

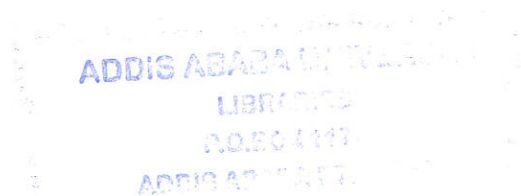
**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**SELF-EFFICACY, ACHIEVEMENT MOTIVATION,
ATTITUDES AND GENDER DIFFERENCE ON
STUDENTS' SCIENCE PERFORMANCE
IN DEBREBRHAN GENERAL
SECONDARY SCHOOL**

**BY
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**A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF REQUIREMENTS FOR THE DEGREE OF
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ADDIS ABABA UNIVERSITY
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Self-Efficacy, Achievement Motivation, Attitudes and Gender
Difference on Students' Science Performance
In Debrebrhan General
Secondary School

By
Mustofa Abdela

Approved by Board of Examiners



Chairman, Department

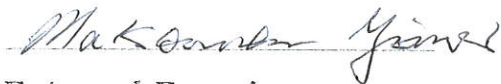
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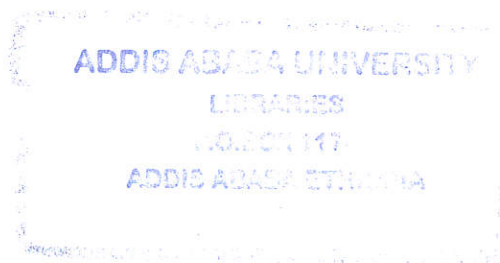
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Acronyms

ATB	Attitudes toward Biology
ATC	Attitudes toward Chemistry
ATP	Attitudes toward Science
ATP	Attitudes toward Physics
BAM	Biology Achievement Motivation
BPR	Biology Performance
BSE	Biology Self-Efficacy
CAM	Chemistry Achievement Motivation
CPR	Chemistry Performance
CSE	Chemistry Self-Efficacy
nach	achievement motive
PAM	Physics Achievement Motivation
PPR	Physics Performance
PSE	Physics Self-Efficacy
SAM	Science Achievement Motivation
SPR	Science Performance
SSE	Science Self-Efficacy

ABSTRACT

The purpose of this study was to examine the effects of science self-efficacy, science achievement motivation, attitudes toward science and gender on science performance of high school students, and to show the difference between males and females among the variables. A total of 202 grade 10 students (108 males and 94 females) were involved in the study from Debre Brehan General Secondary School. A t-test and multiple regression analysis were employed to analyze the data. The result indicated statistically significant gender difference in science self-efficacy (chemistry, physics and biology) and science performance (chemistry, physics and biology). There were also significant gender difference in students' attitudes toward chemistry and physics. However, there were no significant gender difference in students' attitude towards biology and in science achievement motivation (chemistry, physics and biology). Multiple regression analysis also showed that science self-efficacy, science achievement motivation, attitude towards science and gender significantly contributed to the variation in science performance. Because of the significance difference observed between male and female students, and significant contribution of independent variables on science performance, recommendations are forwarded for the concerned bodies.

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Education is the key to development and plays a pivotal role in the process of development. Eventually, it is the fact that science and technology are twin instrument in the economic growth of any society (Mpuchana and Nkoma ,1999).

In turn, science and technology are dependent on the basic science, i.e., biology, chemistry, mathematics and physics. Expertise in these subjects is necessary, and hence the development of human resources in the basic sciences is a necessary condition in the development process.

Depending on educational system prevailing in a specific country either integrated science at the junior secondary, or the separate science subjects in senior secondary school science appears to be the development of scientific skills, favorable attitudes and concepts, but greater emphasis is on the acquisition of basic concepts and problem solving skills. The contents are drawn from physical, biological, health and agricultural sciences.

According to Theodros's (1999) description, secondary education is usually the first level where pupils learn science as a separate subject in a systematic way. Historically, this is true in most countries, primary

personal acquaintance with a scientist in general attract many more men than women. Although there are many interconnected reasons for their state of affairs, one component is women attitudes toward science.

Motivational factors are also crucial to an individual whenever a person achieves anything significant as a result of learning and feeling. Based on Weiner's (1990) explanation, achievement motivation described to accomplish something difficult to master ideas to manipulate or organize persons and objects in physical environment and motivated persons prefer working independently. Moreover, achievement oriented persons try to overcome obstacles not only to attain a high standard and excellent but also to surpass the success of other.

Klein (1982) also demonstrated that people with high achievement motivation are more motivated to perform in achievement conditions, more likely to prefer tasks of intermediate difficulty, respond to at more efficient level and persist longer in the face of failure when compared to people with low achievement motivation.

To sum up, the above information indicates that there exists a certain type of relation between personality variables such as self-efficacy, attitude, achievement motivation, gender difference and academic performance.

1.2. Statement of the Problem

The cognitive factors and the non-cognitive factors have their own contributions on the academic performance of students. As shown in the background section, many researchers have attempted to identify the contributions of non-cognitive or personality factors in explaining academic performance of students in different groups, indifferent levels and different disciplines.

The purpose of this study is to investigate the influence of these non-cognitive factors (self-efficacy, achievement motivation, attitudes and gender difference) on the academic performance of high school students. Therefore, the following questions are raised in the study.

1. Do male and female students differ significantly on science self-efficiency, science achievement motivation, attitudes toward science and science subjects performance?
2. Do gender, science self-efficacy, science achievement motivation and attitudes toward science separately or jointly contribute to the variation in science subjects performance (score of grade 10 students)?

1.3. Objectives of the Study

The general objective of the present study is to investigate the relationship between gender, science self-efficacy, science achievement

contribute students' achievement to be low and minimize female students' number and to take necessary measures, to improve the students' enrollment in the natural science stream.

Therefore, the importance of this study is given as follows:

1. It can help for teachers to study the behavior of their students and encourage the development of appropriate trait, and discourage the inappropriate ones. They can also make the necessary instructional adjustments.
2. The study may make science teachers aware of their students' environment and other factors can influence on students' performance in science subjects.
3. It can show the reasons why female students are less in number in preparatory natural science stream, than social science stream female students.
4. It will be a source of information for authorities and concerned policy makers of the science subjects in the secondary level.
5. Counselors also will be benefited from the result of this study to help students who have a problem in science subjects performance.
6. It will provide information for those who are interested in making further research in science subject areas.

1.5. Operational Definition

1. **Attitudes:** refers to students' tendency to react with science subjects.
2. **Achievement Motivation:** refers to students' perceived self-competence and intrinsic value to be effective with science subjects.
3. **Performance:** students' science subjects achievement as indicated by their scores on a test constructed by subject teachers.
4. **Self-efficacy:** refers to an individual's expectancy in his or her capability to organize and execute the behavior needed to successfully perform science subjects.
5. **Science-** refers to subjects such as chemistry, physics and biology

1.6. Delimitation of the Study

The study was delimited only to grade 10 students. The study area was in DebreBrhan town, DebreBrehan General Secondary School. It was confined in one high school and 202 students were sampled from a total number of 2063 students in the high school. Moreover, the study delimited the effects of these, four variables, sciences self-efficacy, science achievement motivation, attitudes towards science and gender difference, on science performance and relationships between the variables listed above.

CHAPTER TWO

2. REVIEW OF RELATED LITRATURE

In this section an effort was made to bring the works of different scholars and researchers on self-efficacy, achievement motivation, attitudes and academic performance.

In general, the review of literature attempts to focus on the following questions.

1. What are the meanings of self-efficacy, achievement motivation and attitude?
2. Are there significant gender difference in self-efficacy, achievement motivation, attitude and performance?
3. How are these, self-efficacy achievement motivation and attitude related to academic performance?

2.1. Self- Efficacy Beliefs

Bandura (1986) cited in Zeldin and Pajares (2000) defines self-efficacy as people's judgment of their capabilities to organize and execute courses of action requires attaining designated types of performance. A person with a well developed sense of efficacy will behave strongly in his or her capacity, to carry out a task, invest effort in the activity, persist in the face of difficulty and have an optimistic out look. Persons with low level of self-efficacy have little confidence in their capacity to carryout a task,

and this can result in avoidance of difficult tasks, low aspiration, weak commitment to goals and pessimistic outlook (Pajares, 1996).

Self-efficacy beliefs also influence individuals' thought patterns and emotion. High self-efficacy helps to create feelings of serenity in approaching difficult tasks and activities. Conversely, people with low self-efficacy may believe that things are tougher than they really are a belief that fosters anxiety, stress, depression, and narrow vision of how best to solve a problem. Although ineffectual individuals usually avoid challenging tasks. When they do attempt them give up more easily than individuals with high efficacy. When ineffectual fail, they attribute the unsuccessful result to a lack of ability and tend to lack faith in their capabilities. When they succeed, they are more likely to attribute their success to external factors (Bandura, 1977). If students master a challenging task with limited assistance their levels of self-efficacy rise (Bandura et al., 1996; Schunk, 1984).

Bandura (1995) cited in Pajares (1997) contrasts people with different sense of efficacy.

People who have a low sense of efficacy in given domain shy away from difficult tasks, which they view as personal threats. They have low aspirations and weak commitments to the goals they choose to pursue when faced difficult tasks, they dwell on their personal deficiencies, the obstacles they will encounter, and all kinds of adverse outcomes rather than concentrate on how to perform successfully. They slacken their efforts and give up quickly in the

face of difficulties. They are slow to recover their sense of efficacy following failure or setbacks. Because they view insufficient performance as a deficient aptitude it does not retire much failure for them to lose faith in their capabilities. They fall easy victim to stress and depression.

On the other hand

People who have strong beliefs in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an affirmative orientation fosters interest and engrossing involvement in activities. They set themselves challenging goals and maintain strong commitment to them. They invest a high level of effort in what they do and heighten their effort in the face of failure and setbacks. They remain focused and think strategically in the face of difficulties. They attribute failure to insufficient effort, which supports a success orientation. They approach potential stressors or threats with the confidence that they can exercise some control over them. Such an efficacious outlook enhances performance accomplishment, reduces stress, and lowers vulnerability to depression.

It is important to note that academic self-efficacy beliefs vary according to subject matter, in that students may have high self-efficacy in one subject and not in another: mathematics self-efficacy is independent of writing self-efficacy depending on their mastery and vicarious experiences in each subject.

The variations of self-efficacy beliefs between the individuals influence on career selection and aspiration. The stronger the students' beliefs in their efficacy, the more occupational options they consider possible, the greater the interest they show in them, the better they prepare

themselves educationally for different career pursuits, and the greater persistence and success in their academic course work

According to Hackett and Betz (1989), Schunk and Pajares (2001) identified four sources of efficacy expectations; mastery experiences (the first and most powerful source), vicarious experiences, verbal persuasions, and physiological and emotional states.

The most influential of these factors, mastery experiences, which refers to individuals experiences with success or failure in past situation. Information gathered from these experiences is then internalized. Past successes raise self-efficacy and repeated failures lower it, which indicates to individuals' their levels of capability (Bandura, 1977; Pajares, 1996, 1997; Swanson and Woitke, 1997).

Vicarious experiences are often acquired through observation and interpretation. In observing the modeling behavior of others, the learner is able to reflect on past experiences with such behavior and make meaning of its relevance in new situation. Vicarious experience is particularly powerful when observers see similarities in some attribute and then assume that the model's performance diagnostic of their own capability (Bandura, 1977; Pajares, 1996)

Verbal persuasion tries to convince individuals, who may doubt their capabilities that they possess, the skills needed for success at a given task. Encouragement supports career related self-efficacy, criticism

hampers it. Families, friends, and teachers who their own agendas may advertently (or even overtly) limit the educational and vocational progression by discouraging certain occupational interest choices, and engagement (Bardura et al., 1996; Hackett and Betz, 1989; Pajares, 1997)

In education, verbal persuasion delivered by teacher often takes the form of the verbal feed back, evaluation, and encouragement. Persuasion must be realistic, sincere, and a credible source. Otherwise, it can negatively affect students' self-efficacy beliefs (Bandura, 1977).

Physiological state implies that failure, or some degree of performance improvement, can result if a person fearing failure is in a hyperactive state (Bandura, 1977). A physiologically hyperactive state includes a symptoms experienced during "fight or flight" responses of the autonomic nervous system. Emotional state refers to the mood one is in when performing. Such as feeling anxious. Depending on the mood, emotional state can either positively or negatively affect interpretation of an event's outcome (Bandura, 1977). In addition to the four factors that determine general self-efficacy, aptitude, attitude and attributions are found to predict science self-efficacy (Hackett and Betz, 1989).

According to Bandura (1977), self-efficacy judgments are dependent on a particular domain. In other words they are domain specific. This means

that high self-efficacy judgments in a particular area are not necessarily indicative of high self-efficacy in other domains.

In general, according to Pajares (1996), self-efficacy is a social cognitive theory of personality which postulates a triadic reciprocal interaction between individual's personal factors, environmental events, and behavior.

2.1.1. Self-Efficacy and Gender Difference

The relation between gender and self-efficacy is a focus of this research. In general, many researchers show that boys and men tend to be more confident than girls and women in academic areas related to mathematics, science and technology (Hackett and Betz, 1989; Pajares and Miller, 1994; Yalaw, 1997). It has been further noted that females have lower self-efficacy for scientific occupation and occupations requiring quantitative skills (Zeldin and Pajares, 2000). Women's continued under representation in the relatively higher paying, higher status, scientific and technical fields has been partially explained by their lack of preparation relative to men in mathematics (Goldman and Hewit, 1976; Hackett and Betz, 1989). In other studies, researchers revealed that female students take significantly fewer mathematics related courses than male students do in both high school and college, and fewer women than men elect to major in mathematics related courses (Tamir, 1988; Asefa and Carkiyogy, 2002). Low self-efficacy

beliefs of women are thought to reflect the limited and disadvantaged position, have in the work place, and the limited range of career positions presented to them (Betz and Hackett, 1981). The study of Miller et al. (1996) indicated that females had lower perceived ability in math than males. Low mathematical self-efficacy and inadequate high school math preparation both present more often in females than in males, low aspirations for future study in scientific fields (Lapan, Boggs, and Morril, 1989).

Many researchers investigated that lower self-efficacy in females than males in science classes (e.g. Pintrich and DeGroot, 1990; Hackett and Betz 1989). To sum up, Betz and Hackett (1981) in extending Bandura's theory to the domain of career behavior have pointed out the importance of the construct of self-efficacy in understanding the differences in the educational and career choices of women and men. They argue that largely as a result of socialization experiences women exhibit lower expectations than men for many achievement related behaviors and they fail to fully realize their capabilities and talents in career pursuits.

In many research works, frequently observed that the fields of mathematics, science, and technology are typically viewed by students as being with in a male domain (e.g., Fennema and Sherman, 1978; Assefa and Carkiyogy, 2002). In these areas, a masculine orientation is associated with confidence and achievement because masculine perceptions are themselves imbued with the notion that success in this

area is masculine imperative (Hackett, 1985; Eccles, 1986). Consequently, boys tend to be more confident and competent in these areas.

In other research work, Brinter and Pajares (2001) found that girls have higher self-efficacy and higher achievement than do boys. Girls also have stronger self-efficacy for self-regulation, this means students' judgments of their capability to use various self-regulated learning strategies have been found to predict achievement in both writing and mathematics.

2.1.2. Self-Efficacy and Academic Achievement

Students differ in their self-efficacy for learning as a function of their prior experiences, personal qualities, and social support. The latter, social support includes the extent that parents, peers and teachers encourage them to learn, facilitate their access to resources necessary for learning, and teach them self-regulatory strategies that enhance skill acquisition and refinement.

Parent academic aspirations for their children influence their children's achievement, both directly and indirectly, by influencing children's self-efficacy (Bandura et al., 1996). According to Pajares (1996) in academic setting, self-efficacy research has focused primarily on two major areas. One area has explored the link between efficacy beliefs and college major choices, particularly in the areas of science and mathematics. Studies in

the second area have investigated the relationship among efficacy beliefs, related psychological constructs and academic motivation and achievement. Many researchers have reported that mathematics self-efficacy of college undergraduates is more predictive of their mathematics interest and choice of math-related courses and major than either prior math achievement or math outcome expectations (Hackett and Betz, 1989; Pajares and Miller, 1994).

Self-efficacy has the power to predict intellectual performance better than skills alone and it directly influences academic performance through cognition, self-efficacy also indirectly affects perseverance (Schunk, 1984). When compared with students who doubt their learning capabilities and those who feel efficacious for learning or performing a task participate more readily, persist longer when they encounter difficulties, and achieve at higher level (e.g., Schunk, 1984; Yalaw, 1996, 1997). Students' confidence in their academic skills, expect higher marks on exam, and expect the quality of their work to reap on exam benefits. The opposite also true of those who lack such confidence, students who doubt their academic ability envision before they begin an exam (Pajares, 1997).

Individuals high in self-efficacy attempt challenging tasks more often, persist longer at them and exert more effort. If failure results, highly efficacious individuals attribute it to a lack of effort or an adverse

environment. When they succeed, they credit their achievement to their abilities.

In other words, those who regard themselves as inefficacious shy away from difficult tasks, slacken their effort and give up readily in the face of difficulties, dwell on their personal deficiencies, lower their aspirations, and suffer much anxiety and stress. Such self-misgiving undermines performance (Schunk, 1984; Bandura et al., 1996, Yalaw, 1996, 1997).

In different research results, positive and statistically significant relationship were found between self-efficacy and academic performance (Multon, Brown, and Lent, 1991; Yalaw, 1996, 1997; Hackett and Betz, 1989) The meta analysis of results obtained by Multon, Brown, and Lent (1991) on the relation between self-efficacy beliefs are related to performance and account for approximately 14% of the variance in students' academic performance ($r = 0.38$). Baldwin, Ebert-May, and Burns, (1999) stated that self-efficacy becomes more important over the duration of a course as science concepts increase in complexity.

Aptitude, attitude, and attributions were found to predict science self-efficacy in high school students' academic achievements (Yalaw, 1996:1997; Pajares and Miller, 1994). It is thought that science self-efficacy may affect science learning, choice, amount of effort exerted, and persistence in science (Kenned, 1998; cited in Witt-Ross, 2003).

2.2. Achievement Motivation

Motivation is the basic drive for all of our actions. Motivation refers to the dynamics of our behavior, which involves needs, desires, and ambitions in life. Achievement motivation is based on reaching success and achieving all of our aspirations in life. Achievement goals affect the way a person performs a task and represent a desire to show competence. According to Murry (1938) cited in Humphrey and Revelle (1984) indicated that achievement motivation to accomplish something difficult, to master, manipulate or organize physical objects, human beings, or ideas, to do this as rapidly and independently as possible, to overcome obstacles and attain a high standard, to excel one's self, to rival and surpass others, to increase self-regard by the successful exercise of talent (It is the study of how people) make intense, prolonged and repeated efforts to accomplish something difficult.

In other word, Atkinson (1964) defined achievement motivation as a person's disposition to approach success. It represents a person's interest to maintain a high standard of work as part of competitive life. A motive to achieve is manifested through man's action that is through interest and activity to master and manipulate his surroundings his social and physical environment. McClelland (1985) also showed, the *nach* person is achievement motivated and therefore seeks achievement, attainment of realistic but challenging goals and advancement in the job.

Like the above descriptions, many researchers have seen achievement motivation on the educational context. Harakiewicz and Elloit (1993), Daniel (1992) describes achievement motivation can be viewed as a multidimensional construct students engage in a variety of processes in the educational environment and they bring with them, a range of beliefs, responses and patterns of behavior to deal with their work.

Weiner (1972) outlined that the main behavioral difference between individuals high and low in achievement motive group are more likely to initiate achievement activities, they work with greater intensity, persist longer in the face of failure and choose more tasks of intermediate difficulty than person low in achievement needs. Also in other research, Halvari (1997) indicated that individual differences in personality dimensions such as, achievement motives causes' different perception of the same performance situation.

The achievement motive is important in the study of personality, because it influences both academic and economic performance. As a result, there has been considerable interest in defining, the factors that influence achievement motivation in individuals. Although some factors have yielded significant positive correlations in studies of individual differences, none can consistently account for high achievement motivation or the widely divergent background of those who are the actual achievers in society.

2.2.1. Achievement Motivation and Gender Difference

McClelland (1985) demonstrated that achievement motivation represents the motivation to persist until mastery is achieved. The achievement motivation was found to be influenced by gender factor. Veroff, Willox, and Atkinson (1958) cited in McClelland (1985) reported that female high school and college students unlike male students, did not show an increase in achievement related imagery after exposure to an achievement oriented situations compared with women in a neutral condition. Apparently, achievement oriented situation do not arouse women's need to achieve only men's.

Researchers, McClelland, Atkinson, Clark, and Lowell (1953) cited in Kelien (1982) discovered that women's need to achieve was actually lower in the achievement oriented conditions than in related or non achievement condition. Pattharst (1955) cited in Kelin (1982) reported that high *nach* high school boys felt they would obtain a better score on a novel than low *nach* girls. Farmer (1987) explained female achievement in the attribution literature, indicated that females were less intrinsically motivated and that their approach to achievement situation was characterized by learned helplessness. In many research works among different cultures indicated that boys have higher levels of achievement motivation than girls. Such observations are expected to be reflection of the socio-cultural influences on parenting and up bringing rather than built in differences. (Bandura et al., 1996)

demonstrate to self or to others high ability or to avoid demonstrating low ability. This implies that in achievement situations individuals desire success to the extent that it indicates high ability and seek to avoid failure to the extent that it indicates low ability.

The report of Weiner (1972): on achievement motive individuals, high in achievement motivation relative to those in the motive classification ascribes success to high ability and positive effort and failure to lack of effort. The correlation found by Weiner and Kukla (1970) between outcomes and perceived effort expenditure approximates $r = 0.45$ for person high in achievement concerns. Among individuals low in achievement needs this correlation approximates only $r = 0.10$. Thus individuals high in achievement determinants of outcome (high effort produces success and low effort results in failure). On the other hand, persons low in achievement needs perceive that outcome is only weakly influenced by how hard they have tried. However, they believe that personal failure is caused by a lack of ability. High *nach* people have a more intense desire to success than low *nach* people. Moreover, their higher achievement motive causes them to work harder than low *nach* persons in achievement oriented situations. High *nach* college students earn better grades for courses in their major area of study than low *nach* people (Daniel, 1992). Keln (1982) demonstrated that high *nach* persons choose jobs higher in status than low *nach* people. Apparently, high *nach* people compared with low *nach* people have higher expectations of

future success and work harder to secure a career which will allow them to be successful.

2.3. Attitudes

The term “attitudes” has come to be used to refer in a general way to such characteristics of individuals as feelings interest, appreciation, values, commitment, opinions, beliefs, and value systems. Many attempts have been made to define the term, with each attempt trying to clarify and state concisely the nature of the characteristics that is complex (Johnson and Keeves, 1994). Ajzen (2001) defined attitude is a state of readiness, a tendency to respond in a certain manner when confronted with a certain stimuli. Young (1998) also described attitudes may be determined a psychological tendency to evaluate an entity, and which is composed of emotional, cognitive, and behavioral components.

Besides Young, Greenwald et al. (1968) indicated that definitions have tended to subdivide attitude in to three components. (a) Cognitive, (b) affective and (c) behavioral. However, Klopfer (1976) clarifies this separation in to components in relation to science education and focuses consideration of affective behaviors or more specifically on the affective domain in contrast to the cognitive domain. The affective domain is conceived of a continuum of such characteristics formed around the process of internalization. Through which a phenomenon or value successively and pervasively becomes part of the individual (Klopfer,

1976). The major levels of affective continuum are; (a) receiving or attending, (b) responding, (c) valuing, (d) organization(d) characterization by a value or value compel. Through this taxonomy of the affective domain more precise definition of certain student characteristics can be advanced that leads to more precise measurement of attitude toward science.

Many researchers have done on the attitudes of students toward science. They have seen attitude toward science in a different way to measure: Frasser's (1981) cited in Linn (1998) Test of Science Related Attitude (TOSRA) based on seven components: the normality of scientists, social implications of science, attitude toward inquiry, scientific attitudes, enjoyment of science classes, leisure interest in science, and career interest in science. Gogulin and Swartz (1992) also classified factors in which the attitude may be negative or positive by six: teacher perception, anxiety toward science, value of science to society, self concept and enjoyment of science and motivation of science.

Favorable attitudes make students to learn and particularly crucial to facilitate learning in school. Attitudes motivate students to learn more about specific subject and gain satisfaction by accomplishing the various requirements of the subjects (Lin, 1998; Neal, Grill and Timer, 1970; Young, 1998). Students' attitudes toward science have long been regarded as one of the most important outcomes of teaching.

Many researchers on science education announced that the goal of science education is to develop scientifically literate individuals who understand how science, technology and society influence one another. Such individuals both appreciate the value of science and technology in society and understand their limitations (Lin, 1998). Teachers' desire is to teach students who are motivated to learn. Because students who are motivated to participate in learning activities, stay engaged in learning task, and show commitment for learning. The characteristics help students to create goals and beliefs that play an essential part in maintaining a long term relations with learning (McCown, Driscoll and Roop, 1996). In general, research works have identified the factors that influence are attitude, gender, age, teaching strategy, subject content, teacher attitude, learning environment, pace of learning, self-concept and parental attitude.

2.3.1 Attitudes and Gender Difference

School subject choices (science in particular), can be thought of as an expression of gender stereotypes that exist in society at large. These stereotypes portray the males as the dominant person, the one who works outside the home is often prestigious occupations, while the female is portrayed as being subordinate and confined to the home (Steimatter, 1985).

Moreover, these stereotypes reinforce the fact that females predominantly choose the humanities and domestic science, while males choose science and technology related fields (Tamir 1988).

Research in science education indicates that gender influences attitudes toward the subjects. Simpson and Oliver (1985) in multidimensional study among approximately 4,000 students in grades 6 through 10, found that boys exhibited significantly more positive attitudes toward science than girls. In addition, many studies, high school girls rated their degrees of interest in different subjects and physical science as well as future career preference. Girls were more likely to indicate interest in other subjects than physical science and were more likely to predict having future careers in health science and other fields than physical science (Tamir, 1988; Fridler and Tamir, 1990). Numerous studies have shown significant relations between attitudes during the high school years and decisions to pursue careers in math and science. In fact, women and men in science careers, as compared with those in non science careers, took more high school elective science courses and aspired to higher prestige careers as adolescents (Mpuchana and Nkoma, 1999). However, female students generally take fewer science classes in high school than their male counterparts (Tamir, 1988). Even, among college students who are interested and capable of achieving in math and science girls tend to have taken fewer advanced mathematical courses in high school than their peers (Bleeks and Jacobs, 2004).

Gender related differences favored male students in a number of subjects, most notably, in the natural and computer sciences (Sweller, 1989). In the case of advanced placement test taking enrollment by male and female students, some examinations are gender typed. For instance, psychology, French, and Spanish attract more female students, and computer science and physics attract considerably more male students than female students. It is true, of course that this pattern of enrollment largely reflects the ratios of male students and female students registered for test constitute a fact worthy of study its own right. Also Sioberg (1988) documented a male advantage in understanding of science, which tended to increase from grades 4 to 12. For students in grade 12 who majored in science, differences were rather small in biology, greater in physics, and even greater in Chemistry.

Like in high school female students' course interest and college majors' patterns of women are participating significantly more in biological science careers than in physical science careers. Thirty six percent of employed biological scientists are women, while women comprise only 9.7% of physics and 6% of electrical and mechanical engineers (NSF, 2000: Cited in Phillips 2002).

According to Tamir's (1988) study, the result revealed that on the average more boys intend to study for higher university degrees. Almost perfect match exists between subjects chosen for further study and career orientation. While subjects and choose science oriented careers, a more

detailed analysis reveals that differences hold for natural sciences and engineering but for medicine. In fact 12% of the girls compared with 11% of boys aspired medical careers. The low percentage girls electing engineering is especially conspicuous and is in agreement with findings in most researches. Bleeks and Jacobs (2004) show the participation of women and their involvement in the streams of physical science, despite efforts to increase the participation of women in high status fields involving mathematics and science, women continue to be less likely than men to peruse a college education in science fields.

More positive attitudes for males have not always been seen when the population have been subdivided further. For example, Brinter and Pajares (2001) found that elementary school girls liked science more than similar aged boys. Both groups' interest levels declined during intermediate school, but boys' interest rose again during high school girls did not show positive attitude.

In the meta analysis of different studies on attitudes toward science, there were gender related differences in attitudes to the physical and biological science (Ormerod and Duckworth, 1975; Haladyna and Shoughnessy, 1982). They found that there were small differences in attitudes toward science for boys and girls.

On the opposite of the above descriptions Neathery (2000) revealed that female students receive an equal, or some times better grades in science courses.

2.3.2 Attitudes and Academic Achievement

Attitudes associated with science appear to be affecting students' participation in science as subject and impacting performance in science (Lin, 1998). Many research works show the relation between attitude and academic achievement. The majority of the researcher revealed positive attitude underlie better achievements, or better achievements are caused by more of positive attitudes toward the subject. An international assessment of nine-and-thirteen- year old students in twenty countries (IAEP, 1992; cited in Neathry, 2000) revealed that positive attitudes toward science influence student performance.

The relation between math attitude and mathematics performance has been extensively investigated. In research works of Seleshi (1995) Kabir and Kiamnesh (2004) found that students who performed better on mathematics test tend to have positive attitude toward math. Kabir and Kiamnesh (2004) examined the relationship among the factors on students' attitude toward learning mathematics, students mathematical creativity and students' school grades and the effect on achievement in mathematics. Finally they found out that the best predictor among the variable was the students' attitude toward learning mathematics.

science as well as in other subjects and even though girls' over all academic achievement exceeds that of boys (Becker, 1989).

One of the important issues in science education is whether or favorable attitudes to sciences lead to a higher level of performance. Wick and Yager (1966) reported no relation ship between attitudes to science and achievement.

On the contrary, different research works revealed that there is no relation between attitude and academic achievement. In the research of language achievement, Kuhlemier et al. (1996) reported that students' initial attitudes toward German language had no effect on eventual achievements in the subjects. Students who were positive attitude toward German at the beginning of the year did not show better performance on the tests for reading, word-comprehension, writing, grammar, spelling, vocabulary, knowledge, or listening than those having a less positive initial attitude toward German language.

CHAPTER THREE

3. METHODS AND DESIGN OF THE STUDY

This chapter describes the participants, the sampling producers, the data collecting techniques, and the statistical procedures employed to analyze the data.

3.1. Participants

Participants consisted of 202 grade 10 students (94 girls and 108 boys). Stratified random sampling technique was employed to select students from DebreBrhane General Secondary School. The sample consisted of students in the regular classes. The total number of students enrolled in the school were 2063. During the time of test administration some students were absent. So those students were excluded from the analysis. Instruments (the scales) were administered by the author and the assistants. The science test was administered two days later, after administering the self report scales. The reason why, the investigator has selected only grade 10 students is that at this time students are in a position to decide their future career and placement of their study area. Therefore, they are pertinent to impart the needed information for the purpose of this study's issue.

3.2. Procedures

All the questionnaires were group administered while the students were attending their regular classes. First, science self efficacy (chemistry, physics and biology), attitudes to ward science (chemistry, physics and biology) and science achievement motivation (chemistry, physics, and biology) were provided to them. They were also instructed to read the instructions carefully to answer all the questions, and to give their genuine response. After two days latter the general science test (chemistry, physics, and biology), handed out to the students to work on it. To avoid cheating among the students while taking the exam, the classroom teachers, the researcher and the assistants were assigned as invigilators.

Procedures were similar to those used by self-efficacy researchers (e.g., Brinter & Pajares, 2001; Bandalos et al, 2003; Witt-Rose, 2003), Attitude researchers (e.g., MacMillan et al., 1992; Tamir, 1988) and Achievement motivation researchers (e.g., Fortune, Lee, & Cavazos, 2005).

3.3. Instruments and Variables

3.3.1. Instruments

Scales used in the present study have been used by researchers in numerous investigations on the influences of non-cognitive factors to the achievement of students. All the scales asked students to provide judgments along a 4 point Likert continuum ranged from 1 (strongly

disagree) to 4 (strongly agree). Also science achievement test was employed to examine the students' level of performance on each science subject (chemistry, physics and biology).

Science Self-Efficacy- Social cognitive theory maintain that self-efficacy scales should correspond to the outcomes with which self-efficacy scores will be compared the students' science achievement (chemistry, physics and biology) in general got with the general science test. Consequently, students' science (chemistry, physics, and biology) self-efficacy scale for each subject to provide a rating of their confidence level for each subject.

The Scale consisted of 12 similar items for each subject (chemistry, physics and biology). The Cronbach alpha, a measure of the internal consistence reliability of science self-efficacy (SSE) was 0.89. The Cronbach alphas' for the SSE subsections were: chemistry self-efficacy (CSE) = 0.86, physics self-efficacy (PSE) = 0.80 and biology self-efficacy (BSE) = 0.82. The scale was adapted from Bandalos et al. (2003) and Pintrich and DeGroot (1990). The wordings of the adapted items were changed to fit issues of this study.

Attitudes toward Science - The scale consisted of 17 similar items for each subject (chemistry, physics and biology). The instrument was designed to assess the students' attitude toward science in general and chemistry, physics and biology subject for each in a particular form. The obtained reliability coefficient of Cronbach alpha for attitudes toward

science (ATS) was 0.87 and the Cronbach alphas' for the ATS Subsections were: attitudes toward chemistry (ATC) =0.84, attitudes toward physics (ATP) = 0.79 and attitudes toward biology (ATB)=0.80

The scale was adapted from Young (1998) and other researchers. The wording of the adapted items changed and modified to make it straight to the need of this investigation.

Science Achievement Motivation—This was obtained from students' rating based on their perceptions about their desire and willingness to exert efforts to be effective in science subjects. The scale adapted from Daniel (1992) and in addition developed by the investigator.

The Cronbach alpha, a measure of the internal consistence reliability of science achievement motivation (SAM) was 0.80. The Cronbach alphas' for the subsections of SAM were; chemistry achievement motivation (CAM) = 0.77; physics achievement motivation (PAM)= 0.78 and biology achievement motivation (BAM)=0.76. Like that of the other scales, the items of the adapted scale were modified accordingly.

Science Achievement Test—It was used to assess students' achievement level of science in general and to see students' achievement on chemistry, physics, and biology subjects in a specific form. Accordingly, 63 items of science achievement test (each with 21 items) were constructed to cover both grade levels (grades 9 and 10) science subjects. The Kuder Richardson 20 (K.R-20) measure of the internal consistency reliability of science performance (SPR) was 0.84.

The K.R-20 for SPR subsections where: chemistry performance (CPR) = 0.82, physics performance (PPR) = 0.80 and biology performance (BPR) = 0.81. All the items for the achievement test were objective type, each item having four alternatives. The test was then administered to the pilot samples from grade 10 students and item analysis was carried out. More specifically, indices of item discrimination and effectiveness of each distracter were analyzed on the subjects whose total score fall in the upper 27% and the lower 27% (Ebel, 1979; Anastasi, 1982). There were 82 items (28 items of chemistry, 28 items of physics and 26 items of biology) of test. After analyzing each item's difficulty, discriminating level and modification of items, 63 items were remained for the final work (21 for each subject).

3.3.2. Variables

The following variables were considered in the study;

Independent variables

1. Gender
2. Science self-efficacy
 - Chemistry self-efficacy
 - Physics self-efficacy
 - Biology self-efficacy
3. Science achievement Motivation
 - Chemistry achievement motivation

- Physics achievement motivation
- Biology achievement motivation
- 4. Attitudes toward science subject
 - Attitudes toward chemistry
 - Attitudes toward physics
 - Attitudes toward biology

Dependent variable

1. science subjects performance
 - Chemistry performance
 - Physics performance
 - Biology performance

3.4. Data Analysis

The major purpose of this study was to examine the effects of gender, science self-efficacy, attitudes toward science and science achievement motivation on science performance, to show the difference between males and females among the variables. To do this, the statistical techniques, the t-test, simple correlations between variables and multiple regression analysis, were used. Alpha value of 0.05 was used for all significance tests carried out in this study.

CHAPTER FOUR

4. RESULTS

This section presents the results of statistical analysis carried out to answer the basic questions raised in the present study.

Then, results of the main study are presented in this section in the following order

1. Gender difference in science subjects self-efficacy, achievement motivation, attitudes and Performance.
2. Regression analysis to see the prediction of the independent variables to the science subjects performances.
3. Stepwise regression, to see the most and the least contributor variable for the prediction of science performances.

4.1. Gender Difference among the Variables

4.1.1. Gender Difference in Science Self Efficacy

Table 1 Means, standard deviations and t-values for males and females on CSE, PSE and BSE

Variable	Group	N	Mean	SD	t
CSE	Male	108	35.99	5.42	5.83*
	Female	94	31.60	5.25	
PSE	Male	108	32.65	6.15	4.04*
	Female	94	29.52	461	
BSE	Male	108	37.41	5.90	3.45*
	Female	94	34.60	5.45	

*P < 0.05

As it is depicted in Table -1, it is shown that there was a significant gender difference of grade 10 students among their self efficacy level of the science subjects (CSE, PSE and BSE). These, the three subjects self-efficacy level, t-values were greater than the critical value ($t_{cr}= 1.96, df =200, P<0.05$). It implies grade 10 male students science self-efficacy was greater than female counter parts significantly at 0 .05 level of significance.

4.1.2. Gender Difference In Science Achievement Motivation

Table 2 Means, standard deviations and t-values for males and females on CAM, PAM and BAM

Variable	Group	N	Mean	SD	t
CAM	Male	108	34.14	4.85	1.27
	Female	94	33.35	3.82	
PAM	Male	108	33.29	5.16	1.06
	Female	94	32.60	3.92	
BAM	Male	108	35.03	5.24	1.86
	Female	94	33.78	4.18	

$$P > 0.05$$

Table 2 indicates that the t-value of mean differences of the students' science achievement motivation level is based on their gender difference.

The observed t-values of CAM, PAM, and BAM were less than the critical value ($P>0.05$). Based on students' gender difference, there were no significant mean differences among the three science subjects on the

level of their science achievement motivation. However, there were slight mean variations between the two groups with the favor of male students with the three science subjects.

4.1.3. Gender Difference in Students' Attitudes toward Science Subjects

Table 3 Means, standard deviations and t-values for males and females on ATC, ATP and ATB

Variable	Group	N	Mean	SD	t
ATC	Male	108	50.56	7.84	2.64*
	Female	94	47.72	7.37	
ATP	Male	108	46.82	8.66	2.54*
	Female	94	43.93	7.34	
ATB	Male	108	53.21	7.78	0.82
	Female	94	52.32	7.70	

*P<0.05

One of the question among the basic questions was, whether or not a statistically significant difference between male and female students' attitude toward science subjects? To answer this question, Table 3 reveals that the mean differences between male and female students among the three science subjects. Attitudes of students on both subjects, (physical sciences), chemistry (ATC) and physics (ATP), show that there were a significant differences in their attitudes level among grade 10 male and female students (P<0.05). However, students' attitudes toward biology subject (ATB) failed to reach significant difference between male and female students even if there was a slight mean difference between

male and female students attitude toward biology with the favor of male students.

4.1.4. Gender Difference in Science Subjects

Performance

Table 4 Means, standard deviations and t-values for males and females on

CPR, PPR and BPR

Variable	Group	N	Mean	SD	t
CPR	Male	108	9.99	4.05	3.34*
	Female	94	8.24	3.27	
PPR	Male	108	8.28	3.20	1.97*
	Female	94	7.43	2.96	
BPR	Male	108	10.86	3.84	2.69*
	Female	94	9.41	3.77	

*P< 0.05

To see gender difference in science subject performance, Table 4, shows the independent sample t-test values of male and female students' science subject performance. The observed t-values of CPR, PPR and BPR show significant difference between male and female students ($P<0.05$). The comparisons of male and female students with science subject performance were statistically significant mean difference between them. This indicates that with all the three subjects performance of male was greater than female students.

4.1.5. Gender Difference on the Dependent and Independent Variables in General

Table 5 *Means, standard deviations and t-values for males and females on SSE, SAM, ATS and SPR*

Variable	Group	N	Mean	SD	t
SSE	Male	108	106.05	14.57	5.52*
	Female	94	95.71	11.56	
SAM	Male	108	102.45	12.51	1.76
	Female	94	99.72	8.87	
ATS	Male	108	150.60	18.16	2.88*
	Female	94	143.97	13.84	
SPR	Male	108	29.13	9.41	3.21*
	Female	94	25.09	8.33	

*P< 0.05

The other intent of this study was to compare the total sum of mean scores of each variable based on gender difference. To attain this, t-test was computed and results were presented in Table 5. As it is shown in Table 5, gender difference with SSE, ATS and SPR were greater t- values ($p < 0.05$). The above t-tests revealed that the three variables mean score differences were statistically significant between male and female students but, not significant difference with SAM. This implies that there was a statistically significant difference between male and female grade 10 students with those variables (SSE, ATS and SPR).

4.2. Correlation Analysis of the Variables

Pearson product moment correlations were computed between gender, self-efficacy, achievement motivation, attitudes and performance on each subject and science in general

Table 6 Inter-correlations among the variables in Chemistry subject

Variables	1	2	3	4	5
Gender	-				
CSE	0.38*	-			
CAM	0.08	0.32*	-		
ATC	0.18*	0.42*	0.30*	-	
CPR	0.23*	0.36*	0.12	0.32*	-

*P< 0.05

Table 6 portrays that gender was positively and significantly related with chemistry performance (CPR) ($r=0.23$, $p<0.05$). It indicates that students' gender difference influences their chemistry performance (CPR). In addition, CPR was positively and significantly correlated with CSE ($r=0.36$, $p<0.05$) and ATC ($r=0.32$, $p<0.05$). This indicates that as the students efficacy level and interest on chemistry increases, their chemistry performance also increases. However, the relation of CPR with CAM was failed to reach the significant level.

Table 7 Inter-correlations among the variables in Physics subject

Variables	1	2	3	4	5
Gender	-				
PSE	0.28*	-			
PAM	0.08	0.23*	-		
ATP	0.17*	0.62*	0.20*	-	
PPR	0.14*	0.27*	0.12	0.25*	-

*P<0.05

Table 7 indicates that physics performance (PPR) was positively and significantly correlated with gender ($r=0.14$, $P< 0.05$), PSE ($r=0.27$, $P< 0.05$) and ATP ($r=0.29$, $p<0.05$). Thus, the correlations indicate that the variation of physics performance (PPR) influenced by students gender difference, their level of physics self-efficacy and attitudes toward physics subject (ATP). But, students' level of physics achievement motivation (PAM) did not show significant relation with physics performance (PPR).

Table 8 Inter-correlations among the variables in Biology Subject

Variables	1	2	3	4	5
Gender	-				
BSE	0.21*	-			
BAM	0.13*	0.39*	-		
ATB	0.09	0.46*	0.40*	-	
BPR	0.19*	0.40*	0.10	0.27*	

Table 8 indicates that biology performance (BPR) was positively and significantly correlated with gender ($r=0.19$, $p< 0.05$), biology self-efficacy (BSE) ($r=0.40$, $p< 0.05$) and attitudes towards biology (ATB) ($r=0.27$, $P< 0.05$). These indicate the students' biology performance was determined by their gender difference and level of biology self-efficacy (BSE) and attitude toward biology (ATB). However, students' level of biology achievement motivation (BAM) did not show significant relation with biology performance (BPR).

Table 9 Inter-correlations among the variables in science

Variables	1	2	3	4	5
Gender	-				
SSE	0.36*	-			
SAM	0.12	0.44*	-		
ATS	0.20*	0.54*	0.42*	-	
SPR	0.22*	0.43*	0.12	0.44*	-

As shown in table 9, the inter-correlations of variables by cumulating the subsections into a single variable. It reveals that there were a positive significant relationship between science performance (SPR) and gender ($r=0.22$, $p< 0.05$), SPR and science self-efficacy (SSE) ($r=0.43$, $P< 0.05$) and SPR and attitudes toward science (ATS) ($r=0.44$, $P< 0.05$).

These indicate, the students' science performance (SPR) level influenced by their gender difference, their level of science self-efficacy (SSE) and their attitudes toward science subject (ATS). However, science achievement motivation (SAM) was failed to reach significant relation with science performance (SPR)

4.3. Effects of independent Variables on Science Subjects

Performance

The contribution of the independent variables to the prediction of science subject (chemistry, physics and biology) performances.

Table 10 Results of regression analysis on chemistry performance

Source of variations	Df	SS	MS	F	R ²
Regression	4	506.382	126.595	10.40*	0.174
Residual	197	2399.202	12.179		
Total	201	2905.584			

* $P<0.05$

Table 10 provides the results of the regression analysis when CPR was regressed on the predictor variables (CSE, CAM, ATC, and gender) which accounted for 17.4% of the variance in CPR ($F_{(4,197)} = 10.40$, $P < 0.05$). The analysis indicated that there was a significant relation between chemistry performance (CPR) of grade 10 students and a linear combination of the predictor variables.

Table 11 Results of regression analysis on physics performance

Source of variations	Df	SS	MS	F	R ²
Regression	4	207.637	51.909	5.83*	0.107
Residual	197	1741.512	8.840		
Total	201	1949.149			

* $P < 0.05$

Table 11 provides the results of regression analysis when PPR was regressed on the predictor variables (PSE, PAM, ATP and gender) which accounted for 10.7% of the variance on PPR ($F_{(4,197)} = 5.83$, $P < 0.05$). The analysis indicated that there was a significant relations between physics performance of grade 10 students and a linear combination of the predictor variables.

Table 12 Results of regression analysis on biology performance

Source of variations	Df	SS	MS	F	R ²
Regression	4	500.892	125.223	9.85*	0.167
Residual	197	2503.989	12.710		
Total	201	3004.851			

* $P < 0.05$

Table 12 provides the results of regression analysis, when BPR was regressed on the predictor variables (BSE, BAM, ATB and gender) which accounted for 16.7% of the variance on BPR ($F_{(4,197)}=9.85$, $P<0.05$). Which indicated that there was overall strong relationships between biology performance (BPR) of grade 10 students and a linear combination of the predictor variables.

Table 13 Results of regression analysis on science performance in general

Variables	B	SEB	t
Gender	1.303	1.206	1.08
SSE	1.76	.052	3.40*
SAM	-0.091	.058	-1.56
ATS	0.177	.322	4.27*

Constant = -8.14

* $P<0.05$

The relative contributions of gender, science self-efficacy(SSE), science achievement motivation (SAM) and attitudes toward science (ATS) to the prediction of science subjects performance (SPR). Beta weight was calculated for each variable to show the relative contribution of the criterion variable.

The computation of the beta weight for each variable (Table 13) shows that gender, SSE, SAM, and ATS have beta values of, 1.303, 0.176, -0.091, and 0.177 respectively.

The main concern of multiple regression analysis was to see whether the independent variables were statistically significant to predict science subject performance of the target group or not, as demonstrated by t-test

($t_{(200)}=1.96$, $P<0.05$). The beta values of SSE and ATS were statistically significant despite the higher beta value of gender than ATS. Gender was not statically significant. It is because of the higher standard error associated with it.

Multiple correlations show a significant relationship between the students' SPR and a combination of the independent variables. This multiple regression analysis revealed that the predictor variables (gender, SSE, SAM and ATS) combined together added significantly to the prediction of science performance (SPR) ($F_{(4,197)}=16.98$, $P<0.05$)

As indicated by the coefficient of multiple determination ($R^2=0.256$, 25.6%) of the variation in science performance, it accounted for by variability in the variation of the independent variables.

4.4. Predictor Variables more Important in Accounting For the Variation of Science Performance

The results of stepwise multiple regression analysis in which the predictor variables were identified in terms of the order of their importance in explaining the variation in science performance is indicated table 14.

Table 14 Results of stepwise regression on science performance in general

Step	Variables	R	R ²	F
1	ATS	.439	.192	47.65
2	SSE	.492	.242	31.79
3	All variables	.506	.256	16.98

As shown in Table 14, when all the variables were entered in to the regression equation, attitude was found to be the variable that relatively accounted for the highest variation in the students' science performance.

This variable contributed 19.2% of the total variation in science performance. Science self efficacy of the students was the next best variable that entered into the regression equation. Including this self-efficacy from attitude it raised the coefficient of determination by 5.0%.

The contribution of the other independent variables SAM and gender difference appears to be very small variation. The contribution of these variables in the multiple determinations when the rest two variables (SAM) and gender were entered was only 1.4% which indicates very less relation to science performances (SPR).

CHAPTER FIVE

5. DISCUSSION

In this section, the results reported in chapter four are interpreted and discussed. Accordingly, the results on gender difference on science self-efficacy, science achievement motivation, attitudes toward science subject, and performance on science subjects are first discussed. This is followed by discussion of the combined and the relative contribution of independent variables to the dependent variable

5.1. Gender Difference among Variables

In this section an attempt was made to answer the specific research question of whether male and female students differ significantly on science self-efficacy, science achievement motivation, and attitudes toward science subject and science subject performance. To analyze the result the t-test was employed.

5.1.1. Gender Difference in Science Self-Efficacy

Tests of mean self-efficacy differences for the samples based on their gender were evident that there was a statistically significant difference. That is, males were more efficacious than females with SSE ($t_{(200)} = 5.53$, $p < 0.05$).

When science subject is classified into its sub sections, tests of their mean differences are based on students' gender were significant $t_{(200)} =$

5.83, $p < 0.05$) for CSE, ($t_{(200)} = 4.04$, $P < 0.05$) for PSE, and ($t_{(200)} = 3.45$, $p < 0.05$) for BSE. These figures indicate that male students in grade 10 had greater self-efficacy than their female counter parts. These findings are consistent with many research results. The results confirm that male students' had higher self-efficacy than female students. For example, Pintrich and DeGroot (1990) found that secondary level of female students had lower self-efficacy than male students in math. Tippir (1991) cited in Witt-Rose (2003) also indicated that statistically significant difference between male and female grade 9 students in science self efficacy, especially on the physical science subjects.

Similarly, study findings of Smist, Archambault, & Own (1997) cited in Witt- Rose (2003) in secondary education showed that males were found to have higher self-efficacy in physics, chemistry and laboratory. In line to this study's results, DeBaker and Nelson (2000) found that high school girls scored lower than boys on perceived ability in biology, accelerated chemistry, physics and advanced placement physics.

The studies, done in college student also showed similar results as observed in the high school students'. The research examined in college science self-efficacy level, demonstrated that women's perception of their capabilities to succeed in mathematics and related areas were very low (Hackett, 1985; Pajares and Miller, 1994). Consequently, the perception of students' capability directly influences their variability in math,

science & technology performance and career choice (Hackett, 1985; Hackett and Betz, 1989; Andrew, 1998).

There are some studies conducted on high school students in Ethiopia, in these studies (e.g., Yalew, 1996,1997; Eshetie, 2001) students self-efficacy difference was reported. The studies confirmed that male participants showed that higher self-efficacy than female counterparts. Yalew (1997) reported that male students had higher physics self-efficacy than female high school students. Eshetie (2001) also reported that there was a significant gender difference between male and female students with math self-efficacy level of high school students.

Researchers have also observed that students typically view such areas mathematics, science and technology as male domains (Fennema and Sherman, 1978). In science areas, there is a masculine orientation association with confidence and achievement because masculine self-perceptions are imbued with the notion that success is masculine imperative (Eccles, 1986; Hackett, 1985). Consequently, boys tend to be more confident and competent in these areas.

In the contrary to the above descriptions and the present finding, there are research works which show non significant difference between males and females with self-efficacy. For example, Brinter and Pajares (2001) found that girls had higher science self-efficacy and higher achievement than boys do. Smist, Archeambault, & Own (1997) cited in Witt-Rose

(2003) found that females had higher self-efficacy than males in biology. However, Witt-Rose's (2003) finding failed to reach significant gender difference between males and females science self-efficacy by college-students.

The possible reasons for such differences between male and female students' science self-efficacy may be, there are more male students found science than female students on the preparatory classes, mostly science teachers are males. Science teachers, parents, and society in general expect to be done with male students rather than female students.

5.1.2. Gender Difference in Science Achievement Motivation

Though science achievement motivation of sample male students is higher than female students, the results of the t-test revealed that the variable science achievement motivation was not a statistically significant difference between male and female groups. This indicates there is non significant difference in the level of their science achievement motivation between males and females.

The t-test of the students' achievement motivation based on their gender difference was not significant for SAM ($t_{(200)} = 1.76$, $P > 0.05$). The t-value for each of the subject was also failed to reach significant difference between the groups. Thus, there was no significant gender difference

with the science achievement motivation in general and for chemistry, physics, and biology in particular.

In line with the present finding, Fortune, Lee, & Cavazos (2005) denoted that achievement motivation was not related to the evaluation outside observers and their field instruction. Therefore, there was no significant relationship because of gender differences. Farmer (1987) also explained about gender difference in academic achievement motivation, gender role expectations, today remain unclear. The socialization of girls and boys, men and women, leads to social role expectation and related behavior that result in gender difference in achievement and related motivation. Related to this result, Herman (1970) reported non-significant difference between males and females in achievement motivation level. Bernstein et al. (1991) cited in Assefa (1997) argued with a similar idea that females can show the pattern of achievement motivation and non achievement motivation situations but behave only in verbal.

The possible reasons for the inconsistency of this result with many other research works may be, in that, schools are becoming more conscious of gender bias and stereotype practices. They have also been becoming equitable and have narrowed the achievement motivation belief gap between the gender differences. The other reason might be the time to data collection. The data for this study were collected before the EGSECE exam. During that period, all students were preparing for this exam.

Moreover, it was the time when teachers, parents, and peers were making them to study hard to attain good scores and pass the examinations. So, this scale might reflect the influenced behavior with these confounding variables because of the situations they faced them during that time.

5.1.3. Gender Difference in Attitudes toward Science Subject

There was a statistically significant difference between males and females in rating attitudes towards science subject. When the mean differences of males and females were tested, males showed more favorable attitude toward science than female counterparts ($t_{(200)} = 2.88$, $p < 0.05$) in ATS.

The science subject sub-sections were also examined and they indicate the mean differences of male and female students of each subject. The t-values of ATC and ATP showed significant difference between male and female students ($t_{(200)} = 2.64$, $P < 0.05$) for ATC ($t_{(200)} = 2.54$, $P < 0.05$) for ATP. But non significant difference showed between male and females students with ATP.

The result of the present study is related with many research works. Directly, in line to this finding, Catasambis (1995) found that female students' attitude toward science were significantly more negative than male counterparts despite achieving higher grades and scoring similar on achievement tests. Overwhelmingly, the results have shown that males

attitudes were significantly more positive than female attitudes (Catasambis, 1995; Simpson & Oliver, 1985). Also, in a similar way Smith (1992) has shown that boys exhibited significantly more positive attitudes toward science than girls for every grade level. Girls had more negative attitudes towards science than boys but they even still have higher science grades (Becker, 1989).

Studies have also done on the preference of students to be enrolled as a career on science subjects. It was found that boys prefer to study physics, chemistry and biology while females strongly avoid studying science and mathematics (now, 1994). In the same way, Archer and McDonald (1991) in gender related subject preference study suggested that the subjects most commonly liked by boys are mathematics, science and game (physical activity). English, biology and French are the most popular feminine subjects, but chemistry and physics referred often as masculine subjects.

Tamir (1988) tried to show students' attitude in a general and specific form based on gender difference. In a general form girls are less interested in science learning. They have less understanding of the nature of science, and are less inclined to study science in college. While examining students' attitude in a specified form, surprisingly his result coincides with this result. Accordingly, Tamir (1988) demonstrated that boys in Israel tend to specialize in high school physics and girls tendency was to specialize biology. However, the result of him was not showing

significant gender difference with students' biology attitude. Tamir (1988) also demonstrated that male students' attitude towards physics are more positive than female students. The students who showed large positive gains in physical science interest score indicated that they preferred a specific career related activity.

There are also other research works that support this research results. Steinkamp and Maehr (1984) explained that there is a gender differences in attitudes and achievement scores. They found that there was a higher difference in physics and chemistry, and rather small differences in biology between male and female students.

Studies in Ethiopia (Yalew, 1997; Assefa and Carkiyogy, 2002; Assebe, 1997) revealed that attitude differences have been observed with gender differences. They concluded that male students had higher level of science attitudes than female students.

The general picture emerging from the results may be summarized in many research works there were gender related differences in attitudes toward the physical and the biological sciences. Subsequently, girls in general are less interested in studying science, have less positive attitude toward science learning, have less understanding of the nature of science, and are less inclined to continue to study science in college.

5.1.4. Gender Difference and Science Subject Performance

Tests of mean differences in students science subject performance on students' gender difference was positive and significant with the favor of male students.

The findings indicated that male students showed significant gender difference for SPR in a general form ($t_{(200)}$). When it is classified into sub sections, it also showed statistically significant difference at the level of $P < 0.05$. Thus, it indicates male students outperform female students in science subjects. With these, three subjects, male students have shown greater performance than female students.

Similarly, a number of studies were reported on gender differences in science subjects' performance with the favor of male students (e.g., Smith, 1997). Interestingly, consistent to the present result, the First International Science Study (FISS) finding indicated boys performed better than girls in many countries, the mean differences between the boys and girls was 0.69 standard deviations. When subtests were compared, the corresponding figure for biology, chemistry, and physics were 0.26, 0.44 and 0.77 respectively of their standard score difference (Tamir, 1988). Like the FISS, the report of the Second International Science Study (SISS) standard score differences of male and female students were 0.24, 0.33, 0.40 for biology, chemistry, and physics performance respectively (Assefa and Carakiyogy, 2002).

The results of many studies are inconsistent from one author's to the other's result. For example, Becker (1989) found that males significantly outperform females, the difference between males and females performance were large for physics and biology with only small or insignificant difference in chemistry. Steinkamp and Maehr (1984) found that there was a significant achievement score difference between male and female students in physics and chemistry, and small differences in biology. The work of Tamir (1988) showed that boys consistently achieve in high school physics. They are better to apply their physics concepts, more of them aspire for scientific career. On the other hand girls are more interested in biology concepts. They achieve better in certain topics such as genetics and human biology.

Similar to the findings of this study, there were a number of local studies undertaken on the influence of gender differences in students' academic performance. They indicated males outperform female counterparts (e.g., Yalew, 1997; Eshetie, 2001; Seleshi, 1995).

Gender difference of any variable is not homogenous across measures, age groups, and content areas which make it difficult to draw any general conclusion (Assefa & Carkiyogy, 2002). Supporting the above ideas, the study conducted in Maryland, Virginia, with 2,800 students, analysis of the data confirms gender difference achievement in mathematics. Boys and girls perform evenly well through the first year of high school, but the final years, fewer girls than boys opt for more

advanced mathematics course and male students tend to score higher than females on mathematics section of Scholastic Aptitude Test (Norman, 1989; cited in Shami, 1996).

Contrary to the assumption, males favor career choice in science subjects which depends on science ability. Stinkamp and Maehr (1983) reported that males and females do not differ greatly in their actual academic abilities. It is certain that females enroll insignificantly advanced mathematics and science less than males do. Females believe that mathematics and science are less useful in their lives than do males.

The possible explanations for female students' lower performance than male counterparts may be, gender roles and types of encouragement and discouragement, expectation, different learning opportunities and values placed on the subject. Other sources for lower performance may include parents, peer, and the society and culture them living.

According to Seleshi's (1995) explanation, most girls in this area do housework such as cooking, taking care of their young brothers or generally helping their over burdened mothers. Training for their future role as wives and mothers at home would also take their time. This leaves them very little time for their study. Consequently, they are unable to score higher on subjects as that of male counterparts.

science (ATS) was 19.2%, and the next variable that could influence students SPR was SSE, which accounted for 5.0% of the variance of science performance. The remaining two variables (SAM and gender difference) did not provide significant contribution for the variance of science performance (SPR).

The potential of attitude influences science performance as illustrated in many researches. For example, Keeves (1992) cited in Johnson and Keeves (1994) reported that both the 10-year old level and the 14-year old level attitudes to school science involved both ease of science learning and interest in school science had a direct effect in accounting for differences in science achievement between students within classrooms. Welch (1969) evaluated the Harvard project physics and reported positive correlation between attitude and achievement in the range of 0.2 to 0.35.

Similarly, the capacity of self-efficacy to influence students' academic performance is explained by many researchers. The meta analysis research has shown that self-efficacy can generally be expected to account for approximately 14% of the academic performance (Multon et al., 1991). Andrew (1991) found that students' self-efficacy predict 24% of the students' academic performance in physical science and 18.5% in life science.

The results of many studies (e.g., Hackett & Betz, 1989; Pajares, 1996; Ma & Kishor, 1997; Middleton & Spanis, 1999) confirmed that students

with positive attitude toward science subjects have high self-efficacy beliefs at a specific domain and achieve better. Even if attitude and self-efficacy are predictors of performance, consequently with previous findings the predictive power of students' self-efficacy was found to be stronger than the corresponding power of attitude (Hackett & Betz, 1989; Zimmermann, 2000; Yalw, 1997).

To obtain the needed information, 4 instruments have been administrated, those were, science self-efficacy scale, science achievement motivation scale, attitudes toward science subject scale, and science performance test. Each instrument has subsections based on the classification of science subject.

At the beginning, the instruments were administrated on a pilot sample. Based on the pilot responses, item analysis was employed and the instruments were modified.

To analyze the data, comparison of means (independent sample t-test), simple correlations, multiple regression and stepwise multiple regression were employed. The analyses revealed that there were statistically significant results in some variables, and failed to show significant result in the other variables. All significant results of t-tests were in the favor of male students.

There was significant mean difference in science self-efficacy between male and female students. Similarly, the t-test employed to show gender difference in attitude toward science subject and as a whole showed statistically significant. However, when science is subdivided into components, attitudes difference was significantly showed in chemistry and physics but failed to show significant difference in biology. Science performance of students also showed significant mean difference between male and female grade 10 students. It has

1. There is a significant gender difference in science self-efficacy in general. Significantly more male students perceive themselves efficacious with chemistry, physics, and biology.
2. There is no significant mean difference in science achievement motivation between male and female students. The sub sections of science (chemistry, physics and biology) also show non significant difference between male and female students.
3. Significant difference is observed between male and female students' attitudes toward science in general, male students attitudes toward physics and chemistry is higher than female students, but their attitudes in biology is similar to females students.
4. There is a significant gender difference in science performance in general and also on the subject chemistry, physics and biology performance in a particular form.
5. Attitudes toward science, science self-efficacy, science achievement motivation, and gender difference variables strongly predict science subject performance. From the predictor variables, attitudes toward science subject was found to be the highest predictor variable.
6. In general non-cognitive variables have the capacity to influence students' performance and at the same time their enrollment in science subjects.

6.3. Recommendation

Based on the findings of this study and conclusions, the following recommendations are forwarded.

1. Science teachers should pay as much attentions to students' perception of competence as it is the perception that may accurately predict students' motivation and future academic choice.
2. Parents and science teachers are responsible to convey a massage that success in academic area is a matter of desire, effort, and commitment rather than that of gender difference.
3. Parents and science teachers should stress the importance and values of science and encourage girls to persist and preserve in the face of academic and social obstacles and breakdown stereotypical conceptions regarding academic domains.
4. The school counselor and science teachers should become an effective team, each to complete the function of the other. By making students to attribute their confidence in the science subjects.
5. Educational practices should be gauged not only by skill and knowledge they impart for present use also by what they do to children's beliefs about their capabilities which affects how they approach the future.
6. More research is needed to determine why some types of academic fields and female students produce different beliefs than male students.

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Appendix -A

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Dear Student

This questionnaire uses to get first hand information about self-efficacy, achievement motivation and attitude of Grade 10 students in relation to their academic achievement of science subjects (physics, chemistry and biology). The questionnaire consists of three parts, namely: science self-efficacy scale, science achievement motivation scale and science attitude scale. The scales have directions; please respond to all the items according to the direction. Your frank and honest response to each item is practical and very important in succeeding this study.

Thank you in advance.

Part one

Please read each statement carefully based on the extent to which an item explains your agreement level and circle one of the following degrees of agreement accordingly on the space provided

1. Strongly Disagree (SD)
2. Disagree (D)
3. Agree (A)
4. Strongly agree (SA)

1.Science Self –Efficacy

No.	1.1. For chemistry subject	SD	DA	A	SA
1.	I am confident that I have the ability to master the ideas learnt in Chemistry	1	2	3	4
2.	I don't think, I will do better than other students with chemistry	1	2	3	4
3.	I don't think, I will be successful in chemistry	1	2	3	4
4.	I am confident that I can understand the topics in chemistry.	1	2	3	4
5.	I feel like I don't know a lot about chemistry	1	2	3	4
6.	Compared with other students in the class I don't feel I have good study skills.	1	2	3	4
7.	It is easy for me to achieve a good grade in chemistry	1	2	3	4
8.	I am confident that I can do well on the assignments, lab practices and project works	1	2	3	4
9.	I have a lot of weaknesses to understand chemistry.	1	2	3	4
10.	I am confident that I can receive good grade in chemistry	1	2	3	4
11.	I am confident that I can do well even the most difficult work.	1	2	3	4
12.	I consider my self very poor at chemistry	1	2	3	4
	1.2. For physics subject				
1.	I am confident that I have the ability to master the ideas learnt in physics	1	2	3	4
2.	I don't think, I will do better than other students with physics	1	2	3	4
3.	I don't think, I will be successful in physics	1	2	3	4
4.	I am confident that i can understand the topics in physics.	1	2	3	4
5.	I feel like I don't know a lot about physics	1	2	3	4
6.	Compared with other students in the class I don't feel I have good study skills.	1	2	3	4
7.	It is easy for me to achieve a good grade in physics	1	2	3	4
8.	I am confident that I can do well on the assignments, lab practices and project works	1	2	3	4
9.	I have a lot of weaknesses to understand physics.	1	2	3	4
10.	I am confident that I can receive good grade in physics	1	2	3	4
11.	I am confident that I can do well even the most difficult work.	1	2	3	4
12.	I consider my self very poor at physics	1	2	3	4

No	1.3. For biology subject	SD	DA	A	SA
1.	I am confident that I have the ability to master the ideas learnt in biology	1	2	3	4
2.	I don't think, I will do better than other students with biology	1	2	3	4
3.	I don't think, I will be successful in biology	1	2	3	4
4.	I am confident that I can understand the topics in biology.	1	2	3	4
5.	I feel like I don't know a lot about biology	1	2	3	4
6.	Compared with other students in the class I don't feel I have good study skills.	1	2	3	4
7.	It is easy for me to achieve a good grade in biology	1	2	3	4
8.	I am confident that I can do well on the assignments, lab practices and project works	1	2	3	4
9.	I have a lot of weaknesses to understand biology.	1	2	3	4
10.	I am confident that I can receive good grade in biology	1	2	3	4
11.	I am confident that I can do well even the most difficult work.	1	2	3	4
12.	I consider my self very poor at biology	1	2	3	4

2. Science achievement motivation

No.	2.1. For chemistry subject	SD	DA	A	SA
1.	I usually spend a great effort to accomplish the work on time.	1	2	3	4
2. ✓	I would like to find a life in which one would not have to work at all.	1	2	3	4
3.	I appreciate students who excel with chemistry.	1	2	3	4
4.	Even though the questions included from other books are few, I would like to read all related materials.	1	2	3	4
5.	If I have not attained my goal and have not done a task well then I usually give up.	1	2	3	4
6.	I usually tackle the easy problems first and do not worry about the more difficult ones.	1	2	3	4
7.	Regardless of its level of difficulty, I always continue to achieve my goal.	1	2	3	4
8.	I usually set my goals only as high as I can easily reach.	1	2	3	4
9.	If I failed several times consecutively, I would quit trying as hard for the next time.	1	2	3	4
10.	I often do some thing until it is completed though it is dull and boring to me.	1	2	3	4
11.	I don't prefer a little risk to make a lot	1	2	3	4
12.	I am not concerned about the scores I receive on the tests and exams of chemistry	1	2	3	4

No	2.2. For physics subject	SD	DA	A	SA
1.	I usually spend a great effort to accomplish the work on time.	1	2	3	4
2.	I would like to find a life in which one would not have to work at all.	1	2	3	4
3.	I appreciate students who excel with physics.	1	2	3	4
4.	Even though the questions included from other books are few, I would like to read all related materials.	1	2	3	4
5.	If I have not attained my goal and have not done a task well then I usually give up.	1	2	3	4
6.	I usually tackle the easy problems first and do not worry about the more difficult ones.	1	2	3	4
7.	Regardless of its level of difficulty, I always continue to achieve my goal.	1	2	3	4
8.	I usually set my goals only as high as I can easily reach.	1	2	3	4
9.	If I failed several times consecutively, I would quit trying as harder for the next time.	1	2	3	4
10.	I often do some thing until it is completed though it is dull and boring to me.	1	2	3	4
11.	I don't prefer a little risk to make a lot	1	2	3	4
12.	I am not concerned about the scores I receive on the tests and exams of physics	1	2	3	4
	2.3. For biology subject				
1.	I usually spend a great effort to accomplish the work on time.	1	2	3	4
2.	I would like to find a life in which one would not have to work at all.	1	2	3	4
3.	I appreciate students who excel with biology.	1	2	3	4
4.	Even though the questions included from other books are few, I would like to read all related materials.	1	2	3	4
5.	If I have not attained my goal and have not done a task well then I usually give up.	1	2	3	4
6.	I usually tackle the easy problems first and do not worry about the more difficult ones.	1	2	3	4
7.	Regardless of its level of difficulty, I always continue to achieve my goal.	1	2	3	4
8.	I usually set my goals only as high as I can easily reach.	1	2	3	4
9.	If I failed several times consecutively, I would quit trying as harder for the next time.	1	2	3	4
10.	I often do some thing until it is completed though it is dull and boring to me.	1	2	3	4
11.	I don't prefer a little risk to make a lot	1	2	3	4
12.	I am not concerned about the scores I receive on the tests and exams of biology	1	2	3	4

3. Attitudes toward Science

No.	3.1. Attitudes toward chemistry	SD	DA	A	SA
1.	I am interested in chemistry	1	2	3	4
2.	I feel comfortable in chemistry classes	1	2	3	4
3.	I prefer learning chemistry than other subject	1	2	3	4
4.	I detest chemistry and avoid its all the times	1	2	3	4
5.	I have seldom liked studying chemistry	1	2	3	4
6.	I am enthusiastic about chemistry	1	2	3	4
7.	I usually enjoy with doing chemistry	1	2	3	4
8.	I am eager to see new lessons day today	1	2	3	4
9.	Doing chemistry exam doesn't make me anxious	1	2	3	4
10.	I am enthusiastic about chemistry teacher	1	2	3	4
11.	I like to read about chemistry	1	2	3	4
12.	I don't mind doing chemistry	1	2	3	4
13.	Chemistry more of game than it is a hard work	1	2	3	4
14.	I listen when a friend talks about chemistry	1	2	3	4
15.	I would encourage my friends to pursue chemistry	1	2	3	4
16.	Some times I read ahead in our chemistry text book.	1	2	3	4
17.	The ideas in chemistry are not very useful	1	2	3	4
No.	3.2. Attitudes toward physics	SD	DA	A	SA
1.	I am interested in physics	1	2	3	4
2.	I feel comfortable in physics classes	1	2	3	4
3.	I prefer learning physics than other subject	1	2	3	4
4.	I detest physics and avoid its all the times	1	2	3	4
5.	I have seldom liked studying physics	1	2	3	4
6.	I am enthusiastic about physics	1	2	3	4
7.	I usually enjoy with doing physics	1	2	3	4
8.	I am eager to see new lessons day today	1	2	3	4
9.	Doing physics exam doesn't make me anxious	1	2	3	4
10.	I am enthusiastic about physics teacher	1	2	3	4
11.	I like to read about physics	1	2	3	4
12.	I don't mind doing physics	1	2	3	4
13.	physics more of game than it is a hard work	1	2	3	4
14.	I listen when a friend talks about physics	1	2	3	4
15.	I would encourage my friends to pursue physics	1	2	3	4
16.	Some times I read ahead in our physics text book.	1	2	3	4
17.	The ideas in physics are not very useful	1	2	3	4

No.	3.3. Attitudes toward biology	SD	DA	A	SA
1.	I am interested in biology	1	2	3	4
2.	I feel comfortable in biology classes	1	2	3	4
3.	I prefer learning biology than other subject	1	2	3	4
4.	I detest biology and avoid its all the times	1	2	3	4
5.	I have seldom liked studying biology	1	2	3	4
6.	I am enthusiastic about biology	1	2	3	4
7.	I usually enjoy with doing biology	1	2	3	4
8.	I am eager to see new lessons day today	1	2	3	4
9.	Doing biology exam doesn't make me anxious	1	2	3	4
10.	I am enthusiastic about biology teacher	1	2	3	4
11.	I like to read about biology	1	2	3	4
12.	I don't mind doing biology	1	2	3	4
13.	biology more of game than it is a hard work	1	2	3	4
14.	I listen when a friend talks about biology	1	2	3	4
15.	I would encourage my friends to pursue biology	1	2	3	4
16.	Some times I read ahead in our biology text book.	1	2	3	4
17.	The ideas in biology are not very useful	1	2	3	4

Part two

Please respond to the following general information by marking (√) or inserting the required information in the space provided

1. Sex Male ☐ Female ☐
2. Age _____
3. Section 10th _____
4. Roll No _____
5. School _____

Appendix -B

አዲስ አበባ ዩኒቨርሲቲ
ድህረ ምረቃ መርሀ ግብር
የሳይኮሎጂ ትምህርት ክፍል

በተማሪ የሚሞላ

የዚህ መጠይቅ ዋና አላማ የተማሪዎችን በሳይንስ /በፊዚክስ፣ በኬሚስትሪ እና በስነ-ህይወት/ ትምህርት ላይ የእስራዋለሁ /እችለዋለሁ/ ስሜት፣ ለውጤት የመነሳሳት ስሜት እና አመለካከቶች በትምህርታቸው ውጤት ላይ ያለውን ዝምድና ለማየት እና ከተገኘው መረጃ በመነሳት አስፈላጊውን የመፍትሔ አቅጣጫ ለመጠቀም ነው። ስለሆነም ሁሉንም ጥያቄዎች በመሙላት እንዲተባበሩ በትህትና እጠይቃለሁ። የእርስዎ ግልፅነት የተሞላበት እና በታማኝነት የተሰጡት መልስ ለጥናቱ መሳካት ጥሩ አስረዋጽኦ አለው።

በቅድሚያ ስለትብብርዎ በጣም አመስግናለሁ።

ክፍል አንድ

ከዚህ በታች ሶስት ንዑስ ክፍሎች አሉ። ከእያንዳንዱ ንዑስ ክፍል የቀረቡት ጥያቄዎች ከፊት ለፊታቸው ከሚገኙት አማራጮች መካከል የሚስማሙበትን መልስ መርጠው ያክብቡ።

- | | |
|-------------------------|------------------------|
| 1. በጣም አልስማማም /በጣም አልስ/ | 2. አልስማማም /አልስ/ |
| 3. እስማማለሁ /እስ/ | 4. በጣም እስማማለሁ /በጣም እስ/ |

1. የእሰራዋለሁ ወይም እችለዋለሁ ባይነት ስሜት (Self Efficacy)

ተ.ቁ.	1.1. በኬሚስትሪ ትምህርት	በ አል	አል	እስ	በጣ እስ
1	የኬሚስትሪ ትምህርት በደንብ መረዳት እችላለሁ፡፡	1	2	3	4
2	ከክፍል ጓደኞቼ በተሻለ ኬሚስትሪን እሰራለሁ ብዬ አላስብም፡፡	1	2	3	4
3	በኬሚስትሪ ትምህርት ውጤታማ የምሆን አይመስኝም	1	2	3	4
4	በኬሚስትሪ ትምህርት የምማራቸውን ሀሳቦች በደንብ እረዳለሁ	1	2	3	4
5	በኬሚስትሪ ትምህርት በቂ እውቀት የለኝም	1	2	3	4
6	ከሌሎች ተማሪዎች አንፃር ስታይ ጥሩ የአጠናን ስልት የለኝም	1	2	3	4
7	በኬሚስትሪ ትምህርት ጥሩ ውጤት ማስመዝገብ ለኔ ቀላል ነው	1	2	3	4
8	የቤት ስራ እና የቤተ መብራሪ ስራዎችን በተሻለ እሰራለሁ	1	2	3	4
9	የኬሚስትሪ ትምህርትን የመረዳት ድክመት አለብኝ	1	2	3	4
10	በኬሚስትሪ ትምህርት ጥሩ ውጤት እንደማስመዘገብ እርግጠኛ ነኝ	1	2	3	4
11	የኬሚስትሪ ትምህርት አስቸጋሪ እንኳን ቢሆንም የተሻለ እንደምሰራ እርግጠኛ ነኝ	1	2	3	4
12	በኬሚስትሪ ትምህርት በጣም ደካማ ተማሪ ነኝ	1	2	3	4
ተ.ቁ.	1.2. በፊዚክስ ትምህርት	በ አል	አል	እስ	በጣ እስ
1	የፊዚክስ ትምህርትን በደንብ መረዳት እችላለሁ፡፡	1	2	3	4
2	ከክፍል ጓደኞቼ በተሻለ ፊዚክስን እሰራለሁ ብዬ አላስብም፡፡	1	2	3	4
3	በፊዚክስ ትምህርት ውጤታማ የምሆን አይመስኝም	1	2	3	4
4	በፊዚክስ ትምህርት የምማራቸውን ሀሳቦች በደንብ እረዳለሁ	1	2	3	4
5	በፊዚክስ ትምህርት በቂ እውቀት የለኝም	1	2	3	4
6	ከሌሎች ተማሪዎች አንፃር ስታይ ጥሩ የአጠናን ስልት የለኝም	1	2	3	4
7	በፊዚክስ ትምህርት ጥሩ ውጤት ማስመዝገብ ለኔ ቀላል ነው	1	2	3	4
8	የቤት ስራ እና የቤተ መብራሪ ስራዎችን በተሻለ እሰራለሁ	1	2	3	4
9	የፊዚክስ ትምህርትን የመረዳት ድክመት አለብኝ	1	2	3	4
10	በፊዚክስ ትምህርት ጥሩ ውጤት እንደማስመዘገብ እርግጠኛ ነኝ	1	2	3	4
11	የፊዚክስ ትምህርት አስቸጋሪ እንኳን ቢሆንም የተሻለ እንደምሰራ እርግጠኛ ነኝ	1	2	3	4
12	በፊዚክስ ትምህርት በጣም ደካማ ተማሪ ነኝ	1	2	3	4
ተ.ቁ.	1.3. በስነ ህይወት ትምህርት	በ አል	አል	እስ	በጣ እስ
1	የስነ ህይወት ትምህርት በደንብ መረዳት እችላለሁ፡፡	1	2	3	4
2	ከክፍል ጓደኞቼ በተሻለ ስነ ህይወት እሰራለሁ ብዬ አላስብም፡፡	1	2	3	4
3	በስነ ህይወት ትምህርት ውጤታማ የምሆን አይመስኝም	1	2	3	4
4	በስነ ህይወት ትምህርት የምማራቸውን ሀሳቦች በደንብ እረዳለሁ	1	2	3	4
5	በስነ ህይወት ትምህርት በቂ እውቀት የለኝም	1	2	3	4
6	ከሌሎች ተማሪዎች አንፃር ስታይ ጥሩ የአጠናን ስልት የለኝም	1	2	3	4
7	በስነ ህይወት ትምህርት ጥሩ ውጤት ማስመዝገብ ለኔ ቀላል ነው	1	2	3	4
8	የቤት ስራ እና የቤተ መብራሪ ስራዎችን በተሻለ እሰራለሁ	1	2	3	4
9	የስነ ህይወት ትምህርትን የመረዳት ድክመት አለብኝ	1	2	3	4
10	የስነ ህይወት ትምህርት ጥሩ ውጤት እንደማስመዘገብ እርግጠኛ ነኝ	1	2	3	4
11	የስነ ህይወት ትምህርት አስቸጋሪ እንኳን ቢሆንም የተሻለ እንደምሰራ እርግጠኛ ነኝ	1	2	3	4
12	በስነ ህይወት ትምህርት በጣም ደካማ ተማሪ ነኝ	1	2	3	4

2. ለውጤት የመነሳሳት ስሜት (Achievement Motivation)

ተ.ቁ	2.1. በኬሚስትሪ ትምህርት	በጣ አል	አል	እስ	በጣ እስ
1	የቤት ስራዎች እና የቤተ መከራ ስራዎችን በአግባቡ አጠናቅቃለሁ	1	2	3	4
2	ብዙ ጊዜ ከባድ ያልሆኑ ስራዎችን እመርጣለሁ	1	2	3	4
3	በትምህርት ልቆ መገኘትን እንደ ስኬት አልቆጥረውም	1	2	3	4
4	ምንም እንኳን ከተማርነው ውጭ ፈተና ባይካተትም ተዛማጅ ነገሮችን ማንበብ ያስደስተኛል	1	2	3	4
5	ሥራዎችን በጥሩ ካልሰራውና ያለምክትን ግብ ካልመታሁ በቶሎ ተስፋ እቆርጣለሁ::	1	2	3	4
6	ብዙውን ጊዜ ቀላል ጥያቄዎች እንጂ ከባድ ያሆኑትን ጥያቄዎች አላተኩርባቸውም	1	2	3	4
7	አስቸጋሪ ቢሆንም እንኳን አላማየን ከማሳካት ወደ ጎላ አልልም	1	2	3	4
8	በቀላሉ ልደርስበት የምችለውን አልማለሁ	1	2	3	4
9	በተደጋጋሚ በፈተና ካልተሳካልኝ እንደገና ለመጣር አይገፋፋኝም	1	2	3	4
10	አሰልቼና አድካሚ ቢሆንም ነገሮችን ካላጠናቀኩኝ ማቆም አልፈልግም	1	2	3	4
11	ለላቀ ውጤት ቢሆንም ራሴን መጉዳት አልፈልግም	1	2	3	4
12	ስለ ኬሚስትሪ ትምህርት ውጤት ብዙም አልጨነቅም	1	2	3	4
ተ.ቁ	2.2. በፊዚክስ ትምህርት	በጣ አል	አል	እስ	በጣ እስ
1	የቤት ስራዎች እና የቤተ መከራ ስራዎችን በአግባቡ አጠናቅቃለሁ	1	2	3	4
2	ብዙ ጊዜ ከባድ ያልሆኑ ስራዎችን እመርጣለሁ	1	2	3	4
3	በትምህርት ልቆ መገኘትን እንደ ስኬት አልቆጥረውም	1	2	3	4
4	ምንም እንኳን ከተማርነው ውጭ ፈተና ባይካተትም ተዛማጅ ነገሮችን ማንበብ ያስደስተኛል	1	2	3	4
5	ሥራዎችን በጥሩ ካልሰራውና ያለምክትን ግብ ካልመታሁ በቶሎ ተስፋ እቆርጣለሁ::	1	2	3	4
6	ብዙውን ጊዜ ቀላል ጥያቄዎች እንጂ ከባድ ያሆኑትን ጥያቄዎች አላተኩርባቸውም	1	2	3	4
7	አስቸጋሪ ቢሆንም እንኳን አላማየን ከማሳካት ወደ ጎላ አልልም	1	2	3	4
8	በቀላሉ ልደርስበት የምችለውን አልማለሁ	1	2	3	4
9	በተደጋጋሚ በፈተና ካልተሳካልኝ እንደገና ለመጣር አይገፋፋኝም	1	2	3	4
10	አሰልቼና አድካሚ ቢሆንም ነገሮችን ካላጠናቀኩኝ ማቆም አልፈልግም	1	2	3	4
11	ለላቀ ውጤት ቢሆንም ራሴን መጉዳት አልፈልግም	1	2	3	4
12	ስለ ፊዚክስ ትምህርት ውጤት ብዙም አልጨነቅም	1	2	3	4
ተ.ቁ	2.3. በስነ ህይወት ትምህርት	በጣ አል	አል	እስ	በጣ እስ
1	የቤት ስራዎች እና የቤተ መከራ ስራዎችን በአግባቡ አጠናቅቃለሁ	1	2	3	4
2	ብዙ ጊዜ ከባድ ያልሆኑ ስራዎችን እመርጣለሁ	1	2	3	4
3	በትምህርት ልቆ መገኘትን እንደ ስኬት አልቆጥረውም	1	2	3	4
4	ምንም እንኳን ከተማርነው ውጭ ፈተና ባይካተትም ተዛማጅ ነገሮችን ማንበብ ያስደስተኛል	1	2	3	4
5	ሥራዎችን በጥሩ ካልሰራውና ያለምክትን ግብ ካልመታሁ በቶሎ ተስፋ እቆርጣለሁ::	1	2	3	4
6	ብዙውን ጊዜ ቀላል ጥያቄዎች እንጂ ከባድ ያሆኑትን ጥያቄዎች አላተኩርባቸውም	1	2	3	4
7	አስቸጋሪ ቢሆንም እንኳን አላማየን ከማሳካት ወደ ጎላ አልልም	1	2	3	4
8	በቀላሉ ልደርስበት የምችለውን አልማለሁ	1	2	3	4
9	በተደጋጋሚ በፈተና ካልተሳካልኝ እንደገና ለመጣር አይገፋፋኝም	1	2	3	4
10	አሰልቼና አድካሚ ቢሆንም ነገሮችን ካላጠናቀኩኝ ማቆም አልፈልግም	1	2	3	4
11	ለላቀ ውጤት ቢሆንም ራሴን መጉዳት አልፈልግም	1	2	3	4
12	ስለ ስነ ህይወት ትምህርት ውጤት ብዙም አልጨነቅም	1	2	3	4

3. አመለካከቶች (Attitudes)

ተ.ቁ	3.1. የኬሚስትሪ ትምህርት	በጣ አል	አል	እስ	በጣ እስ
1	የኬሚስትሪ ትምህርት እወዳለሁ፡፡	1	2	3	4
2	በኬሚስትሪ ክፍለ ጊዜ ጥሩ ስሜት ነው የሚሰማኝ ፡፡	1	2	3	4
3	ሁሉ ኬሚስትሪን ብማር ደስ ይለኛል	1	2	3	4
4	የኬሚስትሪ ትምህርት ስለምጠላ ብዙም አልከታተልም	1	2	3	4
5	በጣም አልፎ አልፎ የኬሚስትሪ ትምህርትን አጠናለሁ	1	2	3	4
6	ለኬሚስትሪ ትምህርት ክፍለ ጊዜ ልዩ ፍቅር አለኝ	1	2	3	4
7	የኬሚስትሪ ትምህርትን አዘውትሮ መስራት /ማንበብ/ ያስደስተኛል	1	2	3	4
8	አዳዲስ ነገሮችን በየጊዜው ለማየት እንጓለሁ	1	2	3	4
9	የኬሚስትሪ ፈተና ብዙም አያስጨንቀኝም	1	2	3	4
10	የኬሚስትሪ መምህራን በጣም ነው እምወዳቸው	1	2	3	4
11	ማንኛውንም ኬሚስትሪ ነክ ነገሮችን ማንበብ ያስደስተኛል	1	2	3	4
12	ስለ ኬሚስትሪ ትምህርት ብዙም ግድ የለኝም	1	2	3	4
13	ኬሚስትሪ ከአስጨናቂነቱ ይልቅ አዝናኝነቱ ያመዝናል	1	2	3	4
14	ስለ ኬሚስትሪ ሲወራ ማዳመጥ ደስ ይለኛል	1	2	3	4
15	ጓደኞቼ ይህንን ትምህርትን እንዲያተኩሩበት እገፋፋለሁ	1	2	3	4
16	የኬሚስትሪ መፅሐፌን ቀድሜ በማንበብ እዘጋጃለሁ	1	2	3	4
17	የኬሚስትሪ ፅንሰ ሐሳቦች ብዙም ጠቃሚ አይደሉም ብዬ አምናለሁ	1	2	3	4
ተ.ቁ	3.2. የፊዚክስ ትምህርት	በጣ አል	አል	እስ	በጣ እስ
1	የፊዚክስ ትምህርት እወዳለሁ፡፡	1	2	3	4
2	በፊዚክስ ክፍለ ጊዜ ጥሩ ስሜት ነው የሚሰማኝ ፡፡	1	2	3	4
3	ሁሉ ፊዚክስ ን ብማር ደስ ይለኛል	1	2	3	4
4	የፊዚክስ ትምህርት ስለምጠላ ብዙም አልከታተልም	1	2	3	4
5	በጣም አልፎ አልፎ የፊዚክስ ትምህርትን አጠናለሁ	1	2	3	4
6	ለፊዚክስ ትምህርት ክፍለ ጊዜ ልዩ ፍቅር አለኝ	1	2	3	4
7	የፊዚክስ ትምህርትን አዘውትሮ መስራት /ማንበብ/ ያስደስተኛል	1	2	3	4
8	አዳዲስ ነገሮችን በየጊዜው ለማየት እንጓለሁ	1	2	3	4
9	የፊዚክስ ፈተና ብዙም አያስጨንቀኝም	1	2	3	4
10	የፊዚክስ መምህራን በጣም ነው እምወዳቸው	1	2	3	4
11	ማንኛውንም ኬሚስትሪ ነክ ነገሮችን ማንበብ ያስደስተኛል	1	2	3	4
12	ስለ ፊዚክስ ትምህርት ብዙም ግድ የለኝም	1	2	3	4
13	ፊዚክስ ከአስጨናቂነቱ ይልቅ አዝናኝነቱ ያመዝናል	1	2	3	4
14	ስለ ፊዚክስ ሲወራ ማዳመጥ ደስ ይለኛል	1	2	3	4
15	ጓደኞቼ ይህንን ትምህርትን እንዲያተኩሩበት እገፋፋለሁ	1	2	3	4
16	የፊዚክስ መፅሐፌን ቀድሜ በማንበብ እዘጋጃለሁ	1	2	3	4
17	የፊዚክስ ፅንሰ ሐሳቦች ብዙም ጠቃሚ አይደሉም ብዬ አምናለሁ	1	2	3	4

ተ.ቁ	3.3. በስነ ህይወት ትምህርት	በጣ አል	አል	እስ	በጣ እስ
1	የስነ ህይወት ትምህርት እውቀት::	1	2	3	4
2	በ ስነ ህይወት-ክፍል ጊዜ ጥሩ ስሜት ነው የሚሰማኝ ::	1	2	3	4
3	ሁሌ ስነ ህይወትን ብማር ደስ ይለኛል	1	2	3	4
4	የ ስነ ህይወት ትምህርት ስለምጠላ ብዙም አልከታተልም	1	2	3	4
5	በጣም አልፎ አልፎ የ ስነ ህይወት ትምህርትን አጠናለሁ	1	2	3	4
6	ለስነ ህይወት ትምህርት ክፍል ጊዜ ልዩ ፍቅር አለኝ	1	2	3	4
7	የስነ ህይወት ትምህርትን አዘውትሮ መስራት /ማንበብ/ ያስደስተኛል	1	2	3	4
8	አዳዲስ ነገሮችን በየጊዜው ለማየት እንጓለሁ	1	2	3	4
9	የስነ ህይወት ፈተና ብዙም አያስጨንቀኝም	1	2	3	4
10	የስነ ህይወት መምህራን በጣም ነው እምወዳቸው	1	2	3	4
11	ማንኛውንም ስነ ህይወት ነክ ነገሮችን ማንበብ ያስደስተኛል	1	2	3	4
12	ስለ ስነ ህይወት ትምህርት ብዙም ግድ የለኝም	1	2	3	4
13	ስነ ህይወት ከአስጨናቂነቱ ይልቅ አዝናኝነቱ ያመዝናል	1	2	3	4
14	ስለ ስነ ህይወት ሲወራ ማዳመጥ ደስ ይለኛል	1	2	3	4
15	ጓደኞቼ ይህንን ትምህርትን እንዲያተኩሩበት እገፋለሁ	1	2	3	4
16	የስነ ህይወት መፅሐፌን ቀድሜ በማንበብ እዘጋጃለሁ	1	2	3	4
17	የስነ ህይወት ፅንሰ ሐሳቦች ብዙም ጠቃሚ አይደሉም ብዬ አምናለሁ	1	2	3	4

ክፍል ሁለት

ከዚህ በታች በቀረበው ግላዊ መረጃ እንደ አስፈላጊነቱ የ/√/ ምልክት በማድረግ እና ክፍር ቦታውን በመሙላት መልስ ይስጡ::

1. ያታ ወንድ ☐ ሴት ☐
2. እድሜ _____
3. ክፍል 10ኛ _____
4. የክፍል ተራ ቁጥር/ሽ/ _____
5. የትምህርት ቤቱ ስም _____

Appendix - C

General Science Test for Grade 10

Read each question and choose only the letter of your choice on the answer sheet provided.

Section 1 – Biology

1. The oxygen released during the process of photosynthesis is come from.
A. Water B. Carbon dioxide C. Glucose D. Atmosphere
2. The taste that most people sense on the back of the tongue is
A. Sweet B. Bitter C. Salty D. Sour
3. The amount of light entering the eye is determined by the size of the
A. Retina B. cornea C. Pupil D. Fovea
4. Impulses from the spinal cord to muscle fibers in the human leg are transmitted through structures known as:
A. Sensory neurons B. Motor neurons
C. Connective neurons D. Association neurons
5. The organelles responsible for the breakdown of worn out cell organelles and food vacuoles in protozoa is:
A. Lysomes B. Chromosomes C. Ribosomes D. Centrosomes
6. If a red blood cell is placed in hypotonic solution, the condition of the cell there after will be: A. Turgid B. Brust C. Plasomlysis D. Crenation
7. To which of the following classes does a leech belongs?
A. Polychaeta B. Hirudinea C. Oligochaeta D. Schypozoa
8. Which animal produces the list amount of heat per kilogram of body mass?
A. Mouse B. Rat C. Rabbit D. Elephant
9. Animals that feed on meat are categorized as:
A. Herbivores B. Carnivorous C. Omnivores D. Scavengers
10. Which one of the following deficiency disease is caused by lack of vitamin A?
A. Rickets B. Night blindness C. Beriberi D. Pellagra
11. Body temperature, in mammals, is regulated by the
A. Adipose tissue B. Skin C. Fat bodies D. Subcutaneous secretion
12. Which one of the following substances helps in blood clotting?
A. Vitamin E B. Vitamin K C. Vitamin D D. Vitamin B
13. The test for starch carried out on variegated leaves demonstrates the importance of ----- in photosynthesis.
A. Light B. Chlorophyll II C. Water D. CO₂
14. A common characteristic of animals and fungi is their ability to carry on:
A. Chemosynthetic nutrition B. Autotrophic nutrition
C. Heterotrophic nutrition D. Alcoholic fermentation
15. Which of the following portion of a food is usable and digestible
A. Roughage B. Bulk C. Fiber D. Nutrient
16. Loss of appetite and a disease called beriberi are caused by the deficiency of
A. Thiamin B. Niacin C. Riboflavin D. Pyridoxine
17. The first stage of cellular respiration is:
A. Citric acid cycle B. Electron transport
C. Glycolysis D. Kreb'scycle

18. The "Scientific method" involves all of the following except
 A. Imagination and insight C. Origin set of logical steps
 B. An educated guess D. A suspicion of what truth might be
19. Which of the following animals is characterized by variable body temperature?
 A. Bat B. Dog C. Snake D. Cat
20. Nitrogenous wastes may be produced as a result of the metabolism of
 A. Glucose B. Glycogen C. Fatty acids D. Amino acids
21. If one side of a DNA molecule contains the sequence AGTCCG, the complementary sequences on the other side would be
 A. CTGAAT B. TCAGGC C. AGTYCCG D. GCCTGA

SECTION-2 CHEMISTRY

22. The element bromine has two isotopes $^{79}_{35}\text{Br}$ and $^{81}_{35}\text{Br}$. They exist in nature in a 1:1 ratio what is the atomic mass of bromine?
 A. 35 B. 79 C. 80 D. 81
23. Which one of the following gases would have the highest average molecular speed at 25°C?
 A. CH_4 B. CO C. N_2 D. H_2
24. What type of bond is expected to be formed between atoms having greatly differing electro negativities?
 A. Ionic bond B. Metallic bond C. Dative bond D. Covalent bond
25. An atom has the electron configuration of $1s^2 2s^2 2p^6 3s^2 3p^6$. Its mass number is 35. What are its number of protons and neutrons respectively?
 A. 17 and 17 B. 17 and 18 C. 18 and 17 D. 15 and 20
26. Copper (I) oxide and copper (II) oxide illustrate the law of
 A. Isomers B. Isotopes C. Fixed ratio D. Multiple ratio
27. In which of the following species nitrogen has the lowest oxidation number?
 A. NH_3 B. N_2H_4 C. N_2O D. N_2O_4
28. Which oxide gives two kinds of acids when reacted with water?
 A. NO_2 B. N_2O C. N_2O_3 D. N_2O_5
29. Which of the following is an amphoteric oxide?
 A. BeO B. N_2O C. NO D. CO
30. In the reaction $\text{MnO}_2 + 2\text{KBr} + 2\text{H}_2\text{SO}_4 \rightarrow \text{MnSO}_4 + \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O} + \text{Br}_2$, the substance oxidized is
 A. Bromine B. Manganese C. Sulphur D. Potassium
31. C_2H_2 , C_3H_4 , C_4H_6 are members of: A. Alkanes B. Alkenes
 C. Alkynes D. Cycloalkanes
32. Atomic size of elements along a period in the periodic table generally
 A. Increases C. Remains the same
 B. Decreases D. Increase initially and decreases latter
33. What are the numbers of protons, neutrons and electrons respectively in $^{40}_{20}\text{Ca}^{2+}$?
 A. 20, 22, 18 B. 20, 20, 22 C. 20, 20, 18 D. 22, 20, 20

49. How large should be the vertical component of a 15N force is if its horizontal component is 9N?
 A. 6N B. 12N C. 17.5N D. 24N
50. Over what distance of a uniform electric field of 10N/C potential difference of 5 volts.
 A. 2m B. 1m C. 0.5m D. 0.2m
51. If the radius of satellite's orbit is halved its kinetic energy changes by a factor of:
 A. 4 B. $\frac{1}{2}$ C. $\frac{3}{4}$ D. 2
52. What is the nature of the image formed by an object placed between the focal point and the vertex of a converging lens?
 A. Virtual, erect and diminish in size
 B. Real, erect and enlarged
 C. Real, inverted and magnified in size
 D. Virtual, erect and magnified in size
53. Two charges $q_1 = -Q$ and $q_2 = +Q$ are 1m apart. The resultant electric potential midway between the charges is (Take $q_1 = -10C$ and $K = 9 \times 10^9 \text{ NM}^2/\text{C}^2$)
 A. Zero B. $-1.8 \times 10^3 \text{V}$ C. $1.8 \times 10^3 \text{V}$ D. $3.6 \times 10^3 \text{V}$
54. Which one of the following is a term used to represent the maximum displacement of a body in vibration from its equilibrium position?
 A. Wavelength B. Period C. Pulse D. Amplitude
55. In the rippled tank experiment the water waves change direction when they cross from the deeper to the shallower part of the water, which property of waves is responsible for those phenomena.
 A. Refraction B. Reflection C. Diffraction D. Doppler effect
56. Which one of the following is more appropriate for explained mirages?
 A. Total internal refraction B. Total internal reflection C. Diffraction D. Inference
57. What will happen to the electric potential at a point in the field of positive charge if the distance from the charge doubles?
 A. Increases two times B. Decreases by half C. Increases four times D. Decreases to a quarter
58. The unit of magnetic flux is:
 A. Tesla B. Weber C. Henry D. Gauss
59. In the thermionic diode values, which one of the following produces free electrons when heated?
 A. Valve B. Anode C. Diode D. Cathode
60. Transistors are used in the following except:
 A. Radios B. Transformers C. Computers D. Amplifiers
61. what fraction of a second is 1us?
 A. One hundredth B. One thousandth C. One millionth D. One billionth
62. Which physical quality is a non-zero constant in a uniform motion?
 A. Distance B. Displacement C. Velocity D. Acceleration
63. The driver of a car observes a motor cycle moving at 20km/hr in the same direction relative to him. If the speed of the motorcycle relative to the ground is 70km/hrs what is the speed of the car relative to the ground?
 A. 50km/h B. 60km/hr C. 40km/h D. 30 km/h

Answer Sheet

Name ----- Section ----- Roll No.-----

- | | | |
|-----------|-----------|-----------|
| 1. ----- | 22. ----- | 43. ----- |
| 2. ----- | 23. ----- | 44. ----- |
| 3. ----- | 24. ----- | 45. ----- |
| 4. ----- | 25. ----- | 46. ----- |
| 5. ----- | 26. ----- | 47. ----- |
| 6. ----- | 27. ----- | 48. ----- |
| 7. ----- | 28. ----- | 49. ----- |
| 8. ----- | 29. ----- | 50. ----- |
| 9. ----- | 30. ----- | 51. ----- |
| 10. ----- | 31. ----- | 52. ----- |
| 11. ----- | 32. ----- | 53. ----- |
| 12. ----- | 33. ----- | 54. ----- |
| 13. ----- | 34. ----- | 55. ----- |
| 14. ----- | 35. ----- | 56. ----- |
| 15. ----- | 36. ----- | 57. ----- |
| 16. ----- | 37. ----- | 58. ----- |
| 17. ----- | 38. ----- | 59. ----- |
| 18. ----- | 39. ----- | 60. ----- |
| 19. ----- | 40. ----- | 61. ----- |
| 20. ----- | 41. ----- | 62. ----- |
| 21. ----- | 42. ----- | 63. ----- |

DECLARATION

This thesis is my original work and have not been presented for degree in any other university and that all sources of materials used the thesis have been duly acknowledged.

Name Mustafa Abdelo
Signature [Signature]
Place A.A.U
Date of Submission July 31, 2008

The thesis has been submitted for examination under my approval as a research advisor.

Name _____
Signature _____