A COMPARATIVE STUDY TO EXAMINE MATHEMATICS ACHIEVEMENT OF SCIENCE AND NON-SCIENCE HIGH SCHOOL STUDENTS IN THE ODI REGION OF BOPHUTHATSWANA.

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A RESEARCH PROJECT REPORT SUBMITTED TO THE SCHOOL OF EDUCATION, UNIVERSITY OF BOPHUTHATSWANA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF BACHELOR OF EDUCATION.

SCHOOL OF EDUCATION

SUBMITTED: FEBRUARY 1994

ABSTRACT

This study compares the mathematics achievement of some science and non-science high school students. The aim of the study was to examine whether the mathematics performance scores of students in science high schools are significantly higher than those of their counterparts in non - science high schools. It was also examined to what extent mathematics performances of high school students relate to their socioeconomic background, math self - efficacy and attributional beliefs. Students from a science school and a non-science school served as subjects. The above stated variables were measured by already established scales. Analysis of results revealed that generally the mathematics performance scores of science high school students were not significantly higher than those of their counterparts in a non-science high school. Math performance scores were not found consistently related to other variables (socioeconomic background, math self - efficacy, math confidence and attributional beliefs).

The absence of differences in mathematics performance scores between the science high school and non-science high school students may be attributed to the fact that the science high schools, have recently been established. At the time of this study it was their second year of existence.

ACKNOWLEDGEMENTS

I would like to express my particular appreciation to my supervisor, Prof. M. Maqsud, for the time, patience and encouragement which made it possible for the completion and compilation of my research project.

I would also like to express my appreciation to the Principals, Staff and students of Kwena -ya- Madiba and Micha-Kgasi high schools without them my project would have been incomplete. Lastly, I wish to express my gratitude to Joseph, my husband for his assistance with typing and to my children, Stephen and Reotshepile. Their patience, support and understanding encouraged me throughout.

Special thanks to Mrs. Mmabatho Mfikoe for proof reading my report.

TABLE OF CONTENTS

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the problem

The standard 10 results in mathematics have been shockingly poor over the years in the Odi region of Bophuthatswana. For instance, in 1990, 813 candidates from Garankuwa, Jericho and Mabopane Circuits of Education from the Odi region wrote matric mathematics examinations and approximately 20% passed the subject. This type of poor results discouraged high school students to choose mathematics as their academic subject. The recurrence of poor matric mathematics results in Bophuthatswana resulted in the Department of Education (Bophuthatswana) opening science high schools where students interested in studying science subjects, including mathematics, are admitted. These schools are provided with qualified and experienced teachers, especially in these fields of study in order to enhance the students' interest in the science subjects. Three such science high schools were opened in the Odi region, one school in each circuit. These schools are:

(i) Setlalentwa High School (Garankuwa)

(ii) Mabopane High School (Mabopane)

(iii) Kwena-ya-Madiba High School (Jericho)

The philosophy behind the establishment of science schools was to create an academic environment wherein students could have an increased interaction with teachers who are experienced and expertly qualified and hold positive attitudes toward science subjects. This kind of interaction between students and teachers would be conducive for the formation of positive attitudes toward mathematics and science amongst high school students. If the

Department of Education is successful in achieving its goals in relation to the establishment of science high schools, the students of science high schools are expected to be significantly different in their : (a) mathematics achievement, (b) confidence in learning mathematics, (c) judgments of their capabilities, and (d) attributional beliefs from their counterparts in ordinary high schools.

Bandura (1977) introduced the concept of self-efficacy and explained that it refers to the " people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura 1986:391). According to Bandura, self-efficacy beliefs will affect the choice of tasks and the amount of effort someone chooses to expend. In another motivational theory, Weiner(1980) suggested that people attribute consequences of their behaviour to certain causal agents, seeking reasons for their successes and failures. According to Weiner's attribution theory, causal attributes for success or failure are generally associated with ability, effort, task difficulty, luck, help from others, illness, mood, and strategy. These two motivational theories have been extensively applied to enhance achievement in various academic subjects, including mathematics (Kloosterman, 1988). Several researchers (Siegel et al, 1986; Hackett & Betz, 1989) reported a significant positive correlation between math self-efficacy and mathematics attainment. Hackett (1985) reported that math self-efficacy is a very strong variable to predict choice of a mathematics - related college major. Several other studies (Hunt, 1985; Perl, 1979, Reyes, 1984) reported their findings suggesting that students who appear to be confident in learning mathematics tend to be more comfortable when facing mathematical problems. Kloosterman (1988 : 347) indicated that " if students do claim to reflect on their achievement in mathematics, an attributional explanation of motivation is much more plausible than if students fail to reflect on such achievement" .

1.2 Aims of study

The main objective of the study was to examine whether or not students of mathematics at science high schools in the Odi region of Bophuthatswana are significantly different from their counterparts at ordinary high schools in: (a) mathematics achievement, (b) math self-efficacy, (c) confidence in learning mathematics, (d) math attributional beliefs, and (e) socioeconomic background .

1.3 Variables

In this study, estimates of the following variables were taken:

(i) mathematics self-efficacy

(ii) confidence in learning mathematics

(iii) mathematics attributional beliefs

(iv) mathematics achievement

(v) socioeconomic background

1.4 Definitions of Terms

1.4.1 Mathematics Self-Efficacy. It refers to the conviction that one can successfully handle mathematical tasks.

1.4.2 Self-Confidence in Learning Mathematics. It refers to the belief of a student that learn mathematics.

1.4.3 Mathematics Attributional Beliefs. These beliefs are referred to causal attributes for success or failure in mathematics.

1.4.4 Mathematics Achievement. It refers to scores on a test of mathematics.

1.4.5 Socioeconomic Background. It refers to educational and occupational levels of subjects' parents, and to some selected economic facilities available at home.

1.5 Assumptions

Since the sample was chosen randomly, it was assumed that the findings of the study could be generalized to all high school students in Odi region.

CHAPTER TWO

2. REVIEW OF LITERATURE

One of the serious problems that science matriculants in Bophuthatswana are facing, is that the majority of them tend not to qualify for the university entrance enabling them to study mathematics and other science subjects. Although some of them manage to obtain exemptions, their matric math symbols are usually low. The University of Bophuthatswana has recently piloted an intensive one - year programme in Mathematics , Physical Science and Accountancy. The project is intended to upgrade students' matric symbols in the above mentioned subjects, so that more students can qualify for university entrance. Although such programmes, including the establishment of science schools, have recently been introduced, some kinds of learning improvements are inevitable to facilitate their mathematical learning.

The review of related literature is presented under the following sub - headings:-

1. Theoretical explanation of self - efficacy.
2. Empirical work on mathematics self - efficacy.
3. Theoretical framework of the attribution theory.
4. Attributional beliefs and academic achievement.
5. Confidence in learning mathematics and math performance.
6. Socioeconomic background and academic attainment.
7. Sex variations in mathematical achievement.

2.1 Theoretical Explanations of Self - efficacy

Self - efficacy refers to the personal judgment of performance capabilities in a given domain of activities that may contain novel, unpredictable and possible stressful features. It is a personal belief about how successfully one can deal with prospective difficult situation, such as a test, or an interview (Bandura 1977). Bandura (1977) distinguished between self - efficacy expectations and the outcome expectations. Self - efficacy is one's judgment of one's own capability to carry out a particular behaviour or course of action successfully. It is contrasted with the outcome expectations - the estimate that a behaviour will lead to a certain outcome. Self -efficacy theory predicts that people choose, persist in, and expend effort on tasks they believe themselves capable of handling, and avoid situations they believe exceed their coping skills. The impact of self - efficacy on behaviour depends on its characteristics: magnitude, generality and strength. Magnitude reflects the degree of the tasks an individual feels capable of attempting. Generality or the breadth of the domain refers to the application of self-efficacy judgment, and the strength of self- efficacy expectations is postulated to influence persistence of behaviour when discouraging experiences are confronted.

According to Bandura (1982), self - efficacy expectations are viewed as both learned and modified through four types of information modes, that cause perceptions of self - efficacy to develop and change (Bandura 1977, 1986). These types of information modes are: enactive attainment, vicarious experience, verbal persuasion and physiological state. Enactive attainment is the most influential source of information which involves participant's modelling, desensitization, repeated exposure and self-construction. Vicarious experience refers

to the fact that people are able to learn by watching others behave and seeing the consequences of their behaviours. Verbal persuasion is an attempt to convince people to believe that they have the capabilities they need to achieve what they seek. Physiological state helps tell people whether they should expect to succeed or fail an oncoming task.

2.2 Empirical Work on Mathematics Self - efficacy

In school, children's knowledge and thinking skills are continually tested and evaluated. Their results are often compared to one another, and successful students quickly develop a strong sense of self - efficacy, than unsuccessful students. According to the self - efficacy theory, (Bandura 1977), self - efficacy beliefs may determine performance accomplishments and persistence in pursuing a difficult course of action. Recently, Hacket and Betz (1981) extended self - efficacy theory to vocational behaviour, hypothesing that personal efficacy expectations may exert strong influences on the career decisions and achievement of men and women.

Betz and Hackett (1981) investigated the relationship between mathematical performance, and the choice of mathematics related majors. The research was conducted on 153 college women and 109 college men and it had three variables: sex and number of years of high school mathematics. The students' preferences for a college major were classified according to Goldman and Hewitt's (1976) science - non-science continuum. In their findings, they reported the differences of self - efficacy between women and men with regard to educational and career choices. They found that women exhibit lower expectations than men for many achievement related behaviours and thus fail to realize fully their capabilities and talents.

Schunk (1985) also found that mathematics self - efficacy of men tend to be significantly higher than that of women. In addition, he presented the followings educational practices in relation to self - efficacy:

(i) self - efficacy influences choice of activities, students with low sense of efficacy may avoid tasks, whereas those considering themselves more efficacious participate more eagerly;

(ii) self - efficacy affects motivation, students with high sense of efficacy for learning expend greater effort and persist longer than those who doubt their capabilities, and

(iii) percepts of self - efficacy influences the level of skilful performance.

Recently, some researchers proposed that self -efficacy is a unifying mechanism that accounts for the effect of many different therapy techniques. An interesting feature of this construct is its relationship to behavioral changes. Correlations between self - report questionnaire responses and performance in a situation where subjects interact with the feared objects (snake), showed how well they will do when placed in the actual situation (Bandura and Adams 1977; Gauthier and Ladouceur 1981). People who have higher self - efficacy believe that they can perform an activity successfully and will be motivated to perform such activity.

2.3 Theoretical Framework of Attributional Theory

The pertinent skill knowledge or competency is needed to successfully perform an activity. It is also important to invest and focus the energy or effort to the activity that has to be performed. Success or failure in mathematics can be attributed to a variety of causes. The attribution theory, proposed by Weiner (1972, 1980), focuses on the causes to which people attribute their successes and failures. It explains motivation on the basis of the perceived causes that a person might use to explain success or failure in a particular performance. These

causes are called causal attributes or inferences. The following five causal attributes are used to explain people's successes: ability, effort, task difficulty, luck and help from others. Thus, outcomes depend on how much ability one has, how much effort one puts in, how difficult the task is, how lucky one is and how much help one receives.

According to Weiner's theory, reasons for academic success and failure can be categorized into three dimensions of causality: locus of causality, stability, and controllability. Locus of causality refers to the origin of the cause which is internal or external to the person. Stability deals with whether an attribution was stable over a time, it refers to the consistency or unchanging nature of a causal attribute. Lastly, controllability refers to the extent to which a causal attribute is within a person's control and can be intentionally altered by choice, as opposed to being relatively unalterable. Among Weiner's above three dimensions, only effort is controllable. The causal properties affect future goal expectations, generate particular emotional reactions, contribute to self - image and influence subsequent behaviour.

2.4 Attributional Beliefs and Academic Achievement

The attribution theory explains motivation in terms of students' perceptions of the reasons for their successes and failures, rather than as being simply a drive or a trait. Diener and Dweck (1978) categorized students by attributional styles on the basis of the attributions that they made for successes and failures in school. They explored helplessness versus mastery - oriented differences in the nature , timing and relative frequency of various achievement - related cognitions by continuously monitoring verbalizations following failure. Their results revealed that helpless children focused on the causes of failure, whereas the mastery oriented children

focused on remedies for failure. It was suggested that in addition to the nature of attribution one makes, the timing or even occurrences of attributions may be a critical individual difference.

Kloosterman (1988) attempted to show how attitudes towards mathematics can be explained in terms of motivation variables that relate thought to action on the part of students. He examined the relation between attributional variables and self - confidence in the learning of mathematics and academic success and failure. All measures were completed by 489 seventh grade students (266 females and 223 males). They were from three lower middle class schools in Central Indiana. The distribution scale, consisting of six - five subscales, was used to measure mathematical self- confidence and attributional styles. His findings indicated that significant portions of variance in self - confidence scores could be explained from other variables. Students did, on average, report about their thinking, reasons for their successes and failures, and making attributions for failure more than attributions for success. In addition, girls claimed that they thought about their failure in mathematics more often than boys did.

Hudson (1966) pointed out that a liking for mathematics stems from preferred styles of study. Mathematics does not involve the learner to reveal emotions or opinions to others or any communications with others. Hunt (1985) also reported that many students feel they cannot learn mathematics because they lack a "mathematical mind."

The Assessment of Performance Unit (1982) in attempt to check the domain of preferences and attitudes in learning mathematics found that the relationship in mathematics, at age 11 was surprisingly weak. Boys demonstrated greater confidence in their own mathematical ability than

girls, both at age 11 and 15. Interesting results were obtained by Kempa and McGough (1977) in a study of attitudes to mathematics amongst sixth - form students. Their findings revealed that students' view about the difficulty of mathematics did not appear to have been a major determinant in sixth - form.

2.5 Confidence in Learning Mathematics and Math Performance

According to Skemp (1989), confidence in learning mathematics is another factor which could influence math performance. Confidence in learning mathematics may be associated with some emotional variables such as security, frustration and anxiety. A good level of initial confidence tends to be a fulfilling prophesy; the learner succeeds because he thinks he can succeed. Lack of confidence may cause frustrations, resulting from inability to move towards a goal state. Several researchers (Kloosterman, 1988; Reyes, 1984; Hunt, 1985; Fennema and Sherman, 1977; and Dowling, 1978) reported that students who are confident of their ability to learn mathematics are more likely to choose mathematics in schools when it is an optional subject. Dowling (1978) found a strong relationship between confidence and achievement in mathematics. When tasks are approached with confidence, it is more likely that they would be completed successfully than when tasks are handled with uncertainty. In addition, pupils are more likely to attempt learning tasks when they anticipate success. Reyes and Fennema (1980) found that teachers tend to interact more often with students who possess higher level of confidence in learning mathematics than those who have lower level of confidence.

Fennema and Sherman (1977) reported a significant positive association between confidence in learning mathematics and mathematics achievement; coefficients of correlation ranged between 0.22 and 0.47 depending upon sex and grade level. These researchers

reported that among middle and high school students, those who obtained higher scores on mathematics achievement tests, tended to perceive mathematics as a useful subject than those whose scores were lower. They suggested that students' perception of mathematics as a useful subject tends to influence their choice of mathematics as an academic subject.

2.6 Socioeconomic Background and Academic Attainment

In recent years, the importance of fathers in sex -typing has become an issue of increasing theoretical and research interest (Sherman, 1971), and it has sometimes been supposed that fathers are particularly important in girl's mastery of mathematics. For high school students of both sexes, fathers were seen as significantly more supportive to mathematics learning than mothers (Fennema and Sherman, 1978). More fathers than mothers were found to help with math homework (Enerst 1976). In addition, parents' educational and occupational background plays an important role in children's education. For instance, Sherman's (1971) study suggested that modelling of either parents, in regard to career plans, is very significant. The educational and entertainment means such as the TV Educational programs, are also important factors which might influence and increase the students' confidence in school activities.

2.7 Sex Variations in Mathematics Achievements

It has been generally believed that males achieve higher than females in mathematics. Sometimes this difference is attributed to underlying ability and social climate that does not encourage girls to study mathematics (Fennema and Sherman, 1977). Fennema, (1974) and Sherman

(1975) proposed that these beliefs are based on studies that did not control one of the most important variables of achievement in high school mathematics, i.e., the previous study of mathematics. In contrast, Enerst (1976:596) reported that mathematics was the only subject which exhibited no sex differences, when it was investigated " who does better - boys or girls?"

The study of Fennema and Sherman (1977) aimed at gaining new insight into the important area of sex - related differences in mathematics achievement. The subjects from whom the data were gathered on all variables were 589 females and 644 males from the 9th to 12th grade, enrolled in and selected from mathematics class. Few sex - related cognitive differences were found. Their data did not support the expectation that males are invariably superior in mathematics achievement. The literature on sex variations in mathematics leads us to believe that: (1) more carefully controlled studies have shown little difference in mathematics performance between males and females equated for mathematics background (Fennema and Sherman, 1977); and (2) biological sources of sex - related cognitive differences do not contribute to sex differences in mathematics (Sherman,1978).

2.8 Summary

The main objective of this study was to examine mathematics achievement of students at science and non - science high schools in the Odi region of Bophuthatswana. Recent literature on mathematics learning and teaching suggest that variables like math self - efficacy, attributional beliefs, confidence in learning mathematics and socio - economic background tend to influence mathematics performance of school children. In addition, some studies suggested

significant sex differences in mathematics achievement. Hence, the review of related literature covered same theoretical ideas and empirical findings in relation to the above said variables. The findings of some other researchers generally suggested the following conclusions:

(i) mathematics self- efficacy is significantly positively associated with mathematics performance;

(ii) different attributional beliefs are expressed by different age groups;

(iii) girls tend to differ from boys in expressing causal attributes for their successes and failures in mathematics;

(iv) confidence in learning mathematics is significantly positively related to mathematics achievement of school children;

(v) socioeconomic background tend to positively influence mathematics performance; and

(vi) no significant sex differences in mathematics performance exist.

CHAPTER THREE

3. METHODOLOGY

3.1. Aims of this Investigation

In addition to compare the mathematics achievement of Science and Non - Science High School students in the Odi region of Bophuthatswana, the study also aimed at exploring relationships of mathematics self - efficacy, mathematics self - confidence and attributions in the learning of mathematics to general mathematics performances.

3.2. Population

3.2.1 Target Population : Std 8 & 9 male and female students studying at high schools in Garankuwa and Jericho Circuits in Bophuthatswana.

3.2.2 Defined Population: Std 8 & 9 male and female students studying at Micha - Kgasi high school in Garankuwa circuit and their counterparts at Kwena - ya - Madiba science high school in Jericho circuit.

3.2.3 Accessible Population: Mathematics Students of std 8 & 9 at the above two schools.

3.3 Sample

Two hundred and forty Std 8 and 9 students from the above mentioned two schools served as subjects of this study. The distribution of the sample is given below.

School	Std. 8 Boys	Std. 8 Girls	Std. 9 Boys	Std. 9 Girls
Micha-Kgasi High School	30	30	30	30
Kwena-Ya-Madiba High School	30	30	30	30
Totals	60	60	60	60 = 240

At the time of this study, std 8 and std 9 pupils spent about one year and two years, respectively, at their schools.

3.4 Variables Studied

The measures of the following variables were taken from 240 subjects:

(i) Socioeconomic background

(ii) Mathematics self - efficacy

(iii) Self - confidence in learning mathematics

(iv) Attributional beliefs in learning mathematics

(v) General mathematics performance

3.5 Instruments

3.5.1 Socioeconomic Background: The Maqsud (1993) Socioeconomic Background Questionnaire (MSBQ) was used to take estimates of socio-economic status of the subjects of this study. The questionnaire demanded the subjects to provide information as to their parents' educational and occupational backgrounds, and some economic facilities (housing, transport, educational and entertainment means) available to them at home. The data could

be quantified; the minimum and maximum scores on the MSBQ could be 4 and 27, respectively. For full questionnaire, see Appendix A .

3.5.2 Mathematics Self - efficacy. To take measures of mathematics self - efficacy, the Betz and Hackett (1983) Mathematics Self - efficacy Scale (BHMSES) was used. The scale has two subscales, each containing 18 items involving "everyday mathematics tasks". For these items, the students were instructed to rate their confidence in their ability to successfully do the given tasks. Confidence ratings for all items of the two subscales were elicited on a 10-point continuum from no confidence at all (0) to complete confidence (9). The minimum and maximum scores on each subscale could be 0, and 162, respectively. For full scale, see Appendices E & F .

3.5.3 Self - Confidence in Learning Mathematics

This variable was measured with the Fennema - Sherman (1976) Confidence Scale (FSCS). The scale contains 12 Likert - type items which are responded to by students ticking one of the five options (Strongly Disagree - Strongly Agree). Of 12 items, six are positively worded and the remaining six are negatively worded items. The positively worded items are scored by the numerical values as shown below:

1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree , 5 = Strongly Agree

The numerical values were reversed for negatively worded items. Two items of the FSCS are given here for illustrative purposes while the full scale is given in Appendix B

" Generally I think I can do math." (+)

" Math has been my worst subject" (-)

In this study, the FSCS was split into two subscales: Positive Self - Confidence in Learning Mathematics (PSCLM) and Negative Self - Confidence in Learning Mathematics (NSCLM). The minimum and maximum scores for each subscale could be 6 and 30, respectively.

Fennema and Sherman (1976:4) stated that the FSCS is intended to measure confidence in one's ability to learn and to perform well on mathematical tasks.The dimension ranges from distinct lack of confidence to definite confidence. The scale is not intended to measure anxiety and/or mental confusion, interest enjoyment or zest in problem solving. The researcher did not feel to modify the scale as it contains items which could be easily understood by the subjects of this study.

3.5.4 Attributional Beliefs in Learning Mathematics

In order to take measures of attributional beliefs in learning mathematics, the Fennema - Peterson (1984) Mathematics Attribution Scale (FPMAS) was used. The scale contained six -Likert - typed subscales of five items each (1 = strong no, 2 = weak no, 3 uncertain, 4 = weak yes, 5 = strong yes). Four of these scales were designed to measure the extent to which students felt that their successes in mathematics were due to ability in math (SA), effort in math (SE), ease of the mathematical task (ST),or help from others (SO). The remaining two attribution subscales were intended to measure the extent to which students felt that their failures or poor performances in mathematics were due to lack of ability (FA), or lack of effort (FE). All six subscales are given in Appendix D. The minimum and maximum scores on each subscale could be 5 and 25, respectively.

3.5.5. General Mathematics Performance

Mathematics performance was measured by means of the Dowling (1978) Mathematics Problems Performance Scale (DMPPS). The DMPPS was developed to assess actual mathematics performance . The scale consists of 18 items requiring solutions to arithmetic, algebra, and geometry problems. Scores on the scale were determined by adding the number of correct responses. So, the minimum and maximum scores on the DMPPS could be 0 and 18, respectively.

3.6. Procedure

The researcher first visited the two schools and explained the objectives of the study and the nature of the data to be collected to the principals of the two schools. They expressed their full cooperation in collecting the required data. A booklet was made and it contained the following instruments: (a) the Maqsud (1993) Socioeconomic Background Questionnaire, (b) the Betz - Hacket (1983) Math Self - efficacy scale, (c) the Fennema - Sherman (1976) Confidence Scale, (d) the Fennema -Peterson (1984) Mathematics Attribution Scale, and (e) the Dowling (1978) Mathematics Problems Performance Scale. The scales were shown to four mathematics teachers at the two schools and they were requested to examine the scales and give their comments as to the suitability of the scales for std 8 & 9 students in Bophuthatswana. These teachers assured the researcher that their students were able to understand the items of the scales and to respond to them. Since the mathematics problem performance scale contained mathematical tasks of general nature, average math students of

middle and high schools were expected to solve most of the mathematical problems correctly.

The subjects from one school were seated in three classrooms and the five measuring instruments were administered to them at the same time with the assistance of the three teachers working at the school. The subjects were not allowed to discuss with each other while completing the scales; they took about 90 minutes to complete all five scales. This process was repeated at the other school.

3.7 Results

3.7.1 Raw Scores

The raw scores of 120 subjects on the socioeconomic background scale, math self - efficacy subscale 1 (MSE1), Math self - efficacy subscale 2 (MSE2), math self - confidence subscale positive (+), math self - confidence negative (-), math performance scale, and six attribution subscales (SA, SE, ST, SO, FA, and FE) are given in Appendix F.

3.7.2 Sex Differences

Tables 1 & 2 contain mean scores and standard deviations together with t - values for std. 8 and std. 9 non - science and science school boys and girls. These data indicate that although there are no consistent patterns of sex differences, a few comparisons between mean scores of boys and girls yielded significant sex differences. Hence, the researcher decided to treat the scores of boys and girls separately for further analyses.

3.7.3 Comparisons

Tables 3 and 4 contain figural details as to comparisons between science and non-science school pupils at std 8 and 9 levels. The following significant differences were observed:

3.7.3.1 Std. 8 Students

(i) Mean MSE2 scores of both boys and girls studying in the science school were found significantly higher than those for their non - science counterparts.

(ii) The mean math confidence (+) scores of boys as well as girls studying in the science school were found significantly higher than those for their non -science counterparts.

(iii) The mean math confidence (-) score of boys studying in the science school was found significantly higher than that of boys studying in the non-science school.

(iv) The mean FE score of boys studying in the science school was found significantly higher than that of boys studying in the non - science school.

3.7.3.2 Std. 9 Students

(i) The mean math confidence (-) score of girls studying in the science school was found significantly higher than that of those studying in the non -science school.

(ii) The mean SO score of boys studying in the science school was found significantly higher than that of those studying in the non - science school.

TABLE 1
Sex Differences: Means and Standard Deviations with t values
(Non-Science and Science Std. 8 Groups)

Variable	Non-Science School						Science School					
	Boys (N=30)		Girls (N=30)		Mean	t	Boys (N=30)		Girls N=30)		Mean	t
	Mean	SD	Mean	SD	Diff		Mean	SD	Mean	SD	Diff	
1. Socioeconomic Background	6.53	4.64	5.17	3.03	1.36	1.35	6.67	4.00	6.00	3.74	0.67	0.67
2. Math self-efficacy												
MSE 1	88.53	28.84	76.90	24.93	11.63	1.67	91.60	31.62	87.06	29.41	4.00	0.51
MSE 2	86.93	25.80	69.70	30.53	17.23	2.36*	101.70	29.18	90.37	29.58	11.33	1.49
3. Math confidence												
+	19.57	6.51	17.80	5.40	1.77	1.14	23.43	4.65	23.07	3.41	0.36	0.35
-	17.20	6.09	17.27	5.54	-0.07	-.04	22.73	3.89	19.77	5.02	2.96	2.56*
4. Math Performance	4.03	2.08	3.97	1.87	0.06	0.13	4.90	2.22	4.30	1.80	0.60	1.15
5. Attributions												
SA	12.17	5.04	11.80	5.55	0.37	0.27	12.90	5.25	11.10	5.40	1.80	1.31
SE	20.53	3.79	19.60	4.77	0.93	0.84	21.06	3.56	21.00	3.59	0.06	0.11
ST	14.57	5.65	14.40	5.44	0.17	0.12	13.37	4.20	12.73	4.62	0.64	0.56
SO	13.63	4.83	13.50	4.68	0.13	0.11	12.33	3.90	12.47	4.30	-0.14	-0.13
FA	11.23	4.43	10.50	3.44	0.73	0.72	10.43	4.11	9.37	4.03	1.06	1.02
FE	15.97	3.95	15.63	4.37	0.34	0.31	18.27	3.03	16.60	5.53	1.67	1.45

*$p<0.05$

TABLE 2
Sex Differences: Means and Standard Deviations with t values
(Non-Science and Science Std. 9 Groups)

Variable	Non-Science School						Science School					
	Boys (N=30)		Girls (N=30)		Mean Diff	t	Boys (N=30)		Girls N=30)		Mean Diff	t
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
1. Socioeconomic Background	5.67	3.08	8.02	4.54	-2.53	-2.53*	6.63	3.51	6.08	3.58	-0.05	-0.18
2. Math self-efficacy												
MSE 1	93.50	32.04	87.80	31.61	5.07	0.70	89.47	26.17	81.80	28.52	7.67	1.08
MSE 2	92.97	31.65	80.50	27.06	12.47	1.64	85.23	24.40	69.56	21.60	15.67	2.63**
3. Math confidence												
+	19.53	6.07	20.30	4.38	0.77	-0.56	20.13	4.38	17.26	5.44	2.87	2.25*
-	24.81	4.87	16.97	4.54	7.83	0.72	17.73	5.02	16.07	5.72	1.66	1.20
4. Math Performance	4.27	1.53	4.00	2.27	0.27	0.53	4.60	2.21	4.36	1.69	0.24	0.46
5. Attributions												
SA	11.63	5.40	11.43	4.88	0.20	0.15	12.03	4.75	9.97	4.57	2.06	1.71
SE	20.77	3.89	20.17	4.12	0.60	0.58	20.03	3.34	19.23	4.20	0.80	0.82
ST	14.27	5.20	12.83	4.86	1.44	1.10	13.30	4.12	12.87	4.70	0.43	0.38
SO	10.57	3.87	12.93	4.98	-2.36	-2.06*	13.07	4.78	13.27	4.69	-0.20	-0.16
FA	9.47	3.90	10.70	4.68	-1.23	-1.01	10.20	3.34	9.30	4.48	0.90	0.88
FE	15.57	4.99	14.13	5.06	1.44	1.10	15.83	3.97	15.33	4.54	0.50	0.45

*p<0.05 **p<0.01

TABLE 3
Comparisons of Non-Science and Science Students: Mean and Standard Deviations with t values (Std.8 Groups)

Variable	Boys						Girls					
	Non-Science (N=30)		Science (N=30)		Mean Diff	t	Non-Science (N=30)		Science N=30)		Mean Diff	t
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
. Socioeconomic Background	6.53	4.64	6.67	4.00	-0.14	-0.12	5.16	3.03	6.00	3.74	-0.84	-0.95
. Math self-efficacy												
MSE 1	88.53	28.84	91.60	31.60	-3.07	-0.39	76.90	24.93	87.60	29.41	-10.70	-1.52
MSE 2	86.93	25.80	101.70	29.18	-14.77	-2.08*	69.70	30.53	90.37	29.58	-20.66	-2.66**
. Math confidence												
+	19.57	6.51	23.43	4.65	-3.86	-2.65**	17.80	5.40	23.06	3.41	-5.26	-4.52**
-	17.20	6.09	22.73	3.89	-5.53	-4.19**	17.27	5.54	19.77	5.02	-2.50	-1.83
. Math Performance	4.03	2.00	4.90	2.22	-0.87	-1.59	3.97	1.87	4.30	1.80	-0.33	-0.70
. Attributions												
SA	12.17	5.04	12.90	5.25	-0.73	-0.55	11.80	5.55	11.10	5.38	0.70	0.50
SE	20.53	3.79	21.06	3.56	-0.53	-0.56	19.60	4.77	20.96	3.59	-1.36	-1.25
ST	14.57	5.65	13.37	4.20	1.02	0.93	14.40	5.44	12.73	4.62	1.67	1.28
SO	13.63	4.83	12.33	3.90	1.03	1.15	13.50	4.68	12.46	4.31	1.04	0.90
FA	11.23	4.43	10.43	4.11	0.08	0.72	10.50	3.44	9.37	4.03	1.13	1.17
FE	15.97	3.95	18.26	3.03	2.29	2.53*	15.63	4.37	16.60	5.53	-0.97	-0.75

*p<0.05 ** p<0.01

TABLE 4
Comparisons of Non-Science and Science Students: Mean and Standard Deviations with t values (Std.9 Groups)

Variable	Boys						Girls					
	Non-Science (N=30)		Science (N=30)		Mean Diff	t	Non-Science(N=30)		Science N=30)		Mean Diff	t
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
1. Socioeconomic Background	5.67	3.08	6.63	3.51	-0.96	-1.13	8.20	4.54	6.80	3.58	1.40	1.33
2. Math self-efficacy												
MSE 1	93.50	32.04	89.47	26.17	4.03	0.53	87.80	31.61	81.80	28.52	6.00	0.77
MSE 2	92.97	31.65	85.23	24.40	7.74	1.06	80.50	27.06	69.57	21.60	10.93	1.73
3. Math confidence												
+	19.53	6.07	20.13	4.38	-0.60	-0.44	20.30	4.38	17.27	5.44	3.03	2.38*
-	17.93	5.84	17.73	5.02	0.20	0.14	16.97	4.54	16.06	5.72	0.91	-0.67
4. Math Performance	4.27	1.53	4.60	2.21	-0.33	-0.68	4.00	2.27	4.37	1.69	-0.37	-0.71
5. Attributions												
SA	11.63	5.40	12.03	4.75	-0.40	-0.34	11.43	4.88	9.97	4.57	1.46	1.20
SE	20.77	3.89	20.03	3.34	0.74	0.78	20.17	4.12	19.23	4.20	0.94	0.87
ST	14.27	5.20	13.30	4.12	0.97	0.80	12.83	4.86	12.86	4.70	-0.03	-0.03
SO	10.57	3.87	13.07	4.78	-2.50	-2.22*	12.93	4.98	13.26	4.69	-0.33	-0.27
FA	9.47	3.90	10.20	3.33	-0.73	-0.78	10.70	4.68	9.30	4.48	1.40	1.18
FE	15.57	4.99	15.83	3.97	-0.26	-0.23	14.13	5.06	15.33	4.54	-1.20	-0.97

*$p<0.05$;

3.7.4 Intercorrelations

Tables 5, 6, 7, and 8 give coefficients of product - moment correlations of std. 8 and 9 non - science as well as science school pupils. The researcher's main concerns were to see: (a) if math performance scores were significantly related to other variables studied in this study; and (b) whether the patterns of intercorrelations for science school pupils were different from those of non - science school ones.

3.7.4.1 Math Performance

Math performance scores were not found consistently related to other variables (socioeconomic background, math self -efficacy, math confidence, and attributional beliefs) at both std. 8 and std. 9 levels. A few coefficients of correlation were found significant, but they did not tend to establish significant consistent relationships.

3.7.4.2 Patterns of intercorrelations

Slight variations in the patterns of intercorrelations for science school pupils and non - science school pupils were observed, but these were not considered as having significant importance in understanding the processes of learning and teaching mathematics.

3.8 Main Findings

From the data presented in Tables 1-8 generally indicate that there are no significant consistent differences in measures of the variables studied in this study for science and non - science

high school std. 8 and std. 9 pupils. However, there are some tendencies in science school pupils to have higher scores of math self- efficacy and confidence in learning mathematics. Although the researcher expected significantly higher math performance scores for science school pupils, the data did not support this trend.

TABLE 5
Intercorrelations at Std 8 Level (Non-Science)
N = 60

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Socioeconomic Background		-0.11	-0.02	0.00	0.01	0.11	-0.04	-0.03	-0.00	0.02	0.00	0.20
2. Math self-efficacy 1			0.48**	0.12	-0.06	0.09	-0.11	0.14	-0.08	0.14	-0.22	0.05
3. Math self-efficacy 2				0.11	0.26*	0.20	0.16	0.22	0.00	0.04	-0.04	0.20
4. Math Confidence (+)					0.31*	-0.12	0.16	0.30*	-0.00	-0.00	0.01	0.19
5. Math Confidence (-)						0.08	-0.06	0.33**	-0.07	0.09	-0.16	0.32*
6. Math Performance							0.05	-0.01	0.09	-0.05	-0.13	0.07
7. SA								0.01	0.31*	0.11	0.49**	0.06
8. SE									0.06	0.24	-0.21	0.40**
9. ST										0.19	0.10	0.00
10. SO											0.09	0.25**
11. FA												-0.13
12. FE												

*p<0.05 **p<0.01

TABLE 6
Intercorrelations at Std 8 Level (Science)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Socioeconomic Background		0.19	0.00	-0.04	-0.01	-0.26*	0.15	0.21	0.12	0.13	0.04	0.00
2. Math self-efficacy 1			0.70**	0.19	0.19	-0.05	0.16	0.07	0.13	0.16	0.02	0.24
3. Math self-efficacy 2				0.31**	0.25*	0.06	0.12	0.18	0.03	-0.10	0.09	0.27*
4. Math Confidence (+)					0.10	0.11	-0.12	0.03	-0.19	-0.08	-0.12	0.01
5. Math Confidence (-)						0.16	-0.08	-0.18	-0.17	-0.23	-0.08	-0.13
6. Math Performance							-0.03	-0.19	-0.09	-0.13	0.01	0.09
7. SA								0.02	0.36	0.45	0.65**	0.09
8. SE									-0.12	-0.14	-0.11	0.21
9. ST										0.53**	0.42**	0.01
10. SO											0.33	0.07**
11. FA												0.24
12. FE												

*p<0.05 **p<0.01

TABLE 7
Intercorrelations at Std 9 Level (Non-Science)

Variable	1	2			5	6	7	8	9	10	11	12
1. Socioeconomic Background		0.19			-0.12	-0.10	0.12	-0.03	-0.03	0.20	0.32**	0.13
2. Math self-efficacy 1			0.74**	0.36	0.23	0.12	-0.01	0.32**	0.16	-0.09	-0.18	0.27*
3. Math self-efficacy 2					0.28*	-0.16	-0.14	0.20	0.11	-0.24	-0.25*	0.23
4. Math Confidence (+)					0.31**	0.33**	0.08	0.24	0.25*	0.01	-0.13	0.03
5. Math Confidence (-)						0.13	-0.07	0.06	0.31*	-0.12	-0.19	0.13*
6. Math Performance							-0.04	-0.20	0.06	-0.12	-0.29	-0.14
7. SA								-0.02	0.43**	0.28*	0.49**	0.13
8. SE									0.03	-0.16	-0.22	0.13
9. ST										=.27*	0.14	0.50**
10. SO											0.37	0.24
11. FA												0.25*
12. FE												

*p<0.05 **p<0.01

TABLE 8
Intercorrelations at Std 9 Level (Science)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Socioeconomic Background		0.21	0.02	-0.07	0.16	-0.04	-0. 5	-0.12	-0.03	0.09	-0.06	0.13
2. Math self-efficacy 1			0.35	0.00	0.21	0.02	0.01	0.10	0.06	0.24	-0.07	-0.00
3. Math self-efficacy 2				0.29*	0.36	0.02	0.07	0.01	0.11	0.03	0.11	0.06
4. Math Confidence (+)					0.43**	-0.04	0.21	0.09	-0.07	-0.26*	0.07	-0.01
5. Math Confidence (-)						0.09	0.19	-0.08	-0.04	0.11	0.24	-0.14
6. Math Performance							0.13	0.14	0.06	-0.25	-0.12	-0.12
7. SA								0.03	0.41**	0.14	0.55**	-0.03
8. SE									-0.16	-0.09	-0.19	0.15
9. ST										0.21	0.32**	0.17
10. SO											0.20	0.18
11. FA												0.19
12. FE												

*p<0.05 **p<0.01

CHAPTER FOUR

4. Discussions and Conclusions

4.1 Discussion of Results

Although there were some tendencies among the science school students to attain higher mean scores on the scales of math self - efficacy, and confidence in learning mathematics, their mean mathematics performance scores were not found significantly higher than their counterparts in the ordinary high school.

These findings are contrary to the researcher's expectations. It was assumed before completing this study that since students in science high schools are selected on the basis of their stated interests in mathematics and science subjects and that they are exposed to relatively better academic environments (experienced and qualified teachers, laboratory facilities etc), they would demonstrate higher math performance than their counterparts in the ordinary high schools. This study examined only math performance. One may still assume that their performance in other science subjects (biology, chemistry and physics) may be higher as compared with those of students in ordinary high schools.

There are a host of variables, such as attitude toward mathematics, math anxiety, family beliefs in relation to mathematics, teachers, teaching methods, textbooks, which can directly or indirectly influence learning and teaching of mathematics. So, it is difficult to hold that students in science high schools are not benefitting from the academic environments provided in these schools. As these schools have recently been established, it is perhaps too early to see their significant impact on the realization of the objectives of their establishment.

4.2 Conclusions

It is yet dangerous to believe that science high schools in Bophuthatswana are not producing science oriented school leavers, or these schools would not succeed to meet the aims of their establishment, because this study was limited to only two high schools in the Odi region. Bophuthatswana government established a good number of science high schools in almost all the regions. In addition, this study was restricted only to learning mathematics. There is a need for further research along the lines of this study, but further studies should be undertaken with larger samples and be carried out in other parts of Bophuthatswana. Such studies should examine academic attainment of science high schools students in all science subjects.

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APPENDIX A

THE MAQSUD SOCIOECONOMIC BACKGROUND QUESTIONNAIRE (MSBQ)

Name : ----------

Sex : ----------

Age : ----------

School : ----------

Standard : ----------

Father's education : No Schooling, Primary, Secondary, College, University

Mother's education : No Schooling, Primary, Secondary, College,University

Father's Job : ----------

Mother's Job : ----------

Means of transport for family: Bicycle, Motor cycle, Car

Have your family a T.V at home? Yes/No

Have your family a VCR at home? Yes/No

SCORING PROCEDURE

Father and Mothers Education :

No Schooling = 1, Primary = 2, Secondary = 3, College = 4, University = 5.

Father and Mothers Job :

Labourer = 1, Clerical = 2, Junior Adm. Staff = 3, Senior Admin Staff and Junior Professional = 4, Senior Professional = 5, Super Professional = 6.

Means of Transport for family :

Bicycle = 1, Motorcycle = 2, Car = 3.

Have your family T.V and VCR :

Yes = 1, No = 2.

APPENDIX B

FENNEMA - SHERMAN CONFIDENCE SCALE (FSCS)

Read the following statements and encircle the answer for each statement that suit you.

1=Strongly Disagree, 2=Disagree, 3=Uncertain, 4=Agree, 5= Strongly Agree.

1. Generally I think I can do math	1	2	3	4	5
2. Math has been my worst subject	1	2	3	4	5
3. I'm not the kind of person who does well in math	1	2	3	4	5
4. I am sure I can learn mathematics in higher grades	1	2	3	4	5
5. I'm good at math	1	2	3	4	5
6. I can get good grades in mathematics	1	2	3	4	5
7. I am sure that I can learn mathematics	1	2	3	4	5
8. For some reason even though I study, math seems very hard for me	1	2	3	4	5
9. I don't think I can do advanced mathematics	1	2	3	4	5
10. Most subjects I can handle O.K but I often do poorly in math	1	2	3	4	5

11. I think I can learn more difficult mathematics	1	2	3	4	5
12. I have a lot of self-confidence when it comes to math	1	2	3	4	5

APPENDIX C

FENNEMA - SHERMAN CONFIDENCE SCALE (FSCS)

Read the following statements and encircle the answer for each statement that suit you.

1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree.

	e.g.				
1. By trying hard I can become smarter in math	1	2	3	4	5
2. I seldom think about why I've done well on a math test	1	2	3	4	5
3. When I do well in math, I ask myself why I did so well	1	2	3	4	5
4. I often think about why I've done poorly on math test	1	2	3	4	5
5. I seldom care about why I've done poorly on a math test	1	2	3	4	5
6. When I find out I got a low score on a math test, I think about why I did so poorly	1	2	3	4	5

7. When learning new mathematics, it is ok to make some mistakes	1	2	3	4	5
8. Making mistakes shows you are dumb in math	1	2	3	4	5
9. When I do poorly on a math test, I ignore my failure and go on	1	2	3	4	5
10. Good math students almost never get problems wrong	1	2	3	4	5
11. When I do poorly in math, I ask myself why I didn't do better	1	2	3	4	5
12. When I do poorly on a math test, I ask myself why I made so many mistakes	1	2	3	4	5
13. Making a mistake in math shows you are a poor math students	1	2	3	4	5
14. I don't care about what causes me to make mistakes in math	1	2	3	4	5
15. We all make mistakes when learning new topics in math	1	2	3	4	5
16. Hard work can increase my ability to do math	1	2	3	4	5

17. When I do well on a math test, I ignore my success and go on	1	2	3	4	5
18. When I found out I got a high mark on a test,	1	2	3	4	5
19. Some mistakes are normal when learning math	1	2	3	4	5
20. I don't care why I get correct answers in	1	2	3	4	5
21. I can get smarter in math by trying hard	1	2	3	4	5
22. Working can improve my ability in mathematics	1	2	3	4	5
23. I can get smarter in math if I try hard	1	2	3	4	5

APPENDIX D

FENNEMA-PETERSON MATHEMATICS ATTRIBUTION SCALE (FPMAS)

Read the following statements and encircle the answer for each statement that suits you.

5= Strong Yes, 4= Weak Yes, 3= Uncertain, 2= Weak No, 1= Strong No.

1. When you figure out how to do a thought problem, is it because you are smart? 5 4 3 2 1

2. If you can't learn how to do a thought problem, is it because no one help you? 5 4 3 2 1

3. If you understand how to do a thought problem, is it because you tried hard? 5 4 3 2 1

4. When you have trouble with a thought problem, is it because the problem is hard? 5 4 3 2 1

5. When you get most of the thought problems right on your worksheet, is it because you aren't very smart? 5 4 3 2 1

6. If you don't understand how to do a thought problem is it because you aren't very smart? 5 4 3 2 1

7. If you get the right answer to a thought problem is it because the problem is easy? 5 4 3 2 1

8. If you get most of the thought problems wrong on

a worksheet, is it because you aren't very smart? 5 4 3 2 1

9. When you learn how to do a thought problem, is it because you tried hard? 5 4 3 2 1

10. When you can't get the answer to a thought problem, is it because the problem is hard? 5 4 3 2 1

11. When you figure out how to do a thought problem, is it because you tried hard? 5 4 3 2 1

12. If you can't learn how to do a thought problem, is it because the problem is hard? 5 4 3 2 1

13. If you understand how to do a thought problem, is it because someone helped you? 5 4 3 2 1

14. When you have trouble with a thought problem, is it because you didn't try hard enough? 5 4 3 2 1

15. When you get most of the thought problem right on your worksheet, is it because you are smart? 5 4 3 2 1

16. If you don't understand how to do a thought problem, is it because no one helped you? 5 4 3 2 1

17. If you get the right answer to a thought problem, is it because you tried hard? 5 4 3 2 1

18. If you get most of the thought problems wrong on a worksheet, is it because no one helped you? 5 4 3 2 1

19. When you learn how to do a thought problem, is it because someone helped you? 5 4 3 2 1

20. When you can't get the answer to a thought problem, is it because you aren't very smart? 5 4 3 2 1

21. When you figure out how to do a thought problem, is it because the problem is easy? 5 4 3 2 1

22. If you can't learn how to do a thought problem, is it because you didn't try hard enough? 5 4 3 2 1

23. If you understand how to do a thought problem, is it because you are smart? 5 4 3 2 1

24. When you have trouble with a thought problem, is it because no one helped you? 5 4 3 2 1

25. When you get most of the thought problems right on your worksheet, is it because you tried hard? 5 4 3 2 1

26. If you don't understand how to do a thought problem, is it because the problem is hard. 5 4 3 2 1

27. If you get the right answer to a thought problem, is it because you smart? 5 4 3 2 1

28. If you get most of the thought problems wrong on a worksheet, is it because you didn't try hard? 5 4 3 2 1

29. When you learn how to do a thought problem, is it because the problem is easy? 5 4 3 2 1

30. When you can't get the answer to a thought problem, is it because no one helped you? 5 4 3 2 1

31. When you figure out how to do a thought problem, is it because someone helped you? 5 4 3 2 1

32. If you can't learn how to do a thought problem, is it because you aren't very smart? 5 4 3 2 1

33. If you get the right answer to a thought problem, is it because someone helped you? 5 4 3 2 1

34. If you don't understand how do a thought problem, is it because you didn't try hard enough? 5 4 3 2 1

35. When you get most of the thought problems right on your worksheet, is it because the problem are easy? 5 4 3 2 1

36. When you have trouble with a thought problem, is it because you aren't very smart? 5 4 3 2 1

37. If you understand how to do a thought problem, is it because the problem is easy? 5 4 3 2 1

38. When you can't get the answer to a thought problem, is it because you didn't try hard enough? 5 4 3 2 1

39. When you learn how to do a thought problem,
is it because you are smart? 5 4 3 2 1

40. If you get most of the thought problems wrong on
worksheet, is it because the problems are hard 5 4 3 2 1

APPENDIX E

BETZ-HACKETT MATHEMATICS SELF-EFFICACY SCALE (BHMSES) AND PROBLEM SOLVING SCALE FROM DOWLING (1978).

PERSONAL REACTION INVENTORY

There are three parts to this instrument. Please read all instructions and respond carefully and completely.

PART 1

Please indicate how much confidence you have that you could successfully accomplish each of the tasks by crossing the number you choose, according to the following 10-point confidence scale. When you mark or cross your answer, make sure that the number correspond with the appropriate answer on the confidence continuum.

Confidence scale:

No Confidence at all	Very little Confidence	Some Confidence	Much Confidence	Complete Confidence
0	1 2 3	4 5	6 7	8 9

Example: How much confidence do you have that you could successfully:

3. Multiply two large numbers in your head.

Answer: 0 1 2 3 4 5 6 7 8 9

If your answer on the 10-point continuum was 5 "some confidence", you would cross the number 5 from the numbers below the question.

How much confidence do you have that you could successfully:

1. Add two large numbers (eg. 5379+62543) in you head.

Answer: 0 1 2 3 4 5 6 7 8 9

2. Determine the amount of VAT on a clothing purchase.

Answer: 0 1 2 3 4 5 6 7 8 9

3. Figure out how much material to buy in order to make curtains.

Answer: 0 1 2 3 4 5 6 7 8 9

4. Determine how much interest you will end up paying on a loan of R675 over 2 years at 14 2 % interest.

Answer: 0 1 2 3 4 5 6 7 8 9

5. Work with a calculator.

Answer :0 1 2 3 4 5 6 7 8 9

6. Compute your car's petrol mileage.

Answer: 0 1 2 3 4 5 6 7 8 9

7. Calculate recipe quantities for a dinner of 3 when the original recipe is for 12 people.

Answer: 0 1 2 3 4 5 6 7 8 9

8. Understand how much interest you will earn on your savings account in 6 months, and how long that is computed.

Answer: 0 1 2 3 4 5 6 7 8 9

9. Balance your cheque book without a mistake.

Answer: 0 1 2 3 4 5 6 7 8 9

10.Figure out how long it will take to travel from Pretoria Johannesburg, driving at 60 kph.

Answer: 0 1 2 3 4 5 6 7 8 9

11.Set up a monthly budget for yourself taking into account how much pocket money you received, your monthly ticket,

your provision, personal expenses, etc.

Answer: 0 1 2 3 4 5 6 7 8 9

12.Compute your yearly expenses on transport to school.

Answer: 0 1 2 3 4 5 6 7 8 9

13.Understand a graph accompanying an article on business profit.

Answer: 0 1 2 3 4 5 6 7 8 9

14. Figure out how much will you save if there is a 15% mark down on an item you wish to buy.

Answer: 0 1 2 3 4 5 6 7 8 9

15. Estimate you grocery bill in your head as you pick up items.

Answer: 0 1 2 3 4 5 6 7 8 9

16. Figure out which of two summer jobs is the better offer: one with a higher salary but no benefits; the other with a lower salary but with room, board, and travel expenses included.

Answer: 0 1 2 3 4 5 6 7 8 9

17. Figure out the tip on your part of a dinner bill total split of 3 ways.

Answer: 0 1 2 3 4 5 6 7 8 9

18. Figure out how much lumber you need to buy in to build

a set of bookshelves.

Answer: 0 1 2 3 4 5 6 7 8 9

PART II

Suppose that you were asked the following questions in a multiple choice form. Indicate how much confidence you have that you would give the correct answer to the question.
Mark the number of your response below each question, as you marked in PART I. Use the following scale:

No Confidence	Very little	Some	Much	Complete
at all	Confidence	Confidence	Confidence	Confidence
0	1 2 3	4 5	6 7	8 9

Just mark the number of the choice which indicates how much confidence you would have. Do not work the answered to the problems.

How much confidence do you have that you could give the correct answers to the following problems.

19. 3 ¾ - ½ =

Answer: 0 1 2 3 4 5 6 7 8 9

20. The average of three numbers is 30. The fourth number is at least 10. What is the smallest average of the four numbers.

Answer: 0 1 2 3 4 5 6 7 8 9

21. Write an equation which expressed the condition that "the product of two numbers R and S is one less than twice their sum.

Answer: 0 1 2 3 4 5 6 7 8 9

22. Set up problem to be done to find the number asked for in the expression "six less than twice 45/6=

Answer: 0 1 2 3 4 5 6 7 8 9

23. In Starville the operation °on any number a and b is defined by a°b = a x (a + b). Then 2 °3 equals.....?

Answer: 0 1 2 3 4 5 6 7 8 9

24. A living room set consisting of one sofa and one chair is priced R400. If the price of the sofa is 50% more than the price of the chair, find the price of the sofa.

Answer: 0 1 2 3 4 5 6 7 8 9

25. To construct a table, Michele needs four pieces of wood 2,5 feet long for the legs. She wants to determine how much wood she will need for five tables. She reasons: 5 x (4 x 2,5) = (5 x 4) x 2,5. Which number principle is she using?

Answer: 0 1 2 3 4 5 6 7 8 9

26. Fred's bill or some household supplies was R13.64. If he paid for the items with R20, how much change should he received?

Answer: 0 1 2 3 4 5 6 7 8 9

27. On a certain map, 7/8 inch represents 200 miles. How far apart are two towns whose distance apart on the map is 13 ½ inches?

Answer: 0 1 2 3 4 5 6 7 8 9

28. Jane buys a packet containing 9-cent and 13-cent stamps for R2.65. If there are 25 stamps in the packet, how many are 13-cent stamps?

Answer: 0 1 2 3 4 5 6 7 8 9

29. If $3x - 2 = 16 - 6x$, what is the value of x?

Answer: 0 1 2 3 4 5 6 7 8 9

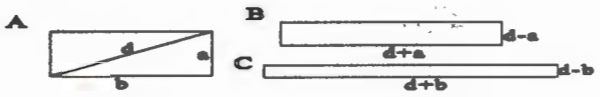
30. There are three numbers. The second is twice the first, and the first is one-third of the other number. Their sum is 48. Find the largest number?

Answer: 0 1 2 3 4 5 6 7 8 9

31. The hands of a clock form an obtuse angle at _____o'clock.

Answer: 0 1 2 3 4 5 6 7 89

32. Mary needs three pieces of poster board for a class project. If the boards are represented by rectangles A,B,C, arrange their areas in increasing order (assume b>a)



Answer 1 2 3 4 5 6 7 8 9

33. In a certain triangle, the shortest side is 6 inches, the longest side is twice as long as the shortest side, and the third side is 3,4 inches shorter than the longest side. What is the sum of the three sides in inches.

Answer: 0 1 2 3 4 5 6 7 8 9

34. Five points are on the line. T is next to G. K is next to H.

Determine the relative position of the points along the line.

Answer: 0 1 2 3 4 5 6 7 8 9

35. The opposite angle of a parallelogram are_____

Answer: 0 1 2 3 4 5 6 7 8 9

36. The formula for converting temperature from degrees

Centigrade to degrees Fahrenheit is F = 9/5C + 32. A temperature of 20 degrees Centigrade is how many degrees Fahrenheit?

Answer: 0 1 2 3 4 5 6 7 8 9

PART III

Work each problem to find the answer. Mark the letter of the answer that you think is the correct one from the five possible answers given below each question.

37. A jet airliner travelling 500 miles per hour makes a trip in 2 hours. With the aid of a tailwind, the plane can make the same flight in 1 3/4 hours. If the tailwind is x miles per hour, then

(a) $500 - x = 4/7\ (1000)$

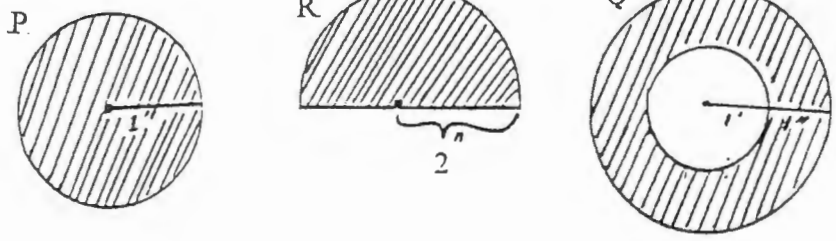
(b) $2\ (500 + x) = 1000$

(c) $1/4 = 1000$

(d) $1000 = 7/4\ (500 - x)$

(e) $1000 = 1/4\ (500 - x)$

38. Arrange the areas P, Q and R of the following shaded regions in increasing order:



(a) $P < Q < R$

(b) $Q < P < R$

(c) $P < R < Q$

(d) $R < P < Q$

(e) $Q < R < P$

39. The sum of angles of a triangle

(a) is between 90 and 180

(b) is 180

(c) is between 180 and 360(d) is 360

(e) depends on the size of the angle.

40. A certain punch is made by mixing orange juice,lemonade and soda. Three times as much as orange juice as lemonade is to be used, and half as much as soda is used. If the hostess is making 36 gallons of the punch, how much soda does she need?

(a) 6 gallons

(b) 10 gallons

(c) 12 gallons

(d) 18 gallons

(e) 22 gallons

41. Mike needs four pieces of wood 2 3/4 feet long for the legs of a table. Boards from which this wood can be cut come in 12-foot lengths. What length board will be left over?

(a) 12 - 2 3/4 (b) 12 + 2 3/4 (c) (2 3/4 x 4) - 12

(d) 12 - (2 3/4 x 4) (e) none of these

42. Five speed test are to be given to John's class. Each test has a value of 25 points. John's average for the first four test is 15. What is the highest possible average he can have on all five tests?

(a) 15 (b) 16 (c) 17 (d) 20 (e) 25

43. Five stations are along a railway. Newton is next to Stanmore. Petersham is next to Lewisham, Refern is next to Newton, Stanmore is next to Petersham. Which of the following statements is true?

(a) Newton is between Stanmore and Petersham

(b) Petersham is between Newton and Stanmore

(c) Renfern is between Stanmore and Newton

(d) Lewisham is between Renfern and Newton

(e) Stanmore is between Newton and Petersham

44. What is the weight of the contents of a large package made up of four packages weighing 3 1/2 pounds, 5 2/5 pounds, 1 pounds, and 2 1/10 pounds?

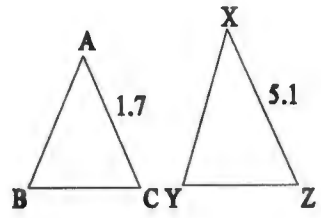
(a) 11 1/10 pounds (b) 11 2/5 pounds (c) 11 4/5 pounds

(d) 12 pounds (e) 12 1/5 pounds

45. Next year Ellen will be three times as old as she was five years ago. How old will she be next year? To answer this question, it is first necessary to solve the equation

$x + 1 = 3(x - 5)$. Find x.

(a) 8 (b) 9 (c) 11 (d) 12 (e) 15



46. The two triangles show that the left are similar.

Thus, the corresponding sides are proportional

and $\frac{AC}{BC} = \frac{XZ}{YZ}$

If AC = 1.7, BC = 2, and XZ = 5.1, find YZ

(a) 3

(b) 3.4

(c) 5.4

(d) 6

(e) 9

47. The sum of two numbers is 90. One of them is 25% more than the other. What is the smallest number?

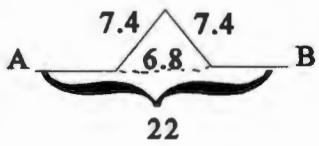
(a) 30 (b) 35 (c) 40 (d) 45 (e) none of these

48. If x = 7/6y + 42 an y = 42, what does x equal?

(a) 98 (b) 91 (c) 84 (d) 78 (e) 0

49. Suppose that an operation == on any numbers a and b is defined by a == b = a + (a x b). Then 5 == 2 equals

(a) 10 (b) 12 (c) 15 (d) 20 (e) 35



50. The roof of the building is pointed. Measurements are given in the diagram. How much stripping is needed to go along the edge of the roof from A to B?

(a) 14.8 (b) 24

(c) 30 (d) 31

(e) 36.8

APPENDIX F

RAW SCORES

NON - SCIENCE STD. 8 BOYS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP
1	5	156	60	27	13	6	20	9	21	9	18	2
2	4	68	66	16	12	14	21	12	15	12	14	3
3	1	104	151	23	19	7	21	5	13	8	21	2
4	17	18	72	25	24	22	17	15	16	23	22	4
5	5	86	89	15	11	17	13	17	12	13	14	7
6	1	65	79	9	18	9	15	8	10	10	16	4
7	7	68	60	24	14	8	25	18	16	8	20	7
8	17	117	90	13	13	7	22	16	8	5	16	6
9	10	83	87	18	17	11	19	15	13	11	17	4
10	7	96	86	25	26	13	25	13	11	13	18	5
11	2	104	113	15	13	14	24	22	25	14	25	4
12	5	96	86	28	18	7	25	5	13	13	13	1
13	7	78	101	16	21	9	24	24	11	7	18	1
14	9	77	103	19	18	6	20	10	12	7	18	8
15	6	83	85	15	14	18	18	12	23	14	12	3
16	3	102	93	10	5	11	16	8	10	15	14	7
17	7	89	67	12	13	12	15	16	11	15	14	2
18	4	80	67	30	28	22	25	10	6	13	16	3
19	4	94	72	23	12	15	16	24	10	9	13	2
20	17	50	97	26	27	8	25	9	11	8	42	3
21	2	60	57	13	10	15	22	16	18	81	13	2
22	5	79	107	28	27	19	21	18	17	31	11	6
23	9	37	44	19	18	8	23	41	12	17	21	3
24	16	97	85	9	10	51	25	23	21	9	15	3
25	5	88	88	23	19	21	25	22	14	6	21	8
26	3	100	78	24	17	6	16	18	9	7	16	5
27	5	121	105	16	18	15	16	16	14	18	14	5
28	4	127	131	30	30	5	20	20	21	5	8	3
29	3	147	145	12	13	12	24	5	7	12	12	5
30	6	86	44	24	18	13	81	17	9	5	14	3

KEY:

SOCB: Socioeconomic Background
MSE1: Math Self-Efficacy 1
MSE2: Math Self-Efficacy 2
CLMP: Confidence in Learning math(+)
CLMP: Confidence in Learning math(-)
SA: Success due to Ability
ST: Success due to ease of task
SO: Success due to help from others
FA: Failure due to Ability
FE: Failure due to Effort
SE: Success due to Effort

RAW SCORES

NON - SCIENCE STD. 8 GIRLS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP
31	5	86	67	16	23	8	25	11	16	9	19	2
32	4	82	89	27	21	21	16	22	7	16	16	2
33	6	76	110	24	14	23	21	18	20	13	17	6
34	7	87	44	23	11	13	15	17	17	12	13	4
35	3	80	89	15	14	6	20	20	11	14	12	4
36	2	68	36	21	6	14	20	11	8	11	19	1
37	2	61	70	22	11	5	24	19	12	11	21	2
38	8	88	69	19	15	5	23	5	10	4	16	3
39	5	39	57	19	17	11	22	19	12	17	7	5
40	4	40	78	16	19	25	22	22	19	14	19	2
41	4	113	111	18	20	17	19	16	14	14	14	3
42	2	11	14	10	14	5	17	6	6	5	8	2
43	2	43	47	16	19	13	16	16	13	13	18	2
44	5	105	11	18	19	12	22	15	21	15	16	4
45	6	76	48	11	22	7	15	13	9	11	9	6
46	8	90	75	12	14	13	11	13	8	9	11	6
47	12	91	86	17	12	6	17	7	20	9	19	2
48	14	76	76	9	15	8	16	17	13	10	18	6
49	5	95	112	22	12	20	24	10	13	10	15	3
50	3	88	60	23	23	8	15	13	13	12	12	4
51	6	88	111	29	27	15	25	8	13	12	22	7
52	3	75	41	19	12	16	25	18	16	9	15	4
54	10	59	27	16	17	11	5	8	9	14	10	2
55	2	74	47	18	16	7	25	18	17	6	11	3
56	8	46	36	21	10	6	20	14	14	6	20	7
57	5	116	64	16	20	7	25	7	25	5	25	4
58	4	103	119	22	23	15	22	8	8	9	15	4
59	1	72	102	6	30	10	18	14	14	6	15	8
60	4	57	90	9	26	15	18	22	18	11	16	4

RAW SCORES

NON - SCIENCE STD. 9 BOYS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP
61	6	71	100	24	22	10	15	21	6	6	14	7
62	7	138	140	24	28	5	25	22	5	6	24	6
63	3	122	93	16	11	22	25	6	5	6	5	4
64	3	104	112	18	11	12	21	14	9	5	21	4
65	4	75	84	26	20	20	21	14	15	13	12	6
66	3	82	71	21	15	14	20	14	12	14	21	3
67	6	114	141	28	25	5	25	19	16	6	18	3
68	3	62	46	7	11	15	14	15	14	12	12	6
69	3	157	144	30	25	23	25	25	8	6	21	6
70	8	128	118	25	24	15	25	20	16	7	21	4
71	7	84	67	21	21	9	20	16	13	8	14	5
72	13	132	131	17	14	13	25	10	12	11	20	2
73	8	98	107	21	21	15	19	18	10	12	16	6
74	9	75	67	19	15	14	20	12	13	14	14	4
75	6	100	119	8	27	8	12	11	12	12	11	2
76	13	147	125	22	15	5	23	6	6	15	23	6
77	3	63	56	20	14	12	19	9	9	6	9	5
78	7	68	68	20	15	11	24	8	9	14	16	2
79	4	147	130	22	16	7	21	13	5	5	9	5
80	3	120	71	17	11	10	21	11	15	15	13	4
81	4	98	120	21	26	7	23	19	7	7	14	7
82	6	70	36	19	25	16	13	15	10	15	16	2
83	13	49	38	20	14	14	19	15	11	16	17	3
84	6	93	90	11	13	8	17	19	12	7	23	4
85	3	54	87	6	14	15	16	13	12	9	11	3
86	4	92	92	24	13	7	20	10	11	7	10	2
87	3	41	92	14	13	5	21	9	7	6	11	5
88	5	101	108	24	25	5	25	6	5	5	11	4
89	3	53	91	18	24	13	13	13	13	14	19	4
90	4	67	45	15	10	7	24	21	23	5	21	4

RAW SCORES

NON - SCIENCE STD. 9 GIRLS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP
91	21	98	56	17	22	12	16	16	16	11	12	3
92	7	49	81	19	21	9	17	10	21	11	13	5
93	6	113	81	26	20	17	23	19	18	6	14	9
94	14	104	121	21	17	5	20	5	7	5	11	5
95	8	76	77	27	21	10	18	10	15	7	11	9
96	2	100	103	21	18	10	16	20	14	10	20	2
97	19	156	140	24	12	25	25	25	25	25	25	2
98	5	79	79	15	17	11	14	11	12	17	22	3
99	8	110	74	23	18	12	17	16	18	13	15	1
100	3	125	103	29	21	8	21	10	7	5	7	8
101	8	67	62	22	19	7	22	11	7	11	9	2
102	8	121	107	24	14	14	23	16	9	11	9	2
103	4	96	26	22	22	5	23	12	9	7	17	4
104	9	75	67	19	15	14	20	12	13	14	14	4
105	6	77	61	21	19	9	22	5	21	5	8	2
106	5	108	77	15	17	5	25	13	17	5	17	4
107	6	78	77	19	19	17	10	16	16	16	14	9
108	9	85	75	17	17	15	21	15	6	13	9	5
109	8	25	41	16	8	10	25	5	13	14	6	3
110	3	73	80	23	14	11	23	16	16	12	16	4
111	8	61	89	15	6	10	23	9	11	12	16	4
112	8	117	108	12	24	10	25	9	9	8	25	2
113	10	31	36	19	12	17	16	16	14	15	17	4
114	13	98	71	26	13	10	17	11	15	13	16	4
115	10	150	133	20	17	11	22	9	12	8	18	5
116	8	68	43	22	20	22	25	22	13	12	20	1
117	16	98	89	27	9	12	12	10	11	6	10	6
118	7	100	111	16	22	5	25	11	5	5	8	3
119	3	75	69	19	22	15	18	16	13	17	14	2
120	4	51	78	13	13	5	21	9	5	7	11	3

RAW SCORES

SCIENCE STD. 8 BOYS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP
121	11	122	134	6	20	17	23	15	11	11	18	3
122	18	91	81	25	22	16	17	15	16	10	18	6
123	13	118	83	24	23	22	22	15	15	10	13	3
124	10	95	79	15	18	10	23	18	11	11	23	2
125	4	104	110	25	20	7	22	12	9	7	15	2
126	7	58	76	20	20	9	17	13	12	12	16	6
127	6	76	102	17	16	18	21	15	15	17	23	2
128	10	33	66	20	18	12	24	12	13	11	18	3
129	11	87	78	24	29	15	25	9	12	8	19	5
130	7	78	56	24	19	14	18	17	11	12	13	5
131	5	59	64	27	22	8	15	14	15	22	21	6
132	5	80	154	24	29	15	22	10	5	13	15	12
133	4	25	77	26	22	17	22	9	15	12	16	3
134	5	120	141	29	19	13	14	20	18	10	19	6
135	4	133	124	22	23	8	23	9	15	5	24	6
136	3	109	142	25	19	25	25	25	21	17	21	4
137	4	147	138	25	26	6	24	13	18	5	18	7
138	2	69	78	25	28	5	25	5	5	5	21	7
139	5	124	117	23	19	14	25	13	14	13	19	5
140	9	98	106	26	21	8	22	12	12	10	17	3
141	4	69	63	20	22	8	22	10	8	5	21	6
142	7	91	101	26	28	21	23	18	12	16	16	5
143	14	95	120	27	25	16	25	19	10	13	22	3
144	9	92	76	21	26	14	21	14	11	11	16	5
145	7	125	100	28	25	14	21	10	17	7	20	3
146	1	61	81	23	25	5	25	7	5	5	17	3
147	1	162	162	30	30	17	13	15	9	11	14	9
148	5	72	119	24	28	9	17	9	9	9	17	5
149	2	97	118	26	20	7	16	15	12	5	22	7
150	7	58	105	26	20	16	20	12	12	10	16	5

RAW SCORES

SCIENCE STD. 8 GIRLS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP	
151	7	110	105	24	24	8	23	21	14	15	16	4	
152	1	30	33	16	18	6	21	15	14	6	20	7	
153	7	33	58	28	16	8	24	8	9	6	15	4	
154	10	93	72	20	16	11	21	21	18	12	21	5	
155	12	102	65	22	13	17	25	15	21	5	5	4	
156	3	76	54	20	19	19	15	14	16	8	19	5	
157	3	48	47	20	24	8	14	14	12	9	10	6	
158	9	119	109	22	23	11	24	13	12	8	20	6	
159	2	64	73	24	14	25	24	16	18	17	18	5	
160	14	123	92	26	22	9	21	11	13	9	13	2	
161	4	65	127	25	15	6	24	11	5	7	9	4	
162	6	137	153	23	33	13	20	16	15	11	21	1	
163	3	90	95	19	23	21	22	6	6	15	20	5	
164	1	75	80	20	22	5	18	17	7	6	13	4	
165	5	102	102	25	15	9	25	13	13	9	30	8	
166	16	102	129	23	28	5	25	11	9	5	17	4	
167	3	125	146	30	17	13	25	11	14	9	25	2	
168	4	63	83	20	17	15	22	12	19	15	16	7	
169	3	53	53	20	24	12	16	11	15	10	12	6	
170	4	69	94	25	30	5	19	5	8	5	9	4	
171	5	60	69	21	26	13	17	21	14	11	14	6	
172	4	137	138	26	16	16	25	11	10	14	20	4	
173	3	79	58	20	20	7	17	16	13	5	9	2	
174	9	80	96	22	14	15	25	21	13	13	18	2	
175	9	126	104	20	19	19	15	9	14	18	24	4	
176	5	88	91	25	22	6	22	10	10	5	10	2	
177	8	120	108	30	16	5	22	5	5	5	19	7	
178	5	101	93	22	23	13	15	12	17	12	16	2	
179	7	67	99	28	13	5	23	6	5	5	22	4	
180	9	91	85	26	18	9	20	10	15	6	17	3	

RAW SCORES

SCIENCE STD. 9 BOYS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP
181	4	77	94	26	26	21	13	13	17	9	9	3
182	4	96	98	22	10	9	14	12	7	10	16	5
183	6	110	123	25	24	15	19	16	15	10	15	3
184	14	115	104	20	18	12	18	9	8	11	12	3
185	3	70	50	13	16	5	25	5	21	5	25	4
186	2	44	74	27	18	23	24	22	6	16	18	6
187	7	52	99	26	25	12	20	10	11	15	17	3
188	14	90	40	11	15	16	17	14	19	11	15	4
189	5	102	102	17	17	13	19	18	14	13	11	5
190	2	86	36	16	12	13	24	9	17	13	16	6
191	6	109	108	20	17	12	20	13	12	8	19	5
192	8	112	93	19	15	12	15	13	12	16	14	3
193	5	67	49	22	14	6	21	8	7	6	18	2
194	14	55	64	23	22	8	15	11	5	6	17	6
195	7	116	87	26	23	8	20	13	12	6	17	5
196	11	109	91	19	21	13	20	15	15	14	16	9
197	3	85	78	17	17	14	23	19	10	13	14	4
198	1	47	65	25	21	11	19	15	14	10	12	6
199	5	120	40	16	13	9	21	13	15	7	10	5
200	7	81	91	14	20	5	18	10	12	5	10	6
201	8	135	65	21	13	18	25	16	11	7	21	4
202	4	73	86	14	16	10	20	14	15	13	14	5
203	11	105	97	19	20	8	23	12	11	9	11	4
204	6	77	105	25	26	16	23	11	6	10	13	13
205	4	85	121	20	16	13	25	16	15	14	21	2
206	8	106	107	24	22	19	24	8	25	9	14	5
207	8	52	98	20	10	5	20	9	11	6	21	3
208	9	76	110	23	23	18	16	18	18	14	17	3
209	8	148	107	15	16	10	20	14	20	11	21	2
210	5	84	76	19	6	7	20	23	11	9	21	4

RAW SCORES

SCIENCE STD. 9 GIRLS

NO	SOCB	MSE1	MSE2	CLMP	CLMN	SA	SE	ST	SO	FA	FE	MP
211	4	6	11	17	11	16	14	15	15	14	15	3
212	5	84	65	22	17	6	25	10	12	5	14	5
213	2	115	109	23	22	5	23	9	12	6	8	2
214	6	110	77	20	18	15	18	12	20	14	15	4
215	16	90	41	20	21	15	21	15	15	9	16	4
216	13	90	82	11	19	5	8	22	24	5	13	4
217	14	82	66	14	14	9	20	15	17	10	20	5
218	9	93	65	22	17	15	25	14	12	5	15	4
219	9	59	77	14	14	5	23	14	17	5	21	3
220	5	72	72	27	7	12	17	12	6	7	14	4
221	4	87	70	19	13	9	23	21	20	8	14	2
222	10	110	88	14	22	10	17	14	18	19	25	3
223	9	91	83	23	23	6	25	8	5	5	14	6
224	3	7	8	22	21	24	10	7	14	91	87	8
225	5	84	34	22	16	15	15	15	15	15	15	4
226	2	85	61	20	16	5	16	10	8	5	21	7
227	5	45	74	21	17	13	20	10	9	11	7	7
228	5	75	93	20	24	10	25	9	12	11	16	5
229	6	7	18	8	6	5	20	5	5	5	7	2
230	7	98	85	21	7	7	19	5	15	5	12	3
231	5	110	74	16	20	5	19	17	17	6	15	6
232	5	90	63	24	24	10	17	14	16	14	15	2
233	6	79	70	12	15	15	19	21	15	17	19	6
234	10	92	89	24	21	6	15	12	5	8	18	4
235	10	89	75	13	11	6	21	11	13	6	18	5
236	11	130	42	15	19	14	24	8	12	11	15	5
237	7	27	90	19	16	15	17	14	16	19	25	2
238	5	76	71	6	6	5	22	9	10	5	14	7
239	3	102	77	10	26	10	11	10	12	13	7	3
240	3	85	78	11	12	10	17	11	15	9	18	5