THE CONTRIBUTION OF HOMEWORK AND OTHER VARIABLES TO 7th AND 8th GRADERS' MATHEMATICS ACHIEVEMENT IN AWASSA

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ASSEFA ENNO
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ABSTRACT

The major purpose of this study is to investigate the contribution of homework and other variables to students' mathematics achievement. The subjects were 240 randomly selected 7^{th} graders (n=120) and 8^{th} graders (n=120) from Awassa Tabor Elementary School in 1996 Eth.C. Each grade students were assigned into experimental and control groups, and the former were taught with assignment of homework and the latter learned without assignment of homework for eight weeks. Achievement tests and questionnaire were instruments for data collection. Initially, these instruments were administered on a pilot sample and improved through item analysis. The data analysis was carried out using ANOVA, F-test, t-test, the Tukey Method and omega squared (ω^2). Results indicated that there is significant difference in mathematics achievement between students in experimental and control groups within achievement levels of each grade. Specifically, the effect of homework accounted 19.2% , 17.2% and 22.6% of the variances in mathematics achievement of 7^{th} grade high achievers, average achievers and low achievers, respectively. With regard to grade 8 students, its effect accounted 21.1% of the variance in high achievers' mathematics achievement, 19.7% of the variance in average achievers' mathematics achievement, and there was no significant difference observed between low achievers in homework and no homework groups at alpha 0.05 level. The results also revealed that there wasn't statistically significant difference in attitudes toward homework between students in both groups within achievement levels of each grade during the course of the study.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Problem

The main objective of the nation's current educational system should be to cultivate the individual's capacity for problem solving and adaptability to the environment by developing the necessary knowledge, ability, skill and attitude. The person, then will be able to participate in an all rounded way in the community and contribute to the overall development of the society he/she lives in and the world community at large. To achieve this end, effective instructional strategies, methods and techniques are highly required.

Paik (2003) outlined practices of ten general strategies, which can be applied widely to the academic subject matter for kindergarten through twelfth grades that improve learning. According to the researcher, although other techniques work well, these practices have survived the test of time, supported by research spanning more than a century. Some of these outlined ten strategies that improve learning are parental involvement and partnerships, homework and feedback, goal setting and time on task, peer tutoring, and cooperative learning. Thus, homework that is reviewed, commented upon and discussed holds more learning value for students.

With regard to the historical emergence of homework as an important tool to improve students' learning and performance, the Ohio School Board Association (1998) presented as under.

> *From the 1900s to the 1940s, there was general agreement on the unequivocal importance of homework to the education of a student. The focus of early homework was on memorization and drills. From the 1940s to the 1950s, educators began to question the homework ritual as counterproductive to the development of problem solving abilities. The 1950s ushered in the Cold War and competition with the Soviet Union. The blow to America's pride by the Soviet Union's successful Sputnik mission resulted in a national movement to improve education. Homework emerged as important tool in the movement to improve student performance.*

Accordingly, the Educational Policies Commission (1960), as cited in Hedges (1971), listed homework as one of ten contemporary issues in education. On the other hand, Coulter (1987) stated that there are few issues in education, which are as controversial as homework. According to the researcher, its advocates claim that it encourages students' initiative, develops independent learning skills and allows time for practice and application of what has been learned in school. It critics, on the other hand, argue that it encroaches upon children's leisure time and denies them access to community activities. According to him, although there is little consensus about the value of homework there is general agreement about its nature and purpose.

In general, Cooper (1994), who provided answers to unresolved questions about the effectiveness of homework and appropriate policy options, noted that homework should be viewed as one of several methods teachers can use to show

children that learning takes place everywhere. Although, homework's value lies in students experiencing success, the Westchester Institute (Westchester Institute for Human Services Research, 2002) supported that homework can be an effective instructional strategy. According to the institute, flexible homework policies that allow schools and teachers to take into the account the unique circumstances of their students are key to making homework meaningful and beneficial for all.

Despite the broad agreement in recent literature that homework is a vital element in increasing students' academic learning time and in making students feel responsible to their own learning (Arends, 1991; Cruickshank et al., 1995), there is no guideline or policy what teachers should do in relation to homework in Ethiopia (Adane and Dawit, 2000). Investigating the effect of homework upon academic performance might help to give considerable attention on the importance of homework in education. Therefore, this study attempted to examine the contribution of homework and other variables to 7^{th} and 8^{th} graders' mathematics achievement in Awassa.

1.2 Statement of the Problem

Adane and Dawit (2000) noted that homework is one of the commonest and well-known instructional activities in our school system. However, the effect of homework upon students' academic achievement might not be evident though teachers usually assign a number of questions to students from text books as homework.

Therefore, the purpose of the study is to investigate the contribution of homework and other variables to 7^{th} and 8^{th} graders' mathematics achievement in Awassa.

Based on the above purpose, the study is intended to answer basic research questions given below.

1. Is there a significant difference in mathematics achievement between homework and no homework groups of grade 7 and grade 8 students in Awassa?
2. Does homework have the same effect upon high achievers, average achievers and low achievers in each grade level?
3. Does the effect of homework upon 7^{th} graders and 8^{th} graders vary in grade level?
4. Is there a significant difference in attitudes toward homework between students in homework and no homework groups of each grade level?

1.3 Objectives of the Study

The objectives of the study are to:-

- investigate the contribution of homework to 7^{th} and 8^{th} grade students' mathematics achievement in Awassa.
- examine whether the effect of homework upon students' mathematics achievement varies in students' achievement levels.
- see whether the contribution of homework to 7^{th} and 8^{th} graders' mathematics achievement differs in grade levels.

- identify the difference in attitudes toward homework between students in homework and no homework groups of each grade level.

1.4 Significance of the Study

Kindred (1968) stated that homework; special projects and library assignments often are considered within the realm of classroom management and left to the discretion of the teacher. According to the writer, on the other hand, many schools find it desirable to develop specific policies in these areas.

The investigation of the effect of homework upon students' academic achievement is important in understanding its value in education as well as for the development of guideline or policy regarding the assignment of homework in instructional process. Moreover, according to Arends (1991), assigning homework is an important element in proper use of instructional time.

Therefore, the findings of the study are expected to:-

- provide information about the value of homework to students to view it as instructional strategy that improves their learning and academic achievement.
- provide information about the value of homework to teachers for proper use of instructional time as well as to parents for providing children with convenient, quiet and comfortable work areas.
- provide information about the value of homework to concerned authorized persons for the development of homework guideline or policy.

1.5 Scope of the Study

The study was confined to Tabor Primary School which is found in Awassa, City of Southern Nations, Nationalities and Peoples' Regional State. The school has both first cycle (grades 1-4) and second cycle (grades 5-8) grade levels. The subjects of the study were chosen from sections of grade 7 and grade 8 students. The selected students from each grade were categorized into two sections, each containing 20 high achievers, 20 average achievers and 20 low achievers. The students found in one of the sections of each grade were considered as experimental group (homework group) and the other as control group (no homework group). In general, the subjects of the study were 240 students who were admitted into Tabor Primary School in 1996 Eth.C.

1.6 Operational Definitions of Important Terms

Homework:- means tasks assigned to students by school teacher which are given to be performed during non school hours.

Pre-tests:- are mathematics tests prepared for 7^{th} and 8^{th} graders from the contents covered during first semester classes in order to determine the subjects of the study with students' first semester mathematics results.

Post-tests:- are mathematics tests administered to students in both experimental and control groups of each grade level (grades 7 and 8) after they have been taught with regular assignment of homework for the

former group and without assignment of homework for the latter group.

Mathematics Achievement:- is the achievement tests (post–tests) results obtained by students in both experimental and control groups of each grade after they have been taught with regular assignment of homework for the former group and without assignment of homework for the latter group.

High achievers:- are students in both experimental and control groups who got 75 and above in the sum of pre-test scores (50%) and first semester 50% mathematics results.

Average Achievers:- are students in both experimental and control groups who got 50-74 in the sum of pre-test scores (50%) and first semester 50% mathematics results.

Low Achievers:- are students in both experimental and control groups who got below 50 in the sum of pre-test scores (50%) and first semester 50% mathematics results.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Nature, Purposes and Effects of Homework

This sub-section literature review deals with the nature and purposes of homework, and the positive and negative effects of homework, respectively.

2.1.1 Nature and Purposes of Homework

Butler (2001) defined homework as the time students spend outside the classroom in assigned activities to practice, reinforce or apply newly-acquired skills and knowledge, and to learn necessary skills of independent study. Similarly, Coulter (1987) described homework as school work formally assigned for completion outside school time. According to the researcher, homework is seen as embracing a number of activities including revision and preparation for future classwork, extended research work, and private study. Because it also serves to help teachers cope with pupils different work rates, finishing off class- work represents one of the most important categories of homework.

Moreover, Bond and Smith (1965) feel that homework helps to :-

- develop sound independent study habits,
- allow pupils to complete or expand an unfinished assignment,
- provide opportunity to assimilate new learning,

- ❖ preview work that is going to be taken up in the near future, and
- ❖ evaluate children's work habits, independent work skills and academic learning.

On the other hand, Paulu (1995a) noted that homework can also help children develop good habits and attitudes by teaching them to work independently, encouraging them to develop self-discipline and responsibility as well as a love for learning. Homework can also bring parents and educators closer together. Parents who supervise homework and work with their children on assignments learn about their children's education and about the school.

In general, from the above, one can conclude the purposes of homework as they can help children review and practice what they have learned; get ready for the next day's class; explore subjects more fully than time permits in the classroom; increase personal responsibility and individual accountability; acquire effective habits of self-discipline and time management.

In addition, homework may be revealed as it enables the teacher in monitoring students' progress and diagnosing their learning problems, and it leads to increased communications between parents and the schools, and it encourages parents' awareness of their children's learning.

2.1.2 The Positive and Negative Effects of Homework

Patten (2003) noted that education is susceptible to fads and fashions, and public attitudes about homework are a case in point. Cooper (1994), a researcher on homework policies and practices, described the cycle of support and opposition to homework over 70 years in the united states. Cooper found both positive and negative effects of homework in his synthesis of the research on homework. According to him, the goal for schools and parents should be to emphasize the positive effects of homework and reduce its negative effects.

The positive effects of homework include better retention of factual knowledge; increased understanding; better critical thinking, concept formation and information processing; curriculum enrichment; better study habits and skills; more independent problem solving; and greater self-direction, self-discipline, and parental appreciation of and involvement in school.

The negative effects of homework, on the other hand, include satiation-requiring students to devote too much time to a subject that may cause them to lose interest in academic material and increased physical and emotional fatigue; denial of access to leisure time and community activities; cheating either through copying of assignments or receiving assistance with homework that involves more than tutoring; and parental interference that may exert an unhealthy amount of pressure on students to complete assignments and perform well, and that may sometimes employ confusing instructional techniques.

2.2 Types of Homework

An interesting typology of homework assignments was presented by Lee and Pruitt (1979) as a guideline for teachers in "prescribing and utilizing homework as a teaching tool". This homework typology allows teachers to understand the purpose of a particular assignment more clearly. According to them, there are four types of homework which are practice, preparation, extension and creative assignments.

2.2.1 Practice Assignments

According to Clark and Starr (1991), in some studies such as mathematics, homework commonly consists of practice activities. Lee and Pruitt (1979) stated that practice assignments are designed to drill or reinforce skills and information covered in class. Moreover, practice assignments were considered by Eddy (1984) as they reinforce newly acquired skills or knowledge. These assignments are most effective when carefully evaluated by the teacher, when matched to the ability and background of the individual student, and when students are asked to apply recent learning directly and personally. In general, Davies (1981) supported that this type of homework facilitates independent learning through practice and application.

2.2.2 Preparation Assignments

Preparation assignments are given to prepare students to profit from subsequent lessons. For these assignments, there should be some systematic check up, usually a quiz, as well as some classroom follow up, but not in the sense of merely

going over the same material in the same way (Lee and Pruitt, 1979). Similarly, Eddy (1984) described that preparation assignments intended to provide background information and they can include readings of texts in the class, library research, collecting materials for a class demonstration, and other activities requiring the gathering or organizing of information before a class discussion or demonstration. The researcher extended the above statement by saying that effective preparation includes guidelines on why and how the assignment should be completed. In addition, accurately estimating a task's level of difficulty and coordinating the assignment of difficult homework among various courses may help teachers avoid overburdening students.

2.2.3 Extension Assignments

According to Lee and Pruitt (1979), extension assignments are provided to ascertain if a student can extend the concept or skill learned in class to a new situation. In the same way, Eddy (1984) explained extension assignments as they require students to apply previous learning. These assignments encourage individualized learning by emphasizing students initiative. Furthermore, according to Clark and Starr (1991), extension assignments should consist of activities that students can do on their own. They should be a logical extension of the classroom work that they can do without supervision or assistance.

2.2.4 Creative Assignments

Creative assignments, as expressed by Lee and Pruitt (1979), are designed to require students to integrate many skills and concepts in producing some project. The use of creative assignments is crucial, since they normally require higher mental processes than mere rote recall and simple comprehension, such as those involved in being able to define a concept in one's own words. According to the researchers, some allowance for and encouragement of divergent responses are critical in creative assignments.

2.3 Relationship Between Homework and Achievement

The reason most often mentioned for giving homework is that it can improve students retention and understanding of the covered material. However, Cooper et al.(1998) indicated that some educators pointed out that any activity can remain rewarding for only so long. Thus, if students are required to spend too much time on academic materiel, they are bound to grow bored with it and achievement will decline.

Coulter (1987) expressed that the recent researches were focused on the kind of homework involved and have offered clearer support for the view that there is a relationship between academic achievement and certain kinds of regularly assigned homework. The researcher stated that the studies which have focused on mathematics have generally reported significant achievement differences in favour of homework groups over no-homework groups, although relationships have

generally been stronger and more consistent for high achievers. Adane and Dawit (2000), who conducted research on the contribution of homework to tenth grade students' mathematics achievement in Bahir Dar (Tana Haik Senior Secondary School) also found statistically significant difference of achievement in favour of homework group students. Besides this, the finding of the researchers indicated that high achievers and low achievers in homework group outperformed significantly their counterparts in no–homework group, and there was no significant difference observed between the average achievers in homework and no-homework groups.

On the other hand, Cooper (1994) clarified that three types of studies enable researchers to answer the question of whether homework enhances students' achievement. The first type of study involves comparing the achievement of students who receive homework with students given no homework or any other treatment to compensate for the lack of the required home study. According to Cooper, in a meta-analysis of 20 studies completed since 1962, 14 yielded results favouring homework, whereas 6 favoured no-homework.

In other studies, researchers compared homework with in–class supervised study. The performance benefits of homework were generally about half what they were when homework was compared with no treatment (Cooper, 1994). The third type of study, according to the researcher, includes the correlation of the amount of time students report spending on homework with their achievement. He presented that among 50 studies researchers correlated the time students reported spending on

homework with their achievement, 43 indices of correlation showed that students who did more homework had better achievement, whereas only 7 indices of correlation indicated the opposite.

One of the most thorough investigations into the effects of homework was the one made by Goldstein (1960), as cited in Hedges (1971), who examined all the researches on homework listed in the education index. He reported that the data in most of the studies supported the idea that regularly assigned homework contributes to higher academic achievement. Keith (1982) also found that high school students of all ability levels performed higher grades through increased homework time. Moreover, according to the researcher, lower ability students achieved grades commensurate with those of brighter peers through increased study.

In general, homework that is stimulating, related to classroom work, carefully designed, and suitable to students' abilities is likely to produce the best effects (Walberg and Paschal, 1994). The research findings published in WHAT WORKS concerning the benefits of homework, as cited in New Paltz Central School District (n.d.), also noted that homework is most useful when teachers carefully prepare the assignment, thoroughly explain it, and give prompt comments and criticism when work is completed. Homework that is reviewed, commented upon, and discussed in class, is three times more effective at improving students' academic achievement (Westchester institute for Human Services Research, 2002).

Therefore, such follow-up shows that the teacher takes homework seriously and that it serves a purpose (Cooper, 1994).

2.4 Variables Affecting the Success or Failure of Homework

It is indispensable to consider variables affecting the success or failure of homework in investigating the effects of homework upon students academic achievement. Paulu (1995a), who supported the view that there is a relationship between academic achievement and certain kinds of regularly assigned homework, contended that the academic benefits of homework increase in the upper grades. In other words, the grade levels of the students can influence the effects of homework on their academic achievement. Cooper (1994) also discovered that the relation between homework and student academic performance is influenced heavily by grade level.

Furthermore, according to Holtzman (1969), as cited in Rickards (1982), precise nature of the assignment and feedback procedures of the teacher are a few of the most important variables which affect the success or failure of homework. On the other hand, Milbourne and Haury (1999) suggested that the students' attitudes toward homework affect the success or failure of homework.

2.4.1 Effects of Grade Level

The most persuasive argument for assigning homework is the assumption that doing homework raises students' academic achievement. In a meta-analysis of 20 studies completed since 1962, Cooper (1994) discovered the presence of a strong grade–level effect when assessing homework's effect on academic achievement as defined by school grades. High school students, 14-16 years of age, who were assigned homework performed 69% better than students in class without assigned homework. For students in Junior high school, 11-13 years of age, the average homework effect was only half this size. Finally the effects of homework on elementary appeared to be small, almost trivial.

An analysis of another group of studies compared homework with in-class supervised study (Cooper, 1994). The most significant finding of these studies is the emergence of a strong grade level effect. For elementary students, in-class supervised study proved superior to homework. In Junior high school, homework was superior to in-class supervised study, whereas in high school homework's effect was the strongest.

In general, Cooper et al. (1998) suggested that the assignment of homework in early grades is not necessarily for its immediate effects on achievement but rather for its potential long-term impact. The impact of early-grade homework is mediated, through time, by its facilitation of the development of proper study skills, which in turn, influence grades.

2.4.2 Students' Attitudes Toward Homework

Considerable evidence demonstrates that attitudes play an important role in determining behavior (Kraus, 1995) and attitudes about homework should be no different (Cooper et al., 1998). Sharp (2001) presented that there is a limited body of research on pupils' attitudes toward homework. The limited research into pupils' preferences indicates that pupils dislike being set to routine homework tasks such as finishing off class work. According to the researcher, they prefer interesting, challenging, and varied tasks that are clearly defined and have adequate deadlines. Generally, pupils have positive attitudes toward homework, and feel it is important in helping them to do well at school (Cooper et al., 1998; Sharp, 2001).

On the contrary, Leone and Richards (1989) found that the mood of students while doing homework was less positive than for most other activities in which they engaged. Students who fall behind academically find their homework more difficult and, as a result, less satisfying (Walberg and Paschal, 1994). As a consequence, according to the researchers, they may put forth less effort and therefore find the work still more difficult and dissatisfying. This vicious circle leads to gradually deepening failure and eventual resignation.

2.5 Guideline for Homework Time Allotments

Cooper et al. (1998) suggested that teacher should ensure that assignments are of a proper length for the developmental level of their students. They should avoid lengthy homework assignments that lead to fatigue and extinction of interest in the covered material.

Though, homework time allotment must be a local decision, Hedges (1971) recommended the following guideline since homework can include a variety of tasks other than written work.

Grade level	Time Allotment
Kindergarten	No homework
1st grade	No homework or at most a token assignment
2nd grade	10 minutes each day
3rd grade	about 15 minutes each day
4th grade	about 20 minutes each day
5th grade	about 25 minutes each day
6th grade	about 30 minutes each day
7th grade	about 45 minutes each day
8th grade	about 1 hour each day
9th grade	about 1¼ hours each day
10th grade	about 1 ½ hours each day
11th and 12th grades	about 2 hours each day

It is obvious that the above suggested daily homework load is for all subjects given in each corresponding grade level. Therefore, teachers are expected to coordinate homework assignments so that a student's homework falls within the expected time frame.

Cooper (1994) recommended that coordinated policies should exist at the district, school and classroom levels. Accordingly, districts should offer a clear and broad rationale for assigning homework, including why it is sometimes mandatory, as well as general guidelines for the amount of how that should be assigned. It is also suggested that schools need to provide more specific time requirements and coordinate assignments between classes.

In light of the above recommendations, the following time frames were given by the New Paltz Central School District (n.d.) as a guideline for assigning homework.

Grade level	Recommended Guideline
Kindergarten	15 minutes for all subjects per day
Grade 1	30 minutes for all subjects per day
Grade 2	45 minutes for all subjects per day
Grade 3	60 minutes for all subjects per day
Grade 4	75 minutes for all subjects per day
Grade 5	90 minutes for all subjects per day
Grades 6 and 7	20-30 minutes per course each day
Grades 8 and 9	25-35 minutes per course each day
Grade 10	30-40 minutes per course each day
Grades 11 & 12	30-45 minutes per course each day

Among the above recommended guidelines, the time frames given for kindergarten through grade 5 as a guideline for assigning homework requires teachers of each grade level to coordinate homework assignment so that a student's homework falls within the expected time frame in average. In general, concerning when not to assign homework, Hedges (1971) and Butler (2001) underlined that homework should not be given over weekends and holidays. This lets undoubtedly students have time to exercise, play, socialize, and pursue their own personal interests.

2.6 The Role of Students, Teachers and Parents Concerning Homework

Homework is an opportunity for students to learn and for parents to be involved in their children's education (Paulu, 1995b). The amount, quality, and usefulness of homework is jointly determined by teachers, parents and students. If one of the three legs of the homework stool is unsupportive, little may be accomplished academically in the large amount of time students spend outside school (Walberg et al., 1985).

2.6.1 The Role of Students

According to Butler (2001), students should write down assignments and make sure all assignments are clear. They shouldn't be afraid to ask questions if necessary. Moreover, they must set aside a regular time for studying and find a quiet, well-lit place to study. Students are also required to complete their assignments successfully by themselves.

2.6.2 The Role of Teachers

Cooper et al. (1998) suggested that teachers should ensure that assignments are of a proper length for the developmental level of their students. They should also avoid lengthy homework assignments that lead to fatigue and the extinction of interest in the covered material. In addition to this, according to Butler (2001), teachers should review the assignment before giving it to students and assure that students have concepts and skills necessary to do the assignment because insufficient preparation for homework may result in higher levels of students frustration.

Moreover, teachers are required to collect homework, check it for completeness, and give intermittent instructional feedback (Cole and Chan, 1994; Cooper, 1994; Good and Brophy, 1986). This procedure shows that the teachers take homework seriously and that is purposeful (Cooper, 1994). Finally, teachers should never use homework as punishment (Butler, 2001; Cooper, 1994; Good and Brophy, 1987) and never give no-homework as a reward (Butler, 2001). Using it in this way communicates to students that school work is boring and aversive (Cooper, 1994). Good and Brophy (1987) also warned that if teachers use homework as a punitive tool, students might view homework as hard and unpleasant experience and develop unfavorable attitude toward it.

2.6.3 The Role of Parents

With regard to parents role, Patten (2003) specified that parents play an important role in helping their children reap the greatest benefits from homework. Parents can help by providing the necessary structure and supports. These include a quiet place to study away from distractions. According to the researcher, parents also provide clear guidelines about when homework is to be completed. Cooper (2001), as cited in Patten (2003), encourages parents to foster autonomy in their children by allowing them to do their homework independently as often as possible. When children struggle to complete assignments, however, Cooper encourages parents to take a more active role in helping children complete homework assignments.

Generally, the schools are also expected to work together with parents to support learning. When schools work together with parents to support learning, children tend to succeed not just in school, but throughout life (San Diego Country Office of Education, 1997). In fact, according to San Diego Country Office of Education, the most accurate predictor of a student's achievement in school is not income or social status, but the extent to which that student's parent is able to create a home environment that encourages learning and become involved in their children's education at school and in the community.

CHAPTER THREE

METHODOLOGY

This study is based on both experimental and descriptive research methods concerning the contribution of homework and other variables to 7^{th} and 8^{th} graders' mathematics achievement in Awassa.

3.1 Subjects

There are five governmental primary schools found in Awassa consisting of both first and second cycle primary level of education. Awassa Tabor Primary School, which is the oldest and containing the greatest sections of grades 7 and 8 than all these primary schools, was purposely chosen as a primary school from which the subjects had to be selected for the study. This school had 17 and 16 sections of grade 7 and grade 8 students in 1996 Eth.C. academic year, respectively.

First, using disproportionate stratified random sampling method, 129 students from sections of grade 7 (43 high achievers, 43 average achievers and 43 low achievers) and 126 students from sections of grade 8 (42 high achievers, 42 average achievers and 42 low achievers) were selected based on their mathematics results in first semester. Then, they were told to prepare themselves for taking mathematics pre-tests which were prepared from the contents covered in first semester grade 7 and grade 8 mathematics classes.

Next, the mathematics pre-tests prepared for each grade level were administered to randomly selected students five days later after they had been informed. The students' test papers were corrected and each student's mathematics pre-test score converted to 50%. The sum of each student's 50% of first semester mathematics result and the converted mathematics pre-test score was taken to categorize students again in achievement levels (i.e., students who scored 75 and above as high achievers, 50-74 as average achievers and below 50 as low achievers). Based on this, from a total of 129 grade 7 and 126 grade 8 randomly selected students, 41 and 40 students were found in the high achiever category; 44 and 43 students were found in the average category; and the other 44 and 43 students were found in the low achiever category, respectively.

Lastly, an attempt was made to divide students into two sections each containing 20 high achievers, 20 average achievers and 20 low achievers who had relatively similar mathematics results out of 100% in both grades. In making equivalency of two sections for each grade level, 1 high achiever, 4 average achievers and 4 low achievers from grade 7, and 3 average achievers and 3 low achievers from grade 8 were excluded from the study. Therefore, the total number of the subjects of the study was 240 students (120 7^{th} graders and 120 8^{th} graders).

3.2 Instruments

The instruments of data gathering for the study were achievement tests (pre-tests and post-tests) and questionnaire.

Achievement Tests

First of all table of specification was prepared for each grade level and objectives were formulated after a thorough analysis of the mathematics content covered in first semester grade 7 and grade 8 mathematics classes. Accordingly, pre-test items were constructed for each grade level to determine the subjects of the study as indicated above. The tests were administered to 75 pilot samples from each grade 7 and grade 8 students and indices of item difficulty and discrimination as well as the relative worth of each destructors were analyzed on the upper 27% and the lower 27% scores (Ebel, 1979; Mehrens and Lehmann, 1984).

The post-tests were constructed from the new contents taught to the subjects of the study for both sections (homework and no homework groups) of each grade level. Content validity an important quality that achievement tests should posses, was taken care of by making use of tables of specifications, and the tests were administered to pilot samples from each grade level and item analysis was also carried out in the same way as pre-tests.

Based on the item analysis, a total of 37 destructors which attracted more from the upper groups than from the lower groups were changed, and a total of 13 items with either zero or negative discrimination indices were discarded from both pre-tests and post-tests of both grade levels. Instead of these discarded items, other 13 items were constructed. Finally, the pre-tests and post-tests for the main study contained 30 items each, and the pre-test and the post test scores of the students

from the sections (homework and no homework groups) of both grades had reliability coefficients (estimated by KR_{-21}) ranging from 0.80 to 0.84 with a mean of 0.82.

Questionnaire

The questionnaire was developed to gather information about the students' attitudes toward homework. It was translated into Amharic in order to make students have clear understanding on the questions raised and enable them to respond to each question accordingly. Then, it was pilot tested with 30 samples of students before the actual data collection began. The rating of the pilot simples' attitudes toward homework had the reliability coefficient 0.66 (using Kuder-Richardson formula that is useful in estimating the reliability of multiple ratings). This testing led to revisions in wording and the addition of questions before the questionnaire was administered to the subjects of the study.

Finally, the questionnaire for the main study contained a total of 8 questions where 5 of them were adopted from the Homework Process Inventory (Cooper et al., 1998) and the other 3 questions added on the adopted questions were developed by the researcher.

Eight questions on attitudes toward homework asked the subjects of the study about their beliefs and affective reactions to homework. One question asked "In general, how do you feel about homework?" and had the following possible responses:- don't like it at all (scored 0); dislike it some (scored 1); neither like nor

dislike it (scored 2); like it some (scored 3); like it very much (scored 4). A second question asked "Do you think homework increases or decreases students' interest in school?" and had the following possible responses:- decreases it a lot (scored 0) ; decreases it some (scored 1); does not make a difference (scored 2); increases it some (scored 3); increases it a lot (scored 4). Six questions measured the respondents' beliefs about some possible positive effects of homework. The four questions asked whether the respondents thought homework helps students "learn, " "develop study skills," "learn how to manage their time," and "learn that learning takes place outside as well as inside of school." All these questions had three possible responses:- does not help at all (scored 0), helps a little (scored 1); helps very much (scored 2). The remaining two questions asked whether the respondents thought homework helps "parents increase their appreciation of education and allow them to reinforce students' achievements," and serves "as a vital link among students, teachers and parents", and these two questions also had three possible responses: does not help at all (scored 0); helps a little (scored 1); helps very much (scored 2), and does not serve at all (scored 0); serves a little (scored 1); serves very much (scored 2), respectively.

The attitudes toward homework ratings of the subjects of the study (each homework and no homework groups) had reliability coefficients (estimated by Kuder Richardson formula) ranging from 0.71 to 0.76 with a mean of 0.73.

3.3 Data Collection Procedures

As expressed earlier, the subjects of the study were 240 7th and 8th grade students, who were enrolled in Awassa Tabor Elementary School in 1996 Eth.C. The selected students from each grade were 120, and they were categorized into two sections, having each 20 high achievers, 20 average achievers and 20 low achievers. Then, using lottery method, the two sections of each grade students were assigned as experimental group (homework group) and control group (no homework group).

Thereafter, code numbers were given to students in experimental and control groups. The code numbers given are:- HWG/001–HWG/020 and NHWG/001-NHWG/020 for high achievers, HWG/021–HWG/040 and NHWG/021–NHWG/040 for average achievers, and HWG/041–HWG/060 and NHWG/041–NHWG/060 for low achievers in homework and no homework groups, respectively. Therefore, these code numbers were used instead of their names to collect data from the respective students in both homework and no homework groups.

The researcher recruited two teachers on a part–time base, who have got diploma in mathematics to assist him in teaching homework group students with assignment of homework and no homework group students without assignment of homework. The background and nature of the study were explained to the assistant researchers. One of them was assigned to teach grade 7 homework and no homework group students. The other assistant was assigned to teach 8th grade experimental and control group students.

Both sections of each grade students were taught for 8 weeks (all school days except one holiday). The experimental group students in both grades were given practice and extension assignments related to their respective mathematics contents on Monday through Thursday during 8 weeks teaching sessions. These types of homework were chosen since they require students to practice and apply previous learning (Clark and Starr, 1991; Eddy, 1984), and they facilitate and encourage independent learning (Clark and Starr, 1991; Davies, 1981; Eddy, 1984). In assigning homework to students, the guideline recommended by the New Paltz Central School District (n.d.) was used. That is, 7^{th} and 8^{th} grade homework group students were assigned homework which could be completed approximately within 20 minutes and 25 minutes, respectively.

The students were monitored for doing their homework and were provided feedback by the teachers. The feedback was provided by discussing and answering all homework questions. The students were also made to take part by writing their answer one by one on the blackboard. In all these, the researcher worked together with assistant researchers in order to share and minimize their loads.

Finally, both sections (homework and no homework groups) of each grade students were administered their respective mathematics post-tests which had been prepared from the contents covered in the process of teaching with assignment of homework for experimental groups and without assignment of homework for control groups during 8 weeks sessions. The subjects of the study

were also given a questionnaire to gather information about their attitudes toward homework.

3.4 Data Analysis

In analysing the data, mean values, t-test, F-test, the Tukey Method, and a three–way and a two–way ANOVA were used. Three independent variables were arranged in a 2x3x2 (homework x achievement level x grade) factorial analysis of variance using mathematics achievement as dependent variable.

Moreover, a 2x3 (homework x achievement level) factorial analysis of variance was employed to examine the effect of homework in each grade level using mathematics achievement as dependent variable. Again these two independent variables were arranged in exactly the same design to test the difference of attitudes toward homework between students in homework and no homework groups of each grade level.

Using Fisher's test of homogeneity of variances (Hinkle et al., 1994), the assumption was found to be tenable and the use of ANOVA was justified. The F-test and t-test were applied to test the differences for statistical significance at alpha level 0.05 in the data analysis. The reliability coefficients for test scores of each of grade 7 and grade 8 homework and no homework groups were computed using Kuder-Richardson Method ($KR\text{-}_{21}$). Similarly, Kuder-Richardson formula, which is useful in estimating the reliability of multiple ratings was used to find the reliability coefficients for attitudes toward homework ratings of each of grade 7 and grade 8 homework and no homework groups.

CHAPTER FOUR

RESULTS

The results of the main study are presented in the following sequence: the achievement of homework group and no homework group students in mathematics tests, and their attitudes toward homework.

4.1 Mathematics Achievement

The research questions handled in this section dealt with the difference in mathematics achievement between homework and no homework groups, the effect of homework upon high achievers, average achievers, and low achievers, and the difference of the effect of homework upon students' mathematics achievement in grade levels.

The major dependent variable was mathematics achievement and a three-way analysis of variance (ANOVA) was performed using homework, achievement level and grade level as independent variables. Table 1 presents the number of observations, sums and means of mathematics test scores of homework group and no homework group students by grade and achievement levels.

Table 1:- Number of Observations, Sums and Means of Mathematics Test Scores of Homework and No Homework Groups by Grade and Achievement Levels.

		Grade 7			Grade 8			Total		
		N	$\sum X$	$\bar{X}$	N	$\sum X$	$\bar{X}$	N	$\sum X$	$\bar{X}$
Homework	HA	20	502	25.10*	20	507	25.35	40	1009	25.23
	AA	20	365	18.25	20	384	19.20	40	749	18.73
	LA	20	236	11.80	20	241	12.05	40	477	11.93
	T	60	1103	18.38	60	1132	18.87	120	2235	18.63
No Homework	HA	20	467	23.35	20	468	23.40	40	935	23.38
	AA	20	326	16.30	20	338	16.90	40	664	16.60
	LA	20	189	9.45	20	209	10.45	40	398	9.95
	T	60	982	16.37	60	1015	16.92	120	1997	16.64

NB:- HA,AA and LA represent high achievers, average achievers and low achievers, respectively.

*The highest possible mathematics achievement test score was 30.

The table indicates that the mean score of homework group students was 18.63 and the mean score of no homework group students was 16.64. As can be seen from it, homework group students found in all levels of achievement achieved better than no homework group students found in all levels of achievement.

The results of Table 2 depict that there was a statistically significant difference ($F_{1,228}=48.36$, $p<0.05$) between students who were assigned homework and students who were not assigned homework in their mathematics achievement. Furthermore, there was a statistically significant difference ($F_{2,\ 228}=731.80$, $p<0.05$)

among high, average, and low achievers in their performance of mathematics. However, the grade level main effect, and all the interaction effects (the grouping of students: as homework and no homework versus achievement level, grade level, etc) were not statistically significant at 0.05 level.

Table 2:- A Summary Table for Three-Way ANOVA

Source of Variation	SS	df	MS	F
Homework Grouping (H)	236.02	1	236.02	48.36*
Achievement Level (A)	7142.36	2	3571.18	731.80*
Grade Level (G)	16.02	1	16.02	3.28
HXA	0.75	2	0.38	0.08
HXG	0.06	1	0.06	0.01
AXG	4.25	2	2.13	0.44
HXAXG	3.57	2	1.79	0.37
Within Cells	1112.70	228	4.88	
Total	**8515.73**	**239**		

*$p<0.05$

Table 3 indicates that homework group students achieved better than no homework group students, having mean scores 18.38 and 16.37 in grade 7 mathematics tests, respectively. It also shows that high achievers, average achievers and low achievers of the homework group students performed higher mean score than their counterparts in no homework group.

Table 3:- Sums, Means and Standard Deviations of Scores and Sums of Squared Scores of Homework and No Homework Groups in Grade 7 Mathematics Test

Group	High Achievers	Average Achievers	Low Achievers	Total
Homework	n=20 T_{11}=502 $\bar{X}_{11}$=25.10 s_{11}=1.92 $\sum X^2_i$=12670	n=20 T_{12}=365 $\bar{X}_{12}$=18.25 s_{12}=2.29 $\sum X^2_i$=6761	n=20 T_{13}=236 $\bar{X}_{13}$=11.80 s_{13}=2.53 $\sum X^2_i$=2906	$T_{1.}$= 1103 $\bar{X}_{1.}$=18.38 $\sum X^2_i$=22337
No homework	n=20 T_{21}= 467 $\bar{X}_{21}$=23.35 s_{21}=1.46 $\sum X^2_i$=10945	n=20 T_{22}=326 $\bar{X}_{22}$=16.30 s_{22}=1.75 $\sum X^2_i$=5372	n=20 T_{23}=189 $\bar{X}_{23}$=9.45 s_{23}=1.54 $\sum X^2_i$=8131	$T_{2.}$=982 $\bar{X}_{2.}$=16.37 $\sum X^2_i$=18148
Totals	$T_{.1}$=969 $\bar{X}_{.1}$=24.23 $\sum X^2_i$=23615	$T_{.2}$=691 $\bar{X}_{.2}$=17.28 $\sum X^2_i$=12133	$T_{.3}$= 425 $\bar{X}_{.3}$= 10.63 $\sum X^2_i$=4737	N=120 T=2085 $\bar{X}$=17.38 $\sum\sum\sum X^2_i$=40485

Table 4 presents the results of a two way analysis of variance. As can be seen from the table, there was a significant difference ($F_{1,114}$= 32.02, $p<0.05$) between students who received homework and students who did not receive homework of grade 7 mathematics. Moreover, there was a statistically significant difference ($F_{2,114}$= 485.54, $p<0.05$) among high, average, and low achievers in their mathematics achievement. Therefore, as shown the strength of association between the

independents (homework and students achievement level) and dependent (mathematics achievement) variables in the ANOVA, ω^2, homework and students' achievement level accounted for about 2.8% and 86.6% of the variances in grade 7 students' mathematics achievement, respectively.

Table 4:- A Summary of Two-way ANOVA on Mathematics Test scores of Grade 7 students by Homework Grouping and Achievement Levels

Source of Variation	SS	df	MS	F	ω^2
Homework Grouping	122.01	1	122.01	32.02*	0.028
Achievement Level	3699.80	2	1849.90	485.54*	0.866
Interaction	1.87	2	0.94	0.25	
Within Cells	434.45	114	3.81		
Total	**4258.13**	**119**			

*$p<0.05$

The comparison of grade 7 mathematics test achievement between homework and no homework groups within achievement levels is presented in the following Table 5 since the aforementioned results indicate the contribution of homework in-toto without specifically indicating which group of students in homework (high achievers, average achievers or low achievers) outscored their counterparts in no homework group. As can be seen from the table, statistically significant differences were found among high achievers, average achievers and low achievers of homework group and their counterparts in no homework group. Moreover, omega squared (ω^2) indicates that 19.2%, 17.2% and 22.6% of the variances in

mathematics achievement of 7th grade high achievers, average achievers and low achievers were accounted for by the effect of homework, respectively.

It is obvious that the effect of homework accounted for the variances found in mathematics achievement of high, average and low achievers in 7th grade students is with experimentwise error rate (α_E) 0.14 due to repeated comparisons using t-test. This is why the effect of homework seems greater upon students of each level of achievement than grade 7 students in general.

Table 5:- Comparison of Grade 7 Mathematics Test Achievement between Homework and No Homework Groups Within Achievement Levels

Groups	$\bar{x}_1-\bar{x}_2$	$S(\bar{x}_1-\bar{x}_2)$	df	t-calculated	ω^2
Homework High Achievers Versus No Homework High Achievers	1.75	0.54	38	3.24*	0.192
Homework Average Achievers Versus No Homework Average Achievers	1.95	0.64	38	3.05*	0.172
Homework Low Achievers Versus No Homework Low Achievers	2.35	0.66	38	3.56*	0.226

* $p< 0.05$

Table 6 shows the number of observations, sums, means and standard deviations of scores and sums of squared scores of homework and no homework groups in grade 8 mathematics test. This table indicates that high achievers, average achievers and low achievers in homework group had mean scores 25.35, 19.20 and 12.05 while their counterparts in no homework group had mean scores 23.40,

16.90 and 10.45 respectively. That is, homework group high achievers, average achievers and low achievers had better mean scores than their counterparts in no homework group.

Table 6:- Sums, Means and Standard Deviations of Scores and Sums of Squared Scores of Homework and No Homework Groups in Grade 8 Mathematics Test.

Group	High Achievers	Average Achievers	Low Achievers	Totals
Homework	n=20 T_{11}= 507 $\bar{X}_{11}$=25.35 s_{11}=1.81 $\sum X^2_i$=12915	n=20 T_{12}=384 $\bar{X}_{12}$=19.20 s_{12}=2.28 $\sum X^2_i$=7472	n=20 T_{13} =241 $\bar{X}_{13}$=12.05 s_{13}=3.49 $\sum X^2_i$ =3135	$T_{1.}$ =1132 $\bar{X}_{1.}$ =18.87 $\sum X^2_i$ =23522
No homework	n=20 T_{21}= 468 $\bar{X}_{21}$=23.40 s_{21}=1.82 $\sum X^2_i$=11014	n=20 T_{22}=338 $\bar{X}_{22}$=16.90 s_{22}=2.15 $\sum X^2_i$=5800	n=20 T_{23} =209 $\bar{X}_{23}$=10.45 s_{23}=2.67 $\sum X^2_i$ =2319	$T_{2.}$ =1015 $\bar{X}_{2.}$ =16.92 $\sum X^2_i$ =19133
Totals	$T_{.1}$=975 $\bar{X}_{.1}$=24.38 $\sum X^2_i$ =23929	$T_{.2}$ =722 $\bar{X}_{.2}$ =18.05 $\sum X^2_i$ =13272	$T_{.3}$ =450 $\bar{X}_{.3}$ =11.25 $\sum X^2_i$ =5454	N= 120 T=2147 $\bar{X}$=17.89 $\sum\sum\sum X^2_i$=42655

Furthermore, the mean score of all homework group students was 18.87 and the mean score of all no homework group students was 16.92, indicating that homework group students performed higher mean score than no homework group students in grade 8 mathematics test.

The result of a two way analysis of variance is presented in the following Table 7. This table depicts that the main effects of homework and level of achievements were statistically significant ($F_{1,114}$=19.17 and $F_{2,114}$=289.65, $p<0.05$, respectively), and the homework-by-achievement level interaction was not statistically significant ($F_{2,114}$=0.21,$p>0.05$).

Table 7: A Summary of Two–Way ANOVA on Mathematics Test Scores of Grade 8 Students by Homework Grouping and Achievement Levels.

Source of Variation	SS	df	MS	F	ω^2
Homework Grouping	114.07	1	114.07	19.17*	0.025
Achievement level	3446.82	2	1723.41	289.65*	0.809
Interaction	2.45	2	1.23	0.21	
Within Cells	678.25	114	5.95		
Total	4241.59	119			

*$p<0.05$

In addition, measures of the strength of association in the ANOVA (ω^2) reveal that 2.5% and 80.9% of the variances in grade 8 students' mathematics achievement were accounted for by homework and level of students' achievement, respectively.

Table 8:- Comparison of Grade 8 Mathematics Test Achievement between Homework and No Homework Groups Within Achievement Levels.

Groups	$\bar{X}_1-\bar{X}_2$	$S(\bar{x}_1-\bar{x}_2)$	df	t-calculated	ω^2
Homework High Achievers Versus No Homework High Achievers	1.95	0.57	38	3.42*	0.211
Homework Average Achievers Versus No Homework Average Achievers	2.30	0.70	38	3.29*	0.197
Homework Low Achievers Versus No Homework Low Achievers	1.60	0.98	38	1.63	

*$p<0.05$

The above Table 8 contains comparison of grade 8 mathematics test achievement between homework and no homework groups within achievement levels in order to have specific information about which group of students in homework (high achievers, average achievers, or low achievers) benefited more from homework than their counterparts in no homework group. As the results of the t-test show, there were statistically significant differences between high achievers in homework and no homework groups and between average achievers in both groups. This means that both high achievers and average achievers in the homework group outscored significantly than their counterparts in no homework group. But there was no significant difference between low achievers in the two groups at 0.05 level.

As can be revealed from Table 8, the measures of the strength of association (ω^2) also indicate that homework accounted for about 21.1% and 19.7% of the variances in mathematics achievement of grade 8 high achiever and average achiever students, respectively. It is clear that the effect of homework accounted for the variances found in high and average achievers' mathematics achievement of grade 8 students is with experimentwise error rate (α_E) 0.14 due to repeated comparisons using t-test. This is why the effect of homework seems greater upon students of both achievement levels than grade 8 students in general.

4.2 Attitudes of Students toward Homework

A two–way analysis of variance was employed on attitudes ratings for each of grade 7 and grade 8 students. The research question guiding the analyses of this section was the difference in attitudes toward homework between students in homework and no homework groups. The number of observations, sums, means, standard deviations and sums of squares of attitudes ratings are presented in Table 9 and Table 11, and their respective summary of two-way analyses of variances are found in Table 10 and Table 12, respectively.

Table 9:- Number of Observations, Sums, Means Standard Deviations and Sums of Squares of the Attitudes Ratings of Grade 7 Homework and No Homework Group Students.

Group	High Achievers	Average Achievers	Low Achievers	Totals
Homework	n=20 T_{11}= 316 $\overline{X}_{11}$ =15.80* s_{11}=3.74 $\sum X^2_i$=5258	n=20 T_{12}= 313 $\overline{X}_{12}$=15.65 s_{12}=3.69 $\sum X^2_i$=5157	n=20 T_{13} =337 $\overline{X}_{13}$=16.85 s_{13}= 2.96 $\sum X^2_i$ =5845	$T_{1.}$ =966 $\overline{X}_{1.}$ =16.10 $\sum X^2_i$= 16260
No homework	n=20 T_{21}= 338 $\overline{X}_{21}$=16.90 s_{21}=3.49 $\sum X^2_i$=5944	n=20 T_{22}= 327 $\overline{X}_{22}$=16.35 s_{22}=3.10 $\sum X^2_i$=5529	n=20 T_{23} =297 $\overline{X}_{23}$=14.85 s_{23}=4.22 $\sum X^2_i$ =4749	$T_{1.}$ =962 $\overline{X}_{1.}$ =16.03 $\sum X^2_i$= 16222
Totals	$T_{.1}$ =654 $\overline{X}_{.1}$=16.35 $\sum X^2_i$= 11202	$T_{.2}$ =640 $\overline{X}_{.2}$=16.00 $\sum X^2_i$= 10686	$T_{.3}$ =634 $\overline{X}_{.3}$=15.85 $\sum X^2_i$= 10594	N=120 T=1928 $\overline{X}$=16.07 $\sum\sum\sum X^2_i$=32482

* The maximum possible attitude rating was 20.

Table 9 shows that the means of attitudes ratings of the homework and no homework groups, and all grade 7 students toward homework were 16.10,16.03 and 16.07, respectively, indicating that they were very close to each other.

Table 10:- A Summary of Two-Way ANOVA on Attitudes Ratings of Grade 7 Students by Homework Grouping and Achievement Levels.

Source of Variance	SS	df	MS	F	F_{cv}
Homework Grouping	0.13	1	0.13	0.01	3.92
Achievement level	5.27	2	2.64	0.21	3.07
Interaction	56.87	2	28.44	2.25	3.07
Within Cells	1443.20	114	12.66		
Total	**1505.47**	**119**			

As can be seen from Table 10, there were no statistically significant differences in attitudes ratings between grade 7 students in homework and no homework groups, and among high, average, and low achievers. Moreover, the homework–by-achievement level interaction effect was not statistically significant at 0.05 level. In general, both groups of students in grade 7 had almost similar attitudes toward homework.

The honestly significant difference test (HSD) also indicates that there were no statistically significant differences for all pairwise comparisons. These results suggest that there were no significant differences in attitudes toward homework between students in homework and no homework groups and among students of homework group high achievers, average achievers and low achievers, and their counterparts in no homework groups.

Table 11:- Number of Observations, Sums, Means, Standard Deviations and Sums of Squares of the Attitudes Ratings of Grade 8 Homework and No Homework Group Students.

Group	High Achievers	Average Achievers	Low Achievers	Totals
Homework	$n=20$ $T_{11}= 321$ $\bar{X}_{11} =16.05^*$ $s_{11}=4.08$ $\sum X^2_i=5469$	$n=20$ $T_{12}=315$ $\bar{X}_{12}=15.75$ $s_{12}=4.08$ $\sum X^2_i=5277$	$n=20$ $T_{13} =307$ $\bar{X}_{13}=15.35$ $s_{13}=3.01$ $\sum X^2_i =4885$	$T_{1.} =943$ $\bar{X}_{1.} =15.71$ $\sum X^2_i= 15631$
No homework	$n=20$ $T_{21}= 320$ $\bar{X}_{21}=16.00$ $s_{21}=3.77$ $\sum X^2_i=5390$	$n=20$ $T_{22}= 333$ $\bar{X}_{22}=16.65$ $s_{22}=2.81$ $\sum X^2_i=5695$	$n=20$ $T_{23} =328$ $\bar{X}_{23}=16.40$ $s_{23}= 2.93$ $\sum X^2_i =5542$	$T_{1.} =981$ $\bar{X}_{1.} =16.35$ $\sum X^2_i= 16627$
Totals	$T_{.1} =641$ $\bar{X}_{.1} =16.03$ $\sum X^2_i= 10859$	$T_{.2} =648$ $\bar{X}_{.2}=16.20$ $\sum X^2_i= 10972$	$T_{.3} =635$ $\bar{X}_{.3}=15.88$ $\sum X^2_i= 10427$	$N=120$ $T=1924$ $\bar{X}=16.03$ $\sum\sum\sum X^2_i=32258$

*The maximum possible attitude rating was 20.

The above Table 11 indicates that the mean rating of the students' attitudes toward homework in grade 8 was 16.03 which was almost the same to that of the students in grade 7 (16.07). The means of attitudes ratings of homework and no homework groups toward homework in grade 8 were 15.71 and 16.35, respectively, showing that the no homework group students' attitudes toward homework was somewhat greater than the attitudes of homework group students toward homework in grade 8.

Table 12:- A Summary of Two-Way ANOVA on Attitudes Ratings of Grade 8 Students by Homework Grouping and Achievement Levels

Source of Variance	SS	df	MS	F	F_{cv}
Homework Grouping	12.03	1	12.03	0.99	3.92
Achievement level	2.12	2	1.06	0.09	3.07
Interaction	7.12	2	3.56	0.29	3.07
Within Cells	1388.60	114	12.18		
Total	**1409.87**	**119**			

The results of a two–way analysis of variance are presented in Table 12. The table reveals that there was no a statistically significant difference between homework group and no homework group students in their attitudes ratings toward homework in grade 8. That is, the students' attitudes toward homework were the same in grade 8 homework and no homework groups.

Furthermore, the achievement level main effect was not statistically significant at alpha level 0.05. Therefore, there was a similar attitude toward homework among high, average, and low achievers of grade 8 students. In addition to this, there was no interaction effect between the grouping of students (as homework and no homework groups) and achievement levels in attitudes toward homework.

In general, statistically significant differences were not also found for all pairwise comparisons of means using the Tukey Method at alpha 0.05 level.

level (Cooper, 1994). This contradictary finding might be occurred due to two different teachers employed to teach 7th and 8th grade students. Moreover omega squared (ω^2, measure of strength of association) indicates that 86.6% of the variance in grade 7 students' mathematics achievement and 80.9% of the variance in 8th grade pupils' mathematics achievement are accounted for by achievement level of the students. This implies that the students' level of achievement is the basic factor in their mathematics achievement. However, the students' learning and academic achievement can be improved by regular assignment of homework and prompt feedback (Paik, 2003; Paulu, 1995a).

The aforementioned results reveal the contribution of homework in-toto without specifically indicating the effect of homework upon students of each level of achievement (high achievers, average achievers and low achievers). With regard to this, the t- test results show that the effect of homework upon 7th grade students of all achievement levels is statistically significant. Supporting the findings of this study, Keith (1982) discovered that students of all achievement levels perform higher grades through regular assignment of homework. But the findings of Adane and Dawit (2000), which indicated that only high achievers and low achievers in homework group outperform significantly their counterparts in no homework group, contradicts the results of the study since students of all achievement levels are not beneficiaries.

It is indispensable to apply omega squared (ω^2), along with the t- test results (when there is a statistically significant difference) in order to understand the degree of

the effect of homework upon each achievement level. Hence, the results of omega squared show that the effect of homework accounts 19.2%, 17.2% and 22.6% of the variances in mathematics achievement of high achievers, average achievers and low achievers in grade 7 (with experimentwise error rate ,α_E = 0.14), respectively. This suggests that low achievers are the main beneficiaries of the contribution of homework to mathematics achievement in grade 7, contradicting that high achiever students benefit more from homework than the average and low achiever students (the International Association for Evaluation of Educational Achievement, as cited in Coulter, 1987).

On the other hand, concerning the effect of homework upon students by levels of achievement in grade 8 differs from grade 7 in that its effect upon students of low achievement level is not statistically significant though the mean score (12.05) of low achievers in homework group is greater than the mean score (10.45) of their counterparts in no homework group. The lack of statistically significant effect of homework found for low achievers of grade 8 students may be due, in part, to less attitudes toward homework held by low achievers in homework group ($\bar{x}$ =15.35) than their counterparts in no homework group ($\bar{x}$= 16.40). Moreover, according to Cooper et al. (1998), children's attitudes are mainly influenced by their parents' guidance and examples, which, in turn, affect either positively or negatively the effect of homework upon their academic achievement. The results of t-test depict that high achievers and average achievers of 8th grade students benefit significantly from homework. Thus, this result is not consistent with the findings of Keith (1982), and Adane and Dawit (2000), who found that students of all

achievement levels perform higher grades through regular assignment of homework, and high achievers and low achievers in homework group outperform significantly their counterparts in no homework group, respectively.

The measures of strength of association (ω^2), show that 21.1% and 19.7% of the variances in mathematics achievement of high achievers and average achievers of grade 8 students are accounted for by the effect of homework (with experimentwise error rate, $\alpha_E = 0.14$), respectively. This implies that high achievers are the major beneficiaries of homework in mathematics achievement than average achievers and low achievers of grade 8 students. This finding is consistent with that of the International Association for Evaluation of Educational Achievement (as cited in Coulter, 1987), which discovered that high achiever students benefit more from homework than the average and low achiever students.

In sum, the findings of the present study indicate that homework enhances students' learning and academic achievement in grades 7 and 8. In other words, a regularly assigned homework, and prompt feedback contributes to 7^{th} and 8^{th} graders' mathematics achievement. This, in turn, may minimize the students' failure in school. Because, studies have singled out mathematics as a major cause for students' failure in school (Aiken, 1970), and this also seems to be certainly true for unsuccessful academic achievement of students in Ethiopian schools.

5.2 Attitudes of Students toward Homework

Students who are able to complete assignments successfully are likely to develop a good working attitude. Moreover, if the assignment serves a good purpose, students will benefit by gaining higher grades, better study habits, and a more positive attitudes toward school and learning. Sharp (2001) expressed that positive attitudes to homework are associated with positive attitudes to school, and pupils' attitudes to homework appear to be related to characteristics such as age and cultural background. This suggests that students of different cultural background and age brackets may not have the same attitude toward homework.

In general, the result of this study depicts that the respondents have positive attitudes toward homework, which is consistent with the findings of previous researchers (Cooper et al., 1998; Sharp, 2001). This positive attitudes toward homework enabled the homework group students of all achievement levels to do their homework regularly and perform better scores in mathematics post-tests than students in no homework group of both grades even if a statistically significant difference in mathematics achievement was not found between low achievers in homework group and their counterparts in no homework group of grade 8 students at alpha 0.05 level. Generally, the mood of the students was likely positive while they were doing their homework, contradicting the finding of Leone and Richards (1989).

The results of analysis of variance indicate that there is no a statistically significant difference between students in homework and no homework groups of each grade in their attitudes toward homework. The honestly significant difference test also indicates that there aren't statistically significant differences for all pairwise comparisons in each grade level. These findings imply that the effect of homework found in this study upon students of each achievement level in each grade is without statistically significant difference between students in homework and no homework groups in their attitudes toward homework.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

Homework is an essential component of the total educational program for students in Ethiopian school systems. However, the degree of the effect of homework upon the academic achievement of the students might not be evident in the country. The objective of the present study was to investigate the extent of the contribution of homework and other variables to grade 7 and grade 8 students' mathematics achievement in Awassa.

Accordingly, the specific research questions formulated for investigation were:-

- Is there a significant difference in mathematics achievement between homework and no homework groups of grade 7 and grade 8 students in Awassa?
- Does homework have the same effect upon high achievers, average achievers and low achievers in each grade level?
- Does the effect of homework upon 7^{th} graders and 8^{th} graders vary in grade level?
- Is there a significant difference in attitudes toward homework between students in homework and no homework groups of each grade level?

The study was confined to Awassa Tabor Primary School. The subjects of the study were 240 randomly selected 7^{th} graders (n=120) and 8^{th} graders (n=120) from the school in 1996 Eth.C. The students selected from each grade were divided into homework group (containing 20 high achievers, 20 average achievers

there is no significant difference in mathematics achievement observed between low achiever students in homework and no homework groups at 0.05 level.

- The results of the study also indicate that homework has positive effect upon both grade 7 and grade 8 students' mathematics achievement. But there is a slight difference in its degree of effect. Omega squared (ω^2) shows that homework and students' level of achievement account 2.8% and 86.6% of the variances in 7^{th} grade students' mathematics achievement, and 2.5% and 80.9% of the variances in grade 8 students' mathematics achievement, respectively. These findings imply that the students' level of achievement is the basic factor in their mathematics achievement even though a regularly assigned homework and prompt feedback improves students' learning and academic achievement.
- In general, the subjects of the study have positive attitudes toward homework, and the difference in attitudes toward homework between students in homework and no homework groups is not statistically significant in each grade level.

Based on the findings of this study, the following recommendations may be forwarded to enhance the students' mathematics achievement.

- Students have to view homework as instructional strategy that improves their learning and academic achievement and attempt to do their assignments successfully by themselves.

- Teachers should not assign homework on weekends and holidays to make students have time to exercise, play, socialize, and pursue their own personal interest, which may, in turn, keep them from developing negative attitudes toward homework.
- Teachers are expected to review the assignment and assure whether students have the necessary knowledge to do homework before assigning it to them in order to avoid students' frustrations that may result from insufficient preparation for homework.
- Teachers are required to monitor students for doing homework and give a prompt feedback.
- Parents should provide children with convenient, quiet and comfortable work area that are free from household destructions.
- Parents should exhibit a positive attitude toward homework and limit after-school activities to allow time to their children for homework and family activities.
- Parents must encourage children to complete homework to the best of their ability. They are also expected to monitor their children's homework because children are more likely to complete assignments when their parents monitor them regularly. How closely they need to monitor should depend upon the age of their child, how independent he/she is, and how well he/she does in school.
- In general, the concerned authorized persons must give due attention for the value of homework and think of how to produce homework guideline and policy rather than leaving as the discretion of the teachers.

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APPENDIX A

MATHEMATICS PRE-TEST

PREPARED FOR 7th GRADERS

Code No _____ Sex _____ Section _____

Direction :- This test contains 30 multiple-choice items. Each item is followed by four possible answers. There is only one best answer for each item. Choose the best answer and write the letter that corresponds to your choice on the space provided.

_____ 1. In Prince Kindergarten School if there are 28 girls and 14 boys, what is the ratio of the number of girls to the number of boys?

A) 1:2 B) 2:1 C) 2:3 D)3:2

_____ 2. Which of the following is the set of whole numbers?

A) $\{0,1,2,3,\ldots\}$ C) $\{1,3,5,7,\ldots\}$

B) $\{0,2,4,6,\ldots\}$ D) $\{1,2,3,4,\ldots\}$

_____ 3. Find the lowest fraction form of 28%

A) 4/15 B)7/15 C)7/25 D)14/50

_____4. Which one of the following is the set of prime numbers less than 15?

A) $\{3,5,7,11,13\}$ C) $\{2,3,5,7,11,13\}$

B) $\{1,3,5,7,9,11,13\}$ D) $\{1,2,3,5,7,11,13\}$

_____ 5. 4.5% can be converted into decimal form as:-

A) 0.045 B) 0.45 C) 4.5 D) 4.05

_____ 6 If $x + 2x + 3x = 48$, what is the value of x?

A) 6 B) -6 C) 8 D) 12

_____ 7.In a certain primary school, there are 20 teachers. If 2 of them are males, find the ratio of the number of female teachers to the number of male teachers?

A) 1:3 b) 2:3 C) 2:5 D)3:5

_____ 8. In question N^{o} 7, what is the percent of male teachers?

A) 20% B) 30% C)40% D) 60%

_____ 9. Which one of the following is false?

A) The opposite of a negative integer is a positive integer.

B) The opposite of every natural number is a negative integer.

C) The opposite of every whole number is a negative integer.

D) The sum of a number and its opposite is zero.

_____ 10. If $-3/5 + 2/7 = x$, then find the value of x.

A) 11/35 B) -11/35 C) 5/12 D) -5/12

_____ 11. Find the sum of $-125+231-(-143)$

A) 37 B) -37 C) 249 D) -249

_____ 12. Solve, $-76.3 + (-89.9) + 100$

A) 66.2 B) -66.2 C) -86.4 D) 113.6

_____ 13. The prime factorization of 180 is:

A) 2^2x3^2x5 B) 2^3x3x5 C) 2^2x3x5^2 D) 2^3x3^2x5

_____ 14. What is the highest common factor (HCF) of 12, 18 and 36?

A) 3 B) 4 C) 6 D)12

_____ 15. The least common multiple (LCM) of 12, 15 and 18 is:

A) 60 B) 180 C) 240 D) 360

_____ 16. Identify the pair having equivalent equation

A) $2x+2=6$ B) $3x+3=6$ C) $3x+2=5$ D) $4x+3=8$

$x+1=2$ $3x=3$ $2x=3$ $4x=11$

_____17. Which one of the following is always correct?

A) The product of any two integers is a positive integer.

B) The product of any two integers is a negative integer.

C) The product of any two negative integers is a positive integer.

D) The product of any two whole numbers is a positive integer.

_____ 18. If $/x+3/= 8$, then find the value of x.

A) -5 or 11 B) 5 or -11 C) 5 or 11 D) -5 or -11

_____ 19. Identify the statement about rational numbers that can be always correct.

A) There is no rational number between any two rational numbers.

B) Every rational number is equal to its absolute value.

C) There exist other rational numbers between any two rational numbers.

D) Every rational number is not equal to its absolute value.

_____ 20. Let $3/5n= 12/25$, then find the value of n.

A) 5/3 B) 5/4 C)3/5 D)4/5

_____ 21. Solve, $3x- 4 <12 -x$

A) $x<4$ B)$x<-4$ C)$x>4$ D)$x>-4$

_____ 22. If $4x+5$ $-2x+x+20$, then find the value of x.

a) X -3 B) x 3 C) x -5 D) x 5

_____ 23. An avocado seller has 500 avocados. If 16% of the avocados are sold, find the number of avocadoes sold.

A) 80 avocados B)160 avocados C)180 avocados D)420 avocados

_____ 24. Haritu bought a bicycle for Birr 850 and sold it for Birr 900. What is the gain percent?

A) 5.56% B) 5.77% C) 5.88% D) 6.25%

_____ 25. Ato Hundito took a loan of Birr 5000 to start farming at the rate of 5% per annual simple interest. How much he had to pay at the end of 4 years?

A) Birr 5500 B) Birr 6000 C) Birr 6500 D) Birr 7000

_____ 26 When a number is multiplied by the sum of 3 and –7 the product will be 12. What is the number?

A) -3 B) 3 C) -4 D) 4

_____ 27. Find the compound interest on Birr 5000 for 2 years at 4% per annual

A) Birr 5100 B) Birr 5200 C) Birr 5300 D) Birr 5408

_____ 28. Suppose Ato Meskelie was earning a salary of 200 birr per month. If he received raises of 10% each year, how much would he be earning after three such raises?

A) Birr 220 B) Birr 242 C) Birr 260 D) Birr 266.20

_____ 29. The width of a rectangle is 3cms less than its length, and its perimeter is 106cms. What is the width of the rectangle?

A) 22cms B) 25cms C) 28cms D) 30cms

_____ 30. In question Nº 29, what is the length of the rectangle?

A) 2 2cms B) 25cms C) 28cms D) 30cms

APPENDIX B

MATHEMATICS PRE-TEST

PREPARED FOR 8th GRADERS

Code No _____ Sex _____ Section _____

Direction:- This test contains 30 multiple choice items. Each item is followed by four possible answers. There is only one best answer for each item. Choose the best answer and write the letter that corresponds to your choice on the space provided.

_____ 1. Identify the mathematical expression for " one fourth of a number plus three times the number".

A) ¼ (x+3x) B) ¼x+ (3+x) C) ¼ x+3x D) 3(¼ x + x)

_____ 2. Which one of the following is the equation for " the sum of three consecutive natural numbers that equal to 36"?

A) x+2x +3x =36 C) x+(x+2) +(x+3)=36

B) x+ (x+1) + (x+2) =36 D)x+ (x-2) + (x-3) =36

_____ 3. Which of the following is an infinite set ?

A) The set of negative integers greater than –20.

B) The set of natural numbers less than 20.

C) The set of positive rational numbers less than 20.

D) The set of positive integers less than 20.

_____ 4. Identify a function from the following relations.

A) $\{(1,2), (2,3),(1,4)\}$ C) $\{(0,0),(2,3),(2,0)\}$

B) $\{(2,4), (3,6), (4,2)\}$ D) $\{(1,3), (2,2), (2,3)\}$

_____ 5. If A =$\{$ -2,-1,0,1,2 $\}$, B= $\{$ -1,0,1 $\}$ and C=$\{$ 0,1,2 $\}$,then which statement is false?

A)$\{$ 0,1 $\}$ $\in$ C B) C $\subseteq$ A C) B $\subset$ A D) $\{$-1 1$\}$ $\subset$ B

_____ 6. In which quadrant (-2,-7), (-3,7), (2,-3) and (2,3) are found , respectively?

A) 1st, 2nd, 3rd & 4th, C) 3rd, 4th, 2nd & 1st ,

B) 4th, 2nd, 3rd & 1st D) 3rd, 2nd, 4th, & 1st

_____ 7. Which one of the following pairs is not directly proportional?

A) 15/13 & 17/15 B) 15/13 & 30/26 C) 14/8 and 21/12 D) 12/4 & 39/13

_____ 8. Find the product of (3m +2n) (2m-n)

A) $4m^2 -3mn -2n^2$ B) $6m^2 -mn-2n^2$ C) $6m^2+mn—2n^2$ D) $6m^2 +4mn-2n^2$

_____ 9. Which of the following is the expression of $(3p -5q)^2$ as a sum?

A) $9p^2 -15pq-15pq+25q^2$ C) $9p^2 -25q^2$

B) $9p^2 -30pq+25q^2$ D) $9p^2 +25q^2$

_____ 10. Simplifying 2(3x+y) + 3y-2x gives:-

A) 4x+5y B) 3x+5y C) 4x+6y D) 6x+5y –2x

_____ 11. $3a^2$ +6a +3a+6 can be factorized as:-

A) 3a (a+2) +3 (a+2) B) (3a+2) (a+3) C) 3 (a^2+3a+2) D) (3a+3) (a+2)

_____ 12. 7a +(3-4a) =9, find the value of a.

A) 2 B) 3 C) 4 D) 6

_____13. Simplifying 3(2c+1) +5(3c+1)+ 10 gives

A) 20c+15 B) 21c+13 C) 20c+18 D) 21c+18

_____ 14. The greatest common factor of $18a^2b$+24b can be

A) 3b B) 6 C) 6a D) 6b

_____15. Find the square of 6.3.

A) 37.49 B) 36.9 C) 39.69 D) 396.9

_____16. What is the square root of 225?

A) 13 B) 14.5 C) 15 D) 25

_____17. $3x+ (2x- 5) = 3 - (4x -10)$, find the value of x.

A) 1 B) -1 C) 2 D) -2

_____ 18. When 7 subtracted from three times a number is 35. What is the number? A) 12 B) 13 C) 14 D) 15

_____ 19. Simplify $\frac{27m^2n}{9mn}$, where m, n 0

A) 1/3m B) 3m C) 3n D) 3mn

_____20. Find the value of $\sqrt{(0,6)^2 + (0,8)^2}$

A) 1 B) 1.18 C) 3.16 D) 10

_____ 21. If $\frac{m+2}{3} = \frac{2m+6-m}{5}$, then find the value of the unknown.

A) -4 B)-1 C) 1 D) 4

_____ 22. Let the height, base and area of a right angled triangle be h, b and A, respectively. If A= ½ hb find the height of a triangle in terms of the remaining variables.

A) h= A/2b B) 2h =A/b C) h= 2A/b D) h=A-1/2b

_____ 23. Identify a linear equation whose true set is the set of all rational numbers.

A) $5x - 4 = 14- 4x$ C) $½x +1/3 =3/5-3/2x$

B) $4x +3 =7x+5 -3x$ D) $2x- 5 = 2+3x-7-x$

_____ 24. Find the side length of a square whose area is 196 square cms.

A) 14 square cms B) 14cms C)16cms D) 16 square cms

_____ 25. The total score in a football game is 52 points. The winning team scored 6 more points than the losing team. How many did the losing and the winning teams score, respectively?

A) 23 & 29 B) 24& 28 C) 25 &27 D) 26&32

_____ 26. The product of four times the sum of three consecutive natural numbers is 48. What are the numbers?

A) 3,4, & 5 B) 6,7, & 8 C) 7,8 & 9 D) 15,16 & 17

_____ 27. The length of a rectangle is twice its width. If the perimeter is 48 cms, find the length and the width, respectively

A) 12cms & 6cms C) 16cms & 8cms

B) 15cms & 7.5cms D) 17cms & 8.5 cms

_____ 28. If the sum of three consecutive even numbers multiplied by 7 equals 126, what are the numbers?

A) 5,6 & 7 B) 4,6 & 8 C) 28,42 & 56 D) 40, 42 & 44

_____ 29. The angles measures of a triangle are x, (x+5), and 3x degrees. Find the degrees of each angle measure of the triangle.

A) 30^0, 35^0 & 115^0 B) 35^0, 40^0 & 105^0 C) 40^0, 45^0 & 95^0 D) 30^0, 60^0 & 90^0

_____ 30. Konjit is one fourth as old as her father and the sum of their age is 70 years. How old are each of them?

A) 12 years and 58 years C) 16 years and 54 years

B) 13 Years and 57 years D) 14 years and 56 years

APPENDIX C

MATHEMATICS POST-TEST

PREPARED FOR 7th GRADERS

Code No _____ Sex _____ Section _____

Direction:- This test contains 30 multiple choice items. Each item is followed by four possible answers. There is only one best answer for each item. Choose the best answer and write the letter that corresponds to your choice on the space provided.

_____ 1. One of the following is a regular triangle.

A. Isosceles triangle C. Scalene triangle

B. Right triangle D. Equilateral triangle

_____ 2. Identify the different one among the four figures.

A. Square B. Trapezium C. Rectangle D. Rhombus

_____ 3. Which one of the following is false about a rhombus?

A. All sides of a rhombus is congruent.

B. All angles of a rhombus is congruent.

C. Opposite angles of a rhombus is congruent.

D. Any rhombus is not a square.

_____ 4. Identify one which is always true.

A. A rectangle is a square.

B. A rhombus is a trapezium.

C. A square is a rectangle.

D. Any parallelogram is a trapezium.

_____ 5. Which of the following is false about a right prism and cylinder?

A. Both have two congruent bases.

B. Both have two parallel bases.

C. Both have bases with the same type of shapes.

D. Both have the same base face property.

_____ 6. Identify one that is false

A. Two angles of an isosceles triangle are congruent.

B. Two sides of an isosceles triangle are congruent.

C. Equilateral triangle is an acute angle triangle.

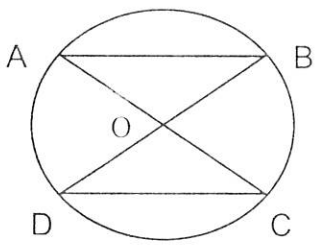
D. Any acute angle triangle is an equilateral triangle.

_____ 7. Find the area of a trapezium whose bases and height are 6cm, 8 cm, and 7cm long, respectively.

A. $21cm^2$ B. $36cm^2$ C. $49cm^2$ D. $52cm^2$

_____ 8. The area of a certain parallelogram is twice the area of a square whose side length is 6cm. What is the height of a parallelogram if its base is 8cm long? A. 8cm B. 9cm C. 10cm D. 12cm

_____ 9. In the figure, which of the angles are congruent?



A. $A\hat{B}D \equiv A\hat{C}D$ C. $B\hat{D}C \equiv A\hat{C}D$

B. $B\hat{A}C \equiv B\hat{O}C$ D. $A\hat{O}B \equiv B\hat{A}C$

_____ 10. In the figure found above, what is the degree measure of $B\hat{A}C$ if $B\hat{D}C=85^0$?

A. 42.5^0 B. 85^0 C. 95^0 D. 105^0

_____ 11. What is the area of a circle whose radius is 5cm?

A. 78.5cm B. 78.5cm^2 C. 87.5cm D.87.7cm^2

_____ 12. Find the radius of a circle whose circumference is 43.96cm.

A. 3.5cm B. 6.85cm C. 7cm D. 14cm

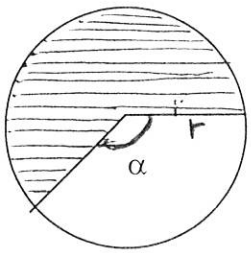
_____ 13. What is the area of a circle whose circumference is 56.52cm?

A. 63.58cm^2 B. 113.04cm^2

C. 177.47cm^2 D. 254.34cm^2

_____ 14. In the figure, r=3cm and $\alpha = 100^0$

What is the area of the unshaded region?



A. 7.85cm^2 B. 15.70cm^2

C. 20.41cm^2 D. 28.26cm^2

_____ 15. In question Nº 14, the area of the shaded region is:-

A. 7.85cm^2 B. 15.70cm^2 C. 20.41cm^2 D. 28.26cm

_____ 16. The height of a prism is 5cm and the perimeter of its base is 24cm. Find its lateral surface area.

A. 60cm^2 B. 120cm^2 C. 150cm^2 D. 240cm^2

_____ 17. In question Nº 16, if the base of the prism is a square, what is the length of the edge of the base?

A. 4cm B. 6cm C. 8cm D. 10cm

_____ 18. A rectangular prism has length 8cm, width 6cm and height 12cm. Find the area of its lateral surface.

A. 336cm^2 B. 363cm^2 C. 432cm^2 D. 576cm^2

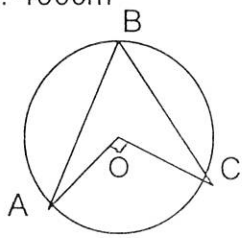
_____19. What is the height of a rectangular prism, if its length, width and lateral surface area are 5cm, 4cm and 180cm^2, respectively?

A. 9cm B. 10cm C. 18cm D. 20cm

_____ 20. In question Nº 19, the total surface area of the prism is:-

A. 190cm^2 B. 200cm^2 C. 220cm^2 D. 400cm^2

_____ 21. What is the angle measure of $\overset{\frown}{ABC}$, if m(AÔC)=90^0?



A. 30^0 B. 45^0 C. 60^0 D. 90^0

_____ 22. Find the height of a right cylinder whose radius is 3cm and lateral surface area is 94.2cm^2.

A. 5cm B. 7.5cm C. 10cm D. 15cm

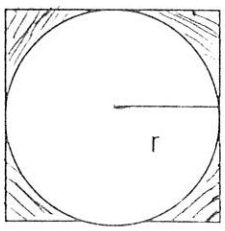
_____ 23. What is the total surface area of the cylinder in question Nº 22?

A. 122.46cm^2 B. 150.72cm^2 C. 172.7cm^2 D. 251.2cm^2

_____ 24. The lateral surface area of a tin is 125.6cm^2. What it its radius if its height is 5cm?

A. 3cm B. 4cm C. 6cm D. 8cm

_____ 25. A circle with radius 3cm is inscribed in a square. Find the shaded region.



A. 7.74cm^2 C. 19.26cm^2

B. 10.26cm^2 D. 28.26cm^2

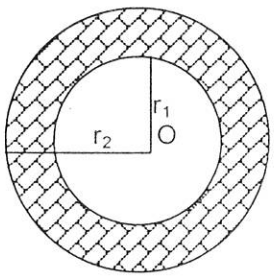
_____ 26. The sum of the area of the upper and lower base of a cub is 32cm^2. What is its volume?

A. 32cm^3 B. 64cm^3 C. 96cm^3 D. 128cm^3

_____ 27. The base of a right prism is a parallelogram. The height of a parallelogram is 8cm and its base is 12cm. What is the volume of a prism if its height is 10cm?

A. $400cm^3$ B. $480cm^3$ C. $960Cm^3$ D. $1020cm^3$

_____ 28. In the figure, O is the common center of the two circles with radii r_1 = 3cm and r_2=5cm. Find the shaded region.



A. $12.56cm^2$ C. $40.24cm^2$

B. $28.26cm^2$ D. $50.24cm^2$

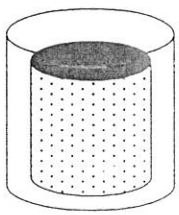
_____ 29. A right cylinder of radius 5cm and height 10cm is filled with water. How much liter of water does a right cylinder contain?

(Hint: 1 liter = 1000cm3)

A. 0.785 liter C. 78.5 liter

B. 7.85 liter D. 785 liter

_____ 30. In the figure, if h=5cm and the radii of the smaller and the larger right cylinders are 2cm and 4cm, what is the volume of the unshaded region?



A. $62.8cm^3$ C.$157cm^3$

B. $125.6cm^3$ D. $188.4cm^3$

APPENDIX D

MATHEMATICS POST-TEST

PREPARED FOR 8th GRADERS

Code No _____ Sex _____ Section _____

Direction: - This test contains 30 multiple-choice items. Each item is followed by four possible answers. There is only one best answer for each item. Choose the best answer and write the letter that corresponds to your choice on the space provided.

_____ 1. One of the following represents a simple path

A. Line segment B) Triangle C) Square D) Circle

_____ 2. An angle whose degree measure is greater than 90° and less than 180° is

A) acute angle C) obtuse angle

B) right angle D) straight angle

_____ 3. Which one of the following is a regular quadrilateral?

A) rhombus B) square C) trapezium D) rectangle

_____ 4. A polygon with 8 sides is called

A) pentagon B) hexagon C) decagon D) octagon

_____ 5. One of following triplets of angles belongs to an acute triangle.

A) 35^{0},55^{0}, 90^{0} C) 45^{0},65^{0},70^{0}

C) 45^{0},45^{0},90^{0} D) 30^{0}, 45^{0},105^{0}

_____ 6. Which one of the following is necessarily true?

A) Any two equilateral triangles are similar.

B) Any two right triangles are similar.

C) Any two scalene triangles are similar.

D) Any two isosceles triangles are similar.

_____ 7. Which one of the following is false about the common properties of a square and a rhombus?

A) Both have parallel opposite sides.

B) All sides in each of them are equal in size.

C) All angels in each of them are equal in measure.

D) Opposite angles in each of them are equal in measure.

_____ 8. Identify the lengths of the sides of a right- angled triangle.

A) 4cm, 5cm & 7cm C) 6cm, 8cm & 12cm

B) 5cm, 12cm & 15cm D) 7cm, 9cm & 14cm

_____ 9. Which one of the following is false about the angles formed when two parallel lines are crossed by a transversal?

A) Alternate exterior angles are congruent.

B) Vertically opposite angles are congruent.

C) Alternate interior angles are congruent.

D) The sum of a pair of alternate interior angles is 360^0

_____ 10. From the property of triangles, which of the following lengths can be sides of a triangle.

A) 5, 6, 7 B) 4,5 & 9 C) 4,6 & 11 D) 7,8 & 18

_____11. Find the number of sides a polygon has, if the sum of the measure of all its interior angles is 1260^0

A) 7 B) 9 C) 11 D) 14

_____ 12. The degree measures of two alternate interior angles formed by two parallel lines cut by a transversal are 5x-20 and 3x+50. What is the measure of these alternate interior angles?

A) 82.5^0 B) 105^0 C) 155^0 D) 175^0

_____ 13. What is the sum of the measures of four interior angles of a heptagon if the sum of the measures of its remaining three interior angles is 430^0

A) 470^0 B) 540^0 C) 720^0 D) 830^0

_____ 14. The length of each legs of an isosceles right- angled triangle is 2 $\sqrt{2}$ cm . Find the length of its hypotenuse.

A) 4cm b) 6cm c) 8 cm d) 16 cm

_____ 15. What is the ratio of the areas of two similar pentagons if the lengths of their corresponding sides are 7cm and 11cm?

A) 7/11 B) 49/11 C) 121/7 D) 49/121

_____ 16. The ratio of the circumference of two similar circles is 5/3 . If the length of the radius of the larger circle is 15cm, how long is the radius of the smaller circle?

A) 6cm B) 9cm C) 10cm D) 12cm

_____ 17. Each of the congruent sides of an isosceles triangle is 25cm long. If the length of its base is 40cm, how long is the attitude to the base of the triangle?

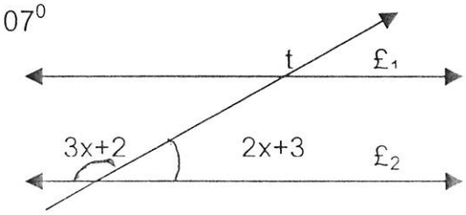
A) 15cm B) 16cm C) 18cm D) 20cm

_____ 18. The area of a circle with radius 10cm is the same as the area of a right–angled triangle whose base is 10cm. Find the height of a triangle.

A) 15cm B) 15.7cm C) 16.7cm D) 17.7 cm

_____ 19. In the diagram, $£_1 // £_2$ and t is a transversal. Find the degree measure of the angle indicated by "2x+3".

A) 35^0 B) 70^0 C) 73^0 D) 107^0



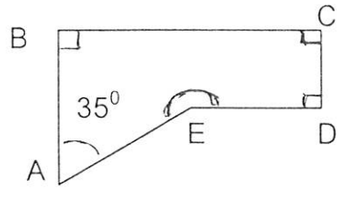
_____ 20. In the above diagram, find the degree measure of the angle indicated by "3x+2".

A) 70^0 B) 73^0 C) 105^0 D) 107^0

_____ 21. In the figure, m ($A\hat{B}C$)= m ($B\hat{C}D$) =m ($C\hat{D}E$) = 90^0 and m ($B\hat{A}E$) = 35^0. Find the angle measure of $A\hat{E}D$

A) 125^0 C) 235^0

B) 145^0 D) 305^0



_____ 27. In question Nº.26, what is the length of $\overline{NO}$?

A) 4cm B) 4.5cm C) 5cm D) 7cm

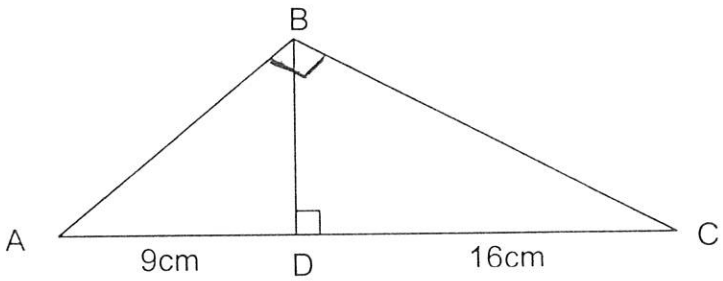
_____ 28. In a right- angled triangle ABC, where the right angle is B, $\overline{BD}$ is the altitude to the hypotenuse $\overline{AC}$. What is the length of $\overline{BD}$ if AD = 9cm and AC = 25 cm.

A) 7cm

B) 12cm

C) 15cm

D) 16cm



_____ 29. In the above figure given in question Nº.28, find the length of $\overline{AB}$.

A) 10 cm B) 12cm

C) 15cm D) 16cm

_____ 30. What is the length of $\overline{BC}$ in the figure found in question Nº. 28?

A) 12cm B) 15cm

C) 16cm D) 20cm

APPENDIX E

ADDIS ABABA UNIVERSITY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

GRADUATE PROGRAM

Questionnaire

The objective of this questionnaire is to gather information from 7th and 8th graders in order to investigate the students' attitudes toward homework. Therefore, you are kindly requested to respond accordingly as the success of the study highly depends on your genuine and honest completion of the questionnaire.

Thank You!

Code No ---------- -----Grade ----------Sex ----------

Instruction:- Each of the following question given regarding your attitudes toward homework is followed by at least three possible choices. Encircle the letter that corresponds to your answer for each question.

1. In general, how do you feel about homework?

   A/ I don't like it at all

   B/ I dislike it some

   C/ I neither like nor dislike it

   D/ I like it some

   E/ I like it very much

2. Do you think homework increases or decreases student's interest in school?

A/ It decreases a lot

B/ It decreases some

C/ It does not make a difference

D/ It increases some

E/ It increases a lot

3. Do you think that homework helps students learn?

A/ It does not help at all

B/ It helps a little

C/ It helps very much

4. Do you think that homework helps students develop study skills?

A/ It does not help at all

B/ It helps a little

C/ It helps very much

5. Do you think that homework helps students learn how to manage their time?

A/ It does not help at all

B/ It helps a little

C/ It helps very much

6. Do you think that homework helps to teach students that learning takes place outside as well as inside of school?

A/ It does not help at all

B/ It helps a little

C/ It helps very much

7. Do you think that homework helps parents increase their appreciation of education and allow them to reinforce students' achievement?

A/ It does not help at all B/ It helps a little C/ It helps very much

8. Do you think that homework serves as a vital link among students, teachers and parents?

A/ It does not serve at all B/ It serves a little C/ It serves very much