are also studied in primary six.

The test item used for the pilot study provided the researcher the opportunity to modify and redesign some of the items. The researcher realized that pupils' responses to some of the items were very poor as a result of lack of understanding. Also the researcher was able to obtain the duration that should be assigned for the administration of test items and possible responses from pupils. The pilot test enabled the researcher to check for the validity and reliability of the test items. After the pilot study, a final 30 items were selected for the study (See Appendix B). Table 3.3 presents the distribution of the content and cognitive domains.

Table 3.3: Distribution of the content and cognitive domains

Domain		N	Total
Content	Number and numerals	5	30
	Number operations	13	
	Measurement, shapes and space	7	
	Collecting and handling data	5	
Cognitive	Knowledge and understanding	13	30
	Application of knowledge	17	

The table shows that most of the standards represented number operation hence most of the items were under this content domain. About 80% of the topics in the mathematics syllabus fall under number operations; this explains why more items were selected from this content domain (CRDD, 2012). Pupils were expected to score at least 55% of the test items or better still 65% to show they are meeting the proficiency level.

3.6 Ethical consideration

Ethical considerations are of great importance when one is conducting research involving human beings (Goddard and Melville, 2001). It is important for the researcher to design a study in which principles of integrity, respect for persons and justices are exemplified. The researcher accepts the assertion that research contributes to scientific knowledge and that human and technological advances are based on this knowledge. It is accepted that educational research should contribute to teaching and development of the learner. In order to deal with ethical problems in research, Cohen, Manion and Morrison (2007), write that the researcher must establish clearly, the purpose of the research to the participants. The researcher must also communicate, if any, risks to the participant; ensuring that they are in the position of making their own decision, if not, have someone consent to their participation. However, participants must be given the opportunity to decide whether or not they wish to be part of the study (Cohen, Manion and Morrison 2007). In addressing the above concerns and suggestions raised, the researcher embarked on the following in order to deal with any ethical concerns that may arise:

3.6.1. Permission

The researcher took introductory letter from the Department of Basic Education, of the University of Education, Winneba which enabled her to seek permission and approval from the head-teachers and mathematics teachers of the various schools to administer the test items. The researcher also established a cordial relationship with the mathematics teachers in the various schools, thereby acquiring the necessary assistance and support needed to carry out the research.

3.6.2 Confidentiality

All respondents were assured of confidentiality both in written and verbal forms. As a precautionary measure, participants were not made to write their names on the answer sheet. Participants were also assured of confidentiality and anonymity of their answers and the information they provided for the research.

3.6.3 Consent

Written consent was given to head teachers' of the participating schools to sign. The consent was obtained voluntarily without compulsion, coercion or bribery. The aims, methods and duration of the research were explained to the participants. See Appendix F for the consent form.

3.7 Data collection procedure

The researcher visited the schools with official letters of instruction from University of Education, Winneba, seeking permission from the heads of schools for respondent to answer questions. The researcher also established a cordial relationship with the mathematics teachers as well as the class teachers in the various schools, thereby acquiring the necessary assistance and support needed to carry out the research. The test item designed to investigate pupils' performance on the national minimum standard was administered to all pupils who participated in the research. Pupils' achievement in the test assisted the researcher to obtain information to assess their performance on the national minimum objectives. The researcher was present to explain how to answer the test items; the researcher communicated the purpose and uses of the research to group, promised to provide feedback about the result, and assured them of confidentiality. This was important because participants were expected to give reasonable and honest responses.

3.8 Data analysis

This study assessed pupils' performance on the national minimum standard test in relation to the content and cognitive domains. In this study the researcher went through the responses provided by the pupils, gave codes to the responses and these codes were entered in Statistical Package for Social Sciences (SPSS) and analysed. The data entries were done by the researcher in order to check the accuracy of the data. Data were cleaned before running any analysis. Cleaning the data helped the researcher to get rid of errors that could result from coding, recording, missing information, influential cases or outliers. Quantitative analysis was used to illustrate the kind of support stakeholders need to offer pupils in the study of mathematics and to generate ways of improving pupil's performance on mathematics at the primary school level. Descriptive statistics, frequencies, independent sample t–test and chi - square relational test was used for the data analysis. Descriptive statistics was used to determine the extent to which pupils perform on the national minimum standard assessment test. Independent samples t-test was used to find whether the factors (gender, type of school and school location) influence pupils' performance on the national minimum standard assessment test. The chi – square relational test was used to compare pupils' performance within the groups (gender, type of school and school location) and the various levels of the National Education Assessment benchmarks.

3.8.1 Independent samples t-test and chi-square

The independent samples t-test compares the means between two unrelated groups on the same continuous, dependent variable (Lund and Lund, 2012). The Chi-Square Test procedure tabulates a variable into categories and computes a chi-square statistics. This goodness-of-fit test compares the observed and expected frequencies in each category to test that all categories contain the same proportion of values or test that each category contains a user-specified proportion of values. The Independent samples t-test was employed to compare the means between the categories of gender, school type, school location and pupils' performance on the national minimum standard assessment test. The chi-square relational test was employed to compare pupils' performance within the groups (gender, type of school and school location) and the National Education Assessment benchmarks.

3.8.2 Normality test

Park (2008) asserts that statistical methods are based on various underlying assumptions. One common assumption is that a random variable is normally distributed. In many statistical analyses, normality is often conveniently assumed without any empirical evidence or test. But normality is critical in many statistical methods. When this assumption is violated, interpretation and inference may not be reliable or valid. According to him, there are two ways of testing normality. Graphical methods visualize the distributions of random variables or differences between an empirical distribution and a theoretical distribution (e.g., the standard normal distribution). Numerical methods present summary statistics such as skewness and kurtosis, or conduct statistical tests of normality. Graphical methods are intuitive and easy to interpret, while numerical methods provide objective ways of examining normality. To determine whether the dependent variables (pupils overall performance on the national minimum standard assessment test) were normally distributed for each combination of the levels of the independent variables, test of Normality was employed. The test of Normality for pupils overall performance on the national minimum standard assessment test is presented in Table 3.4.

Table 3.4: Shapiro-Wilk Test of Normality for pupils' performance on the NMSAT

Factor	Categories	Statistic	Df	Sig
Gender	Boys	0.99	159	0.48*
	Girls	0.98	141	0.11*
Type of school	Public	0.99	178	0.11*
	Private	0.99	122	0.25*
School location	Urban	0.99	231	0.07*
	Rural	0.98	69	0.19*

*Normal ($p > 0.05$)

Table 3.4 shows the result of the Shapiro-Wilk Test of Normality for pupils' performance on the NMSAT. Shapiro-Wilk Test is more appropriate for small sample sizes (< 50 samples) but can also handle sample sizes as large as 2000 (Lund and Lund, 2012; Park, 2008). For this reason, the researcher employed the Shapiro-Wilk test as the numerical means of assessing normality. It can be observed from Table 3.4 that the dependent variables; pupils' overall performance on the NMSAT were normally distributed for each of the categories in the independent variables. If the p-value of the Shapiro-Wilk Test is greater than 0.05 then the data is normal. If it is below 0.05 then the data significantly deviate from a normal distribution (Lund and Lund, 2012; Park, 2008). Therefore, the assumption of dependent variable being approximately normally distributed for each combination of the levels of the independent variables was met.

3.9 Summary

The study was conducted to investigate pupils' performance on the national minimum standard assessment test among primary school pupils in the Efutu municipality. The data collected from pupils were analyzed by using descriptive and quantitative procedures. Independent sample t-test and chi-square relational test were conducted to find out whether pupils' performance on the NMSAT was influenced by their gender, type of school and school location. Efutu municipality was chosen as a site for the study because the researcher has been teaching in the municipality for the past 4 years and knows the academic environment of the municipality.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Overview

This chapter focuses on the results of the analyses of the data and discussion of the major findings. The data were organized and presented using tables, figures, descriptive and inferential statistics. The results and discussions are presented under the following themes:

- Demographic Information of Participants
- The overall performance of pupils on the minimum standards assessment test.
- Performance of pupils with respect to gender, the type of school (private and public) and location (rural and urban)
- Proportion of pupils reaching the National Education Assessment benchmarks.
- Discussion of major findings.

4.1 Demographic Information of Participants

Three hundred (300) pupils were sampled from ten schools for the study in the Efutu municipality. Out of the 300 pupils' sampled, 53% were boys and 47% were girls. The gender distribution of the pupils is presented in Table 4.1.

Table 4.1: Frequency distribution of gender of pupils

Gender	Public	Private	Total
Girls	86	55	141
Boys	92	67	159
Total	**178**	**122**	**300**

The gender distribution of pupils' shows that the number of boys and girls selected from the public schools was higher than those from the private schools in the municipality. The reason is that, in the municipality, the public schools have higher enrolment than those in the private schools. The three hundred (300) pupils had ages ranging from 11 to 22 years. The average age of the pupils was 12 years. The age distribution of the pupils is presented in Table 4.2.

Table 4.2: Frequency distribution of pupils' age

Age	Public	Private	Total	Percentage
11 – 14	126	109	235	78
15 – 18	47	13	60	20
Above 18	5	0	5	2
Total	**178**	**122**	**300**	**100**

The age distribution of the pupils shows that majority of the pupils (78%, n = 235) were within the age range of 11-14 years followed by the range of 15 – 18 (20%) years. This suggests that as a whole, about 98.33% of the respondents that participated in this study were within the ages of 11 and 18. These pupils were selected because their ages corresponded with the proposed age for primary six by the Ghana Education Service. Finally the school location of the pupils used for the study was also considered. The distribution of the pupils' school location is presented in Table 4.3.

Table 4.3: Frequency distribution of school location of pupils

Location	Public	Private	Total
Urban	109	122	231
Rural	69	0	69
Total	**178**	**122**	**300**

The results in Table 4.3 show that 77% (n = 231) of the pupils were located in the urban schools while the remaining 33% were located in the rural schools in the municipality. Most of the pupils were selected from the urban schools because about 90% of the schools in the municipality are located at the urban center. Only few schools are located at the rural areas outside the urban centre.

4.2 The overall performance of pupils on the national minimum standards assessment test (NMSAT)

The overall percentage means score of pupils' responses on the test items were computed. The test comprised 30 items and the proportion of pupils obtaining correct responses on each item was also analyzed. A percentage mean score below 50% of the total score represents low score while a percentage mean score above the median score represents high score. The scores were further organized into maximum and minimum values and the results presented in Table. Table 4.4 presents the descriptive statistics of pupils' scores on the national minimum standard test.

Table 4.4: Descriptive statistics on the total score of pupils

	(n)	Minimum Score	Maximum Score	Mean	Std. Deviation
Total score	300	13	97	55	17. 6

The results from Table 4.4 indicate that the pupils' percentage mean score on the test was 55% with a standard deviation of 17.6%. This is an indication that the general performance of pupils on the national minimum standard assessment test was good. However, because the test centered on concepts that were considered to be minimum for each child, it was expected that the mean score would be about 75% but that was not the outcome. The results were further presented in percentiles in order to obtain the true representation of pupil's performance. Table 4.5 shows the percentages of pupils performing above or below particular points on the achievement scale (i.e. from the 5th to 95th percentiles).

Table 4. 5: Percentiles of achievement on the national minimum standard assessment test

5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
26.7	33.3	43.3	55.3	66.7	79.7	83.3

The 5th percentile indicates the lowest limit where the bottom five percent of primary six pupils' achieved scores, which was 27% while the 95th percentile indicate the highest limit above which only the top five percent of the pupils achieved a score which was 83%. The results from Table 4.5 show that more than half of the pupils obtained scores above the 50% mark.

4.2.1 Pupils' performance on the National Education Assessment (NEA) benchmarks

Table 4.6 presents the achievement of pupils' on` the National Education Assessment (NEA) competency categories or benchmarks, where a score below 33% indicates an achievement below minimum competency level, a score from 33% to 54% indicates an achievement of minimum competency, and a score of 55% and above indicates an achievement on proficiency level.

Table 4.6: Categorized percentage score by NEA score

Benchmark	Frequency	Percent
Below minimum competency (i.e. scoring below 33%)	28	9.3
Minimum Competency (i.e. scoring from 33% to 54%)	131	43.7
Proficiency (i.e. scoring 55% or higher)	141	47.0
Total	300	100

The results in Table 4.6 show that most of the pupils (47%) are achieving proficiency with only about 9% being below the minimum competency level. However, since the test measures minimum standard, it was expected that about 70% of the pupils should achieve proficiency. Therefore, the 53% of pupils performing below the proficiency level indicates about half of the primary six pupils in the municipality have not attained the national minimum standard required in mathematics.

4.2.2 Standards that were most or least attained by pupils in each of the four content domains

Table 4.7 presents the proportion of pupils achieving some of the Primary 6 mathematics standards. Since the test is a minimum standard test, an average percentage correct score of 65 and above on an item, which measures a standard, indicates the standards is being attained by most pupils or are not difficult standards. The table shows some standards with content domains and the percentage of pupils reaching these standards and the ranking of the difficulty of the standard.

Table 4.7: Standards that most pupils easily attain by content domains

Content domain	Standard specified by syllabus objective	Percent reaching standard	Ranking of difficulty (i.e. from least)
Number operations	• Carry out column addition and subtraction of numbers involving decimals, up to 3 decimal places	94.0	1
	• Recite addition and subtraction facts for each number up to 20	84.0	2
	• Choose and use appropriate operations (including multiplication and division) to solve word problems, explaining methods and reasoning	77.0	3
	• Carry out multiplication and division of numbers involving decimals.	72.0	4
Measurement shape and space	• Identify right angles	66.0	5

From Table 4.7, it can be noticed that most of the pupils are capable of choosing appropriate operations to solve word problem; reciting addition and subtraction facts for each number up to 20; carrying out column addition and subtraction of numbers involving decimals up to 3 decimal places; carrying out short multiplication and division of numbers involving decimals; and identify right angles.

Table 4.8 presents some standards that are not being achieved by most pupils or the top seven most difficult standards. Since the test is a minimum standard test, an average score of at most 54 percentages on an item indicates the item is difficult and that pupils are incompetent on the standards.

Table 4.8: Standards that most pupils find difficult to attain by content domains

Content domain	Standard specified by syllabus objective	Percent not reaching standard	Ranking of difficulty (i.e. from most)
Numbers and numerals	• Order a mixed set of numbers with up to three decimal places	22.5	1
	• Understand division and recognize that division is the inverse of multiplication	25.0	2
Number operations	• Use a fraction as an operator to find fractions of numbers or quantities (e.g. $\frac{3}{4}$ Of 48, $\frac{7}{10}$ of 30, $\frac{15}{100}$ of 200 centimeters).	29.0	4
	• Understand percentage as a number of parts in every 100, and find simple percentages of small whole-number quantities	41.3	5
Measurement, shape and space	• Understand and use money notation.	27.0	3
	• Use units of time and state the relationships between them (second, minute, hour, day, week, month, year	53.7	7
	• Find the perimeter and area of simple shapes drawn in square grid or draw such shapes when given the perimeter and area.	52.0	6

From Table 4.8, it can be noticed that the most difficult standard is 'to order mixed set of numbers with up to three decimal places' which was achieved by only 22.5% of the pupils. The next six most difficult standards which at most 54% of pupils were unable to reach are 'use a fraction as an operator to find fractions of numbers or quantities';

'understand percentage as a number of parts in every 100, and find simple percentages of small whole-number quantities'; 'understand division and recognize that division is the inverse of multiplication'; 'understand and use money notation'; 'use units of time and state the relationships between them (second, minute, hour, day, week, month, and year)'; and 'find the perimeter and area of simple shapes drawn in square grid or draw such shapes when given the perimeter and area'.

4.2.3 Performance of pupils in various content domains

The national minimum standard (NMS) assessment test was organized around four content domains, namely, number and numerals; number operations; measurement, shape and space; and collecting and handling data. The test comprised 30 items. The pupils' average correct score on all items out of the 30 score points was 16.45 score points. Table 4.9 shows the percentage average score obtained on all items in the mathematics content domains.

Table 4. 9: Average Score Correct in the Content Domains

Content	Minimum	Maximum	Mean	Std. Dev.
Number and Numerals	0	5	2.05	1.2
Number operations	1	13	7.61	2.4
Measurement, shape and space	0	7	3.56	1.6
Collecting and Handling data	0	5	3.22	1.3

The mean performance of the pupils in all the four content domains is as follows: Number and numerals, 2.05; Number Operations, 7.61; Measurement, Shape and Space, 3.56; and Collecting and Handling Data, 3.22. The pupils' average percent correct was highest on Collecting and Handling Data items, meaning that most pupils were able to answer questions in this content domain. The lowest average percent correct was recorded on Number and Numerals. This implies that pupils' performance on number and numerals was not good.

Figure 4.1 shows differences between average percentage performances in each content domain.

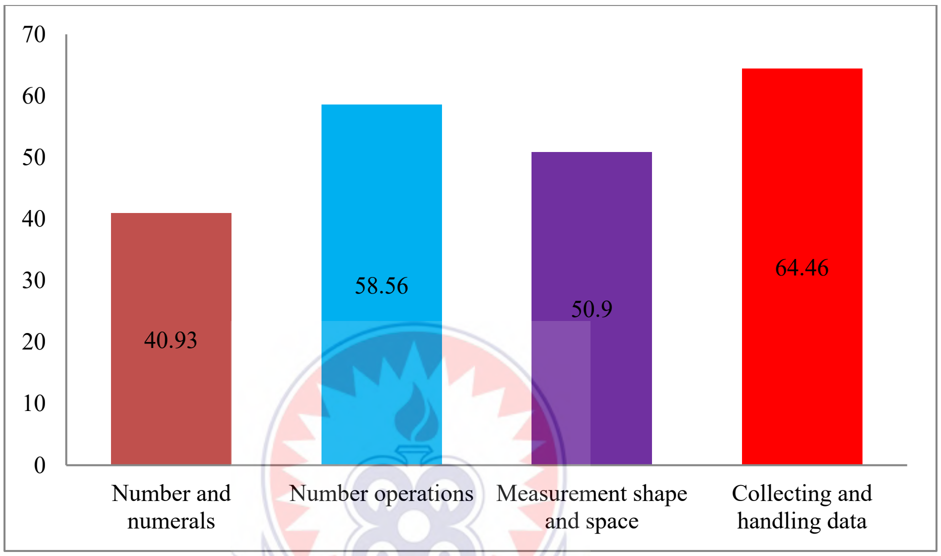

Figure 4.1: Average percentage score on content domain

The results from figure 4.1 shows that pupils performed relatively better in Collecting and Handling Data but the mean score was below the expected NMS average of 65%. They obtained an average scores 64.46% out of 5 items, slightly below the 65% average score for the National Minimum Standard Assessment Test. Their performance in Number Operations, and Measurement, Shape and Space was above 50% though, but below 65% but performed relatively lower in Number and Numerals. They obtained 40.93% score which is way below the expected average score in Number and Numerals.

4.2.4 Performance of pupils in various cognitive domains

In assessing strengths and weaknesses in the cognitive domains, the average performance in these domains relative to the overall level of performance was also examined. Table 4.10 indicates pupils' mean score on the various cognitive domains namely; knowledge and understanding and application of knowledge.

Table 4.10: Average score correct in the cognitive domains

Domain	Min	Max	Mean	Standard Deviation
Knowledge and understanding	1	13	6.98	2.53
Application of knowledge	1	17	9.47	3.29

The mean performance of the pupils in the knowledge and understanding and application of knowledge domains was 6.98 and 9.17 respectively. This indicates a good performance of pupils in these domains. However, pupils performed better in the application of knowledge domain attaining 9.47 of the expected mean score (8.5). Figure 4.2 illustrates differences between percent average performances in each mathematics cognitive domain.

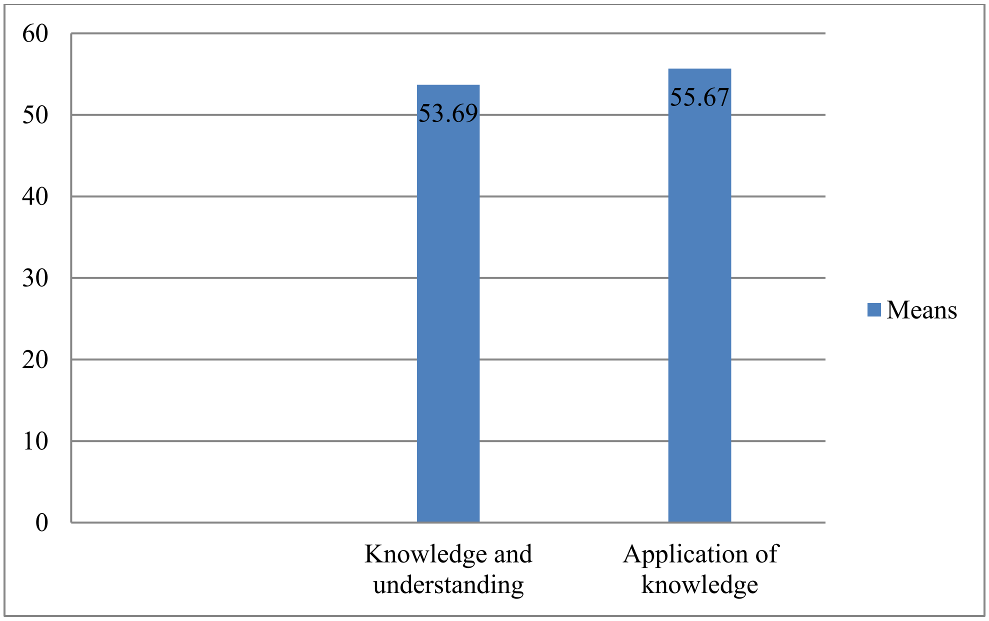

Figure 4. 2: Average percentage score on cognitive domain

Figure 4.2 indicates that the performance was fairly good although none of the domains reached the expected average of 65% in each of the cognitive domains. Again, it can be seen from Figure 4.2 that pupils performance on application of knowledge was a little above the overall average in knowledge and understanding. This implies that pupils' performance on application of knowledge was good.

4.3 Performance of pupils in relation to gender, type of school and school location

The second question raised in this study was to find out whether the performance of pupils on the NMS assessment test is influenced by gender, type of school and school location. To determine this, the mean score for both boys and girls, private and public schools and urban and rural schools was computed and analyzed to find out the relationship in their performances. Table 4.11 indicates pupils' percentage mean score on the National Minimum Standard Assessment Test in relation to gender (boys or girls), type of school (public or private) and school location (urban or rural).

Table 4. 11: Average score correct in relation to gender, type of school and school location

	n	Min	Max	Mean	Std Dev.
Boy	159	13	97	55.97	16.87
Girl	141	13	97	53.52	18.31
Public	178	13.3	96.7	51.67	17.09
Private	122	16.67	96.7	59.42	17.32
Urban	231	17	97	57.46	16.87
Rural	69	13	93	45.99	17.11

The percentage mean performance of the pupils in relation to gender (boys and girls) was 55.97 and 53.52 respectively. This indicates that the performance of both boys and girls on the NMSAT was good. However, the boys obtained a percentage mean score of 55.97, which was higher than the percentage mean score for the girls and was slightly higher than the total mean. Also, the percentage means score of the pupils in relation to the type of school (public and private) was 51.67 and 59.42 respectively. This indicates that the performance of pupils from the private schools were better than those from the public schools.

Finally, the percentage mean performance of the pupils in relation to the school location (urban and rural) was 57.46 and 45.99 respectively. This indicates that the performance of pupils from the urban schools was better than those from the rural schools. This performance might have been obtained by pupils because pupils from the urban areas were more than half of the total population. The result was further analyzed using the independent sample t-test to test the null hypothesis "There is no significant difference between the pupils' performance with respect to gender, type of school and school location on the minimum standards". Table 4.12 shows the relationship between pupils' performance and gender, type of school and school location.

Table 4.12: Differences in pupils' performance in relation to gender, type of school and school location

Factor	Categories	N	Mean	Std. Dev.	df	t	Sig.
Gender	Boy	159	55.97	16.87	298	1.207	0.228
	Girl	141	53.52	18.31			
School type	Public	178	51.67	17.09	298	-3.841	0.000
	Private	122	59.43	17.32			
School location	Urban	231	57.46	16.87	298	4.939	0.000
	Rural	69	45.99	17.11			

*Significant ($p<0.05$); **Highly significant ($p<0.001$)

The results in Table 4.12 show that though there were differences in the mean scores, the differences in their mean scores ($t = 1.207$, $p = 0.228$) show that there exist no significant differences in the performance of pupils on the national minimum standards assessment test with respect to gender. The value of sig (0.228) is greater than 0.05 ($p> 0.05$) which indicate that there is no significant difference between the variables. Consequently, the null hypothesis that "there is no significant difference in the performance of boys and girls on the national minimum standard assessment test" was accepted. This implies that pupils' performance on the national minimum standards has nothing to do with gender.

The result also shows that the differences in their mean scores ($t= -3.841$, $p=0.000$) was statistically significantly higher between the type of school (public or private). This is because the sig value (0.000) was less than the *p* value (0.05); this indicates that there is a significant difference between the variables. Consequently, the null hypothesis which states that "there is no significant difference in the performance of pupils from the private schools and those from the public schools on the national minimum standard assessment test" was rejected. This implies the type of school (public or private) have influence on the pupils' performance on the national minimum standards assessment test.

Finally it was established that "there is a significant difference between the school location (urban or rural) and pupils' performance on the national minimum standard assessment test". This is because the sig value (0.000) was statistically lower than the *p* value (0.05). Consequently, the assumption that "there is no significant difference in the performance of pupils from the urban schools and pupils from the rural schools on the national minimum standard assessment test" was rejected. This implies that school location (urban or rural) have influence on the pupils' performance on the national minimum standards assessment test.

4.3.1 Gender differences in achievement in the various content and cognitive domains

In assessing strengths and weaknesses in the content domains, the average performance in these domains relative to the gender of pupils was also examined. Table 4.13 indicates pupils' mean score on the various content domains in relation to gender.

Table 4.13: Average score correct on the content domains in relation to gender

Gender		Number and Numerals	Number Operations	Measurement Shape and Space	Collecting and Handling Data
Boy	Mean	42.26	60.33	51.30	64.91
	Std. Dev.	25.56	17.49	23.19	27.35
	Min.	0	15.38	0	0
	Max.	100	100	100	100
	Mean	39.43	56.57	50.46	63.97
Girl	Std. Dev.	24.25	19.96	23.75	26.54
	Min.	0	7.69	0	0
	Max.	100	100	100	100

The percentage mean performance of boys on the content domains is as follows: Number and Numerals, 42.26; Number Operations, 60.33; Measurement, Shape and Space, 51.30; and Collecting Data, 64.91. The mean performance of girls on the content domains is as follows: Number and Numerals, 39.43; Number Operations, 56.57; Measurement, Shape and Space, 50.46; and Collecting Data, 63.97. This indicates that the performance of both boys and girls on the content domain was good. However, the average achievement for boys was slightly higher than that of the girls in the four content domains. Both boys and girls had their best performance in the Collecting and Handling Data and the worst performance in Number and Numerals.

Pupils' performance on the various cognitive domains in relation to gender was also analyzed. The descriptive statistics of the pupils' average score on the cognitive domain in relation to gender is presented in Table 4.14

Table 4.14: Average score correct on the cognitive domains in relation to gender

Gender		knowledge and understanding	Application of knowledge
	Mean	54.33	57.23
	Std. Dev.	19.15	18.29
Boy	Min.	7.69	17.65
	Max.	100	100
Girl	Mean	52.97	53.94
	Std. Dev.	19.79	20.39
	Min.	15.38	5.88
	Max.	100	100

The result from Table 4.14 indicates that the boys outperformed the girls in both Knowledge and Understanding and Application of Knowledge domains. They attained a mean score of 54.33 and 57.23 respectively for the two domains which was higher than the total means score (53.69 for Knowledge and Understanding and 55.69 for Application of Knowledge). However, both boys and girls had their best performance in the Application of Knowledge domain.

4.3.2 Performance of pupils on the various content and cognitive domains in relation to the type of school

Pupils' performance on the various content domains in relation to the type of school (public and private) was analyzed. Table 4.15 indicates pupils' mean score on the various content domains in relation to the type of school.

Table 4.15: Average percent correct on the content domains in relation to the type of school

Type of school		Number and Numerals	Number Operations	Measurement Shape and Space	Collecting and Handling Data
Public	Mean	36.63	57.13	46.55	59.66
	Std. Dev.	24.28	17.72	22.11	28.16
	Min.	0	15.38	0	0
	Max.	100	100	100	100
Private	Mean	47.21	60.66	57.26	71.48
	Std. Dev.	24.67	20.05	23.91	23.41
	Min.	0	7.69	14.29	0
	Max.	100	100	100	100

The result from Table 4.15 indicates that pupils from the private schools performed better than those from the public schools. The least average score was recorded for Number and Numerals in both schools, however the mean score for pupils from the private schools was slightly higher than the total mean score but less than the expected percentage mean score (50%). The pupils from the private schools obtained a higher means score that were greater than the total mean score and the expected mean score on the remaining content domains. Both public and private schools had their best performance in the Collecting and Handling Data and the worst performance in Number and Numerals.

Pupils' performance on the various cognitive domains in relation to type of school was also examined. The descriptive statistics of the pupils' average score on the cognitive domain in relation to the type of school is presented in Table 4.16.

Table 4. 16: Average score correct on the cognitive domains in relation to the type of school

Type of school		Knowledge and understanding	Application of knowledge
Public	Mean	51.38	51.88
	Std. Dev.	17.94	19.51
	Min.	7.69	5.88
	Max.	100	100
Private	Mean	57.06	61.23
	Std. Dev.	21.05	17.76
	Min.	15.38	11.76
	Max.	100	100

The result from Table 4.16 indicates that pupils from the private schools performed creditably well in both Knowledge and understanding and Application of Knowledge domains than pupils from the public schools. They attained a mean score of 57.06 and 61.23 respectively for the two domains which were higher than the total means score (53.69 for Knowledge and understanding and 55.69 for Application of knowledge) and exceeded the expected mean score. However, pupils from both the public and the private schools had their best performance in the Application of Knowledge domain.

4.3.3 Pupils performance on the content and cognitive domains with respect to school location

Pupils' performance on the various content domains with respect to the school location (urban and rural) was analyzed. Table 4.17 presents pupils' mean score on the various content domains in relation to the school location.

Table 4.17: Average score correct on the content domains in relation to the school location.

School location		Number and Numerals	Number Operations	Measurement Shape and Space	Collecting and Handling Data
	Mean	43.81	60.44	53.74	68.57
Urban	Std. Dev.	23.65	18.58	23.07	25.45
	Min.	0	7.69	0	0
	Max.	100	100	100	100
	Mean	31.30	52.29	41.41	50.72
Rural	Std. Dev.	26.89	18.07	22.21	27.35
	Min.	0	15.38	0	0
	Max.	100	92.31	100	100

The result shows that the pupils from the urban areas outperformed their counterparts from the rural areas in all the four content domains. Their mean score on all the content domains was above the total mean score for each domain. However, since the pupils from the rural areas were not many, their performance might have been affected because pupils from the urban areas had greater number of pupils participating in the study. The result further shows that pupils from the urban areas performed well on all the content domains; with their highest performance on collecting and handling data and their lowest performance on number and numerals. Pupils from the rural areas however had their highest performance on number operations and their lowest performance on number and numerals.

Pupils' performance on the various cognitive domains in relation to the school location was also analyzed. The descriptive statistics of the pupils' average score on the cognitive domain in relation to the school location is presented in Table 4.18.

Table 4.18: Average score correct on the cognitive domains with respect to school location

School location		Knowledge and Understanding	Application of Knowledge
Urban	Mean	56.08	58.52
	Std. Dev.	18.85	18.31
	Min.	15.38	11.76
	Max.	100	100
Rural	Mean	45.71	46.21
	Std. Dev.	19.34	19.83
	Min.	7.69	5.88
	Max.	100	94.12

Pupils from the urban areas performed creditably well in both domains, however those from the rural areas performed below the percentage mean score for both domains. The mean score obtained by the pupils in the urban areas on both cognitive domains was above the total mean score and was above the average score for both domains (53.69 for Knowledge and Understanding and 55.69 for Application of Knowledge). The result further shows that pupils from both the rural and urban areas obtained higher mean score on Application of knowledge domain; however those in the urban areas had the highest mean score. Generally, the pupils from the rural schools performed better because they were not many as compared to those from the urban areas yet their mean scores were not too bad.

4.4 Proportion of pupils reaching the National Education Assessment (NEA) benchmarks with respect to Gender, Type of school and Location of school

In answering the third research question of the study, the researcher compared the pupils' performance to NEA benchmarks to determine the proportion of pupils that have attained the various levels. By the NEA criteria, a score below 33% represents an achievement below minimum competency, a score from 33% to 54% represent competency and a score of 55% and above represents proficiency. Table 4.19 presents the number of students (with the percentages in parenthesis) reaching the NEA benchmarks with respect to gender, type of school and location.

Table 4. 19: Proportion of pupils reaching the NEA benchmarks

		NEA Benchmark categories			
		Below minimum competency	Minimum competency	Proficiency	Total
Gender	Boy	13 (8.2)	64 (40.3)	82 (51.6)	159
	Girl	15(10.6)	67(47.5)	59 (41.8)	141
Type of school	Public	22 (12.4)	87 (48.9)	69 (38.8)	178
	Private	6(4.9)	44(36.1)	72 (41.8)	122
School location	Urban	13 (5.6)	97 (42.0)	121 (52.4)	231
	Rural	15(21.7)	34(49.3)	20 (29.0)	69
Total		**28(9.3)**	**131(43.7)**	**141(47)**	**300(100)**

Percentages in parenthesis ( )

The results from Table 4.19 indicate that out of 159 boys used for the study, (n =77) of them performed below proficiency, whiles the remaining (n =82) achieved proficiency. The result also shows that (n = 82) girls out of 141 performed below proficiency, whiles the remaining (n =59) reached the proficiency. In comparing the two groups, the result places the boys slightly ahead of the girls because most of the boys have reached proficiency whereas greater number of girls performed below proficiency.

Furthermore, the results show that (n =109) pupils from the public schools performed below proficiency whiles (n =69) pupils attained proficiency. The results further indicate that (n =50) pupils' from the private schools performed below the proficiency level while (n =72) pupils reached the proficiency level. Furthermore, (n =22) pupils from the public schools performed below proficiency as against only (n = 6) pupils' from the private schools. Finally, the results also indicate that 121 of the pupils from the urban schools have reached proficiency whiles 110 pupils could not attain proficiency. The results further indicate that 20 pupils' from the rural schools achieved proficiency while 49 pupils were not able to reach the proficiency level. Finally, 15 pupils from the rural schools performed below proficiency as against only 13 pupils from the urban schools. The implication is that a little over half of the pupils' from the urban schools have reached the proficiency level with more than half of the pupils from the rural schools performing below proficiency.

Figure 4.3 presents proportion of pupils reaching the NEA benchmarks with respect to gender, type of school and school location.

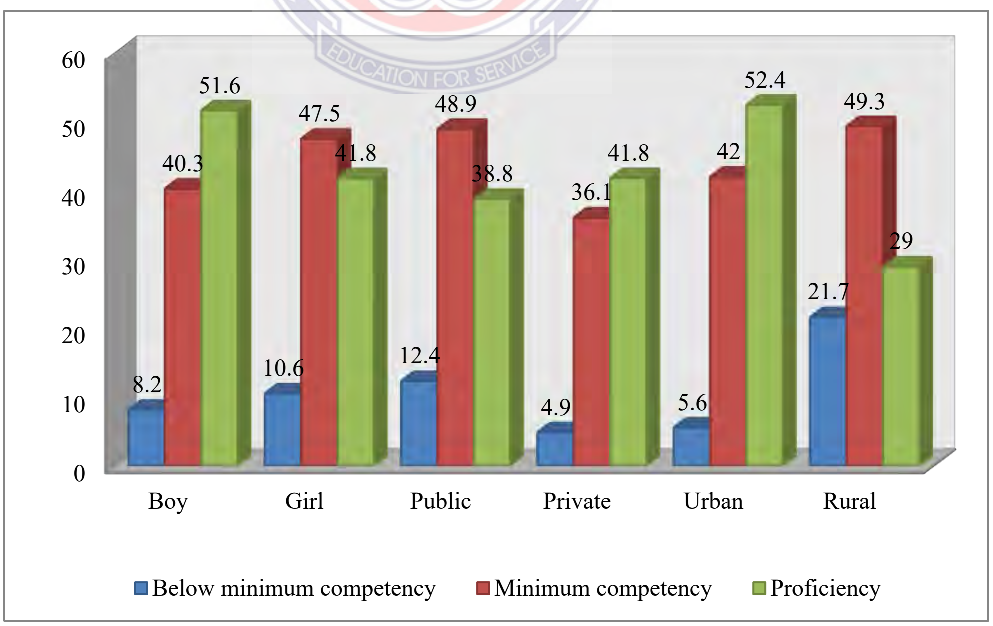

Figure 4. 3: Proportion of pupils reaching the NEA benchmarks

With regard to gender, it is clear from Figure 4.3 that the boys outperformed the girls with over 51% of the boys reaching proficiency while only 41% of girls reached this benchmark. It was also observed that as many as 10% of the girls are below the minimum benchmarks but it was interesting to identify that 8% of the boys are also below minimum competency. The result also indicates that the private school pupils performed better than the public school pupils with 41% of the private school pupils attaining proficiency while only 38% of the public school pupils attained this benchmark. As many as 12% of the pupils from the public schools are below the minimum competency benchmark but it is surprising to note that 4% of the pupils from the private schools are also below minimum competency. Finally, with regard to location, the result indicates that urban schools outperformed their counterparts from the rural schools with over 52% of the urban school pupils reaching proficiency while only 29% of rural school pupils reached this benchmark. It was observed that as many as 21% of the rural school pupils are performing below minimum competency, however it was interesting to identify that over 5% of the urban school pupils also attained this benchmark.

To verify whether the observed differences are statistically significant, the data was subjected to further analysis using the chi-square relational test (at an alpha level of 0.05) to test the null hypothesis that "there is no significance difference between the proportion of boys and girls, private and public and urban and rural schools in reaching the various levels of the NEA benchmarks. The result of the chi square test is presented in Table 4.20.

Table 4. 20: Results of chi square test for pupils reaching the NEA benchmarks by gender, type of school and location

		Pearson Chi-Square		
		Value	df	Asymp. Sig. (2-sided)
Gender	Boy Girl	2.894[a]	2	.235
Type of school	Private Public	13.332	2	.001
Location	Urban Rural	21.609[a]	2	.000

*significant (p< 0.05); **Highly Significant (p < 0.001)

Table 4.20 shows a Pearson chi-square value of 13.332 with 2 degrees of freedom and the *p* value is 0.01 (i.e. $\chi^2 = 13.332$, df = 2, $p > 0.01$) indicating that the p value is less than $p < 0.05$. Hence the null hypothesis was rejected because there is a significant difference between the proportion of private and public schools in reaching the various levels of the NEA benchmarks. The result further shows that, there was a significant difference between the proportion of urban and rural schools reaching the various levels of the NEA benchmarks, as a chi-square value of 21.609 with 2 degrees of freedom and a *p* value of 0.000 ($\chi^2 = 21.609$, df = 2, $p > 0.00$) was recorded. This indicates that the p value is less than $p < 0.05$; hence the null hypothesis that there is no significant difference in the number of pupils reaching the various levels of the NEA benchmarks was rejected.

4.5 Major findings

In this research, the researcher sought to investigate pupils' performance on the national minimum standard assessment test. This research was to determine whether or not pupils are achieving the mathematics national minimum standards set in the mathematics syllabus. The researcher used thirty multiple choice test items to assess pupils on the minimum objectives set in the mathematics syllabus for primary schools. The test items were designed in line with the national education assessment test (NEA) and the minimum objectives set in the primary school mathematics syllabus. In order to achieve this, three research questions were answered and the hypotheses formulated for the second and third were tested.

Research question one investigated primary school pupils' general performance on the national minimum standard assessment test. The findings from the quantitative analysis show that most of primary six pupils were achieving the national minimum objectives enshrined in the teaching syllabus for mathematics. However it was worrying to note that quite a number of pupils are not achieving the national minimum objectives. This performance put up by pupils confirms (CRDD, 2012), assertion that the minimum objectives are very simple and each pupil should be able to perform creditably well in any assessment that stems from it. The finding of this research is in contrast to the findings of (Ampiah, 2010). He asserts that pupils' general performance on the national education assessment was very disappointing as most of them failed to perform above average. Pupils' general performance on the national minimum standard assessment test was also compared to the National Education Assessment test benchmarks; where a score below 33% is classified as below minimum competency, a score above 33% to 54% is classified as minimum competency and a score above 55% is labeled as competency. The comparison of pupils' performance on the NMS assessment test to the three levels proposed by the NEA reveals that only 47% of the pupils have reached the competency level with the remaining 53% reaching the minimum competency and below minimum competency level.

This result affirms the MOE (2012) report that most pupils have not reach the competency levels as most of the pupils were performing at the minimum competency and below competency levels.

On findings of some standards that were easy for most pupils to attain and ones that were difficult for most pupils to attain, seven out of the sixteen minimum standard objectives that the test items were selected from, were found difficult by majority of the pupils. Only five of the standards were easy for most of the pupils with the rest of the standards being average.

Again, pupils' general performance on the content and cognitive domains on national minimum standard assessment test was analyzed. The result revealed that pupils' performance on some of the content domains were not encouraging. To start with, pupils' performance on the items labeled as number and numerals was not encouraging though only five items were allocated for that. Most pupils were not able to obtain half of the total percentage score (40.9%) and in effect the total mean score for number and numerals was below 50%. Number operations had the greatest number of items because about 80% of the topics in the syllabus are allocated to number operations. Most pupils were able to obtain more than half of the total percentage score (58.56). This implies that pupils performed better on the items labeled as number operations. Pupils performance on measurement, shape and space was also encouraging as most of the pupils obtained exactly half of the total score (50.9). Finally, pupils' performance on collecting and handling data was very good as pupils obtained more than half of the total percentage score (64.47).

This finding is in contrast with National Education Assessment MOE (2012) report where the mean scores for the content domain indicate that majority of pupils had not mastered the skills targeted in the assessment. In the NEA results, measurement, shape and space recorded the lowest mean score while in the national minimum standard assessment test; pupils' percentage mean score on measurement, shape and space was higher. In number operations pupils percentage mean score for the national minimum standard assessment test was better than the mean score obtained in the NEA test. The lowest percentage means score was recorded for number and numerals in both the NMSAT and the NEA test. However the percentage means score for number and numerals on the NMSAT (40.9) was slightly above the percentage mean score for NEA (40.7). Collecting and handling data recorded the highest percentage mean score in both NMSAT and the NEA, however the mean score obtained in the national minimum standard assessment test (64.46) was much higher than the percentage mean score obtained in the NEA test (44). The result is also in contrast with the findings of Mullis, Martin, Foy and Arora (2012) on the students' performance on the content domains in the TIMSS 2011 assessment. They write that students obtained a higher mean score on number and algebra and the lowest performance on geometry.

The finding from the quantitative data shows that pupils' performance on the cognitive domains was good. Pupils mean score on the items labeled as knowledge and understanding was good but the mean score for application of knowledge was slightly higher than the knowledge and understanding. This performance confirms (Mullis, Martin, Foy and Arora 2012) report that from the TIMSS 2011 assessment, the average percent correct in knowing was 55 and 50 percent for applying. However, the average percentage correct for reasoning was 40; this is in contrast to the mean score obtained on application of knowledge for the national minimum standard assessment test.

The study also analyzed the general performance of pupils on the content and cognitive domains with respect to gender, type of school and school location. On the findings of gender and pupils overall scores on the content domains, the boys performed better than the girls in all the four domains with the highest percentage score in collecting and handling data and the lowest percentage score in number and numerals. On the cognitive domains, the boys performed better than the girls. However the boys and girls had their best performance in application of knowledge. The finding of this research confirms the findings of Anamuah-Mensah, Mereku and Ampiah (2008) who identified from their research that the males outperform the females in both content and cognitive domains.

The findings on the type of school and pupils performance revealed that pupils from the private schools outperformed their counterparts from the public schools in both the content and cognitive domains attaining a mean score that was higher than the overall mean scores for each of the content domains. The result agrees with the MOE (2012) report that private schools pupils perform better than those from the public schools. The findings on the school location also showed that pupils from the urban centers performed creditably well in both the content and cognitive domains as compared to their counterparts from the rural centers. The finding of this research confirms a research conducted by Etsey (2009) that pupils from the urban centers perform better than those in the rural centers.

The result from the independent sample t-test used to determine whether there is any significance difference between the overall performance of pupils and gender, type of school and school location was also examined. On the findings from gender, type of school and school location, the independent sample t-test analysis showed that there was no significant difference in the performance of boys and girls on the national minimum standard assessment test. This finding is in line with the findings of Sprigler and Alsup (2003) which showed that there is no gender difference on the mathematical reasoning ability at elementary level. Finding from longitudinal study about gender differences in mathematics also show that there is no difference among boys and girls in mathematics achievement (Ding, Song and Richardson; 2007). However, this is in contrast with the findings of Gallagher and Kaufman (2006), they argue that the math achievement and interest of boys are better than the girls.

The finding on the type of school and pupils performance on the national minimum standard test showed that there was a significant difference in the performance of pupils from the private schools and those from the public schools. This confirms Ampiah (2010) finding that private schools performed significantly better than those in the public school. The finding on the school location and pupil's performance on the NMSAT also shows that there was a significant difference in the performance of pupils from the urban schools and those from the rural schools. This confirms the findings of Etsey (2009), that pupils from the urban centers perform creditably well in national assessments. The finding is also in line with the findings of the MOE (2012) report where more than twice as many P3 pupils from urban schools achieved proficiency-level scores on the mathematics test (22% vs. 9%). The difference in performance between urban and rural P6 students was even more striking. Urban P6 students were more than three times more likely to achieve proficiency math scores than their rural counterparts (21% versus 6%).

The third research question investigated proportion of pupils reaching the NEA benchmarks with respect to gender, type of school and school location. On the findings from the proportion of pupils reaching the NEA benchmarks with respect to gender, the chi-square relational analysis showed there was no significant difference between the mean scores obtained by boys and girls and the mean scores by the NEA benchmarks. This finding is in contrast to the MOE (2012) report which indicated that the boys are more likely to reach proficiency as compared to the girls. The finding also revealed there is a significant difference between mean scores attained by both private and public schools and the various levels of the NEA benchmarks. The implication is that more half of the pupils' from the public schools have not reached the proficiency level yet. However, more than half of the Pupils from the private schools have reached the proficiency level. The result also showed there is a significant difference between mean scores attained by both urban and rural schools and the NEA benchmarks. This result confirms the MOE (2012) report that pupils' performance in urban schools was much higher than in rural schools.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Overview

This chapter presents a summary of the study, key findings, conclusion and recommendations including areas for further research.

5.1 Summary

This study sought to investigate pupils' performance on the national minimum standard assessment test. It also investigated pupils' performance on the content and cognitive domains. Finally it sought to find out whether there is a relationship between pupils' performance and gender, type of school and school location.

The general approach used in this research was a survey. It was used to solicit pupils' responses on the national minimum standard assessment test. Pupils from the Efutu municipality were used for the study. The study involved 300 pupils (159 boys and 141girls) selected from ten schools (five public and five private) using stratified sampling technique. Multiple choice test items were used as the instrument for the study. The test was based on the national minimum objectives enshrined in the primary school mathematics syllabus.

The data collected were analyzed using descriptive statistics, independent sample t-test and chi-square relational tests. Descriptive statistics was used to determine the extent to which pupils perform on the national minimum standard assessment test. Independent samples t-test was used to find whether the factors (gender, type of school and school location) influence pupils' performance on the national minimum standard assessment test. The chi – square relational test was used to compare pupils' performance within the groups (gender, type of school and school location) and the various levels of the National Education Assessment benchmarks. The major findings are summarized in the section that follows.

5.2 Findings

The key findings of the study are as follows:

The findings showed that majority of the pupils performed creditably well in the national minimum standard assessment test. Generally, out of a total of 300 pupils used for the study, 36% ($n = 109$) of the pupils obtained less than half of the total score while 64% ($n = 191$) obtained more than half of the total score. This indicates that most of the pupils did well in the national minimum standard assessment test. However, quite a number of pupils (109) out of the total (300) performed below average.

Again, the responses given to each of the items by pupils were categorized into content and cognitive domains. Pupils had their lowest percentage score on number and numerals and their highest percentage score on collecting and handling data. The results indicated that pupils' performance on number and numerals was not too good. The findings on the cognitive domains revealed that pupils' performance was very encouraging. Most of the pupils' performance on knowledge and understanding and application of knowledge was good.

Furthermore, pupils found it difficult to answer about 41% of the national minimum objectives. The top three most difficult items required pupils to order a mixed set of numbers with up to three decimal places, understand division and recognize that division is the inverse of multiplication and understand and use money notation. The top three easiest minimum objectives required pupils to carry out column addition and subtraction of numbers involving decimals, up to 3 decimal places, recite addition and subtraction facts for each number up to 20 and Choose appropriate operations (including multiplication and division) to solve word problems.

Again, it was established that the boys performed slightly better than girls. Private schools outperformed their counterparts from the public schools. Urban schools performed better than the rural schools. The findings of the independent samples t-test analysis revealed that there was no significant difference in the performance of pupils on the national minimum standard assessment test in relation to gender. The implication is that pupils' performance on the national minimum standards assessment test is not influenced by gender (boy and girl). However, it was established that there was a significant difference in the performance of pupils on the national minimum standard assessment test in relation to type of school and school location. The implication is that pupils' performance on the national minimum standards assessment test is influenced by the type of school (private and public) and school location (urban and rural).

Finally, the findings on the chi-square relational test revealed there was no significant difference between gender and the NEA benchmarks. However, it was established that there was significant difference between the type of school and school location and the various levels of the NEA benchmarks.

5.3 Conclusion

The use of the national minimum assessment test has helped teachers in the various participating schools to assess their pupils from time to time and identify areas that need re enforcement. The findings from pupils' performance on the national minimum standard test revealed that most of the pupils have achieved the minimum objectives. However it was established that quite a number of pupils have not achieved the minimum objectives. It was also revealed that private school pupils outperformed their counterparts from the public schools on the national minimum standard test. Also urban school pupils performed better than the pupils from the rural schools on the national minimum standard test. The researcher interaction with the pupils after the test administration revealed that most of the public school and rural school pupils' were finding it difficult to read and understand the questions. Some also had difficulties with the problem solving items, as most of them were not able to comprehend the items. However, the view of some participating pupils' on the national minimum standard assessment test was that the items were very interesting though challenging and expressed their interest to solve more.

The findings from pupils' performance on the content and cognitive domains indicated that most Ghanaian primary six pupils have not mastered some of the topics that fall under the content and cognitive domains. This was evident in the responses they provided for some of the items. Among the content domain, number and numerals had the least mean score indicating that much emphasis need to be placed on this content domain. The other domains saw much improvement, however, much need to be done for pupils to attain higher scores in those domains. The findings also showed that although the pupils seem to perform better in both knowledge and understanding and application of knowledge, much effort need to be in place to address some of the difficulties pupils have in responding to such items.

5.4 Recommendations

Based on the conclusions of the study, the following recommendations are made for the improvement of assessment in teaching and learning activity:

1. Although most primary six pupils' performed well in the study, it was established that quite a number of pupils are not achieving the minimum objectives. The researcher therefore recommends that primary six teachers constantly organize remedial lessons for such pupils to assist them achieve the minimum objectives. This will motivate pupils to learn other difficult concepts and also help erase the fear some of them have for the subject.
2. Pupils' in the public schools and rural schools need to be assisted, because most of them were finding it difficult to read the questions and this affected their performance. Teachers' as well as stake holders should come up with strategies to assist pupils in this situation. Again teachers need to work more on the standards that were most difficult for pupils to achieve.
3. Mathematics teachers must try to develop their own test items based on the national minimum objectives to assess their pupils' performance on every topic taught. This will enable them plan an appropriate intervention for each pupil. It will also enable the teachers make an informed decision on how to help pupils' improve their mathematical skills.
4. Teachers must make use of the various technologies such as the internet to search for various assessment tools that assesses mathematical thinking in order to have variety of materials for use in their teaching and learning activity.
5. Stakeholders of education must not only put emphasis on the teaching and learning activity but also on assessment tools.
6. Teachers must be educated on the use of various assessment tools such as the NEA, SEA, TIMSS and the NMSAT. This will assist teachers with a variety of

assessment tools to use in the classroom to assess various learning outcome. Lastly, textbook developers can help teachers by assisting teachers with assessment tools that is geared towards assessing the pupils' performance on the national minimum objectives.

5.5 Suggestions for further research

This survey on the pupils' performance on the national minimum standard assessment test for primary six is an opportunity for conducting further research work in Ghana. Other researchers could consider assessing the pupils' performance on the national minimum standard in other regions of Ghana. This can be conducted for some junior high schools one student and the results compared to the performance of those in primary six.

Since teachers play an important role in the development of their pupils', other researchers could also consider assessing the Pre-Service teachers in Ghana knowledge on the national minimum objectives.

Lastly other researchers could consider the factors that affect pupils' performance on the national minimum objectives enshrined in the primary school Mathematics curriculum in Ghana.

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APPENDICES

APPENDIX A TEST ITEM SPECIFICATION

Content domain	Minimum objectives	Item number	Number of items	Cognitive domain	Questions	Options
Number and Numerals	Read, write and order whole numbers to at least 1000; know what each digit represents.	1	1	Knowledge and understanding	1. What is the value of **8** in the number 876,205?	A. 100,000 B. 80,000 C. 800,000 D. 8000
		7	1	Knowledge and understanding	7. What is seventy-nine thousand, five hundred and twenty in figures?	A. 790,520 B. 795,020 C. 7,900,520 D. 79,520
		17		Knowledge and understanding	17. What is the place value of **2** in the number 4,325,670	A. Thousand B. Hundred thousand C. Ten thousand D. Hundreds
		10		Knowledge and understanding	10. What is 840,342 in words?	A. Eight hundred thousand three hundred and forty two B. Eighty four thousand three hundred and forty two C. Eight hundred and forty thousand three hundred and forty two

Content domain	Minimum objectives	Item number	Number of items	Cognitive domain	Questions	Options
						D. Eight thousand three hundred and forty two
Number and numerals	Order a mixed set of numbers with up to three decimal places	8	1	Application of knowledge	8. Which of the following decimal fractions has been arranged in ascending order of magnitude?	A. 0.60, 0.65, 1.89, 0.354, 2.34 B. 0.354, 0.65, 0.60, 1.89, 2.34 C. 2.34, 1.89, 0.65, 0.60, 0.354 D. 0.354, 0.60, 0.65, 1.89, 2.34
Number operations	Choose and use appropriate operations (including multiplication and division) to solve word problems, explaining methods and reasoning	3	1	Application of knowledge	3. A basketball team scores **420** points in the first game of a tournament and **157** points in the second game. How many points did the team score in the two games?	A. 577 B. 570 C. 477 D. 677
Number operations	Recite addition and subtraction facts for each number up to 20	5	1	Knowledge and understanding	5. What number in the box is missing? $7 + 9 = 8 + \square$	A. 8 B. 9 C. 6 D. 7
Number	Identify unit fractions such as	6	1	Application of	6. A girl has **20** pencils. If **5** of the	A. $\frac{1}{3}$

Content domain	Minimum objectives	Item number	Number of items	Cognitive domain	Questions	Options
operations	$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{10}$, and use them to find fractions of shapes and numbers			knowledge	pencils are red, what fraction of the pencils are red?	B. $\frac{1}{5}$ C. $\frac{1}{4}$ D. $\frac{2}{4}$
Number operations	Use a fraction as an operator to find fractions of numbers or quantities (e.g. $\frac{3}{4}$ Of 48, $\frac{7}{10}$ of 30, $\frac{15}{100}$ of 200 centimeters).	28	1	Application of knowledge	28. There are 30 hours in a school week. If $\frac{1}{5}$ of the week is spent studying Mathematics, how many hours are spent on studying Mathematics?	A. 5 hours B. 4 hours C. 6 hours D. 8 hours
		9.	1	Application of knowledge	9. What is $\frac{2}{3}$ of 24?	A. 12 B. 16 C. 48 D. 8
Number operations		12.	1	Knowledge and understanding	12. What fraction is missing?	A. $\frac{3}{2}$ B. $\frac{2}{2}$ C. $\frac{3}{4}$ D. $\frac{2}{4}$
Number operations	Reduce a fraction to its simplest	11.	1	Knowledge and understanding	11. Find the product: $\frac{3}{5} \times \frac{2}{3}$ leaving your	A. $\frac{6}{15}$

Content domain	Minimum objectives	Item number	Number of items	Cognitive domain	Questions	Options
	form by dividing through by common factors				answer in the simplest form.	B. $\frac{2}{5}$ C. $\frac{3}{15}$ D. $\frac{1}{5}$
Number operations	Solve simple problems involving ratio and proportion	26	1	Application of knowledge	26. If 2*kg* of rice cost GH¢30.00, what is the cost of 5*kg* of rice?	A. GH¢ 75 B. GH¢ 60 C. GH¢ 90 D. GH¢ 70
Number operations		13	1	Application of knowledge	13. A car has **4** tyres. How many tyres have **3** such cars?	A. 16 B. 12 C. 14 D. 8
Number operations	Understand percentage as a number of parts in every 100, and find simple percentages of small whole-number quantities	14	1	Application of knowledge	14. Find 50% of **900** oranges	A. 350 B. 400 C. 600 D. 450
Number operations		16	1	Knowledge and understanding	16. Find the simple fraction for **60%**	A. $\frac{60}{100}$ B. $\frac{6}{100}$ C. $\frac{6}{10}$

Content domain	Minimum objectives	Item number	Number of items	Cognitive domain	Questions	Options
						D. $\frac{3}{5}$
Number operations	Carry out column addition and subtraction of numbers involving decimals, up to 3 decimal places	15	1	Knowledge and understanding	15. 0.253 + 0.422 ——— ———	A. 0.675 B. 0.754 C. 0.576 D. 0.657
Number operations	Understand division and recognize that division is the inverse of multiplication	24	1	Knowledge and understanding	24. What is $40 \div \frac{2}{5}$?	A. 100 B. 1000 C. 80 D. 120
Number operations	Carry out short multiplication and division of numbers involving decimals.	27	1	Knowledge and understanding	27. What is 0.684× **2**	A. 0.368 B. 1.268 C. 0.268 D. 1.368
Measurement, shape and space	Use units of time and state the relationships between them (second, minute, hour, day, week, month, year	2	1	Application of knowledge	2. How many days are there in 72 hours?	A. 4 days B. 2 days C. 3 days D. A day
		22.	1	Application of	22. How many seconds are there in 7	A. 420 seconds B. 320 seconds

Content domain	Minimum objectives	Item number	Number of items	Cognitive domain	Questions	Options
				knowledge	minutes?	C. 120 seconds D. 360 seconds
Measurement, shape and space	Find the perimeter and area of simple shapes drawn in square grid or draw such shapes when given the perimeter and area.	20	1	Application of knowledge	20. Find the perimeter of a rectangle of length 8cm and breathe 4cm.	A. $30cm^2$ B. $13cm^2$ C. 24cm D. 23cm
		21	1	Application of knowledge	21. Find the area of a square of length 6cm.	A. $36cm^2$ B. 24cm C. $12cm^2$ D. $30cm^2$
		25	1	Application of knowledge	25. Find the length of a rectangle of area $20cm^2$ and breadth 4cm.	A. 5cm B. $20cm^2$ C. $18cm^2$ D. $30cm^2$
Measurement, shape and space	Understand and use money notation.	23	1	Application of knowledge	23. Ama has **one** GH¢1.00 coin, **three** 50Gp coins	A. GH¢ 2.70 B. GH¢ 2.90 C. GH¢ 3.00

Content domain	**Minimum objectives**	**Item number**	**Number of items**	**Cognitive domain**	**Questions**	**Options**
					and **two** 20Gp coins. How much money does Ama have altogether?	D. GH¢ 1.70
Collecting and handling data	Solve a given problem by organising and interpreting numerical data in simple lists, tables and graphs.	4	1	Knowledge and understanding	4. Which point in the number plane has the ordered pair: (5, 7)?	A. E B. H C. G D. F
		18	1	Knowledge and understanding	The calendar below is for January, 2013. Study it and answer the question below. 18. How many Tuesdays are in January 2013?	A. 4 B. 5 C. 6 D. 7
				Application of knowledge	The following are the marks obtained by nine girls in a mathematics test. Use the information to answer question 19.	A. 10 B. 12 C. 7 D. 9

Content domain	**Minimum objectives**	**Item number**	**Number of items**	**Cognitive domain**	**Questions**	**Options**
					12, 8, 5, 10, 9, 6, 11, 7, 13, 19. What is the median mark?	
		29	1	Knowledge and understanding	29. Which region had the least number of girls?	A. Accra B. Ashanti C. Northern D. Volta
		30	1	Knowledge and understanding	30. Which region had the largest number of pupils?	A. Accra B. Ashanti C. Northern D. Volta
	Total		30			

APPENDIX B

TEST ITEMS ON THE NATIONAL MINIMUM STANDARD

ASSESSMENT TEST AND MARKING SCHEME

UNIVERSITY OF EDUCATION, WINNEBA
Department of Basic Education

NATIONAL MINIMUM STANDARDS ASSESSMENT TEST

NMSAT

May 2014

Primary 6: Mathematics

Form 1

Time Allowed: 1 Hour

This test is designed purposely to find out how valid and achievable are the national minimum standards set for Primary 6 in the 2012 revised syllabus for primary school mathematics. The answers you will provide will used solely for academic work.

I thank you very much for agreeing to take part in the exercise.

Instructions

Please read this page first; your teacher will tell you when you can start the test.

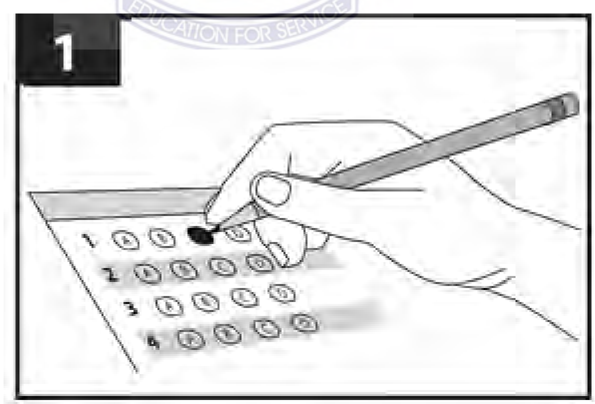
In this test, you are given a problem. Each problem has 4 possible answers. Each answer has a letter A, B, C and D. Only one of the answers is correct. Choose the correct answer. Then, on your answer sheet, find the box that has the same letter as the answer you have chosen. Shade the box.

Example:

1 Which of these is an even number?

A. 5
B. 3
C. 4
D. 11

The correct answer is **4** because **4** is an even number. The answer **4** has the letter C therefore C will be shaded as the correct answer.



Please wait for your teacher to tell you to turn over the page and start the test.

1 What number in the box is missing? 16 = 9 + □ B

A. 8

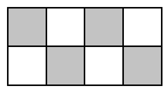
B. 7

C. 6

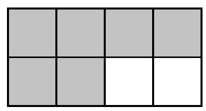
D. 9

2 Which of these shapes is $\frac{1}{4}$ shaded? D

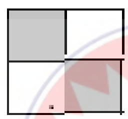
A



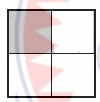
B



C



D



3 A

$$\begin{array}{r} 0.253 \\ +\ 0.422 \\ \hline \\ \hline \end{array}$$

A. 0.675

B. 0.754

C. 0.576

D. 0.657

4 What is the value of **8** in the number 786,205? B

A. 100,000

B. 80,000

C. 800,000

D. 8,000

5 How many days are there in 72 hours? C

A. 4 days

B. 2 days

C. 3 days

D. 1 day

6 Find 50% of 900 oranges. B

A. 350

B. 450

C. 600

D. 400

7 A car has **4** tyres. How many tyres have **3** such cars? B

A. 16

B. 12

C. 14

D. 8

8 Addition: $\frac{1}{2} + \frac{2}{2} =$ A

E. $\frac{3}{2}$

F. $\frac{2}{2}$

G. $\frac{3}{4}$

H. $\frac{2}{4}$

9 What is 0.68×2**?** A

A. 0.36

B. 1.26

C. 0.26

D. 1.36

10 What is $\frac{2}{3}$ of 24? C

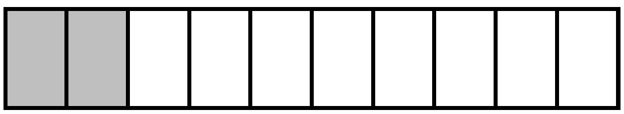
A. 8

B. 12

C. 16

D. 48

11 What decimal fraction of the figure is shaded? C



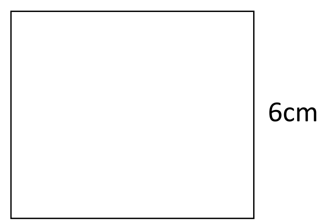
A. 0.02

B. 0.01

C. 0.20

D. 0.10

12 Find the area of a square of length 6cm. A



A. $36cm^2$

B. $30cm^2$

C. 24cm

D. $12cm^2$

13 Division: $40 \div \frac{2}{5} =$ B

A. 80

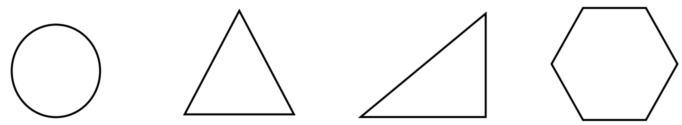
B. 100

C. 120

D. 1000

14 Which shape is a right-angled triangle? C

A. B. C. D.



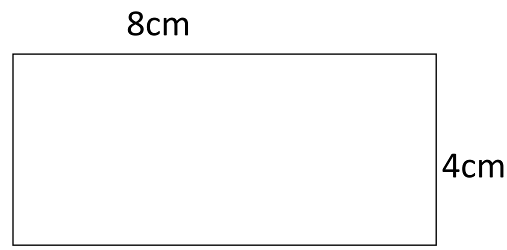
15 What is the perimeter of the rectangle which has length 8cm and width 4cm? C

E. $30cm^2$

F. $13cm^2$

G. 24cm

H. 23cm



16. Convert $\frac{3}{100}$ to a decimal fraction. C

A. 0.0003

B. 0.003

C. 0.03

D. 0.3

17 What is seventy-nine thousand, five hundred and twenty in figures? D

A. 79,000,500,20

B. 7,900,520

C. 7,900,520

D. 79,520

18 Which of the following decimal fractions has been arranged from the smallest to the largest? C

A.	0.65,	1.8,	0.35,	2.3.
B.	0.35,	2.3	0.65,	1.8.
C.	0.35,	0.65,	1.8,	2.3.
D.	1.8,	2.3	0.35,	0.65.

19 A girl has 20 pencils. If 10 of the pencils are red, what fraction of the pencils are red? D

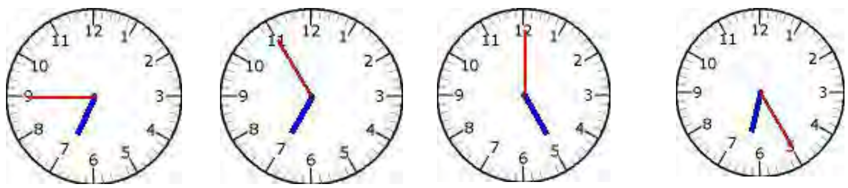
A. $\frac{1}{3}$

B. $\frac{1}{5}$

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

D. $\frac{1}{2}$

20 Baaba started her homework at 5:25 p.m. If she took one hour to do the homework, which clock shows the time she finished? D



A. B. C. D.

21 Ama has **one** GH¢1.00 coin, **three** 50Gp coins and **two** 20Gp coins. How much money does Ama have altogether? B

A. GH¢ 2.70

B. GH¢ 2.90

C. GH¢ 3.00

D. GH¢ 1.70

22 Ama took $3\frac{1}{2}$ hours to travel from Kumasi to Accra. How many minutes did she take? C

A. 230 minutes

B. 220 minutes

C. 210 minutes

D. 240 minutes

23 If 2*kg* of rice cost GH¢30.00, what is the cost of 5*kg* of rice? A

A. GH¢ 75

B. GH¢ 60

C. GH¢ 90

D. GH¢ 70

24 Marks obtained by nine girls in a mathematics test are: D

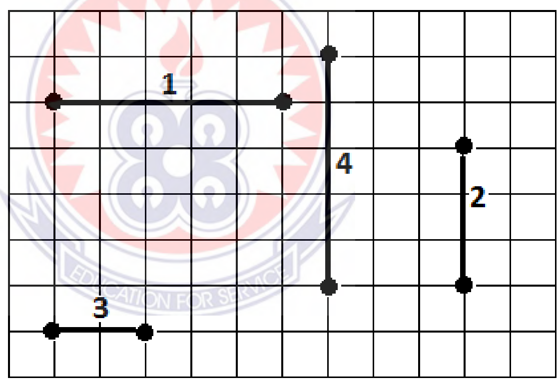
12, 8, 5, 10, 9, 6, 11, 7, and 13. What is the median mark?

A. 10
B. 12
C. 7
D. 9

25 What fraction is **60%** D

A. $\frac{6}{100}$
B. $\frac{3}{20}$
C. $\frac{3}{10}$
D. $\frac{3}{5}$

26 Which two lines are equal in length? C



A. Lines 1 and 2

B. Lines 2 and 3

C. Lines 4 and 1

D. Lines 3 and 4

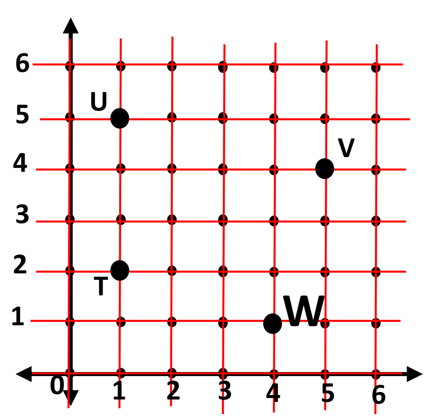
27 Which letter is at the point (5, 4)? C

A. T

B. U

C. V

D. W



28 In an '*Agoroo*' game, Musa won ¢420 in the first round and ¢157 in the second round. How much did Musa win in the two rounds? A

A. ¢577

B. ¢570

C. ¢477

D. ¢677

29 The table shows the number of oranges and bananas that five people ate in one month. How many oranges and bananas did Koku eat? B

Name	Kofi	Koku	Ami	Mam	John
Oranges	10	8	9	10	20
Bananas	17	12	13	14	10

A. 8 oranges and 17 bananas

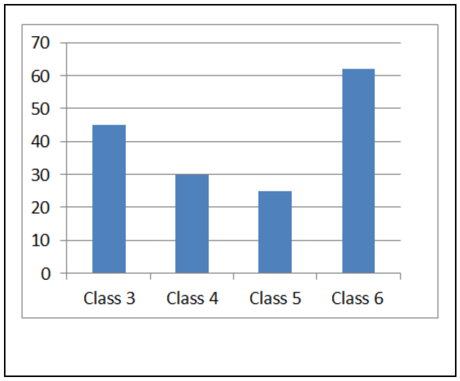
B. 8 oranges and 12 bananas

C. 8 oranges and 9 bananas

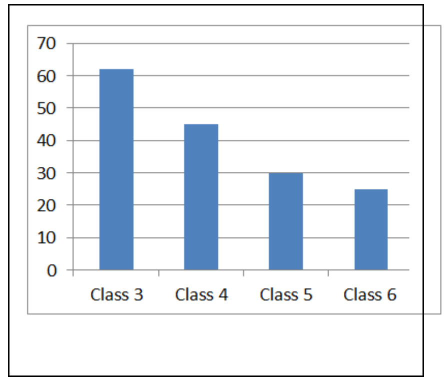
D. 8 oranges and 13 bananas

30 The table shows the number of pupils in classes 3, 4, 5 and 6. Which graph matches the table? B

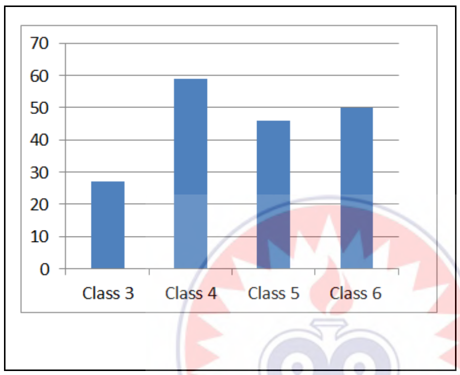
	Class 3	Class 4	Class 5	Class 6
Number of students	62	45	30	25


70
60
50
40
30
20
10
0
Class 3
Class 4
Class 5
Class 6

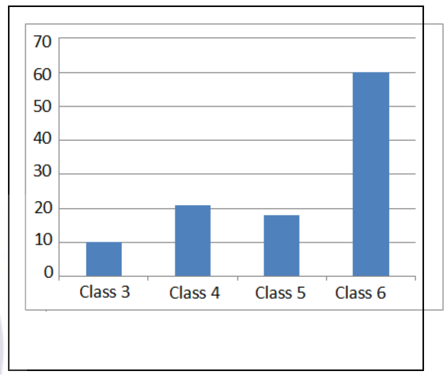
A


70
60
50
40
30
20
10
0
Class 3
Class 4
Class 5
Class 6

B


70
60
50
40
30
20
10
0
Class 3
Class 4
Class 5
Class 6

C


70
60
50
40
30
20
10
0
Class 3
Class 4
Class 5
Class 6

D

APPENDIX C

TABLE OF SPECIFICATION FOR TEST ITEMS

Content domain	Minimum objectives	Item number	Number of items	Cognitive domain
Number and Numerals	Read, write and order whole numbers to at least 1000; know what each digit represents.	4	1	Knowledge and understanding
		17	1	Knowledge and understanding
Number and numerals	Order a mixed set of numbers with up to three decimal places	11	1	Knowledge and understanding
		18	1	Application of knowledge
Number operations	Choose and use appropriate operations (including multiplication and division) to solve word problems, explaining methods and reasoning	3	1	Application of knowledge
Number operations	Recite addition and subtraction facts for each number up to 20	1	1	Knowledge and understanding

Number operations	Identify unit fractions such as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{10}$, and use them to find fractions of shapes and numbers	19	1	Application of knowledge
Number operations		2	1	Knowledge and understanding
Number operations		8	1	Knowledge and understanding
Number operations	Use a fraction as an operator to find fractions of numbers or quantities (e.g. $\frac{3}{4}$ Of 48, $\frac{7}{10}$ of 30, $\frac{15}{100}$ of 200 centimeters).	10	1	Application of knowledge
Number operations	Solve simple problems involving ratio and proportion	26	1	Application of knowledge
Number operations		7	1	Application of knowledge
Number operations	Understand percentage as a number of parts in every 100, and find simple percentages of small whole-number quantities	6	1	Application of knowledge
Number operations		16	1	Knowledge and understanding
Number operations		25	1	Knowledge and understanding

Number operations	Carry out column addition and subtraction of numbers involving decimals, up to 3 decimal places	3	1	Knowledge and understanding
Number operations	Understand division and recognize that division is the inverse of multiplication	13	1	Knowledge and understanding
Number operations	Carry out short multiplication and division of numbers involving decimals.	9	1	Knowledge and understanding
Measurement, shape and space	Use units of time and state the relationships between them (second, minute, hour, day, week, month, year	5	1	Application of knowledge
		20	1	Application of knowledge
Measurement, shape and space		22	1	Application of knowledge
Measurement, shape and space	Find the perimeter and area of simple shapes drawn in square grid or draw such shapes when given the perimeter and area.	15	1	Application of knowledge
		12	1	Application of knowledge
Measurement,	Identify right angles.	14	1	Knowledge

shape and space				and understanding
Measurement, shape and space	Understand and use money notation.	21	1	Application of knowledge
Collecting and handling data	Solve a given problem by organising and interpreting numerical data in simple lists, tables and graphs.	4	1	Knowledge and understanding
		26	1	Application of knowledge
		24		Application of knowledge
		29	1	Knowledge and understanding
		30	1	Knowledge and understanding
	Total		30	

APPENDIX D

SAMPLE OF PUPILS ANSWER SHEET

NATIONAL MINIMUM STANDARDS ASSESSMENT TEST PLM 22

SEX: BOY ☒ GIRL ☐ AGE: 13

INSTRUCTIONS TO CANDIDATES
1. Use grade HB Pencil throughout
2. Answer each question by choosing one letter and shading it like this: [A] [B] [C] [D] [E]
3. Erase completely any answer you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need
5. Do not make any markings across the heavy black marks at the right hand edge of your answer sheet.

1	A	B	C	D	E	21	A	B	C	D	E	41	A	B	C	D	E
2	A	B	C	D	E	22	A	B	C	D	E	42	A	B	C	D	E
3	A	B	C	D	E	23	A	B	C	D	E	43	A	B	C	D	E
4	A	B	C	D	E	24	A	B	C	D	E	44	A	B	C	D	E
5	A	B	C	D	E	25	A	B	C	D	E	45	A	B	C	D	E
6	A	B	C	D	E	26	A	B	C	D	E	46	A	B	C	D	E
7	A	B	C	D	E	27	A	B	C	D	E	47	A	B	C	D	E
8	A	B	C	D	E	28	A	B	C	D	E	48	A	B	C	D	E
9	A	B	C	D	E	29	A	B	C	D	E	49	A	B	C	D	E
10	A	B	C	D	E	30	A	B	C	D	E	50	A	B	C	D	E
11	A	B	C	D	E	31	A	B	C	D	E	51	A	B	C	D	E
12	A	B	C	D	E	32	A	B	C	D	E	52	A	B	C	D	E
13	A	B	C	D	E	33	A	B	C	D	E	53	A	B	C	D	E
14	A	B	C	D	E	34	A	B	C	D	E	54	A	B	C	D	E
15	A	B	C	D	E	35	A	B	C	D	E	55	A	B	C	D	E
16	A	B	C	D	E	36	A	B	C	D	E	56	A	B	C	D	E
17	A	B	C	D	E	37	A	B	C	D	E	57	A	B	C	D	E
18	A	B	C	D	E	38	A	B	C	D	E	58	A	B	C	D	E
19	A	B	C	D	E	39	A	B	C	D	E	59	A	B	C	D	E
20	A	B	C	D	E	40	A	B	C	D	E	60	A	B	C	D	E

APPENDIX E

INTRODUCTORY LETTER

UNIVERSITY OF EDUCATION, WINNEBA
DEPARTMENT OF BASIC EDUCATION
P.O. BOX 25, Winneba Ghana Tel. (0432) 22036
E-Mail: Basic@uew.edu.gh

Our: DBE/M.PHIL.67/VOL.2/14/21 *Date*: May 15, 2014
Your Ref:

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....

LETTER OF INTRODUCTION
LYDIA IMPRAIM

Please, this is to introduce to you Ms. Lydia Impraim, an M.Phil student of the Department of Basic Education of University of Education, Winneba.

She has expressed the desire to carry out research survey by administering tests to pupils in your institution to enable her work on her thesis.

We would, therefore, be grateful if she will be given the needed assistance.

Thank you.

ASONABA KOFI ADDISON (PhD)
(Ag. Head of Department)

APPENDIX F

CONSENT FORM

Letter for consent and consent form

19th May, 2014

Dear Head teacher,

Subject: **Seeking Approval for research in your schools.**

I am Lydia Impraim, from University of Education, Winneba. I am conducting a survey on pupils' performance on the national minimum standard assessment test for primary school mathematics as part of my study in Master of Philosophy in Basic Education (Mathematics).

The rationale for the survey is to investigate pupils' performance on the national minimum objectives enshrined in the mathematics syllabus. The outcome of this research would be used to correct the deficiencies in the teaching and learning of mathematics at the basic school level.

Briefly, the data collection methods will include multiple choice test items. The test will be conducted at a time that is considered convenient for you.

If you agree on me using your school (i.e. pupils) in this research, please fill in the consent form attached.

I await your response. If you require further information I can be contacted through

Email lydiaimpraim@yahoo.com or cell phone number 0275605800.

Thank you for your consideration.

Lydia Impraim

Participant's consent form

I________________________________, of__________________________ give consent for LYDIA IMPRAIM, to carry out her survey. I understand the survey will involve completing a set of multiple test items I understand that all information including my name, the name of the school, and the name of the municipality, will be kept confidential. I understand that these activities will not disrupt our programme.

Signed: _______________________________

Date: ______________________________