

**RELATIONSHIP BETWEEN HOMEWORK PRACTICES AND PERFORMANCE IN
MATHEMATICS AMONG PUBLIC DAY SECONDARY SCHOOL STUDENTS IN
HAMISI SUB-COUNTY, KENYA**

BY

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DECLARATION

Declaration by the candidate

This thesis is my original work and has not been submitted for award of a degree in any other university.

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DEDICATION

To Rebecca, the wife of my youth, to my wonderful children Roy, Ian, Fridah, Ronny and Peter,
and to Leonida, the beloved mum.

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ABSTRACT

Homework is a task that teachers assign to students to be completed outside the class time. It is an important tool for enhancing instruction as it is designed to reinforce what students have already learned and to prepare them for upcoming lessons and tasks. Various endeavours have been employed to improve performance in mathematics including homework which teachers give to students at various amounts and frequencies. However, research done so far does not give guidance on the amount and frequency at which teachers should administer homework so that it is beneficial to students in terms of improved performance in mathematics. The same does not state whether students' attitude towards homework influence their performance. The purpose of this study was to determine the relationship between homework practices and students' performance in mathematics in Hamisi Sub-county. Objectives of the study were to establish how students' attitude towards homework, homework frequency and amount of homework are related to performance in Mathematics. The study findings may be used to regulate the amount of homework tasks given to students and frequency at which homework should be administered such that it is beneficial to learners. The study encompassed both descriptive survey and correlation designs. In the conceptual framework, the dependent variable was performance in Mathematics while the independent variables were students' attitude towards homework, frequency of homework and amount of homework administered. The study population consisted of 1,600 Form 2 students and 30 teachers of Mathematics. Simple random sampling technique was employed to identify 310 Form 2 students constituting 19% of the population while purposive sampling was used to select 27 teachers from 27 schools. Achievement test was administered to students while questionnaires were administered to students and teachers to collect data. Face validity of the instruments was ascertained by experts from the Department of Educational Communication, Technology and Curriculum Studies, Maseno University while reliability of the instruments was determined through a pilot study involving 3 schools which were not used in the final study, giving a reliability coefficient of 0.834. Descriptive and inferential statistics were used to summarize the relationships in the data. The study established that students with positive attitude towards homework performed better in mathematics than those with negative attitude. Students assigned homework weekly performed better than those assigned homework daily, fortnightly and monthly. Students assigned 21-30 sums staggered through different days performed better than those assigned more or less sums for the entire topic but as a single assignment done within a period of one day. The Ministry of Education should use the findings of this study to develop a policy on homework as a tool for enhancing performance in mathematics and other subjects instead of leaving the management of homework exclusively at the discretion of teachers.

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LIST OF ABBREVIATIONS AND ACRONYMS

CSO	Curriculum Support Officer
D.C.C	Deputy County Commissioner
EMIS	Education Management Information System
HODs	Heads of Department
K.C.S.E	Kenya Certificate of Secondary Education
KEMI	Kenya Education Management Institute
KNEC	Kenya National Examinations Council
NG-CDF	National Government Constituency Development Fund
QASOs	Quality Assurance and Standards Officers
SCDE	Sub-County Director of Education
SCQASO	Sub- County Quality Assurance and Standards Officer
S.G.S	School of Graduate Studies
SPSS	Statistical Package of Social Science
SMASE	Strengthening Mathematics and Science Education
TSC	Teachers Service Commission
VAP	Value added progress

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CHAPTER ONE

INTRODUCTION

1.1. Background to the Study

Homework was defined by Cooper (2009) as the tasks assigned by teachers to students to be completed outside the class. Epstein and Van Voornhis (2011) identified homework as a natural connector of school and home. In these ways, homework is one of the most common school activities involving teachers, students and parents. Recently, however, there have been serious debates worldwide about whether or not teachers should assign homework. The debates involve students' complaints about the time required to do their homework, parents' complaints about the quantity of homework assigned and their lack of ability to guide their children on homework, and teachers' complaints about the lack of time to design effective homework assignments and deliver feedback to students (Cooper et al, (2011).

Hayward (2010) confirms that the effect of homework on student achievement is a highly debated issue and has been for over a century. Hyde et al, (2008) found that comparing of education systems worldwide has led to a push to raise the standards of education in schools and to compete in the global marketplace. The results of international surveys as well as other research evidence point to the fact that low achievement in Mathematics is a complex phenomenon (Mullis et al, 2008). The researchers go on to conclude that underachievement in mathematics occurs for a number of reasons linked to home background and school-related factors that often reinforce each other. How much homework to give, how often to give it and what it should entail are all questions that researchers studying homework-achievement relationship have strived to address (Hayward, 2010).

As a child, primary school principal Angela Helsloot (Sydney, Australia) was always given homework in mathematics and, as a teacher, she has marked homework sheets nearly every day (Pallavi, 2017). Pallavi adds that Angela stopped the practice of giving homework to students 20 years into her career after a survey on students, parents and teachers revealed that overwhelming 70% of those surveyed felt that homework makes little difference in learning outcomes for early learners especially in mathematics. Pallavi adds that project work has proven to be more instructive than homework as it builds up collaboration and communication among learners.

The concept of extending work done in the school environment to the home setting is intrinsic to education system in most African countries. A Namibian study states, “homework is an everyday part of school life” (Eita, 2007) and comments on the benefits of parental involvement in mathematics homework to consolidate learning. It goes on to add that a successful homework policy is predicated on parental involvement in children’s education. As such, parents’ role in supporting homework is part of a wider understanding of community, parent and school cooperation in the education process.

Singh, Mbokodi and Msila’s (2004) study of black parental involvement in education found that parents’ involvement in education was crucial, especially regarding homework in mathematics. They went as far as indicting “parents who played little or no role in their children’s homework contributed to the poor performance of their children” (2004, p. 301). Various international studies including Marzano & Pickering, (2007) and Plato (2007) have indicated that homework, when issued in the lower grades, can be beneficial to learners. Some of the positives include the improvement of a learner’s factual knowledge and the learners’ understanding of mathematical concepts.

In the South African study conducted by Singh, Mbokodi and Msila (2004), mentioned above, the authors write about homework being part of the parental expectation of a “quality education” for their children. These authors bring our attention to the spirit of “let us educate together”. The “us” in this quotation refers to parents and teachers. In this instance, therefore, homework can be seen as having the potential to form a bridge between the home and the school.

High school research by Singh *et al*, (2004) suggests that black parents who have been disadvantaged by the above mentioned schooling situation do not feel confident in helping their children with mathematics homework, an area in which they themselves faced major challenges. In addition, some teachers had stopped assigning homework to their learners, since the teachers believed that no assistance was forthcoming from students’ homes (Nadine, Jacqui and Eileen, 2008). It is noteworthy that the work done by continental researchers mainly dwelt on parental involvement on their children’s homework activities.

Harold (2009) confers that America’s Mathematics problems are serious and goes on to say that these problems begin when children are very young and persist throughout primary and secondary school. Harold also found that American children are not doing as well in Mathematics as their peers in other countries. Annisia (2015) in a research work entitled “Parental involvement and its effects on students’ academic performance in public secondary schools in Korogwe,

Tanzania” found that parents were not buying their children supporting materials’ at home and this is due to low level of education and poverty among the families. Annisia also found that many students were involved in various domestic work including fetching water, cooking, cleaning, and income generation activities. Those activities consume most of students’ time,

which they could use for studying. The length and frequency of their participation in domestic chores greatly affected students' academic achievement because they lacked time to study at home, they arrived to school late and slept in class because of being tired.

Kapinga (2014) agrees that in Tanzania, the home set up such as space, furniture (chairs and tables), home chores distribution, silence and reading rooms provide encouragements for the students to take studies at home thus contribute to better academic achievements. Madrigal *et al*, (2014) also consolidates the above observation on the roles of the parents in facilitating students' academic achievement when established that the heavy agricultural work at home, bricks making and involvement in the petty businesses among the students hindered academic performance among the secondary students in rural Korogwe District Council.

The work done in Tanzania also talks about parental involvement in students' homework activities. There is no research done regionally on attitude of students, frequency and amount of homework. According to Echaune et al, (2015), factors associated with students' performance in mathematics may have been addressed but the impact of parental involvement continues to be a significant issue. Echaune et al add that some schools in Kenya post poor results amid claims that parents are not supportive. The study examined the effect of parental involvement in homework on academic performance in public primary schools in Teso North Sub County, Busia- Kenya. The objectives of their study were; to establish the types of homework assistance children get from parents, to ascertain the extent of parental involvement in homework and to examine the association between parental involvement in homework and school academic performance. It is evident that their work excluded the attitude of students towards homework,

the frequency at which homework should be given and the correct amount of homework to administer to students in mathematics.

The mean scores in mathematics in KCSE for the years 2012 to 2016 had ever been below average in Western region of Kenya as shown in table 1.1 below.

Table 1.1: Western Region Mean Scores and Grades in Mathematics

County	2016	2015	2014	2013	2012	MEAN SCORE	MEAN GRADE
Bungoma	2.482	3.523	3.419	2.902	3.155	3.096	D
Busia	2.563	3.512	3.258	2.816	2.816	2.993	D
Kakamega	2.414	3.222	3.112	2.824	2.967	2.907	D
Vihiga	2.250	3.405	2.942	2.800	2.723	2.824	D

Source: *Regional Director of Education's (RCE) Office, Western (2017)*

The regional performance in Mathematics was not very impressive as all the counties attained a mean grade of D (plain) over the five year period with Vihiga's mean score being the lowest at 2.824.

Table 1.2: Vihiga County KCSE Mean Scores and Grades in Mathematics

County	2016	2015	2014	2013	2012	MEAN SCORE	MEAN GRADE
Emuhaya	2.311	3.564	2.919	2.748	2.902	2.888	D
Hamisi	1.960	3.299	2.812	2.443	2.320	2.566	D
Sabatia	2.424	3.645	3.148	3.107	3.124	3.089	D
Vihiga	2.305	3.112	2.892	2.902	2.548	2.752	D

Source: *County Director of Education's, (CDE), Office, Vihiga (2017)*

Apart from Sabatia Sub-County which managed a mean score of 3.000 and above over the five year period, the rest of the Sub-Counties did not attain above the mean score of 3.000 except in the year 2015, with Hamisi realizing a low performance at a mean score of 2.566 over the period.

This explains why the researcher selected Hamisi Sub-County to determine if an effectively managed homework would have an impact on performance in Mathematics.

Cooper (2011) confers that in many ways homework is an enigmatic part of school. This is probably because it is not clearly mentioned in the national curricula and in the syllabi of mathematics in many countries. Many education systems worldwide lack a direct policy on homework at any level (Ogoye, 2007). This is also the case in Kenya. Even the Basic Education Act, 2013 (R.O.K, 2013) is silent on it.

Homework is therefore left at the discretion of the teacher. Due to lack of policy guideline, teachers often misuse this provision and end up administering too much homework assignments (Kohn, 2006). Cases where every teacher gives homework and expects it to be completed the following morning are on the increase (Duke, 2007). The student may end up missing sleep as he /she struggles to complete the assignment, fearing punishment. According to Kohn (2006), the work therefore lacks in quality, as the student attempts only to complete the work, whether it is correctly done is not an issue of concern. With all the pressure mounted on the student to complete the work given, it is observed that most teachers are also keen on the completeness of the work rather than its quality since they hardly have time to mark these assignments or to discuss them in class (Cooper, 2011). Cooper adds that most students, having discovered the complacency on the side of their teachers to mark these assignments, have formed a habit of copying the completed work from the high achievers.

Cooper goes on to say that since schools also lack policy on homework, the administrators are not concerned with supervision of teachers to establish those who give work consistently and those who do not. Kalish (2006) found that students may present a variety of explanations for

not complying with the requirements of homework. Some may not have understood the assignment, others have no support at home, yet others have other priorities hence make a conscience choice not to do the work.

According to Wiesenthal et al, (2013) teacher behavior such as assigning, collecting and grading can affect student outcomes when it comes to homework. Though many researchers disagree about the role homework plays in improving academic performance, teachers continue to assign the work (Kralovec and Buell, 2013). Teachers assign homework for many reasons including to reinforce previously taught skills (Wiesenthal et al, 2013). This is a “Practice makes perfect” approach in which students are working to strengthen their abilities. Wiesenthal and his colleagues go on to argue that homework provides non-instructional benefits. Time spent on assignments at home teaches students to work independently and foster good work habits. They add that the other reasons why teachers give homework in mathematics include additional practice and a method of participation. Walker *et el* (2014) assert that parents often become involved in their children’s education through homework.

Whether children do homework at home, complete it after the school programs or work on it during the school day, homework can be a powerful tool for (a) letting parents and other adults know what the child is learning (b) giving children and parents a reason to talk about what is going on at school, and (c) giving teachers an opportunity to hear from parents about children’s learning (Haddock, 2010). The author adds that the basic objectives of assigning homework to students are the same as schooling in general: To increase the knowledge and improve the abilities and skills of students; and to reinforce what students have already learned, prepare them for upcoming lessons, extend what they know by having them apply it to new situations, or to integrate their abilities by applying many different skills to a single task. Homework also

provides opportunity for parents to participate in their children's education. Otula (2007) insinuates that homework is the most misunderstood and misused element in the learning process yet it is the best tool for improving students' performance.

Harvey and Gerald (2010) gave four purposes and benefits of homework as follows:

1. Preparation homework, given to prepare students to gain maximum benefit from subsequent lessons.
2. Practice homework, given to help students master specific skills and should be limited to material presented in class.
3. Extension homework given to determine if the students can transfer a new skill or concept to a new situation.
4. Creative homework, given to require students to integrate many skills and concepts in the process of producing a response.

In order to ensure students' homework success, it is important that teachers, schools and counties produce a clear and concise homework policy (Cosden *et al.*, 2014)

In Hamisi Sub-county, the following attempts have been made to improve performance in Mathematics:

- Remedial and holiday tuition. Hiring qualified teachers.
- Capacity building workshops by Quality Assurance and Standards Officers (QASOs) to improve teaching methods.
- Improving access to instructional materials.
- Strengthening Mathematics and Science Education (SMASE) in-service trainings.
- Early completion of syllabus.

- Creating adequate time for revision.
- Improved curriculum supervision by principals and HODs.
- Improved condition of school buildings courtesy of the NG-CDF.
- Teacher and student motivation to address negative attitude towards mathematics.

(Curriculum Support Office (CSO), Hamisi, 2007).

Despite these endeavors, performance in mathematics has ever been low compared with the other sub-counties in Vihiga County and Western Region. For example, in Kenya Certificate Secondary Education (KCSE) examinations for the last 5 years, the Sub-County attained the mean grades and scores shown in Table 1.3 below.

Table 1.3: *Hamisi Sub- County KCSE Mean Scores and Grades in Mathematics*

Year	Grades	Scores
2012	D-	2.320
2013	D	2.443
2014	D	2.812
2015	D	3.299
2016	D	1.960

Source: Sub- County Director of Education's (SCDE) Office, Hamisi, (2017)

The performance by students in mathematics in Hamisi Sub-County over the past five years has been far below average as it has never attained above a mean grade of D+, the modal grade being D. The implication here is that a factor which might not have been addressed could be

responsible for this low performance in mathematics hence the need to consider the role of correctly articulated homework practices in performance of mathematics.

Table 1.4: *The trend of performance in KCSE Mathematics over the last five years by Grades in Hamisi Sub-County:*

YEAR	ENTRY	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E		
2012	2716	132	61	84	94	107	122	195	129	167	418	614	593		
2013	2523	114	53	92	95	85	98	122	128	136	339	540	721		
2014	3167	131	59	73	93	69	123	125	152	176	439	679	1034		
2015	3212	112	49	44	82	109	132	126	147	168	412	598	1192		
2016	3351	31	24	26	43	39	62	61	122	146	692	712	1393		
TOTAL	14,969	523	246	319	407	409	537	629	678	793	2300	3143	4933		

Source: Sub- County Director of Education's (SCDE) Office, Hamisi, (2017)

Quality grades of B- and above have been very few. Of the candidature of 14,969 over the period, 10,376 scored the wastage grades of D, D- and E. 4,933 students attained grade E in mathematics over the period. This is a worrying trend as it implies that over 10,376 students never qualified for any meaningful courses in colleges and universities.

Table 1.5: *Percentage performance in KCSE Mathematics by grades over the last five years in Hamisi Sub-County*

YEAR	ENTRY	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
2012	2716	4.8	2.24	3.09	3.4	3.9	4.5	7.2	4.7	6.1	15.3	22.6	21.8
2013	2523	4.5	2.1	3.6	3.7	3.3	3.8	4.8	5.07	5.39	13.4	21.4	28.5
2014	3167	4.13	1.8	2.3	2.9	2.17	3.8	3.9	4.7	5.5	13.8	21.4	32.6
2015	3212	3.48	1.52	1.36	2.55	3.39	4.10	3.92	4.57	5.23	12.8	18.6	37.1
2016	3351	0.92	0.71	0.77	1.28	1.16	1.85	1.82	3.64	4.35	20.6	21.2	41.5
Total	14,969	3.50	1.84	2.58	3.01	2.99	4.02	4.62	4.91	5.94	14.38	21.64	30.47

Source: Sub- County Director of Education's (SCDE) Office, Hamisi, (2017)

Table 1.5 shows the percentages of students' performance over the five year period according to grades. It is a concern that out of the 14,969 candidates who sat for KCSE examinations over the period, 4,933 (30.47%) scored grade E. A greater concern is that, other factors held constant, these students were often assigned homework to help boost their performance in Mathematics. This shows that homework assigned to these students bore no fruit.

This is an area of concern since admission to most courses be it science or arts oriented, at certificate, diploma or degree levels require at least a credit in mathematics (Joint Admissions Board, 2011; MOEST, 2007). Warton (2011) in the work entitled "The Forgotten Voices in Homework" cited that, adults, whether educational policy makers, teachers or parents, hold consistent views about homework. According to them it has many purposes among which are (a) the encouragement of academic learning and (b) the development of skills and attributes such as student responsibility, learning autonomy and time management. Warton goes on to explain that

in marked contrast to the adult views, little is known about student attitude, ideas and understandings about homework.

Naitore (2018) concurs that students gain the aspects of responsibility as they put the initiative to fulfill the homework given by the teacher and that studying at home takes a lot of discipline. He however fails to categorically outline whether the homework success has any impact on the overall student achievement. Leo (2005) found that students see homework as a natural feature of the daily school routines. Leo adds that students cited home environment as a factor in homework. Leo goes on to say that some students felt home environment was not conducive for homework.

Day scholars are more subjected to harsh conditions which lead to their lower performance in mathematics compared with students in boarding schools as shown in Table 1.6 below.

Table 1.6: *Performance in mathematics by Day scholars and Boarders*

Year	2016	2015	2014	2013
Sub-County Mean Score	1.960	3.299	2.812	2.443
Day scholars' Mean Score	1.438	2.412	2.388	1.995
Boarders' Mean Score	2.482	4.185	3.236	2.891

Source: Sub- County Director of Education's (SCDE) Office, Hamisi, (2017)

The table reveals that over the four year period, students in day schools have shown consistent lower performance in mathematics than their boarding counterparts. So the research aimed at establishing if a well-coordinated homework management would help improve their performance

in mathematics. Apart from exhibiting low performance in mathematics, day scholars face a lot of other challenges in pursuit of academic excellence.

Faisal (2016) observes that day scholars have to wake up in the wee hours to do their chores and prepare for school while their boarding counterparts are still enjoying their slumber. Faisal goes on to state that day students are susceptible to many difficulties, which mainly stem from home. Their fees is not regularly paid and so more often they have to contend with interruptions to their learning as they are sent home for fees. When they return home, they have to complete the so many household chores before they eventually settle down for study. Moreover, a number of them sleep in the neighborhood some distances away.

Because of the many challenges faced by day scholars, they were incorporated in this study to establish the favorable homework practices that would enhance improved academic performance.

Students' view on homework has hardly been taken into consideration. Therefore, this study sets out to investigate homework given in mathematics from the students' point of view, and whether the amount and frequency at which homework is assigned has any positive correlation with achievement.

1.2 Statement of the Problem

Low performance in mathematics is a concern to many. As indicated in the background to the study, homework is an important tool for enhancing instruction and is one important way through which learning time can be extended (Arends, 2011). This is possible if it is well managed and coordinated. Poor homework policies contribute to enlarging the achievement gap between higher and lower achievers.

Although homework is an important area of concern to parents, students, teachers and education managers, it has not been adequately addressed in Kenya. Very few researchers have concentrated on what is done, how it is done or how homework can be planned to meet the needs of different learners in mathematics. One study by Eshiwani (1983) could be counted but it only touched on homework incidentally. Ngaruiya (2002) carried out a study on nature of mathematics homework, teachers' perception on the value of homework and opinion of students regarding homework but did not identify the beneficial amount and frequency of homework activities.

There is little evidence that students' feeling about homework has ever been sought. Similarly its contribution to education achievement in Hamisi sub-county cannot be verified. Because there is no clear policy to regulate homework in Kenya in general and in Hamisi sub-county in particular, it is left at the discretion of teachers who end up loading it on students.

Homework tasks are assigned without considering learners' ability, home environment, availability of relevant instructional materials such as text books and whether or not the student understood the concepts as taught in class.

This is worsened when several questions are given from the same topic to the extent that students feel some degree of monotony. Students who fail to present completed work are often subjected to outlawed corporal punishment in addition to the dreaded one of being sent home for parents or being kept out of class for the entire teaching session. Learners therefore spend longer hours trying to answer homework questions. Those who are unable to complete the tasks hurriedly copy verbatim from their more gifted colleagues without attempting to understand the concepts. Amount of homework given by teachers varies from teacher to teacher. Similarly, the frequency of homework though important, has not been examined to determine its optimum impact.

Attitude is also an important factor in determining general management and impact of homework and hence the need for empirical findings to shed light on general acceptability of homework as a tool in improving performance in mathematics. For the above reasons, this study aims at establishing how attitude of students, frequency and amount of homework impact on their performance in mathematics.

1.3 Purpose of the Study

The purpose of this study was to establish the relationship between homework practices and performance in mathematics among public day secondary school students in Hamisi Sub-County, Kenya.

1.4 Objectives of the Study

The study sought to achieve the following objectives:

- i) To establish relationship between students' attitude towards homework and their performance in Mathematics.
- ii) To determine the relationship between frequency of homework and students' performance in Mathematics.

- iii) To find out the relationship between amount of homework administered to students and their performance in Mathematics.

1.5 Research Questions

The study was guided by the following research questions:

- i) What is the relationship between attitude of students towards homework and their performance in Mathematics?
- ii) Does a relationship exist between frequency at which teachers assign homework to students and their performance in Mathematics?
- iii) Is there a relationship between the amount of homework tasks administered to students and their performance in Mathematics?

1.6 Assumptions of the Study

In the study, it was assumed that the students have a positive attitude about homework and that they know its value. It was also assumed that teachers frequently employ the use of homework as a means of enhancing learner performance in mathematics. The other assumption was that the schools involved in the study had a policy that regulates homework practices.

1.7 Scope of the Study

The study focused on form 2 students and teachers of Mathematics in public day secondary schools in Hamisi Sub-county to establish whether homework had any impact on performance in mathematics.

Form 2 students were selected because they were neither under influence of primary education nor under pressure of KCSE exams hence had time for the interviews and were also well placed to give their perceptions of homework. The study was not interested in the roles parents play in setting the home environment for their children to study.

Rather it relied on students to obtain information on how their attitude towards homework influenced their achievement in mathematics; and on teachers to determine the extent to which amount and frequency of homework affected learners' performance in mathematics.

Though there were a number of topics in form 2, the study focused on trigonometry I because it is fairly easy to comprehend as long as it is well taught and it is the only topic that cuts across almost all classes.

1.8 Limitations of the Study

Students' performance in mathematics is influenced by the amount of time spent on studies. However, performance may also be determined by hereditary factors but this study did not concentrate on heredity as a factor in performance.

The study did not cover homework practices in primary schools. It is therefore not guaranteed that the findings therein will also be applicable in primary schools. A similar study should therefore be carried out in early year education and primary schools.

Self-reported grades were likely to be biased due to the temptation by some teachers to inflate them for their own reasons. This was overcome by using a test which the researcher administered and marked by himself.

The validity of Likert scale attitude measurement could be distorted due to Central tendency bias which refers to the notion that some respondents may avoid choosing the most extreme options provided. This was overcome by guiding and inducting the respondents, asking simple and straight forward questions and assuring the respondents that there would be no victimization whatsoever.

Out of the many topics in form 2 mathematics, only trigonometry I was used. This was due to limited time and vastness of the study area. However, trigonometry is a topic that cuts across a number of classes and most students find it manageable.

1.9 Significance of the Study

The findings of this study may be useful to education policy makers and school administrators in coming up with policy on homework. It may enable parents to play an active role in providing facilities and more conducive home environment for their children to do homework. It may guide teachers on the optimum amount of homework to administer to students at a given time.

It may also guide teachers on the beneficial frequency of administering homework. In addition, it may challenge teachers to mark the homework tasks, give constructive comments and revise these tasks with students. It may encourage students to consider homework as an inherent component of learning and be encouraged to complete the assigned tasks and avoid copying their peer's completed work.

1.10 Conceptual Framework of the Study

The study was conceptualized on how various factors interrelate to affect students' attitude towards homework, frequency and amount of homework and how these correlate with their ultimate performance in mathematics.

The conceptual framework represented in Figure 1.1 shows the relationship between the independent variables (Attitude of students towards homework, frequency and amount of homework and education policy) and the dependent variable (Achievement in mathematics). The intervening variables are student ability, teacher competence, availability and use of instructional materials, peer influence and learning environment.

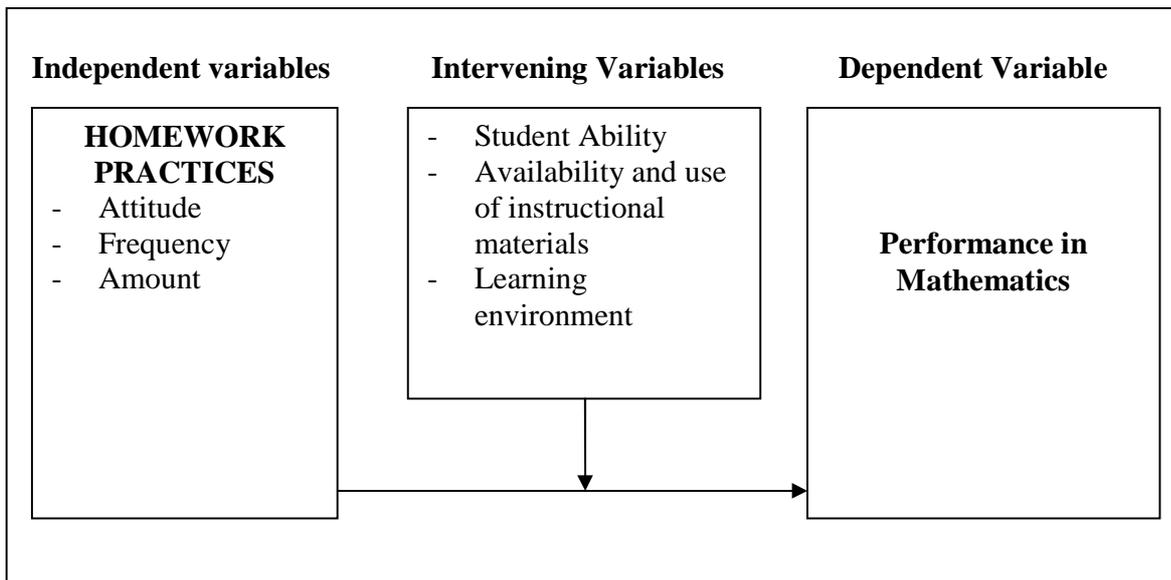


Figure 1.1: *Conceptual framework on the relationship between Homework practices and Performance in Mathematics.*

Students' attitude towards homework has a direct influence on their performance. Those with positive attitude perform better in internal assessments and vice versa. This is because they don't visualize homework tasks as a punishment or as what deprives them of time to do other non-related activities.

Teachers tend to give more frequent homework tasks if the school has adequate instructional materials. This is expected to impact positively on performance. Very frequent homework assignments can deny students access to leisure activities that also teach other important life skills.

The amount of homework tasks assigned to learners has a direct impact on performance. Excess homework amounts can be counterproductive. For example, when the work is too much, a parent may want to assist the child in homework tasks but may end up causing confusion in the learner as the parent may introduce misleading methodology (Cooper, 2009).

To address the intervening variables namely student ability, availability and use of instructional materials and learning environment, the study focused on sub-county day secondary schools since they have students of more or less similar academic ability, they are endowed with equal quantities of instructional materials and exhibit similar learning environment.

1.11 Operational Definition of Terms

The key terms used in this study are defined as follows:

Amount of Homework	The number of questions assigned to students to be completed at home within a period of one week.
Attitude	Students' feelings and perception towards homework amount, frequency and its value to performance.
Frequency of Homework	How often homework is given to learners per week as a measure on the following scale: Daily, weekly and fortnightly.
Homework	Assignment that teachers give to students that are meant to be completed after the lesson time.
Homework Practices	Homework amounts assigned to learners at varying frequencies and whether they are completed, marked and corrected.
Performance	Academic achievement by students in the mathematics test as developed by the researcher (See Appendix E).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, literature reviewed relates to the objectives and research questions of the study. The literature review therefore describes how students' attitude towards homework, frequency at which teachers assign homework and amount of homework administered affect learners' performance in mathematics. The literature review defines homework as a set of tasks that are assigned by teachers for students to complete outside of school hours (Cooper et al, 2006).

2.2 Relationship between Attitude of students towards homework and their performance in Mathematics

Cooper et al, (2009) surveyed students and found that students in lower grades, on average, felt that homework helped them learn. However, scholars alleged that homework placed too much pressure on students, and they questioned its benefits. Homework was viewed as an intrusion on student's extracurricular activities (Cooper, 2011). The launch of Sputnik by Russians in 1957 sparked the movement for increased academic vigor and encouraged homework as a means to accelerate learning. However, by mid 1960s, the movement once again reversed and homework was seen as too much pressure for students (Cooper, Lindsay, Nye & Greathouse, 2009).

In recent years, homework has been once again viewed by many as an inconvenience and intrusion into family life and as an impediment to a full and active social life for children (Cooper, 2011). Cooper and others did not establish if homework had any influence on academic achievement. Second grade students were compelled to complete their homework to avoid getting in trouble with parents and teachers or to save an adult the effort of reminding them to do

their homework (Warton, 2011). Warton however did not give the impact of doing and not doing homework on performance.

Leo (2005) found that students see homework as a natural feature of the daily school routines. They see homework as a tool for revising. Leo adds that students cited home environment as a factor in homework. Leo adds that some students felt home environment was not conducive for homework. Some students also get more support in their work than others. Leo should have gone ahead to find out if students with positive perception towards homework performed any better than those with negative perception.

Cooper, Lindsay and Greathouse (2009) also noted that increased out-of-school assignments may lead to unfavorable attitudes towards homework among elementary school students. They however did not show how the unfavorable attitude could impact on students' performance. According to Peace (2006), students believe that there is a relationship between homework and achievement, and that they also believe that homework is not necessary unless course material is new or challenging. This is true but it is noteworthy that homework can also be a means of revising even the less challenging concepts.

Chick and Thomas (2005) found that most children do not like to do homework. They do not enjoy sitting and studying at least, not after having spent a long school day comprised mostly of sitting and studying. Harvey (2010) found that most children dread homework, or at best see it as something to be gotten through. Harvey further argues that supporters of homework rarely look at things from the students' point of view, though; instead, students are regarded as inert objects to be acted on; make them practice and they will get better. Harvey adds that this viewpoint is disrespectful or that it's a residue of an outdated stimulus – response psychology and suggests

that it is counterproductive since children cannot be made to acquire skills. They are not machines such that we put in more homework and get out more learning. Kalish (2006) says that perhaps worst of all, summer homework affects how kids feel about learning and school.

Kohn (2006) asserts that the effect that shows up is more negative attitudes on the part of students who get more homework assignments. Kohn further argues that supporters of homework rarely look at things from the students' point of view, though; instead, students are regarded as inert objects to be acted on: Make them practice and they will get better. Vatterott (2009) is of the opinion that the question how can we make students do their homework should not be a concern but rather why they don't do their homework. Vatterott goes on to say that students differ in their "work speed" – that some take longer to learn a concept or complete tasks than others- yet teachers often expect slower students to take the additional time to complete the same homework task that other students finish more quickly and that families differ in their priorities, yet many teachers believe all students should arrange their daily schedules to put homework first.

One study found that 90% of students believe that homework will help students (Van Voorhis, 2011). Van Voorhis adds that this new point is disrespectful or that it is a residue of an outdated stimulus-response psychology and suggests that it is counterproductive since children cannot be made to acquire skills. Numerous researchers have sought to examine the empirical relationship between homework and academic achievement (e.g. Keith, Diamond- Hallam & Rine, 2014; Kitsantas, Cheema & Ware, 2011; Cooper, Lindsay, Nye and Greathouse, 2009). Few however, have analyzed the relationship between student attitude towards homework and performance.

Despite this, some students also view homework as busywork assigned to students (Buffy and Neil, 2008). In a survey of 180 High School students, they found that an equal number of students viewed homework as busy work compared to a way to prepare for class. While the article does not specifically define busy work, the context suggests that busy work does not prepare students for future classes and merely fills time in class. Sallee and Rigler also found that an equal number of students also viewed homework as an easy way to earn points in class compared to deepening one's understanding of the material. According to Corno and Xu (2009), most students view homework as a job: something they may not want to do but must do. They however declined to give the effect of this view on performance.

Camille (2014) asserts that there is no regulation of homework as State Educational Systems and local districts generally do not have regulations set in place to discuss homework. Instead it is left up to the teacher to decide what is assigned for homework and why. Camille should have highlighted the aftermath of leaving homework entirely at the behest of teachers.

Authors such as Denise (2013) have researched the effects of homework but few have delved into the idea of students' attitude towards homework. Consequently, the perception of students (the principal participants) of homework remains largely unknown. Raquel et al, (2012) found that students' homework performance is a strong predictor of students' academic success in mathematics and that the percentage of homework completed was a strong predictor of the students' average test score. Homework completion has a positive effect on student academic achievement.

Raquel further found that a combination of homework performance, student demographics, perceptions and challenges would be strong predictor of academic success. In addition,

homework performance is a significant predictor of students' performance on teacher-made tests but not for standardized tests. He concludes that more homework is not the answer to higher standardized test scores.

2.3 Relationship between frequency of homework and performance in Mathematics.

For homework to be truly beneficial, students, teachers and parents must work together. Teachers must create appropriate assignments, mark and provide feedback. Students must finish the work and parents must support the process (Colden, Friedman and Tiersky (2008). Wiesenthal (2013) found that teachers who work in schools with a well-defined homework policy are more likely to assign, collect, grade and return homework. Carlsson (2015) in his work 'Homework for English from students' perspective' highlighted that homework is never discussed in class and that all students feel stressed because of homework and a solution to this would be to have extra time in school for doing their homework.

Keith *et al*, (2014), found out that more frequent, shorter assignments are more effective than less frequent, longer assignments, which is related to the concept found by Kitsantas *et al*, (2011) that students' motivation decreases when they spend more time on assignments. They however failed to qualify the term "effective". Similarly, Kitsantas did not indicate how spending more time doing assignments affect students' performance. Peace (2006) found out that there was no significant difference in test scores of students who had homework graded and collected and those who did not have homework graded and collected.

Orodho (2002) asserts that there is developing trend for secondary school students to have extra lessons in school subjects outside the official school hours / days. This has caused a major concern among parents and professionals with regard to the length of the school hours / days. Orodho stated further that teachers offered extra teaching during evening and over school

holidays to cope with the broad 8-4-4 curriculum. De Jong et al (2011) found that most teachers assigned homework tasks almost every lesson, which was 6-7 times a week. The results showed that frequency was not related to performance. Little research specifically addresses whether daily homework is beneficial to children. Cooper, Lindsay, Nye and Greathouse (2009) found non-significant relationship between the frequency of homework assigned and average student performance. Walberg, Paschal and Weinstein (2009) found that daily homework assignments resulted in larger effects on performance than homework assigned less often or assigned randomly. Dettmers, *et al*, (2009) found that there is a positive association between schools with frequent homework and student performance.

According to Marzano and Pickering (2007), parents should frequently facilitate homework completion rather than helping their children with homework.

Kohn (2006) found through decades of investigation that even if you regard standardized test results as a useful measure, homework (some versus none or more versus less) is not even correlated with higher scores at various stages. Kohn adds that where any correlation exists at all between homework and test scores, it is usually fairly small and that it has a tendency to disappear when more sophisticated statistical controls are applied. Moreover, there is no evidence that higher achievement is due to homework even when an association does appear. Kohn goes on to state that homework is usually for practice and practice should be on content students know relatively well. Kohn also found out that if students are stuck, then they have been given homework that is too hard.

Kohn explains further that even if practice is sometimes useful, it cannot be concluded that homework of this type works for most students and homework is not of any use for those who

don't understand what they are doing. Kohn adds that such homework makes students feel stupid; gets accustomed to doing things the wrong way (because what is really 'reinforced' are mistaken assumptions) and teaches them to conceal what they do not know. He further explains that even if homework was helpful for most students that does not mean they need to do it at home. Kalish (2006) adds that the nightly burden which is homework robs children of the sleep, play and exercise time they need for proper physical, emotional and neurological development.

Kalish goes on to say that homework is a hidden cause of the childhood obesity epidemic creating a nation of 'homework potatoes.

Trautwein (2010) found that the frequency of homework assignments had a positive effect on mathematics achievement gains, whereas lengthy homework assignments had negative, albeit non-significant, effect on achievement gains. Trautwein concludes that monitoring of homework completion did not contribute significantly to achievement gains. The more homework students complete, the better they do in school, according to research conducted by psychologists Cooper, Lindsay and Greathouse of the University of Missouri, Colombia. Regardless of students' ability or prior coursework, the amount of time they devote to homework increases their achievements (Keith & Cool, 2014).

Cooper (2011) confers that longer assignments-in one instance twice as long; in the other, three times as long-are no more effective than shorter assignments, but the difference is not statistically significant. Homework is effective when it is done frequently, marked, graded and revised immediately, directly related to the topic being taught, used to assess areas already covered in class and graded and included in the general evaluation process (Otula, 2007). McEntire (2016) found that little research specifically addresses whether daily homework is

beneficial to students and that not all districts or countries have homework policies and not all schools and teachers follow the policies their districts or countries may have.

2.4 Relationship between amount of homework and performance in Mathematics.

Amount of homework in this case refers to the quantity of task in terms of number of take away questions assigned to learners at ago. Denise (2007) found that too much homework has negative effects on student well-being and behavioral engagement and adds that too much homework can diminish its effectiveness and even be counterproductive. Denise cites prior research indicating that homework benefits plateau at about 2 hours per night, and that 90 minutes to two and a half hours is optimal for high school students. Pope's study found that too much homework is associated with greater stress as indicated by 56% of the students in the survey data. 43% viewed homework as a 1⁰ stressor. Less than 1% of the students said homework was not a stressor. Many students said that their homework load led to sleep deprivation and other health problems. Researchers at the secondary level conclude that high amounts of homework do not guarantee high performance (Kohn, 2006).

According to Jessica (2016), spending too much time on homework meant that students were not meeting their other developmental needs or cultivating other critical life skills. Clifton adds that there is no relationship between the time spent on homework and how much the students enjoy it. The research calls into question the value of assigning large amounts of homework and that homework should not be simply assigned as a routine practice. Farrow (2006) in the work entitled "Homework and Attainment in Primary Schools" pointed out that amount of homework, child's ability, home back ground, sex and school impact negatively on homework completion and final achievement. While educators support homework for its value in enforcing daily

learning and fostering the development of study skills, a backlash against the practice has been growing since 1990s.

Kalish (2006) states that summer homework sounds like a good idea until you see how miserable a child looks as he/she slogs through that pile of books, reports, mathematics packets, etc. Kalish goes on to state that schools should rethink summer homework, and not because it stresses students (and parents), the truth is homework does not accomplish what we assume it does. Kitsantas, (2011), in the study entitled “Role of Homework and Self-efficacy Beliefs”, found that it is the belief of many teachers that more homework means higher achievement. Kitsantas deduced that it is not the amount of time students spend on homework that is important in raising achievement, but the sense of self-efficacy they develop while carrying out the assignments.

Otula (2007) explains that the correct quantity of homework depends on age, class, work covered and skills already acquired by the students. Otula goes ahead to assert that the amount of homework given should not deny a child time to relax and play. Kravolec (2013) argued that the burden of homework causes significant family stress including parent-child conflict, reduced family leisure time, and overly tired children, and questions whether the benefits of homework are worth its costs. Kravolec goes on to say that homework broadens class divides, as children in families with fewer resources struggle to keep up.

Cooper *et al* (2009), using the homework process inventory (HPI) questionnaire, found that there was no relationship between the amount of homework assigned, which was based on estimates of time needed to complete the assignment, and student achievement. Cooper however found a positive correlation between homework completed and achievement but failed to explain

whether homework tasks completed was accurately or correctly done or not. This is because completing a task does not necessarily mean one gets the correct answers.

Effandi and Zanaton (2007) in a study entitled “ Promoting cooperative Learning in science and mathematics Education” pointed out that in preparing the students of today to become successful individuals of tomorrow, mathematics /science teachers need to ensure that their teaching is effective, and that efforts should be taken to direct the presentation of mathematics lessons away from the traditional methods to a more student-centered approach .

Hoover *et al*, (2014) found out that parental involvement in their children’s homework is a factor in increased academic achievement. According to Epstein, (2007), student achievement is higher when parents monitor homework, participate in school activities and support the work and values of the school. In a master’s thesis, Leo (2004) found that parents were not always seen as helpful resource to their children in homework. In most cases parents were themselves too stressed to offer any meaningful help.

Teachers must accept the difficult task of making parents aware of homework expectations (Bursuck, 2014). Brooks, (2011) concluded that homes in which parents were willing and able to provide guidance on homework-housed students who were successful in school.

Africa population and Health Research Centre (APHRC) (2010) during a study to assess the quality of teaching and, learning in primary schools found that teachers who have negative attitudes impair the ability of student to receive messages from subjects they teach. The study also showed that most teachers have a low understanding of what they teach. They exude little confidence in the methodology in mathematics. In most cases, they copied the questions without showing students how they arrived at the answer. Any student who dares to seek to know how

the teacher arrived at the answer would face the teacher's full wrath. Research by Cooper, Lindsay, Nye and Greathouse (2008) demonstrates that parental attitudes towards homework play an important role in their children's education. They assert that parental attitudes with respect to study at home have direct positive effects on their children's attitudes toward homework and the children classroom achievement.

Cooper (2007) suggested that research findings support the common "10 minute rule" which states that all daily homework assignments combined should take about as long to complete as 10 minutes multiplied by the students' grade level. According to Cooper, assigning too much homework could have an adverse effect on the student.

Duke (2007) in a review of more than 60 research studies on homework between 1987 and 2003 showed that, within limits, there is a positive correlation between the amount of homework done and student achievement. The research synthesis also showed that too much homework could be counterproductive.

The research supports the "10 minute rule", the commonly accepted practice of assigning 10 minutes of homework per day per grade level. According to Haddock, (2006), teachers need to know what their students understand and can do independently and that teachers should often advice parents not to do the children's homework assignments for them nor correct their children's homework assignments and have them copy the corrections. Haddock,(2006) citing a study done at University of Michigan concludes that the amount of homework given is increasing over time. In a sample taken of students between the ages 6 and 9, it was shown that students spend more hours doing homework than was the case in 1981.

Carole (2011) of Michigan State University points out that it isn't 'quantitative changes in behaviour' such as requiring students to spend more hours in front of books that help them learn better. Rather, its qualitative changes in the ways students view themselves in relation to the task, engage in the process of learning and then respond to learning activities and situation. Carole explains further that these attitudes and responses emerge from the way teachers think about learning and, as a result, how they organize their classrooms; and that assigning homework is unlikely to have a positive effect in any of these variables. Carole goes on to assert that education is less about how much the teachers cover than about what students can be helped to discover- and that more time won't help to bring about that shift.

Kohn (2006), citing an analysis of 1994 and 1999 trends in mathematics and science study data from 50 countries by researchers Daniel Baker and Gerald Letendre found that there was not only lack of positive relationship but the overall correlations between national averages in amount of homework assignment were all negative.

Kohn adds that there is no reason to think that most students would be at any sort of disadvantage if homework were sharply reduced or even eliminated. Kohn wonders why something whose cons (stress, frustration, family conflict, loss of time for other activities, a possible diminution of interest in learning) so clearly outweigh the pros should be allowed to go on.

Camille (2014) found that despite several studies having researched on the relationship between the amount of homework given to students and their academic achievement, there was no consensus on the results. But his own finding was that the amount of homework assigned had no

influence on a student's achievement as determined by the state standardized test, while the amount of homework the student completed had a positive correlation with achievement.

However, Keith *et al* (2008) found that students who spent more time doing homework performed better than those who spent less time. They were however not clear on whether students spent more time on homework because they were given more tasks to accomplish or whether they were weak or had limited knowledge on the concept taught.

Keith *et al* (2008) further found the relationship between time spent on homework and achievement to be statistically significant. Kitsantas *et al* (2011) surveyed 15-year-olds and found that there was a negative correlation between time spent on Mathematics homework as reported by students and achievement. Kitsantas goes on to narrate that most authors speculated that when students are given large amounts of homework, their motivation toward the topic declines.

Furthermore, research indicates that over the last 25 years, high school students have decreased the amount of homework that they complete (Brooklings Institution, 2003). It goes on to assert that there is a popular concept that students are being assigned too much homework. Trautwein *et al* (2010) found that amount of homework and the length of time it took to complete the homework had no effect on achievement. Trautwein emphasizes that homework assignments that require an extended amount of time to complete have no impact on Mathematics achievement.

In a study titled "Using Student-Managed Intervention to Increase Homework Completion and Accuracy", Olympia *et al* (2011) found that 16 sixth grade students having homework difficulties in mathematics made substantial improvement in amount of homework completed after self-management training and implementation of self-managed individual and group

contingency procedures. This study showed that students who selected their own goals did better than students who were given a specified goal. Cooper *et al*, (2009) found that the amount of homework assigned and completed and attitudes about homework helped predict grades in lower classes.

Fraser (2008) came up with the following as he and his colleagues made an attempt to develop strategies to improve student motivation to complete homework.

- i) Parental involvement can be insufficient and misdirected.
- ii) Homework material can lack relevance to content material, skill and students lives.
- iii) Students may lack organizational skills and strategies to complete homework.
- iv) Poor student attendance can influence homework completion.

Critics who condemn homework point to the fact that research on the topic has produced inconsistent findings and argue that its impact on achievement is unclear. Educators intuitively believe that there is a relationship between the completion of mathematics homework and achievement, but analysis of the research studies shows no consensus to support this belief. According to Peace (2006), students believe that there is a relationship between homework and achievement, and that they also believe that homework is not necessary unless course material is new or challenging.

According to a Duke University review of more than 175 students, there is little or no correlation between homework and standardized test scores or long term achievements in elementary school, and only a moderate correlation on middle school. Patty, B. (2006) found that high school students who receive homework on a consistent basis performed better on standardized tests and have higher grades than do the students who don't. In his work entitled "The Battle over Homework", Cooper (2007) found that homework makes a significant impact on academic

achievement. Duke (2007) found that feedback improves the effectiveness of homework especially when given in a timely manner (within 24 hours). The study further adds that effective feedback improves student learning by correcting misunderstanding, validating process and highlighting errors in thinking.

It goes on to say that embedded comments provide much better feedback than a mere grade at the top of the paper. Kohn (2006) states that there is a widely held belief that homework 'reinforces' the skills that students have learnt or rather, have been taught in class. He says it is meaningless to 'keep practicing until you understand' because practicing doesn't create understanding just as giving students a deadline doesn't teach time management skills.

Brownell (2011) challenged the drill-and-practice approach to mathematics arguing that if one is to be in a quantitative thinking one needs a fund of meanings, not a myriad of automatic responses. Brownell goes on to state that drill does not develop meanings and repetition does not lead to understandings. Cooper (2009) emphasized that homework's effects on achievement is best gauged by experimental studies comparing students who are purposely assigned homework with students purposely assigned no homework but who are similar in other ways. Cooper found that the homework can improve students' scores on the class test that come at the end of a topic. However, this study suggested little or no relationship between time on homework and achievement. He further states that too much homework might also not be good for adolescents. Cooper adds that some studies did show positive correlations between homework and achievement.

According to Kalish (2006), there is almost no evidence that homework helps elementary school students achieve academic success and little more than it helps older students. Kohn (2007)

found that at the high school level, the correlation between homework and achievement is weak and tends to disappear when more sophisticated statistical measures are applied. O'Rourke–Ferrara (2009), found out that analysis of 100 students in the lower grades showed that the effect of homework on achievement is minimal. O'Rourke–Ferrara goes on to assert that too much homework can be detrimental to family life and student's achievement.

According to Dennis (2007), pupils who do their homework perform better in tests and assessment situations. He points out that students however, feel stressed. Based on a review of prior research, Cooper (2006) concluded that more time on homework is associated with higher achievement. Past studies examined the relationship between academic achievement and homework using variables such as the amount of homework assigned, time spent on homework and the amount of homework actually completed (Cooper, Lindsay, Koller, Schmitz, & Baunet, 2002; Zimmerman & Kitsantas, 2005). They add that generally, research using these variables remained inconclusive because most studies found that homework is not related with academic achievement in elementary school. Kitsantas *et al.*, (2011) showed that further analyses revealed that homework is more beneficial to low-achieving students than to the high achieving students. They add that specifically, the results showed that as teachers assigned more homework in their classes, the achievement gap between high- and low-achieving students became less evident.

McMullen (2007) found that one extra hour of Mathematics per week improved Mathematics achievement by 0.243 standard deviation. McMullen adds that this change is large enough to move a student from 50th percentile in Mathematics to 59th percentile over the course of a school year. A prevalent type of study in the field of homework investigates how the design of homework can affect student achievement. More specifically, whether homework is checked for

computation, collected and graded. De Jong, *et al* (2011) found that simply checking homework was negatively related to student achievement.

Similarly, Walberg, *et al*, (2009) found that teachers who collected, corrected and graded homework found a stronger relationship between homework and performance. When homework was graded or commented on, it raised learning from the 50th to the 79th percentile (Walberg, *et al*, 2009). Katherine (2014) found out that it is parents and not the students who demand for too much homework for their children, thinking that this will have a greater impact on their academic performance. Teachers who just give short assignments are considered less serious.

In the work entitled “Help! Homework is wrecking my home life”, Chaika (2014) explains that as many students will tell you that the amount of homework assigned has reached an all-time high. Chaika goes on to say that never before have students had as homework, and that too much homework appears irrelevant to them. In addition, parents wonder how much homework is too much homework. Wiansenthal (2013) established that teacher behavior such as assigning, collecting and grading can also affect student outcomes when it comes to homework.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers research design, study area, population, sample size and sampling technique, instruments of data collection and how their reliability and validity were obtained, data collection procedures, ethical consideration and methods of data collection respectively.

3.2 Research Design

This study adopted a correlation research design whose purpose was to discover relationships between variables through correlation statistics. The Basic design involved collecting data on the three variables (Students' attitude towards homework, frequency at which teachers assign homework and the amount of homework administered and performance in Mathematics) and computing correlation coefficient. To measure students' attitude, those who have positive or negative attitude towards homework were correlated with their performance in mathematics after a selected topic (Trigonometry I) had been covered.

To determine the effect of frequency of homework on performance, they were given homework assignments daily, weekly, fortnightly and monthly. Their performance was also measured. It is noteworthy that the data collection was staggered to coincide with the time students in form 2 in various schools were covering Trigonometry I. All the sampled students were thus subjected to a standard test based on that topic.

To establish the effect of the amount of homework, different groups of students were each assigned different number of questions as homework at any given time.

For example, they were assigned 1 to 10, 11 to 20, 21 to 30, 31 to 40 and above 40 questions respectively. They were then subjected to a test and their performance measured.

3.3 Area of Study

The study was carried out in public day secondary schools in Hamisi Sub-county, Vihiga County, Kenya. The sub county was carved from Vihiga district in 2007. It borders Kisumu North to the South, Vihiga and Sabatia to the West; Kakamega South to the North and Nandi South to the East.

It is located between $0^{\circ} 15'N$ and $0^{\circ} 5'S$ and $34^{\circ}27' E$ and $35^{\circ}0' E$. The Sub-County covers a total area of 189.4 km^2 . According to the 2009 National population census, the Sub-County has a population of 149,425. This translates to 789 persons per square kilometer. The major economic activities are trading, subsistence farming and commercial agriculture. The poverty index for Hamisi Sub-county is 0.41 (Republic of Kenya, 2008- Second Report on Poverty in Kenya Volume II: Poverty and Social Indicators). The map of Hamisi Sub-County is herein attached as Appendix A.

3.4 Study Population

The study population comprised of 1,600 form 2 students and 30 mathematics teachers from 30 schools. This information was obtained from 2014 EMIS records in the SCDE's office, Hamisi. Form 2 class was chosen because they had more experience in secondary school life as compared to Form 1s and were not under heavy pressure of time as Forms 3s and 4s who had KCSE exams closely before them hence could freely participate in the study.

Day scholars were chosen in this study because their performance in mathematics was dismal as compared with that for boarders as shown in the background to the study. Moreover, due to the

so many challenges they face on daily basis, it was important to establish the homework practices that would be beneficial to them.

Mathematics teachers were the ones responsible for implementing the mathematics curriculum hence gave valuable information on homework and how it influences performance in Mathematics.

3.5 Sample Size and Sampling Techniques

Sampling is the process by which inference is made to the whole by examining a part (Field, 2005). Field goes on to say that the purpose of sampling is to provide various types of statistical information of qualitative or quantitative nature about the whole by examining a few selected units.

Cluster sampling procedure was used to select 12 public day secondary schools, constituting 40% of all the day secondary schools in the sub County. Three schools which did not form part of the study sample were used to pilot the instruments of data collection. Systematic sampling was used to select Form 2 students in every school at regular intervals through their attendance registers. Out of the target population of 1,600 day secondary school students in Form two, 310 constituting 19% of the population were accessible. This excluded the number that participated in the pilot study. The sample size was as derived from table for determining sample size from a given population by Krejcie and Morgan (1970). The table for determining sample size from a given population is herein attached as Appendix K.

Saturated sampling method was used to select 27 teachers of mathematics with a teaching experience of 5 years and above, constituting 90% of the total population of teachers of Mathematics.

These teachers were selected because they were not novice hence had the requisite mastery of content and were adequately competent to handle the questionnaire. The other 3 teachers were used to pilot the research tool. Names of teachers and a list of schools were obtained from the SCDE’s office, Hamisi.

Table 3.1: *Population and Sample Size*

Respondents	Population (n)	Sample (n)	Sampling Technique	Percentage
Form 2 Students	1,600	310	Systematic	19
Mathematics Teachers	30	27	Saturated	90

3.6 Instruments of Data Collection

The major methods the researcher used to collect data to accomplish the objectives of the study were closed and open -ended questionnaire.

3.6.1 Questionnaire

The study used two questionnaires to collect data, namely; the students’ questionnaire and the teachers’ questionnaire. Both closed and open ended questions were used. Closed-ended questions enabled the researcher to obtain standardized responses useful in obtaining information on current practice while open-ended questions enabled the researcher to gather in–depth information on questions that need clarification.

3.6.1.1 Students' questionnaire

This questionnaire was used to collect data on personal information, students' ability based on previous achievements in mathematics, their attitude of homework, home and school environment and their conduciveness to studies, teacher competence, and frequency at which homework was given and marked. The questionnaire had three sections: Section

A measured attitude of students. Section B measured frequency of homework and Section C measured amount of homework. Measurement of attitude was based on Likert scale with five options. The questionnaire for students is attached as Appendix B.

3.6.1.2 Questionnaire for Teachers

The questionnaire for teachers was used to collect data on personal information, teaching experience, academic qualification, in-sets attended, teacher attitude towards the teaching of mathematics, availability of instructional materials, mathematics curriculum design, amount of homework assigned weekly and the frequency at which they administer homework assignments plus the major challenges facing the teaching of mathematics in their schools. The questionnaire for teachers is attached as Appendix C.

3.6.1.3 Interview Schedule for Students

The interview schedule was used to get information on the students' attitude towards homework. The interview schedule for students is herein attached as appendix D.

3.6.2 Document Analysis Guide

Document analysis guide was employed to establish the amount of homework, frequency at which homework tasks were being given, whether students were completing the assignments or

not, and whether the assignments were being marked and correction done. In addition, analysis of the students' exercise books would reveal how they were performing in the assigned tasks. Documents analyzed were results of mathematics test given, exercise books of learners showing dates when homework assignments were given and amount of homework given. The Document Analysis Guide is attached as Appendix E.

3.6.3 Mathematics Test

This was mathematics test administered to students upon completion of Trigonometry I which is a topic in Form 2. The Mathematics test administered to learners herein attached as Appendix E was set by the researcher himself and was composed of questions from Trigonometry F.

3.6.4 Marking Scheme for the Mathematics Test

The marking scheme was used to mark the students' written test which was administered after they had completed Trigonometry I. The marking scheme is herein attached as Appendix G.

3.7 Reliability and Validity of the Instruments

3.7.1 Reliability of the Instruments

Kasomo (2006) defines reliability as the dependability of an instrument or procedure to give consistent results over time.

The researcher pre – tested the questionnaire using three schools within the Sub-County. The reliability of the students' and teachers' questionnaire was done using test-retest. Reliability coefficient was obtained by repetition of the same measure on a second time as postulated by Graziano and Raulin, (2010).

This yielded r value of 0.776 which is an indicator of a high level of internal consistency (Sim and Wright, 2005; Madan and Kensinger, 2017). George and Mallery (2003) argued that the

closer the coefficient is to 1.0, the greater is the internal consistency of the items (variables) in the scale and therefore from the findings above, it indicates a good reliability.

Reliability of the mathematics test was done using split-half method. This measured the degree of internal consistency by checking one half of the results of the test against the other half (Ganesh, 2009). A test was administered to the sampled students. It was then split into half as per odd numbered items and even numbered items in the test and scores on one half of the test correlated with scores on the other half of the test according to Murphy and Davidshofer (2005). The reliability score for the two tests was found to have split half correlation coefficient of 0.803.

This was adjusted using the Spear-Brown Prophecy Formula to compensate for the reduction of the test by half (in the split half method).

The Spear-Brown Prophecy Formula is given by $\frac{2r}{1+r}$ where r is the Pearson correlation between the two halves. The correlation was thus adjusted to 0.891.

3.7.2 Validity of the Instruments

Validity of a tool is the degree to which the tool measures what it is intended to measure (Jeff, 2014). Much care was taken to ensure validity of the instruments through three ways. First, the items for the instruments were developed around the objectives of the study. Major concepts and routines in homework were listed, a number of items drafted, studied and revised as necessary while following the guidelines suggested in literature.

Secondly, content validity was established by consulting expert judges from this field who scrutinized the instruments through item analysis. Items were added, modified for clarity or

dropped as necessary to improve on their validity at every stage. Finally, the pilot study was used to observe the construct validity of the instruments especially through item analysis.

3.8 Data Collection Procedures

Before undertaking the actual study in the respective secondary schools, the researcher sought permission from the School of Graduate Studies (SGS) of Maseno University, Deputy County Commissioner (DCC) and Sub County Director of Education (SCDE), Hamisi Sub-county before proceeding to the field for data collection. Once permission was granted, the researcher visited the respective schools for introduction, to book appointment with them and to brief them about the study. The completed questionnaires were collected immediately.

3.9 Ethical Considerations

According to Mugenda and Mugenda (2003), ethical considerations are critical for any research. Leedy and Ormrod (2005), affirm that most ethical issues in research fall into four categories: protection from harm, informed consent, right to privacy and honesty with professional colleagues. In this study, ethical guidelines for conducting the research were embraced to ensure that ethical values are not violated.

Before proceeding to the field for data collection, the researcher applied for research permit from the National Council for Science, technology and Innovations (NACOSTI) through the School of Graduate Studies of Maseno University. The researcher, upon being granted research permit, reported to Sub County Director of Education, Hamisi Sub County for further permission to visit schools for data collection.

Further, the participants were assured that the study is purely for academic purposes. The research was conducted on condition of anonymity as the study did not insist on the identities of the

respondents as a pre-condition to take part in research. The questionnaires carried this disclaimer. Finally, the researcher remained objective and ensured that the findings, conclusion and recommendations were based only on the data.

The Maseno University School of Graduate Studies and National Council for Science, Technology and Innovation (NACOSTI) approval letters are herein attached as Appendices H and I respectively. The Sub-County Director of Education's authority letter is attached as Appendix J.

3.10 Methods of Data Analysis

According to Polit and Hungler (1997), data analysis means to organize, provide structure and elicit meaning. The data collected in this study was coded and tested for completeness and then analyzed through descriptive and inferential statistics using Statistical Package of Social Science (SPSS) and presented using tables. Pearson Correlations and regression analysis were used to establish the relationship between variables. These types of inferential statistics are easy to compute and interpret and they also help in making conclusions. Descriptive statistical techniques (frequencies and percentages) were employed to analyze field data from questionnaires and interview schedule and to assist in the interpretation of data.

To determine whether students attitude towards homework had any effect their performance in mathematics, students who expressed negative attitude and those that showed positive attitude towards homework in mathematics had their performance compared using Pearson's moment correlation coefficient. How different students perceived homework in mathematics was also viewed under the following variables: whether homework should be made compulsory, whether homework consumes time for studying other subjects, whether it is necessary for learning mathematics and whether time for doing homework is adequate. These parameters were analyzed

using tables and percentages. Lastly, performance of students was determined based on their rate of homework completion and how teachers' ability to mark and make constructive comments on the students' assignments had influence on their attitude towards homework. These were analyzed using tables and percentages.

Analysis of data relating to frequency of homework versus performance, comparison between frequency at which teachers' assigned homework to students and the students' preferred frequency of homework assignment was done using tables, percentages and Pearson's moment correlation.

Analysis of data involving amount of homework versus performance was done by comparing number of questions given at a time, number of questions students preferred as homework at a time and total number of homework assignments given in the topic trigonometry I was done using tables and percentages. Consequently, amount of homework versus performance in mathematics was analyzed using Pearson's moment correlation.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings, interpretation and discussion of data. It has been sub-divided into sections and sub-sections. The researcher presented the research findings on the basis of the study objectives and research questions. The quantitative data was analyzed using both descriptive and inferential statistics. The descriptive statistics was used to describe and summarize the data in form of tables and frequencies. The inferential statistics was used to help make inferences and draw conclusions. Statistical tests including Pearson Correlation analysis were used to test the research questions.

Correlation analysis was used to establish the relationship between: Students' attitude towards homework and performance in Mathematics; the frequency of homework in Mathematics and performance and amount of homework and performance in Mathematics. All tests of significance was computed at $\alpha = 0.05$. For the qualitative data, a thematic analysis approach was used. The Statistical Package for Social Sciences (SPSS) version 22 was used to analyze the data.

4.2 Attitude of students towards homework and performance in mathematics

4.2.1 Attitude of students towards homework

Attitude in this context refers to feelings and perception held by learners towards homework. It is determined by learners' entry behavior, the teaching methodology, teachers' own attitude and learner's previous and present performance in mathematics. All these serve as motivational and demotivational factors on the side of the learner. When students were interviewed on their attitude towards homework in mathematics, they scored as follows:

Table 4.1: *Attitude of students' towards homework*

Do you like homework?	YES	NO
Number	99	211
Percentage	32	68

On the question whether they liked homework, only 32% of the correspondents answered to the affirmative. 68% of them did not like homework. This implies that most students had a negative attitude towards homework. When asked the reason for their negative attitude towards homework, the students' cited failure to comprehend the concepts as taught in class, lack of text books and unconducive home environment.

4.2.2 Perception of students about homework

Perception in this respect refers to students' individual feelings about the benefits of homework in their academic improvement and ultimate performance in exams.

Table 4.2: *Perception of students towards homework in Mathematics*

Statement	Frequency	Mean
Homework in Mathematics should be made compulsory for all students		
Strongly Agree	31	2.733
Agree	43	
Undecided	15	
Disagree	81	
Strongly Disagree	140	
Homework in mathematics consumes time to study other subjects		
Strongly Agree	87	2.561
Agree	81	
Undecided	59	
Disagree	49	
Strongly Disagree	34	
Homework is necessary for learning Mathematics		
Strongly Agree	50	2.894
Agree	81	
Undecided	37	
Disagree	74	
Strongly Disagree	68	
Time is often adequate for assignments		
Strongly Agree	22	2.616
Agree	74	
Undecided	37	
Disagree	118	
Strongly Disagree	59	
OVERALL MEAN		2.701

The findings indicate that students' opinion on the statement of whether homework in Mathematics should be made compulsory for all students; 10% strongly agreed, 14% agreed, 5% were undecided, and 26% disagreed while 45% strongly disagreed. Overall, 71% of the respondents had a negative attitude towards homework.

On whether homework in mathematics consumes their time to study other subjects, the level of agreement was at 51%. The implication here is that most respondents felt homework in mathematics was more of an impediment to their academic progress. This group therefore exuded very little confidence in homework and its benefit. This finding is in agreement to that of Trautwein and Schnyder (2006), who established that students' homework effort is influenced by expectancy and value beliefs, homework characteristics, parental behavior, and conscientiousness. Similarly, homework was viewed as an intrusion on student's extracurricular activities (Cooper, 2011). In addition, the launch of Sputnik by Russians in 1957 sparked the movement for increased academic vigor and encouraged homework as a means to accelerate learning.

On the statement on whether homework is necessary for learning Mathematics, 57.8% of the respondents were in agreement, while 42.2% disagreed. This supports the findings of Cooper, Lindsay, Nye and Greathouse, (2009) who discovered that by mid 1960s, homework was seen as too much pressure for students. Furthermore, the findings seem to be supported by other researchers. For example, in recent years, homework has been once again viewed by many as an inconvenience and intrusion into family life and as an impediment to a full and active social life for children (Cooper, 2011).

On the statement of whether time is often adequate for assignments, 52.32% of the respondents expressed their approval. 47.68% of the respondents differed expressing that time available for doing homework assignments was never adequate. This was somehow in agreement with the findings of Leo (2005) that students felt home environment was not conducive for homework.

4.2.4 Performance by students with negative attitude towards homework

The students with negative attitude towards homework performed as shown in table 4.3 below:

Table 4.3: *Performance by students with negative attitude towards homework*

No. of students examined	% Score in Mathematics	Grade
17	0-19	E
41	20-24	D-
48	25-29	D
47	30-34	D+
26	35-39	C-
13	40-44	C
11	45-49	C+
6	50-54	B-
1	55-59	B
0	60-64	B+
0	65-69	A-
0	70-100	A

From Table 4.3, when the 211 students who showed negative attitude towards homework in mathematics were tested and their percentage scores analyzed, it was found that they obtained mean score of 2.993 (Grade D). 17 of them i.e. 8% scored grade E in mathematics. Overall, 104

out of 211 who expressed a negative attitude towards homework in mathematics translating to 49% attained wastage grades of D+ and below.

4.2.4 Performance by students with positive attitude towards homework

The students with positive attitude towards homework performed as shown in table 4.4 below:

Table 4.4: *Performance in mathematics by students with positive attitude towards homework.*

No. of students examined	% Score in mathematics	Grade
0	0-19	E
2	20-24	D-
4	25-29	D
10	30-34	D+
18	35-39	C-
25	40-44	C
14	45-49	C+
9	50-54	B-
6	55-59	B
6	60-64	B+
3	65-69	A-
2	70-100	A

From the findings in Table 4.4, it was found that students with positive attitude (those who felt homework in mathematics should be made compulsory, believed that homework in mathematics does not deny them time to study other subjects, felt that homework in mathematics is necessary for learning and liked homework) obtained a mean score of 6.434 in mathematics as compared to those with negative attitude who scored 2.993.

For example, 1.7% of them scored grade A plain in mathematics, however none of the students with negative attitude scored grade A in mathematics. Instead, 8% of the students with negative attitude scored grade E in mathematics and none of the students with positive attitude scored E.

This finding is similar to the findings by Regueiro (2016) who examined changes in students' homework engagement and motivation as they advance to higher grade levels in Spanish compulsory education and found that there were statistically significant differences in students' homework engagement and motivation as they advance to higher grade levels.

The findings are in agreement with that of Seward, (2007) who investigated the effects of students using self-assessment on their homework and found that students began to understand the relationship between homework and performing well on tests by the end of the action research period. Seward further stated that, early in the period, most students encountered difficulty understanding that they controlled their learning and did not think homework was important. By the end of the year, all students said homework was important and that it helped them on quizzes and tests.

Peace (2006) stated that students believe that there is a relationship between homework and achievement, and that they also believe that homework is not necessary unless course material is new or challenging. However, this finding is in contrast to that of Algilari, (2009) who conducted a descriptive study that aimed to identify students' and parents' attitude about homework and whether their perceptions differed and found that students and parents do not find homework very beneficial and do not think that the efforts that students put on homework pay off.

In addition, the participants believed that teachers cannot meet the expectations related to monitoring homework assignments and provision of correctives and feedback. Similarly, the findings were in contrast to the words echoed by Cooper, Lindsay & Greathouse (1998) who also noted that increased out-of-school assignments may lead to unfavorable attitudes towards homework among elementary school students. Furthermore, one of the teachers stated that; *“Students who perform poorly in Mathematics are those with negative attitude generally and particularly towards extra work, homework included”*. This was supported by another teacher who said that, *“Attitude is very core when it comes to academic achievement in mathematics.”*

This finding goes along with the words of Kohn (2006) who asserts that the effect that shows up is that students who get more homework assignments tend to have more negative attitudes towards Mathematics hence perform more poorly. In addition, 12% of the students with positive attitude managed to score grade B as compared to 0% of the students with negative attitude. In general, 83.5% of the students with positive attitude towards homework in mathematics managed to score grade C and above as compared to 15% of the students with negative attitude.

Unfortunately, 13% of the students with negative attitude towards homework were recorded to have scored grade C- as compared to their positive attitude counterparts with only 18% scoring grade C-. These findings are in agreement with the words echoed by Thelen (2008) who determined the relationship between mathematics homework and learning in middle-school students and the impact on achievement and indicated that between 82% and 95% of the teachers believed that mathematics homework positively impacts on achievement.

Furthermore, the findings are similar to those of Letterman, (2013) who carried out a study whose purpose was to understand students' perception of homework assignments and identify

factors that influenced their ideas. In addition, the findings are in agreement with those of Kelly & Deane (2005) who identified the degree that case managers use homework within their clinical practice and explore the way it is administered with people diagnosed with persistent and recurring psychiatric illness and established that 93% of case managers implement homework, but only 15% regularly use a systematic approach to homework administration. 76% of case managers reported people in recovery had a positive attitude towards the use of homework, yet 72% felt that homework completed was of a low quality.

A student had this to say on whether they like homework in mathematics: *“I don’t like homework in mathematics because teachers give assignments on areas we do not understand well in class. Moreover, sometimes I don’t have textbooks to enable me do homework activities because we share textbooks”*

All the students agreed that *“their mathematics teachers give them homework tasks at varying frequencies and amounts”*.

4.2.3 Teachers’ input on the attitude of learners towards homework

Table 4.5: *Whether students complete homework tasks*

S/N	RESPONSE	FREQUENCY	PERCENTAGE
1	All complete	7	26
2	Most complete	14	52
3	Few complete	5	18
4	Very few complete	1	4
	Total	27	100

Majority of students representing 52% were reported to be completing homework assignments. This implies that 48% of the students were not completing these tasks. This is in agreement with what the students themselves reported that *“they sometimes don’t complete homework assignments and go ahead to copy from others because of inability to understand the concepts as taught.”*

The fact that 18% of the teachers reported that only a few of their students finish homework implies that a number of students don’t understand what their teachers teach them in class. Teachers must therefore transform their teaching methods so that they appeal to learners.

Table 4.6: *General attitude of students towards homework in mathematics*

S/N	RESPONSE	FREQUENCY	PERCENTAGE
1	Very positive	5	19
2	Positive	12	44
3	Negative	7	26
4	Very negative	3	11
Total		27	100

Most teachers representing 63% indicated that their students exhibited positive attitude towards homework while 37% showed that they were dealing with learners who had negative attitude towards homework in mathematics. This is shown by their inability to complete homework tasks and by the quality of work presented.

This could be explained by the fact students could be finding homework tasks so either boring, burdensome or difficult.

Table 4.7: *The frequency of marking homework assignments*

S/N	RESPONSE	FREQUENCY	PERCENTAGE
1	Daily	4	15
2	Once a week	12	44
3	Twice a week	8	30
4	Fortnightly	3	11
Total		27	100

Majority of teachers representing 44% mark homework tasks once a week while 30% mark twice a week and 11% fortnightly. This implies that students don't get feedback on homework regularly hence most don't have the impetus to complete these tasks promptly.

If teachers were to present learner –centred lessons, give homework tasks at reasonable frequencies and amounts, mark the assignments regularly and give feedback to students, then the attitude of students towards homework would be more positive and performance in mathematics would improve.

4.2.5 Relationship between students' attitude towards homework and performance

The results of the correlation are presented in table 4.6 below.

Table 4.8: *Correlation between students' attitude of homework and their performance in mathematics*

		Attitude of students towards homework.	Achievement
Attitude of students towards homework.	Pearson Correlation	1	.964**
	Sig. (2-tailed)		.003
	N	310	310
Performance	Pearson Correlation	.964**	1
	Sig. (2-tailed)	.003	
	N	310	310

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

The Pearson Product-Moment correlation coefficient ($r = .964$) was computed and indicated that there was high positive correlation between attitude of students towards homework and their performance in mathematics.

The analysis revealed highly significant ($p < 0.05$) positive relationship between attitude of students towards homework and their academic achievement in mathematics. This implies that attitude towards homework is a major factor determining academic performance in mathematics. Those with positive attitude towards homework obtained superior grades than those that exhibited negative attitude towards homework.

4.3 Relationship between frequency of homework and performance in mathematics

4.3.1 Frequency of homework

Frequency of homework refers to regularity at which teachers assign homework to their students. For example, a teacher may decide to give the students twenty tasks at ago or spread the same amount of work over a longer period of time. This section gives findings on the effect of the two treatments on the learners' performance in mathematics.

Table 4.9: *Frequency of homework*

	Response	Frequency	Percentage
How frequent does your mathematics teacher give you homework assignments?	Daily	214	69
	Weekly	74	24
	Fortnightly	16	5
	Monthly	6	2
How frequent do you prefer to be given homework by your teacher?	Daily	77	25
	Weekly	170	55
	Fortnightly	47	15
	Monthly	16	5

69% of the respondents indicated that teachers gave them homework daily, 24% were given homework weekly while only 5% confirmed being given homework fortnightly and 2% were given homework tasks monthly. It is therefore a general practice that most teachers assign homework daily and weekly.

When asked about their preference for homework, 25% of students preferred to be assigned these tasks daily, a whopping 55% preferred weekly homework assignments while 15% were happy with fortnightly assignments and only 5% wanted to be given homework assignments monthly.

This indicates that at least all students acknowledged the benefit of homework in their study success but majority of the respondents preferred these to be given weekly.

4.3.2 Performance in mathematics at various frequencies of homework

Students were given homework daily, weekly, fortnightly and monthly after which they were tested and performed as shown in table 4.8 below:

Table 4.10: *Performance in mathematics at various frequencies of homework*

PERFORMANCE (%)									
Frequency of Homework	No.	0-19	20-29	30-39	40-49	50-59	60-69	70-100	Mean%
Daily	214	9	21	65	57	38	13	7	41.9
Weekly	74	1	1	8	20	27	12	5	46.92
Fortnightly	16	2	1	4	5	4	0	0	37.27
Monthly	6	1	1	2	1	1	0	0	33.67
Total	310	15	30	92	98	81	29	15	39.94

The 214 students who were being assigned homework on daily basis scored 41.9% on average as compared to the 74 students who were being assigned homework on weekly basis and who obtained a superior mean score of 46.92%. Students who were assigned homework fortnightly and monthly obtained 37.27% and 33.67% respectively. Probably, daily homework tasks fatigued the students while weekly assignments came with relief to them. The research established that once students get the correct concepts as taught in class, they will still perform favorably irrespective of the number of times they are assigned homework.

From the findings in Table 4.7, it can be deduced that weekly homework assignments give better yields in terms of performance than the daily, fortnightly and monthly assignments. This finding is in contrast to that of Comber (2013) who asserts that within limits, the more hours allowed for instruction in a subject, the higher the student achievement and that at the end of secondary school cycle, it was noted that the more teachers gave homework and corrected them, the higher the student achievement levels.

The findings agree with those of Trautwein (2012) who found that the frequency of homework assignments had a positive effect on mathematics achievement gains. The more homework students complete, the better they do in school, according to research conducted by psychologists Harris Cooper, James J. Lindsay and Scott Greathouse of the University of Missouri, Colombia.

Regardless of students' ability or prior coursework, the amount of time they devote to homework increases their achievements (Keith & Cool, 2007). Cooper (2007) confers that longer assignments-in one instance twice as long; in the other, three times as long-are no more effective than shorter assignments, but the difference is not statistically significant. In addition, the findings are similar to those of Ferrara, (1998) who showed that homework completion frequency does predict the student grades and may have an impact on later achievement.

Furthermore, the findings are supported by the words of Blome (2006) who found that high school students who receive homework on a consistent basis performed better on standardized tests and have higher grades than do the students who don't. Cooper (2007) also established that homework makes a significant impact on academic achievement. Trautwein (2012) also found that lengthy homework assignments had negative, albeit non-significant, effect on achievement gains.

4.3.3 Relationship between frequency of homework and performance.

To address the second objective of the study, a correlation analysis was conducted.

The set scores on the frequency at which teachers assign homework to students in Mathematics were used as the independent variable while scores from performance was used as the dependent variable. The results of the correlation are presented in table 4.9.

Table 4.11: *Relationship between frequency of homework and performance*

		The frequency at which teachers assign homework to students in Mathematics.	Performance
The frequency at which teachers assign homework to students in Mathematics.	Pearson Correlation	1	.789**
	Sig. (2-tailed)		.000
	N	310	310
Performance	Pearson Correlation	.789**	1
	Sig. (2-tailed)	.000	
	N	310	310

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

The Pearson Product-Moment correlation coefficient ($r = .789$) was computed and revealed highly significant ($p < 0.05$) correlation between the frequency at which teachers assign homework to students in Mathematics and academic performance among public day secondary schools in Hamisi Sub-County.

However, it was established that students assigned homework weekly performed better than those assigned homework daily, fortnightly and monthly.

4.4 Relationship between amount of homework and performance in mathematics

4.4.1: Amount of homework.

Amount of homework refers to the quantity of assignment questions administered to learners at ago and whose solutions the teacher expects to be presented for marking.

For example, in the topic Trigonometry I, teachers opted to give varying amounts of homework to the respondents.

Table 4.12: *Amount of homework administered to students in Mathematics*

	Questions	f	%
Number of questions given as homework at a time	1 – 5	192	62
	6 – 10	78	25
	11 – 15	34	11
	Above 15	6	2
Number of questions students preferred to be given as homework at a time	1 – 5	189	61
	6 – 10	96	31
	11 – 15	19	6
	Above 15	6	2
Total number of questions given as homework in the topic Trigonometry 1	1 – 10	62	20
	11 – 20	40	13
	21 – 30	124	40
	31 – 40	72	23
	Above 40	12	4

The figures in the table above show that most teachers gave very few homework assignments at any given time. 62% of the respondents indicated that their teachers gave them between 1-5 questions, 25% were assigned 6-10 questions, and 11% were taking home 11-15 questions while only 2% were being given over 15 questions.

In the topic Trigonometry I, most students, 40%, were given between 21 and 30 questions while only 4% were given over 40 questions.

4.4.2 Amounts of homework Teachers assigned to their learners.

Teachers indicated that they gave homework tasks to their learners as shown in table 4.11 below.

Table 4.13: *Amounts of homework teachers assigned to their learners.*

Question	No. of teachers responding (f)
What is the average number of questions you gave as homework to your students in the topic Trigonometry I?	
1 to 10	5
11 to 20	4
21 to 30	11
31 to 40	6
Above 40	1

5 teachers representing 20% of the respondents gave less than 10 homework questions to their learners. 4 or 13% gave less than 20, 11 or 40% gave between 21 and 30 questions while 23% and 4% gave less than 40 and above 40 questions respectively. This is in tandem with the students responses on the total number of questions given as homework in the topic Trigonometry 1.

The number of questions teachers assigned to students at a given time depended upon such factors as:

- (a). Class size. Teachers with large classes give a few homework assignments to ease marking.
- (b). Text book ratio. Where there are few text books, the teacher would give a few questions which students can easily copy and answer later.
- (c). Teacher's workload. Teachers who have several lessons usually give a few homework tasks.

It was also found that 60% of the students preferred to be given between 1 and 5 questions as homework. Very few i.e. only 2% expressed comfort with above 15 questions as homework at a time. They gave various reasons for their feeling:

1. Apart from mathematics, they are also given homework in other subjects.
2. They need time to follow their own study time table.
3. Not all students have their own textbooks.
4. For some students, home environment is sometimes not conducive for study.
5. They feel fatigued where a lot of homework is given in an area the concept was not clearly understood in class.

4.4.2 Performance at various amounts of homework administered per topic

The table below shows the relationship between the amount of homework administered in the topic Trigonometry I and students' performance in the test set from the topic.

Table 4.14: *Performance at various amounts of homework administered in the topic Trigonometry I.*

PERFORMANCE (%)									
Amount of Homework	No.	0-19	20-29	30-39	40-49	50-59	60-69	70-100	Mean %
1-10	63	5	15	24	14	4	1	0	33.9
11-20	39	6	9	12	5	5	1	1	37.7
21-30	123	4	19	37	34	24	4	1	40.4
31-40	72	5	24	19	16	4	3	1	34.6
Above 40	13	1	3	5	2	2	0	0	32.2
TOTAL	310	21	70	97	71	39	9	3	35.56

These findings show that the amount of homework given per topic in mathematics has a direct relationship with performance. Performance increases with the amount of homework up to between 21-30 questions where it reaches peak then begins to decline. The law of diminishing returns probably takes effect as additional amount of homework starts causing fatigue to the learners leading to decline in performance. It was established that when homework is given in excess, some students lose interest and start copying from others just to satisfy the teacher. Such work therefore adds no value to them when it comes to performance.

4.4.3 Relationship between amount of homework and performance

Table 4.15: *Relationship between amount of homework and performance*

		The amount of homework administered to students in Mathematics.	Performance
The quantity of homework administered to students in Mathematics.	Pearson Correlation	1	.971**
	Sig. (2-tailed)		.004
	N	310	310
Performance	Pearson Correlation	.971**	1
	Sig. (2-tailed)	.004	
	N	310	310

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

The Pearson Product-Moment correlation coefficient ($r = .971$) was computed and indicated that there was high positive correlation between the amount of homework administered to students in Mathematics and performance among public day secondary school students in Hamisi Sub-County. However, this was only up to a given extent. Additional homework assignments was found to be detrimental to improved performance. The analysis revealed highly significant ($p < 0.05$) positive relationship between the amount of homework administered to students in Mathematics and performance.

These findings are similar to those echoed by Farrow (2006) who investigated homework and attainment in primary schools and pointed out that amount of homework impact negatively on homework completion and final achievement. In addition, this finding is similar to that of

Comber (2017) who asserts that within limits, the more hours allowed for instruction in a subject, the higher the student achievement and that at the end of secondary school cycle, it was noted that the more teachers gave homework and corrected them, the higher the student achievement levels. Furthermore, the findings are in agreement to the works of Trautwein (2010) who found that the frequency of homework assignments had a positive effect on mathematics achievement gains.

The more homework students complete, the better they do in school, according to research conducted by psychologists Harris Cooper, James J. Lindsay and Scott Greathouse of the University of Missouri, Columbia. Regardless of students' ability or prior coursework, the amount of time they devote to homework increases their achievements. (Keith & Cool, 2008). Cooper (2007) confers that longer assignments-in one instance twice as long; in the other, three times as long-are no more effective than shorter assignments, but the difference is not statistically significant.

However, the findings are in contrast to that of Trautwein (2010) who found that lengthy homework assignments had negative, albeit non-significant, effect on achievement gains. Qualitative findings confirm that there is a relationship between homework and academic achievement in Mathematics just as quantitative findings also found.

This is supported by the findings of Adam and Robert (2012) who conducted a study whose focus was on the association between time spent on homework and academic performance in science and mathematics by assessing survey and transcript data from two national representative samples of high school students collected in 1990 and 2002 and results indicated that there is

consistently positive significant relationship between homework and performance on standardized exams.

Furthermore, the findings are in agreement with Dubois, (2011), who investigated the efficiency of students completing homework verses class work and indicated that homework did have a significant effect on student achievement. Moreover, the findings are in agreement to Peace (2006), who found that students believe that there is a relationship between homework and achievement. In addition, the findings are in agreement to those of Cooper (2009) who found that the homework can improve students' scores on the class test that come at the end of a topic.

Similarly, according to Dennis (2007), pupils who do their homework perform better in tests and assessment situations. The findings were in contrast to those of Hyde, *et al*(2008) who carried out a study whose purpose was to determine whether or not giving homework affects student mathematics achievement in the fourth grade and the two-tailed p-value determined that homework does not affect student math achievement in the fourth grade.

These findings were in contrast to those of Vatterott (2009) who carried out a study whose purpose was to examine the effects of mathematics homework on performance among elementary school students demonstrating varying levels of achievement in mathematics and the post-test results indicated no statistically significant differences between the two homework types overall or within each level of achievement group.

The findings are in contrast to the words echoed by Kohn (2007) who found that at the high school level, the correlation between homework and achievement is weak and tends to disappear when more sophisticated statistical measures are applied. These findings are also in contrast to

those of those of Raquel (2012) who found that there is no positive correlation between the average amount of homework assigned in a nation and corresponding level of academic achievement. He confers that many countries with the highest scoring students such as Japan, the Czech Republic and Denmark, have teachers who give little homework.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter deals with discussions, summary of the findings, conclusions and recommendations.

5.2 Summary of the Findings

This study used a correlation research design to establish the relationship between homework and performance in mathematics among public day secondary school students in Hamisi sub-county, Kenya. Quantitative data was collected using researcher administered questionnaires while qualitative data were collected from students and teachers.

5.2.1 Relationship between attitude of students towards homework and their performance in mathematics

The first objective determined the attitude of students towards homework and how this was related to their performance in Mathematics. The Pearson correlation coefficient was used to determine the relationship between the variables. Significant positive relationship was obtained between attitude of students towards homework and their performance in Mathematics. For example, 3% of the students with positive attitude had A in mathematics, however none of the students with negative attitude scored grade A in mathematics. Instead, 30% of the students with negative attitude scored E in mathematics and none of the students with positive attitude scored E. In general, 28% of the students with positive attitude managed to score grade B and above as compared to 0% of the students with negative attitude.

In addition, the findings indicate that students' opinion on the statement of whether homework should be made compulsory for all students, the level of agreement to the statement was 48.6%.

This is an indicator that almost half of the respondents had a negative attitude towards homework.

On the statement whether homework in mathematics consumes their time to study other subjects, the level of agreement was at 54%. Most respondents felt that a lot of emphasis was being put on homework assignments thus hindering their endeavour to strictly follow their personal home time tables.

The findings indicate that 13.9% of the respondents found homework tasks to be exciting, 79.3% of the respondents considered them tiresome while 5.7% considered them boring and 1.1% of the respondents considered them time wasting.

In addition, the findings indicates that 36.7% of the students considered homework assignments easy, 60.9% considered them difficult. The findings also shows that 40% of the teachers always explained the homework assignments before giving them to students, 29.9% sometimes explain, 9.2% rarely explain while 20.7% never explain the homework tasks. On writing comments or remarks on the exercise books after marking, 28.7% always wrote comments after marking, 62.1% sometimes wrote while 9.2% never wrote a comment on the exercise books after marking.

5.2.2 Relationship between frequency of homework and performance in Mathematics.

The second objective determined the frequency at which teachers assigned homework and how this is related to their performance in Mathematics.

Pearson Product-Moment correlation coefficient indicated that there was high positive correlation between the frequency at which teachers assigned homework and the students' performance in Mathematics. The results show that most teachers (69%) preferred to administer homework tasks to their learners on daily basis. This method is however not popular with

learners most of whom preferred to be given homework assignments on weekly basis. This preference by students was also found to be the most favorable to performance as those who were assigned homework on weekly basis performed better (46.92%) than those who were being given daily (41.9%), fortnightly (37.27%) and monthly (33.67%).

5.2.3 Relationship between amount of homework and performance in Mathematics.

The third objective determined the amount of homework administered to students in Mathematics in Hamisi Sub-county. The Pearson Product-Moment correlation coefficient computed indicated that there was a high positive correlation between the amount of homework administered to students in Mathematics and performance up to some point when additional homework assignments did not add value to performance. 62% of teachers gave fewer questions (1-5) as homework at a given time. Only 2% of the teachers gave more than 15 questions for the topic Trigonometry 1.

Similarly, more students (60%) preferred fewer homework assignments (1-5 questions) at a time. At the end of this topic, 40% of teachers gave 21-30 questions as homework while only 4% gave over 40 questions.

Although there was insignificant difference in performance, the research established that those students assigned between 21 and 30 questions as homework for the entire topic performed better at an average score of 40.4%. Those given 31-40 and above 40 questions scored 34.6% and 32.2% respectively. Probably the law of diminishing returns set in thus affecting performance.

5.3. Conclusions

Homework was found to be a tool that is quite useful in learning, revision and attainment of better scores and grades in Mathematics so long as the students' attitude towards it is maintained positive and it is administered in a manner which is less strenuous to learners and teachers use it to evaluate learners as far as the recently taught concept is concerned.

There was significant positive relationship between attitude of students towards homework and academic achievement. Students would only benefit when their attitude towards homework is positive. The benefits of homework would only be realized when teachers present learner-centred lessons such that mathematical concepts are understood clearly in class. In other words, it would be futile to present shoddy lessons and then bombard learners with several homework assignments and expect them to obtain superior grades in exams. Students alluded to the fact that most teachers did not consistently mark homework assignments. The few who did never revised these tasks with the learners and did not emphasize the need for learners to make correction to their failures. Furthermore, most teachers never made constructive comments on the learners' written work hence learners were less guided on what was expected of them.

Staggering homework assignments made them less stressful to students. In addition students subjected to this kind of treatment achieved higher scores in Mathematics compared with those who were assigned several homework tasks to work on at a go. There was high positive correlation between the amount of homework administered to students in Mathematics and academic achievement up to a certain point. Students who were assigned an average of 5 homework tasks per week performed better in mathematics than those who were assigned above 15 homework tasks.

5.4 Recommendations

The following are the recommendations made:

1. On relationship between students' attitude towards homework and their performance in Mathematics, teachers should design quality homework tasks to fit the needs of each individual student. They should mark such assignments regularly, give constructive remarks and encourage learners to do correction in case they fail to get correct answers. In addition, the Ministry of Education should consider developing a policy on homework so that it is not left at the discretion of teachers who might end up loading it upon students hence making learning a stressful venture. Teachers should be inducted on homework policies and its benefits by institutions like KEMI to enhance effective homework delivery.
2. On relationship between frequency of homework and performance in Mathematics, teachers should assign homework tasks on weekly basis as this has proven to yield better performance in mathematics as compared to daily, fortnightly and monthly options.
3. On relationship between amount of homework administered to students and their performance in Mathematics, teachers should give few (between 1-5) homework tasks at any given time as this has proven to yield improved performance in mathematics.

5.5 Suggestion for Further Research

Further research should be conducted in the following areas:

1. The extent to which Homework influences students' academic achievement in other subjects apart from Mathematics.
2. Factors leading to most students developing a negative attitude towards homework.
3. Whether the effect of homework on performance is the same in high school, middle primary and lower primary.
4. How to develop teachers' formative assessment practices without discouraging students from taking more responsibility for homework.

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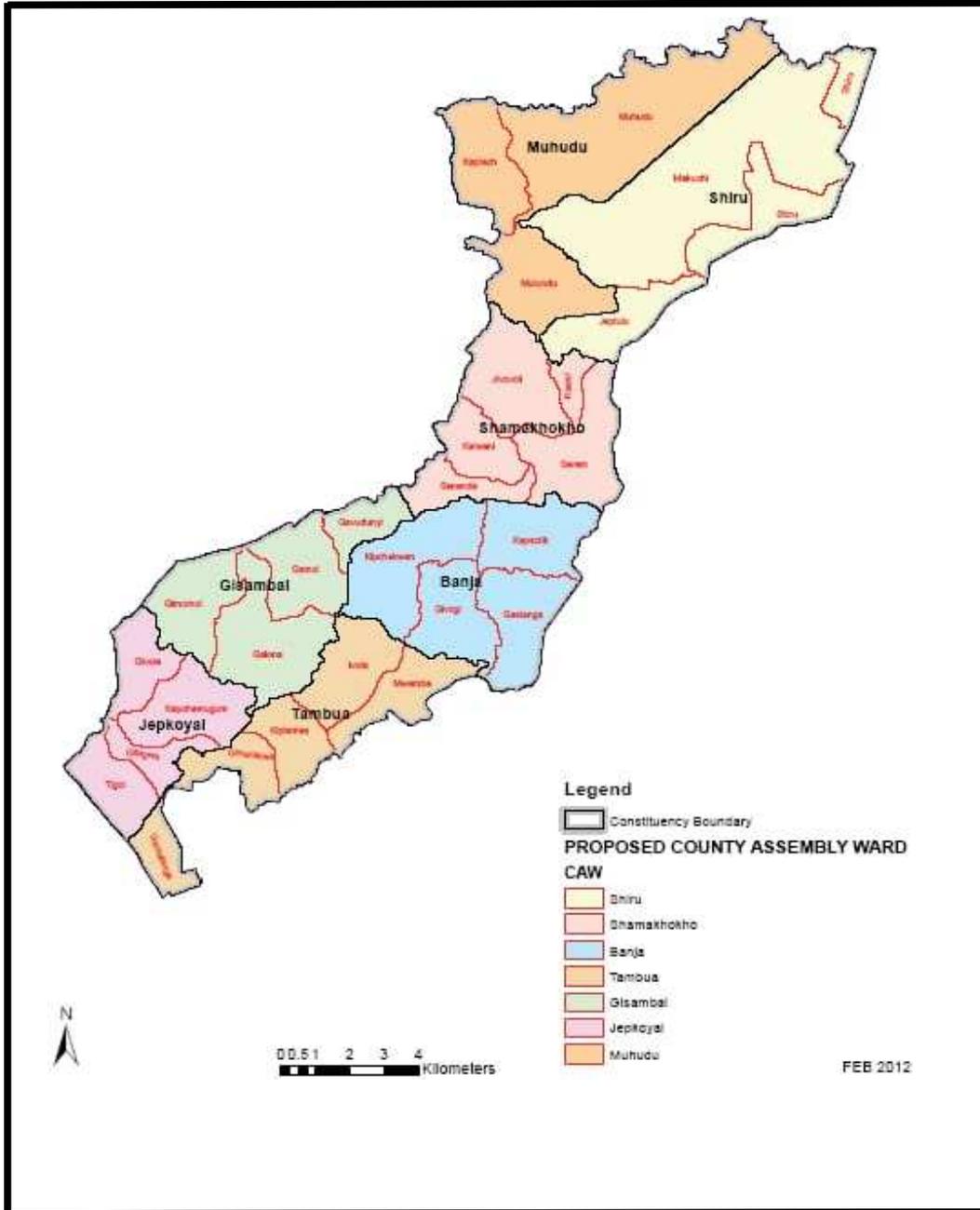
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APPENDICES
APPENDIX A: MAP OF THE STUDY AREA



APPENDIX B: QUESTIONNAIRE FOR STUDENTS

Good morning/afternoon. How are you? You are one of the respondents selected to participate in this study. The purpose of the study is to establish the relationship between homework and achievement in Mathematics. Kindly tick (√) or write the correct responses in the space(s) provided. Your honesty and giving of individualized responses will greatly contribute to this objective. Any information given will be treated with strict confidentiality and used only for the research purpose. Do not reveal your identity or that of your school.

A. Attitude of students towards homework and its relationship with performance in Mathematics.

1. Homework in mathematics should be made compulsory.

Strongly agree	[]
Agree	[]
Undecided	[]
Disagree	[]
Strongly disagree	[]
2. Homework in mathematics consumes my time for studying other subjects?

Strongly agree	[]
Agree	[]
Undecided	[]
Disagree	[]
Strongly disagreed	[]
3. Homework is necessary for learning mathematics?

Strongly agree	[]
Agree	[]
Undecided	[]
Disagreed	[]
Strongly disagreed	[]
4. I find homework in mathematics burdensome.

Strongly agreed	[]
Undecided	[]
Agree	[]
Disagreed	[]
Strongly disagreed	[]

5. Homework assignments are boring.
- | | |
|--------------------|-----|
| Strongly agree | [] |
| Agree | [] |
| Undecided | [] |
| Disagree | [] |
| Strongly disagreed | [] |
6. Homework assignments are easy to do.
- | | |
|-------------------|-----|
| Strongly agree | [] |
| Agree | [] |
| Undecided | [] |
| Disagree | [] |
| Strongly disagree | [] |
7. Homework helps me to improve in mathematics.
- | | |
|-------------------|-----|
| Strongly agree | [] |
| Agree | [] |
| Undecided | [] |
| Disagree | [] |
| Strongly disagree | [] |
8. Time for doing homework is often adequate.
- | | |
|--------------------|-----|
| Strongly agree | [] |
| Agree | [] |
| Undecided | [] |
| Disagree | [] |
| Strongly disagreed | [] |
9. (a) Do you like homework?
- | | |
|-----|-----|
| Yes | [] |
| No | [] |

(b). Give reasons for your answer to question 9(a)

above.....
.....
.....

B. Frequency at which students are assigned homework and its effect on their performance in Mathematics.

10. Does your mathematics teacher give you homework?

Yes []

No []

11. How often does your mathematics teacher give you homework assignments?

Daily []

Weekly []

Fortnightly []

Monthly []

12. How often do you prefer to be given homework by your teacher?

Daily []

Weekly []

Fortnightly []

Monthly []

C. Amount of homework administered to students versus performance in Mathematics.

13. What is the amount of homework often assigned to you by your teacher at a time?

1 to 5 questions []

6 to 10 questions []

11 to 15 questions []

Above 15 questions []

14. How many questions do you prefer to be given to you as homework assignment by your teacher at any given time?

1 to 5 []

6 to 10 []

11 to 15 []

Above 15 []

15. Approximately how many questions altogether did the teacher give you as homework in the topic Trigonometry 1?

1 to 10 []

11 to 20 []

21 to 30 []

31 to 40 []

Above 40 []

THANKS FOR YOUR CONTRIBUTION. GOD BLESS YOU.

APPENDIX C: QUESTIONNAIRE FOR TEACHERS

Good morning/afternoon. How are you? You are one of the respondents selected to participate in this study. The purpose of the study is to establish the relationship between homework and achievement in Mathematics. Kindly tick (✓) or write the correct responses in the space(s) provided. Your honesty and giving of individualized responses will greatly contribute to this objective. Any information given will be treated with strict confidentiality and used only for the research purpose. Do not reveal your identity or that of your school.

1. What is your highest academic qualification?

LEVEL	OPTION
KCE/K.C.S.E. (0 Level)	
KACE/A- level	

2. What is your highest professional qualification?

- | | | | |
|----------------------------|-----|----------------|-----|
| Untrained teacher | [] | Diploma | [] |
| Bachelor's degree | [] | Masters Degree | [] |
| Any other (Specify): | | | |

3. What is the general attitude of your students towards homework in Mathematics?

- | | | | |
|----------|-----|---------------|-----|
| Positive | [] | Very positive | [] |
| Negative | [] | Very negative | [] |

4. How often do you give homework assignments to your form 2 students?

- | | | | |
|-------------|-----|---------|-----|
| Daily | [] | Weekly | [] |
| Fortnightly | [] | Monthly | [] |

5. What is the average number of questions you often give as homework to your students?

- | | | |
|----------|-----|--|
| 1 to 10 | [] | |
| 11 to 20 | [] | |
| 21 to 30 | [] | |
| 31 to 40 | [] | |
| Above 40 | [] | |

6. Do your students always complete the homework tasks given?

- | | | | |
|-------------------|-----|----------------|-----|
| All complete | [] | Most Complete | [] |
| Very few complete | [] | None completes | [] |

7. What do you think is responsible for failure by some students to complete homework tasks?

.....
.....

8. How often do you mark homework assignments?

- | | | | |
|-------------|-----|----------------|-----|
| Daily | [] | 2 times a week | [] |
| Once a week | [] | Fortnightly | [] |

9. My students do correction regularly after every task?

- | | |
|--------------------|-----|
| Strongly agree | [] |
| Agree | [] |
| Undecided | [] |
| Disagree | [] |
| Strongly disagreed | [] |

10. Do you regularly revise homework with learners?

- | | | | |
|-----|-----|----|-----|
| Yes | [] | No | [] |
|-----|-----|----|-----|

11. Does your school have a homework policy?

- | | | | |
|-----|-----|----|-----|
| Yes | [] | No | [] |
|-----|-----|----|-----|

12. What determines the number of questions you give students as homework at a time?.....
.....

THANKS FOR YOUR CONTRIBUTION. GOD BLESS YOU.

APPENDIX D: INTERVIEW GUIDE FOR STUDENTS

Good morning/afternoon. How are you? You are one of the respondents selected to participate in this study. The purpose of the study is to establish the relationship between homework and achievement in Mathematics. I'm going to ask you a few questions. Kindly answer me without any fear. Your honesty and giving of individualized responses will greatly contribute to this objective. Any information given will be treated with strict confidentiality and used only for the research purpose.

1. Do you like homework in mathematics? Give reasons for your answer.
2. Does your mathematics teacher give you homework assignments?
3. Do you ever complete the homework assignments?
4. Have you ever copied completed homework assignments from your classmate?
5. What made you copy the completed homework assignments from your classmate?

THANKS FOR YOUR CONTRIBUTION

APPENDIX E: DOCUMENT ANALYSIS GUIDE

To obtain information on how often students are given homework; the amount of homework given to students by their teachers in mathematics; the performance by students in the mathematics test and the use teachers make of the results of homework assignments, the following documents were analyzed:

1. Student' mathematics exercise books.
2. Students' attendance registers.
3. Marks records for form 2 students
4. Analysis of KCSE examination at the Sub-county and regional level.
5. Result of the researcher's test.

The following are the guide to enable the above documents to be effectively analysed:

1. How often are students given homework?
2. What is the amount of homework given to students by their teachers in mathematics?
3. What is the performance by students in the mathematics test?
4. What use do teachers make of the results of homework assignments?

APPENDIX F: MATHEMATICS TEST

TRIGONOMETRIC RATIOS 1

FORM 2

Time: 1 Hour 30 Minutes

Instruction to candidates:

Answer all questions in this paper in the spaces provided.

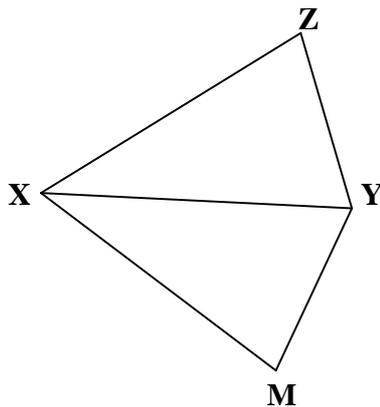
1. Evaluate using table $\frac{7 \cos 30}{\sin 60}$ (2marks)

2. Given $\cos \theta = \frac{1}{2}$ Determine $\sin \theta$ (2mks)

3. Evaluate using mathematical tables:

$\frac{9 \sin 36.5^\circ}{36.46 \cos 25}$ (3mks)

4. In the figure below $\angle XZY = 60^\circ$, $\angle XYZ = \angle XMY = 90^\circ$, $XM = 8\text{cm}$ and $MY = 6\text{cm}$. Z



Calculate the length of XY (3mks)

5. Calculate the value of X if

$$\text{SIN } (3x+10)=\text{COS } (x+20)$$

(3mks)

6. Given $\text{SIN } \Theta = \frac{5}{12}$. Determine the value of $\text{Cos } \Theta$

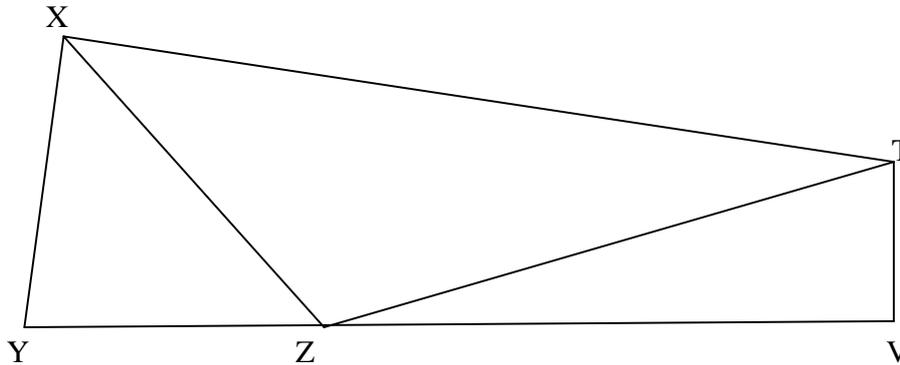
(2mks)

7. A flag post is erected vertically on a level ground making an angle of 75° away from point C, 50M away. Calculate the height of flag post. (3mks)

8. When the angle of elevation of the sun is 50° , a vertical electrical pole casts a shadow of length 10M on a horizontal ground. Determine the height of the electrical pole. (3mks)

9. The angle at the vertex of a pair of dividers is 65° . The tips of the arms are 16cm apart. Determine the angle between the horizontal and the arms. (2mks)

10. In the figure below $YV=40\text{cm}$, $TV=14\text{cm}$, $\angle ZTV=70^\circ$ and $\angle YXZ=30^\circ$.

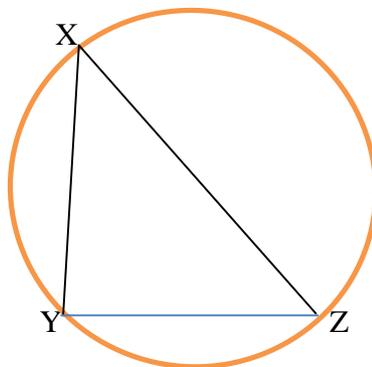


Calculate length of: ZV (3mks)

11. Points A and B are equidistant from another point C. the bearing of A from C is 330° . The bearing of B from C is 220° . Calculate the bearing of B from A. (3mks)

12. In the right angled triangle, the shorter sides are 8cm and 6cm long. Calculate the length of the hypotenuse. (3mks)

13. XYZ is a right angle triangle inscribed in a circle XYZ with XZ as the diameter. $YZ=40\text{cm}$ and $XY=60\text{cm}$. calculate the $\angle ZXY$ and $\angle XZY$ (3mks)



14. The angle of elevation of the top of a flag from point A on the horizontal ground is 30° . From another point B, 10m nearer to the base of the tree, the angle of elevation of the top of the flag is 40° . Calculate the height of the tree.
(3mks)

15. Given that $\sin \theta = \frac{4}{5}$ determine $\tan \theta$. Giving your answer to 4s.f (3mks)

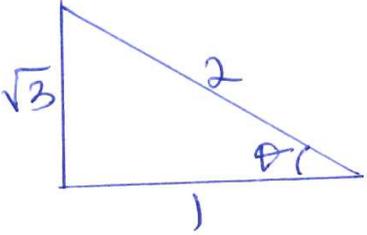
16. Given that θ is an acute angle and $\sin \theta = \frac{\sqrt{3}}{2}$. Find without using mathematical tables or a calculator $\tan (90^\circ - \theta)$. (3mks)

17. Mr. Ken walks directly from a point X on a straight line towards a big tall building 420m away. After covering 180m he discovers angle of elevation of the top of the building is 60° . Calculate the angle of elevation of the top of the building from X.
(3mks)

18. Simplify without using tables or a calculator:
 $\frac{1}{2}(\cos 30^\circ + \frac{1}{2}(\cos 60^\circ))$ (3mks)

APPENDIX G: CORRESPONDING MARKING SCHEME FOR THE MATHEMATICS TEST

Q1. $\cos 30^\circ = \sin 60^\circ$
 $\therefore \frac{7 \cos 30^\circ}{\sin 60^\circ} = \frac{7 \sin 60^\circ}{\sin 60^\circ}$
 $= 7$

Q2.  $\sin \theta = \frac{\text{opposite}}{\text{Hypotenuse}}$
 Using SOHCAHTOA
 $\sin \theta = \frac{\sqrt{3}}{2} = \frac{1.732}{2}$
 $= 0.866$

Q3	No.	Std form	Log
	9	9×10^0	0.9542
	$\sin 36.51$		$\bar{7}.7745^+$
			<u>0.7287</u>
	36.46	3.646×10^1	1.5618
	$\cos 25$		$\bar{7}.9573^+$
			<u>1.5191</u>
			0.7287
			<u>1.5191</u> -
	0.1630	1.630×10^{-1}	$\bar{7}.2096$

$$\frac{9 \sin 36.51}{36.46 \cos 25} = 0.1620$$

Q4. (a) $xy^2 = xm^2 + my^2$

$$xy^2 = 8^2 + 6^2$$

$$xy^2 = 64 + 36$$

$$xy^2 = 100$$

$$xy = \sqrt{100}$$

$$xy = 10 \text{ cm}$$

(b) $\tan \theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$

$$\tan 30 = \frac{zy}{10}$$

$$xy = 10 \tan 30$$

$$xy = 5.773$$

Q5. $\sin(3x+10) = \cos(x+20)$

If $\sin a = \cos b$

then $a + b = 90$

$$\therefore 3x + 10 + x + 20 = 90$$

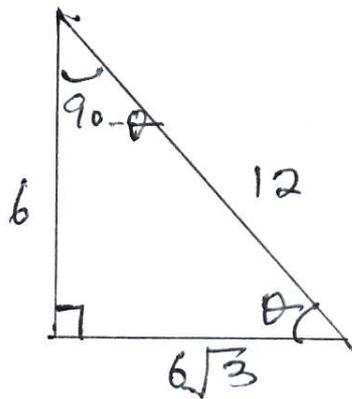
$$4x + 30 = 90$$

$$4x = 90 - 30$$

$$4x = 60$$

$$\underline{x = 15}$$

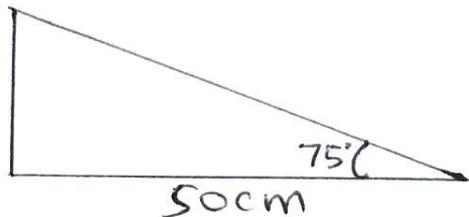
Q6



$$\begin{aligned}
 \text{(i) } \cos \theta &= \frac{\text{Adjacent}}{\text{Hypotenuse}} && \text{SOHCAHTOA} \\
 &= \frac{6\sqrt{3}}{12} \\
 &= \frac{\sqrt{3}}{2} = \frac{1.732}{2} = 0.866
 \end{aligned}$$

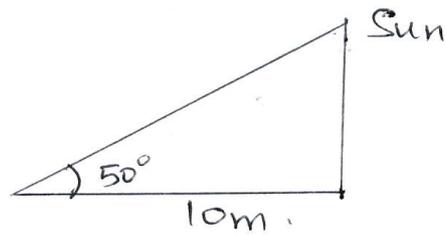
$$\begin{aligned}
 \text{(ii) } \tan (90 - \theta) &= \frac{6\sqrt{3}}{6} \\
 &= \sqrt{3} = \underline{\underline{1.732}}
 \end{aligned}$$

Q7.



$$\begin{aligned}
 \tan 75^\circ &= \frac{H}{50} \\
 H &= 50 \tan 75^\circ \\
 &= \underline{\underline{186.602}}
 \end{aligned}$$

Q8.

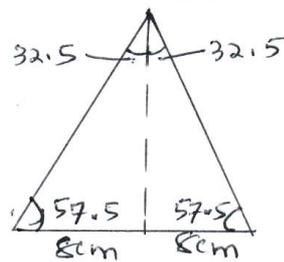


$$\tan 50^\circ = \frac{H}{10}$$

$$H = 10 \tan 50$$

$$= 11.917$$

Q9.



(a). $130 - 65 = 115$ (Sum of angles in a triangle).

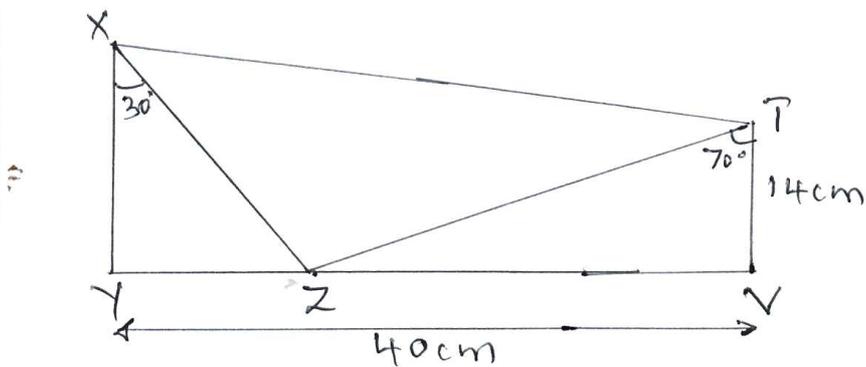
$$\frac{115}{2} = \underline{\underline{57.5^\circ}}$$
 (Base angle of an isosceles triangle)

(b). $\tan 57.5^\circ = \frac{\text{Hypotenuse}}{8}$

$$H = 8 \tan 57.5^\circ$$

$$= 12.557 \text{ cm.}$$

Q10.



$$(a) \tan 70^\circ = \frac{ZY}{14}$$

$$\begin{aligned} ZY &= 14 \tan 70 \\ &= 38.464 \end{aligned}$$

(b)

$$\frac{15 \text{ cm}}{\sin 30^\circ} = \frac{XZ}{\sin 20^\circ}$$

$$XZ \sin 30^\circ = 15 \sin 20^\circ$$

$$XZ = \frac{15 \sin 20^\circ}{\sin 30^\circ}$$

$$= \frac{1.2772}{0.5}$$

$$= 2.954 \text{ cm}$$

(c) ZT

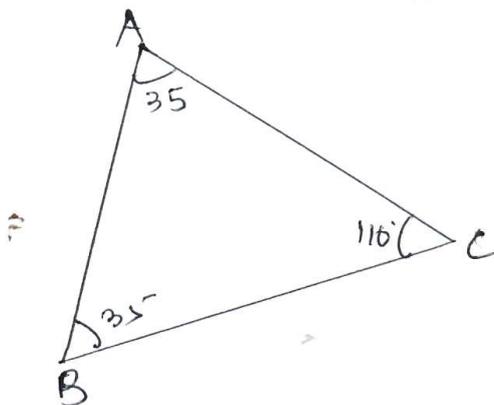
$$H^2 = h^2 + b^2$$

$$ZT = 14^2 + 32.5$$

$$= \sqrt{678.25}$$

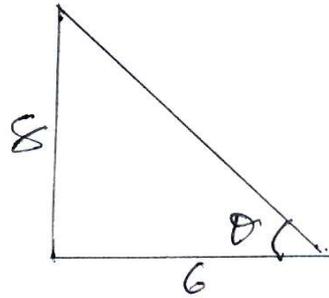
$$= 40.96 \text{ cm.}$$

Q11.



$$\begin{aligned} \text{Bearing B from A} &= 90^\circ + 60^\circ + 35^\circ \\ &= \underline{\underline{185^\circ}} \end{aligned}$$

Q12.



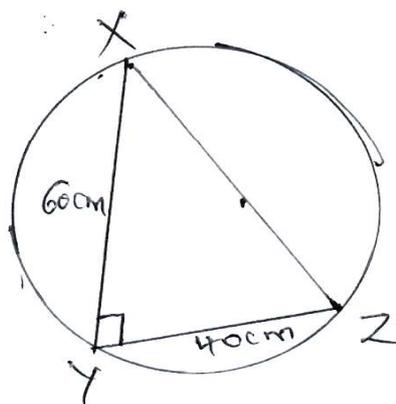
$$\begin{aligned} \text{(a) Hypotenuse}^2 &= 8^2 + 6^2 \\ \text{Hyp.}^2 &= 64 + 36 \\ \text{Hyp.}^2 &= 100 \\ \text{Hypotenuse} &= \sqrt{100} \\ &= \underline{\underline{10 \text{ cm.}}} \end{aligned}$$

$$\text{(b) } \tan \theta = \frac{3}{6} \quad (\text{SOHCAHTOA})$$

$$\tan \theta = 1.333$$

$$\theta = 53.100^\circ$$

Q13



$$\tan ZXY = \frac{40}{60}$$

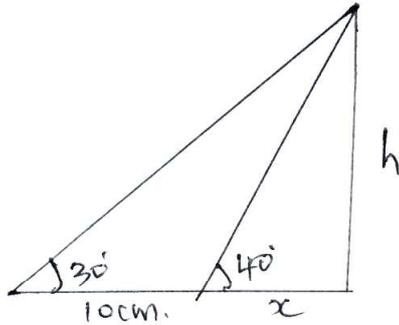
$$\tan ZXY = 0.666$$

$$\angle ZXY = 33.6890308^\circ$$

$$\angle ZXY = 33.69 \text{ (2 d.p.)}$$

$$\begin{aligned}\angle XYZ &= 180 - (90 + 33.69^\circ) \\ &\text{(Sum of angles in a triangle)} \\ &= 56.31^\circ\end{aligned}$$

Q14.



$$\tan 30 = \frac{h}{x+10}$$

$$h = (x+10) \tan 30$$

$$\tan 40 = \frac{h}{x}$$

$$h = x \tan 40$$

Since $h = h$

$$\frac{x \tan 40}{\tan 30} = \frac{(x+10) \cancel{\tan 30}}{\cancel{\tan 30}}$$

$$\frac{x \tan 40}{\cancel{\tan 30}} \times \cancel{\tan 30} = (x+10) \times \cancel{\tan 30}$$

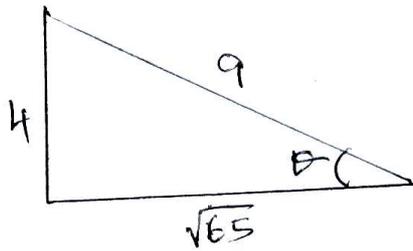
$$x \tan 40 = (x+10) \tan 30$$

$$x = 22.056 \text{ m}$$

$$h = 22.056 \tan 40^\circ$$

$$\text{height, } h = \underline{\underline{18.51 \text{ m.}}}$$

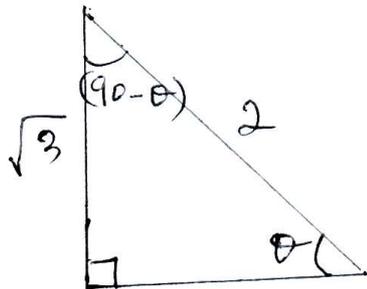
15



SOHCAHTOA

$$\tan \theta = \frac{4}{\sqrt{65}} = \frac{4}{8.062} = 0.4961$$

16

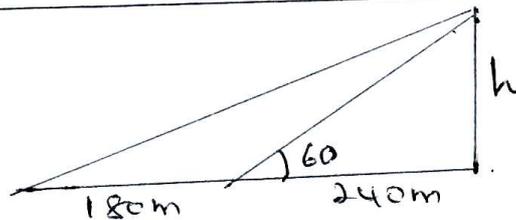


$$\tan(90 - \theta) = \frac{1}{\sqrt{3}}$$

$$= \frac{1}{1.732}$$

$$= 0.5773$$

17



$$\tan 60^\circ = \frac{h}{240}$$

$$h = 240 \tan 60$$

$$h = 415.692$$

$$\tan \theta = \frac{415.692}{420}$$

$$\tan \theta = 0.9897 \quad \theta = 44.70^\circ$$

$$18 \quad \frac{1}{2} (\cos 30 + \frac{1}{2} (\cos 60))$$

$$\frac{1}{2} (\frac{\sqrt{3}}{2} + \frac{1}{2} (\frac{1}{2}))$$

$$\frac{1}{2} (\frac{\sqrt{3}}{2} + \frac{1}{4})$$

$$\frac{1}{2} (\frac{2\sqrt{3} + 1}{4})$$

$$= \frac{\sqrt{3}}{4} + \frac{1}{8}$$

**APPENDIX H: MASENO UNIVERSITY SCHOOL OF GRADUATE STUDIES
APPROVAL LETTER**



**MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

Office of the Dean

Our Ref: PG/MED/00016/2010

Private Bag, MASENO, KENYA
Tel:(057)351 22/351008/351011
FAX: 254-057-351153/351221
Email: ags@maseno.ac.ke

Date: 18th June, 2015

TO WHOM IT MAY CONCERN

**RE: PROPOSAL APPROVAL FOR OBUYA SAMUEL OTIENO PETER —
PG/MED/00016/2010**

The above named is registered in the Master of Education Programme in the School of Education, Maseno University. This is to confirm that his research proposal titled "*Relationship between Homework Perception, Frequency and Quality and Achievement in Mathematics among Public Day Secondary School Students in Hamisi Sub County, Kenya*" has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.

18 JUN 2015

Dr. Pauline Andang'o
ASSOCIATE DEAN, SCHOOL OF GRADUATE STUDIES

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED
FOUNTAIN OF EXCELLENCE



**APPENDIX I: NATIONAL COUNCIL FOR SCIENCE, TECHNOLOGY AND
INNOVATION'S APPROVAL**

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349, 254-020-2673550
Mobile: 0713 753 757, 0735 404 245
Fax: 254-020-2213215
When replying please quote
secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI KENYA
website: www.ncst.go.ke

Our Ref:
NCST/RCD/14/015/574

Date:
9th November, 2015

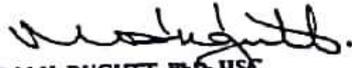
Obuya Samuel Otiemo Pater
Maseno University
Private Bag
MASENO, KENYA

RE: RESEARCH AUTHORIZATION

Following your application dated 4th August, 2015 for authority to carry out research on "Relationship between homework practices and performance in mathematics among public day secondary school students in Hamisi Sub-County, Kenya," I'm pleased to inform you that you have been authorized to undertake the research in Hamisi Sub-County for a period ending 30th June, 2016.

You are advised to report to the Deputy County Commissioner and the Sub-County Director of Education, Hamisi Sub-County before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.


DR M.K. RUGUTT, PhD, HSE
DEPUTY COUNCIL SECRETARY

Copy to:

The Deputy County Commissioner
The Sub-County Director of Education
Hamisi Sub-County

*"The National Council for Science and Technology is committed to the Promotion of Science and
Technology for National Development"*

**APPENDIX J: SUB COUNTY DIRECTOR OF EDUCATION'S AUTHORITY TO
COLLECT DATA FROM SECONDARY SCHOOLS**

REPUBLIC OF KENYA

**MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION**

WHEN REPLYING QUOTE
dechamisi@gmail.com



HAMISI SUB-COUNTY
P.O. BOX 24
HAMISI

Tel: 0725568631

REF:MOE/HAMISI/ADM/1/VOL.1/323

2nd SEPTEMBER, 2016

All Principals
HAMISI SUB-COUNTY

RE: AUTHORITY TO CARRY OUT RESEARCH

The subject above refers.

Obuya Samuel Otieno Peter of National Identification Number 10035569 and who is currently a student at Maseno University Admission Number PG/MOE/016/2010 is expected to conduct a research as part of his course requirement.

This office has therefore authorized him to collect data from secondary schools within Hamisi Sub-County.

The purpose of this letter is to request you to accord him the necessary assistance to enable him achieve his aspiration successfully.

Thank you.

A handwritten signature in black ink, appearing to read 'AGM'.

ALFRED GARI MORIASI
SUB-COUNTY DIRECTOR OF EDUCATION
HAMISI

CC.
The County Director of Education
/HIGA

**APPENDIX K: TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN
POPULATION**

<i>N</i>	<i>S</i>	<i>N</i>	<i>n</i>	<i>H</i>	<i>T</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size.
S is sample size.